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Building Effective, Sustainable, Practical Assessment

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Conference Overview

The seventh biennial Library Assessment Conference was held in Houston, Texas, December 5–7, 2018. The conference brought together nearly 600 participants primarily from North American academic libraries. The program offered paper and poster presentations as well as invited keynotes, workshops, and practicums, covering all areas of library assessment. These proceedings, arranged by themed sessions, comprise 80 papers representing the diversity of assessment efforts, including value and impact, space, methods and tools, digital libraries, and non-traditional users. Since 2006, the conference has produced more than 450 papers that form the foundation of library assessment practice and research during this period.

The conference, the largest gathering of library assessment professionals, is sponsored by the Association of Research Libraries and the University of Washington Libraries with the goal to build and nurture a vibrant library assessment community by bringing together interested practitioners and researchers who have responsibility or interest in the broad field of library assessment. The University of Houston Libraries and Texas A&M University Libraries were local sponsors for the 2018 event.

The next Library Assessment Conference will be held October 26–28, 2020 in Rosemont, Illinois, close to Chicago O'Hare International Airport. More information is on the web at http://www.libraryassessment.org.

Our sincere appreciation goes to Angela Pappalardo and Katie Monroe of ARL for their prodigious efforts in successfully compiling these proceedings.

Best regards,

Sue Baughman, Conference Co-Chair

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Outcome Measurement in Academic Libraries: Adapting the Project Outcome Model

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I. Introduction

In 2015, the Public Library Association (PLA, a division of the American Library Association) launched Project Outcome, a free online toolkit designed to help public libraries understand and share the impact of their programs and services. It equips libraries with short, easy-to-use, patron-focused surveys designed to measure the impact of library services such as childhood literacy, computer training, and workforce development. The project focuses on measuring the outcomes of the programs that many public libraries have in common, thereby minimizing the work for each library in developing measures while also maximizing impact by giving libraries a shared language and the ability to aggregate data. It also gives libraries the resources and training support needed to apply their results and confidently advocate for their future. This session will begin with an overview of the Project Outcome model and the results of four years of activity and engagement in the public library field.

Expanding upon this successful model, PLA partnered with the Association of College & Research Libraries (ACRL, a division of the American Library Association) to develop a version of Project Outcome for academic libraries. While outcome assessment may already be common in the academic field, the Project Outcome model will offer academic libraries access to a standardized set of outcome measures and a free, easy-to-use toolkit. It includes patron-focused surveys across seven service areas, an online dashboard of interactive tools for collecting and analyzing the data, and practical guidance on using the results. This toolkit will provide academic libraries of any size the means to easily measure the learning outcomes of their programs and services and to use that data as the basis for improvements and advocacy. By collecting similar data nationally across a range of academic and research libraries, ACRL will begin to develop a national picture of the impact of academic libraries, thus better supporting its members and furthering its mission.

ACRL appointed a task force for this work in early 2018 and will launch the new tool in April 2019. The task force field-tested seven new surveys in the areas: undergraduate instruction, events/programs, research support, teaching support, digital collections, library spaces, and library technology. This paper describes the task force's work to establish standard learning outcome measures for academic libraries, initial field-testing results, and how Project Outcome can create opportunities for growth or change.

With over 1,300 libraries collecting more than 200,000 patron surveys in the system, PLA's Project Outcome has helped the public library field collectively move towards the use of standardized outcome measures. In adapting this model for academic libraries, ACRL intends to support its members and the academic library field to create momentum towards outcome measurement as common practice.

II. Background: PLA's Project Outcome

Project Outcome builds upon a 2013 initiative led by then-PLA president Carolyn Anthony (former director, Skokie Public Library), who established a Performance Measurement Task Force to develop standardized

measures of effectiveness for library services and promote training and implementation tools for using the data collected. The task force comprised a diverse group of public and state library leaders, consultants, data researchers, and analysts. After collecting outcome data from 2013 Public Library Data Service (PLDS) survey responses and conducting pilot tests in 27 libraries in late 2014, the task force identified the seven essential library service areas for Project Outcome to assess that could be easily and directly linked to improving or changing a patron's knowledge, confidence, behavior change and awareness. These key outcomes are based on the social theory that performance is more adequately measured when capturing the outcomes of knowledge, attitude, and behavior change.[1]

Figure II-1. PLA Project Outcome survey areas

CIVIC/COMMUNITY ENGAGEMENT   DIGITAL LEARNING   ECONOMIC DEVELOPMENT

EDUCATION/LIFELONG LEARNING   EARLY CHILDHOOD LITERACY   JOB SKILLS   SUMMER READING

The Project Outcome immediate surveys are six questions long and include both Likert-scale and open-ended questions. The immediate surveys are designed to be distributed immediately after completion of a program or service and they aim to help libraries better understand the impact that a program or service has on patrons and their intention to change behavior as a result. The immediate surveys are ideal for assessing the immediate impact of a program or service, informing program or service changes, and providing a "snapshot" for advocacy and reporting.

The Project Outcome follow-up surveys vary in length and follow a yes/no/please explain format. The follow-up surveys are designed to be used four to eight weeks after completion of a program or service and they aim to help libraries better understand whether patrons have changed their behavior or continued to benefit as a result of the program or service. The follow-up surveys are ideal for assessing the impact of a program or service after a period of time, informing internal planning, measuring progress toward strategic goals, and providing evidence for advocacy.

The task force also developed the outcome measurement guidelines, which are designed to help libraries conduct four key alternative outcome measurement activities and demonstrate long-term, collaborative impact on the community: writing your own outcomes; measuring with alternative methods; measuring outcomes over time; and measuring outcomes collaboratively with partners. Libraries can use the guidance, worksheets, references to other experts, articles on the topic, and case studies to develop more complex outcome measurement models. They can be used in conjunction with or separately from the surveys.

PLA launched the Project Outcome toolkit in June 2015, with financial support from the Bill & Melinda Gates Foundation, and, as of January 2019, it has collected over 200,000 patron responses from over 1,300 public libraries in the US and Canada. The standardized metrics allow for data to be stored and aggregated at the local, state, and national level and displayed on a series of interactive data dashboards.

In order to drive awareness and use of the toolkit, staff, with support from the task force, implemented an outreach campaign that included in-person conference presentations with participating libraries as co-presenters and free monthly webinars. The latter have focused on the ease of implementation and published case studies from library staff highlighting how they were able to measure and use outcome data.

Most importantly, public libraries have successfully used the data collected for a variety of activities, such as: making changes to programs; communicating the value of the library to funders, decision makers or the public; informing or measuring progress on strategic plans; and supporting or engaging partners. Several case studies published on the Project Outcome website illustrate the ways public libraries have used outcome data to make improvements to programs or services (see Appendix 1).

The graph below (Figure II-2) represents responses from 760 libraries and further illustrates that libraries participating in Project Outcome see an overall increase in outcome data use.[2]

Figure II-2. Use of outcome data among participating public libraries
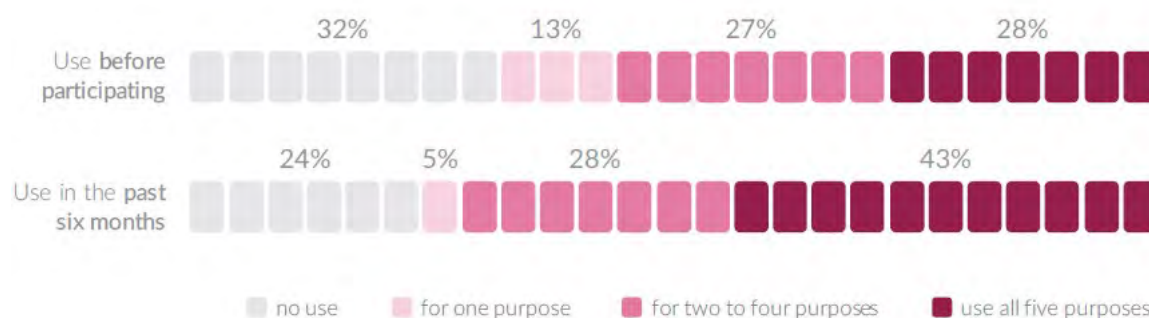
III. ACRL Project Outcome for Academic Libraries

PLA noticed a strong interest in the Project Outcome assessment tools from academic libraries. While the survey management tool and data dashboards are available only to public libraries, the resources and webinars are freely available to anyone who registers on the website. They recorded 101 users who signed up from academic libraries in the United States (N=92), Canada (N=7), and Australia (N=2). Of those that joined from the United States, a cross-section of colleges and universities was represented (see Table III-1 below).

Table III-1. Basic Carnegie Classification of academic librarians who registered on the PLA Project Outcome site, as of October 17, 2017

Basic Carnegie Classification	N	Percentage
Associate's Colleges	12	13.0%
Baccalaureate Colleges	4	4.3%
Master's Colleges & Universities	25	27.2%
Doctoral Universities	49	53.3%

Basic Carnegie Classification	N	Percentage
Tribal Colleges	2	2.2%
Total	92	100.0%

PLA alerted ACRL to the trend and planning began soon thereafter to adapt Project Outcome to the needs of academic libraries. In fall 2017, the ACRL Board of Directors approved a project plan and significant investment to build the tool to fit the needs of academic librarians, resulting in the establishment of the ACRL Project Outcome for Academic Libraries Task Force on November 15, 2017. Its charge is: "to adapt the Project Outcome measures, developed by the Public Library Association, to an academic library context. Collecting consistent outcomes data will allow academic libraries to benchmark at the national and state level and will help ACRL better support its members and mission."[3] A timeline was established, with the product roll-out scheduled for the ACRL Conference in April 2019. Like the PLA Project Outcome tool, ACRL's Project Outcome for Academic Libraries will provide tools, resources, and webinars at no cost to the academic library community.

The ACRL Project Outcome Task Force consists of eleven members and three staff members. The members were drawn from a cross-section of academic institutions. Two members are from associate's colleges, two from baccalaureate colleges, one from a master's college, and five from doctoral universities. One additional member serves as a liaison to the ACRL board, and the three staff members represent ACRL and PLA. The task force met in person in Chicago in March 2018 and has held regular virtual meetings since then as a whole and in smaller working groups.

The goal of their work is to create a series of standardized outcome measures that allow for the evaluation of impact over time. These measures must be relevant across a range of programs and types of academic libraries. Each participating library's results are aggregated into a dataset that in turn allows comparisons of impact at the national level and by Carnegie classification.

III.1 Standardized Outcome Measures
Project Outcome has defined an outcome as: "a specific benefit that results from a library program or service." Whether quantitative or qualitative, "outcomes are often expressed as changes that individuals perceive in themselves."[4]

Based on the theoretical work of Schrader and Lawless,[5] PLA developed four outcome measures: knowledge (learned something new), confidence (feel more self-assured or self-reliant), behavior change or application (will apply or use what you have learned), and awareness (increased cognizance or recognition of resources/services/spaces available). These were operationalized in the Project Outcome immediate surveys as four quantitative (Likert-scale) questions.

In addition, two open-ended qualitative questions were added: "What did the users like the most?" and "What can the library do to improve?" These provide more insight into ways to help users, as well as qualitative data that can be used to demonstrate value and impact to the associated stakeholders.

III.2 Survey Adaptation: Scope and Limits
In adapting PLA's toolkit for academic libraries, the ACRL task force needed to keep as much of the original structure as possible in order to preserve the theoretical basis of the outcomes and project model, which had been verified through field-testing done by the PLA.

This includes keeping unchanged the:

- Maximum number of survey areas (seven),
- Maximum number of standard questions in each survey (six),
- Order of survey questions, and
- Response types: Likert-scale and open-ended comments.

No additional validity or reliability testing was planned or conducted. This reflects the focus of the Project Outcome tool on generating useful actionable new knowledge (practical, local, applied) for improvement, which does not always fully align with the standards of social science research (theoretical, causal, prove/disprove ideas, perfect/ideal).[6]

ACRL purposefully chose to maximize PLA's investment by using existing technology and software, and to keep survey elements unchanged (as described above). This delimited the scope of the task force's work. In addition, the data collection design relies on self-reported data. While this does provide valuable insight into the perceptions and values of our users, George Kuh points out that its two main limitations are the respondents' ability to provide accurate information, especially in potentially awkward or embarrassing positions, and "the potential for students to provide intentionally false or non-representative information."[7]

Given these parameters, the ACRL task force developed surveys for seven library activity/service areas (see Table III-2 below). Along with the text of the immediate surveys, the task force provided some guidance on the definition and intended use of each survey. (Development of the follow-up surveys is still in progress at the time of writing.)

Table III-2. Project Outcome for Academic Libraries immediate surveys for field testing

Activity/Service Area	Definition & Suggested Uses	Survey Questions
Undergraduate Instruction	Services or programs to assist undergraduate students in their coursework and enhance their learning. Examples: one-shot instruction sessions, library orientation programs.	1. I learned something new that will help me succeed in my classes. 2. I feel more confident about completing my assignment(s). 3. I intend to apply what I just learned. 4. I am more aware of the library's resources and services. 5. What did you like most about this program/service? 6. What else could the library do to help you succeed in your classes?
Events/Programs	Services to inform, enrich, and promote community learning. Examples: exhibits, lecture series, civic engagement services, stress relief activities.	1. I learned something new from this event or program. 2. I feel more confident about the topic. 3. I intend to discuss or share with others what I just learned. 4. I am more aware of the library's resources and services.

Activity/Service Area	Definition & Suggested Uses	Survey Questions
		5. What did you like most about this program/service? 6. What could the library do to help you learn more?
Research Support	Services to improve research skills and help researchers succeed. Examples: reference services, research consultation services, workshops for graduate students or faculty.	1. I learned something new that will help with my research goals. 2. I feel more confident about my ability to complete my research. 3. I intend to apply what I learned to meet my research needs. 4. I am more aware of the resources and research support the library provides. 5. What did you like most about this program/service? 6. What could the library do to help you with your research?
Teaching Support	Services to help faculty and instructors develop curriculum and/or course materials that will better support student learning. Examples: OER services, online learning modules, faculty teaching workshops.	1. I learned something new that will be helpful in developing my course(s). 2. I feel more confident about incorporating library resources into my course(s). 3. I will apply the techniques and/or information I learned to future courses. 4. I am more aware of resources and services the library provides. 5. What did you like most about this program/service? 6. What could the library do to help you with your teaching?
Digital Collections	Online collections or resources provided by the library that support classroom instruction or research. Examples: digital exhibits, image databases, online archival collections.	1. I feel more knowledgeable about the topic supported by the digital resource (collection) I used. 2. I feel more confident about my understanding of the topic supported by the digital resource (collection) I used. 3. I intend to apply what I just learned from the digital resource (collection) I used. 4. I am more aware of digital resources (collections) the library provides.

Activity/Service Area	Definition & Suggested Uses	Survey Questions
		5. What did you like most about this program/service? 6. What could the library do to help you better use digital resources?
Library Spaces	Specific spaces that are intended to be used to enhance academic performance and support student learning. Examples: group study rooms, individual study spaces, testing labs, writing centers, tutoring centers.	1. This space contributed to my ability to learn something new. 2. Using this space makes me feel more confident about my ability to achieve my goals. 3. I am likely to use this space again in the future. 4. After using this space, I am more aware of the library resources and services available to me. 5. What did you like most about this library space? 6. What could the library do to improve this space?
Library Technology	Services to access technology, build technology-related skills and confidence, and help students incorporate technology into their coursework. Examples: technology loan programs, maker spaces, technology related user "how to" workshops.	1. I gained experience that contributed to my knowledge of educational technologies. 2. I feel more confident about integrating technology into my assignments or projects. 3. I intend to continue to use these and other technologies for future assignments or projects. 4. I am more aware of technology resources and services the library provides. 5. What did you like most about this program/service? 6. What could the library do to help you better use technology?

IV. Field-Testing Results

Following approval of the provisional survey text (Table III-2) by the task force and the ACRL Board of Directors, a call for volunteers to field-test the new surveys was announced on June 26, 2018. The field-testing and data collection process ran through October 31st. In that time, 108 individuals from 100 institutions signed up to field-test the surveys. When the process completed, 54 colleges and universities had actively participated in data collection, submitting a total of 11,449 responses.

Figure IV-1 below shows all volunteer institutions mapped by location, number of responses, and Carnegie classification. Overall, the responses were well-distributed between types of institutions, with community colleges contributing 27% of the total responses, baccalaureate institutions contributing 27%, master's granting institutions contributing 21%, doctorate-granting institutions contributing 24%, and special focus institutions contributed the remaining 1% of the total responses.

Figure IV-1. Volunteer institutions and responses
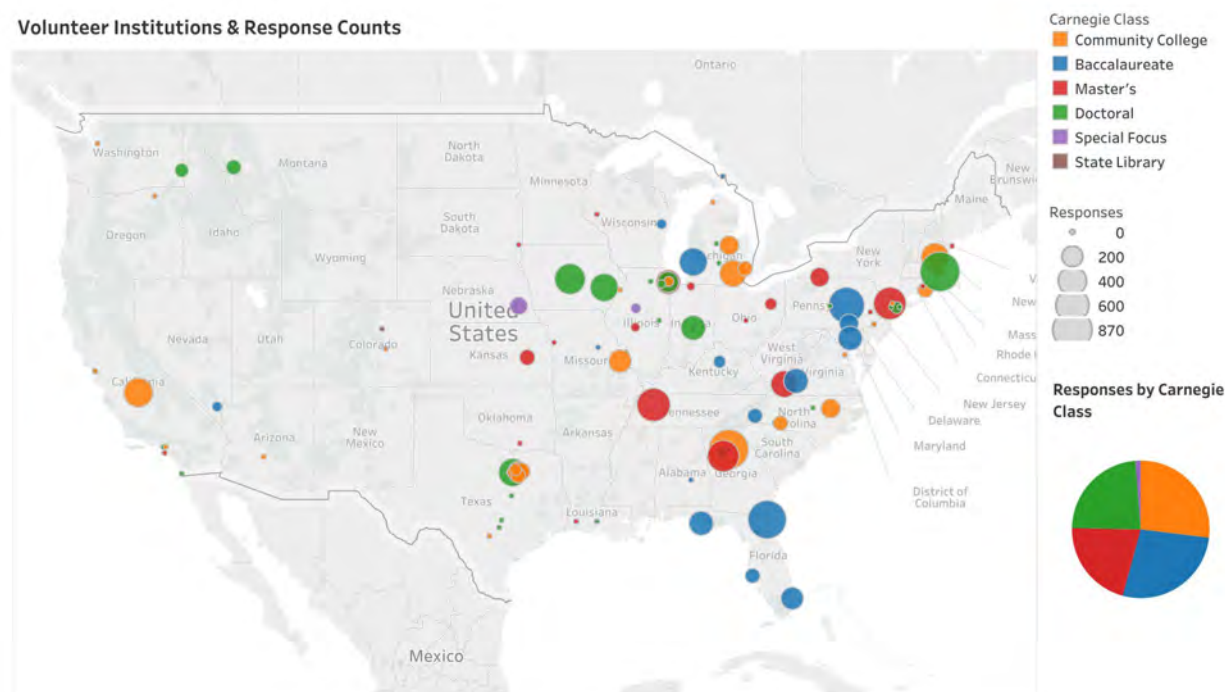
Table IV-1. Response count for each survey and number of institutions submitting responses

Survey	Number of valid responses	Number of institutions
Survey 1: Undergraduate Instruction	9148	40
Survey 2: Events/Programs	307	14
Survey 3: Research Support	204	11
Survey 4: Teaching Support	52	7
Survey 5: Digital Collections	5	1
Survey 6: Library Spaces	1303	15
Survey 7: Library Technology	430	5

For this preliminary study, we analyze in detail only the results from the two surveys with the highest response rates. (See Appendix 2 for links to interactive data visualizations with aggregate results of all the surveys.)

The undergraduate instruction survey proved by far the most popular. The breakdown of institutions using this survey by Carnegie classification closely mirrors that of the active participants as a whole. Feedback from survey administrators showed they used it to assess a variety of instruction types including: instruction sessions in specific classes (in anthropology, art, biology, communication, education, English, ESL, foreign languages, health sciences, music, nursing, political science, psychology, religious studies, and social work); adult education sessions; orientation programs; research-related instruction sessions; citation and reference instruction; and general life skills sessions.

Table IV-2. Outcomes: Undergraduate Instruction

Question	Average score*	N=	Responses on scale/ not blank
Knowledge: I learned something new that will help me succeed in my classes.	4.42	9112	99.6%
Confidence: I feel more confident about completing my assignment(s).	4.24	8743**	95.5%
Application: I intend to apply what I just learned.	4.44	9096	99.4%
Awareness: I am more aware of the library's resources and services.	4.46	9093	99.4%
What did you like most about this program/service?		8569	93.6%
What else could the library do to help you succeed in your classes?		6977	76.2%
* Averages exclude responses given as N/A ** The lower number for this question is due to the fact that one survey administrator (using Qualtrics) did not include this question. Those responses have been assumed as N/A.			

The open-ended questions, though not requiring a response, nonetheless had very high response rates. Asked what they liked most about the program/service, respondents most frequently used the words: resources, use, library, learning, research, information, liked, and help. Asked what else the library could do to help them, respondents most frequently used the words: more, nothing, help, library, resources, research, books, and study. Overall, this suggests that users feel positively about the instruction sessions libraries provide, and what they would like most is *more* programs and services. This aligns with PLA's findings from public libraries, which suggest that patrons most commonly ask for more: more hours, more programs, and more specific classes.[8]

The second most popular survey was on library spaces. In designing this survey, the task force grappled with whether or how it was possible to use learning outcomes to assess spaces. Rather than asking whether library users like the space, outcomes need to address how the space affects their learning. Field-testers used the survey to assess study spaces, recent renovations, and the reactions of incoming students to library spaces.

Table IV-3. Library Spaces: Outcomes

Question	Average score*	N=	Responses on scale / not blank
Knowledge: This space contributed to my ability to learn something new.	4.32	1272	97.6%
Confidence: Using this space makes me feel more confident about my ability to achieve my goals.	4.27	1291	99.1%
Application: I am likely to use this space again in the future.	4.61	1292	99.2%
Awareness: After using this space, I am more aware of the library resources and services available to me.	4.08	1280	98.2%
What did you like most about this library space?		1102	84.6%
What could the library do to improve this space?		989	75.9%
* Averages exclude responses given as N/A			

Among the most frequently used words in responses to the question "What did you like most about this library space?" were: quiet, study, space, work, group, open, room, great, and comfortable. The most frequently used words in response to the question about improvement were: more, nothing, rooms, study, chairs, quiet, tables, better, and outlets. The "more" and "better" they wanted included chairs, outlets, food/coffee, quiet spaces, and larger spaces.

As is apparent from Table IV-1 above, not all the surveys experienced such high levels of engagement. In some cases, such as the teaching support survey, this may stem from the fact that fewer programs or services are offered in that area and they engage fewer users (faculty and graduate students are, relatively speaking, a numerically smaller user base than undergraduates). In other cases, such as the digital collections survey, it may be that the topic area is not as widely relevant. For the final toolkit, the task force has changed that survey from digital collections to "digital and special collections" to give it broader applicability.

We also asked those who volunteered but chose not to administer surveys to also provide feedback on why. Responses, sent via email and an anonymous survey, suggested several reasons. Those included: survey fatigue among library users (making librarians reluctant to administer more surveys); time commitments that cropped up between when they volunteered and when they were going to administer the surveys; the administration did not approve the use of the surveys; they needed more time to figure out how to integrate surveys in their workflow; or they decided that the survey instruments did not match their specific needs.

All field-testing volunteers who did collect results were asked to fill out a feedback form about the process for each unique program or service that they surveyed. That form had 274 responses as of November 6, 2018. 77.3% of respondents said they had no known problems administering the surveys. Those who did experience problems reported that they ran out of time or faced unwilling respondents. Asked, in an open-ended question, how they would use this type of data, the words assess/assessment appear in 20.2% of completed responses, improve/improvement appears in 23.2% of responses, feedback appears in 12.6% of responses, and report/reporting appears in 5.1% of responses. In terms of reactions to the survey questions themselves, feedback was mixed, with some volunteers suggesting the questions fit their needs, while others said there were too few or too many questions, or that they were too general.

Overall, the field-testing results support three key findings:

1. As is common with Likert-scale surveys, a ceiling effect was expected and observed for the quantitative outcome questions, with average results converging close to 4 ("agree").

2. Interest or need for assessment does not always translate into practice. Both survey fatigue and lack of time (users' or librarians') can make librarians reluctant to administer surveys, even if the results may be useful.

3. Feedback from survey administrators suggests that while overall a six-question, one-page survey may be less rigorous than some research-oriented survey tools, even asking users to complete this short survey is a time burden. Therefore, keeping the surveys short and simple is an advantage and will enable wider use of this toolkit.

The task force weighed all the field-testing results and feedback in deciding on the final survey text on December 10, 2018. The seven surveys in the final toolkit are: Instruction, Events/Programs, Research, Teaching Support, Digital & Special Collections, Space, and Library Technology. Project Outcome for Academic Libraries will launch in April 2019.

V. Conclusion: Activating Project Outcome for Library Assessment and Advocacy

Beyond the operational goals of the Project Outcome for Academic Libraries Task Force, the broader purposes are threefold:

First, to help academic libraries of all types measure learning outcomes to capture one expression of their value. This aim is facilitated by the creation of simple, easy to use surveys. Along with the toolkit, ACRL will also develop resources that facilitate greater understanding of outcome measurement and its application.

Second, a goal is to make outcome measurement a common practice among the academic library field. In a higher education landscape increasingly dominated by demands to prove return on investment in order to obtain funding, outcome data can help libraries communicate the value of the programs and services they offer. Libraries can use the results from Project Outcome for advocacy on the local level and to secure additional resources, as PLA has shown.[9] The ability to benchmark results nationally and at the level of institution type will help academic libraries understand how they are doing relative to their peers and provide an incentive to do better. From ACRL's perspective, the aggregate data can also bolster advocacy efforts that benefit academic libraries overall.

Finally, and perhaps most significantly, libraries can activate their results for improvement. When they do so, it increases the value of engaging in outcome measurement, shifting it from an assessment practice they have to do, to something they want to do because it can result in meaningful positive change.

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Endnotes

1. Schrader and Lawless, "The Knowledge, Attitudes, & Behaviors Approach," 8–15.
2. Project Outcome, "Final Evaluation Findings," 2.
3. ACRL, "ACRL Project Outcome for Academic Libraries Task Force: Charge."
4. Project Outcome, "Final Evaluation Findings," 1.
5. Schrader and Lawless, "The Knowledge, Attitudes, & Behaviors Approach."
6. Upcraft and Schuh, "Assessment vs. research," 16–20; ACRL, *Value of Academic Libraries*, 30–32.
7. Schrader and Lawless, "The Knowledge, Attitudes, & Behaviors Approach," 9; Kuh, "The National Survey of Student Engagement, 3.
8. Project Outcome, "Year in Review: Annual Report," 12.
9. Project Outcome, "Final Evaluation Findings," 3.

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Appendix 1: PLA Case Studies
Using Project Outcome with Summer Library Program to Track Impact across Time and Strengthen Championship

Appleton Public Library; Appleton, WI: Appleton Public Library (APL) offers a range of activities for children, teens, and adults as part of their Summer Library Program. In an online component of the program, patrons can earn rewards by completing missions, such as visiting a local nature preserve or the police department. These missions help patrons build connections with community resources and other community members through informal interactions. Project Outcome surveys conducted in 2016 showed that patrons benefited from the program, but found some of the missions confusing and hard to follow. APL has since improved the descriptions and layout of the missions, and will review survey results to assess whether these changes resulted in more patrons taking part in missions.

APL reports on the impacts of library programs and services to its board based on the results of Project Outcome surveys and Impact Surveys. Library leaders have found that outcomes resonate with board members, strengthening how they voice their support for the library. One leader shared, "I think [reporting on outcomes] really transformed conversations with our Board, so that they're much more interested... It lets us tell a more complete story about the library, and what we're offering... so they can understand it more fully... When you talk strictly in numbers, or outputs, it's not something that people can hold on to as clearly. And so when you start talking about outcomes and the impact that a library is having, that's where the true heart of what we're doing is. And our Board feels that, as well... It allows them to... have something more concrete to hold on to, and to talk to people about what the library does in a more complete way than 'X number of people walk in the door every year' or 'X number of books walk out.'" A board member shared, "The [outcome] data provides an objective story, backing up much more engaging stories from staff about serving the community with objective numbers... [and] includes things the Board may not think to ask for. This adds dimensions to how the Board considers the library's success in serving the community."

Using Project Outcome with Summer Reading and Digital Literacy Programs to Support Partnership Development and Expand Services at a Small Library

Burnsville Public Library; Burnsville, WV: Project Outcome surveys showed that caregivers of young participants in Burnsville Public Library's (BPL) Summer Reading Program wanted tutoring and extra help for their children. Equipped with this information and evidence of program impact, BPL worked with the local school district to have two teachers offer tutoring at the library the following summer for three days each week. A library staff person whose two children participated in the program shared, "[The children] work on reading, math, they get on the computer... It's really benefiting them. And some of the kids are here because they need the extra help, and some of them are here just to try to beat the summer slide. It's working very well."

BPL also started a new after-school program because surveys showed an appetite for additional programming for children. Children shared that they wanted to learn more about science and technology, so one of the after-school classes will include hands-on Science, Technology, Engineering, Arts, and Mathematics (STEAM) activities.

Using Project Outcome with Story Time and Teen Programs to Improve Programming and Better Meet Community Needs

Plano Public Library; Plano, TX: After a month of participating in a library story time program (including Babes in Arms, Toddler Time, Rhyme Time, and Preschool), PPL administered Project Outcome's Early Childhood Literacy survey to gather basic feedback from caregivers and learn if they were experiencing the intended gains in support of children's basic literacy skills. In addition to providing evidence of positive outcomes, some caregivers reported their children had challenges being in such large groups due to sensory issues. As a result, the library decided to offer "sensory story times" at two of their branches with a smaller group size of 10 caregivers and children. A library leader explained, "We have gotten some incredible

feedback from our parents about how we are helping their children by adding this program, and how their children are better able to interact with other children."

PPL also learned from the surveys that caregivers enjoy programming that includes books in different languages. In response, PPL added a new series called Storytime Around the World, in which library staff read books in Arabic, Chinese, French, and Spanish in three-week cycles. The added programming has attracted new families as well as prior story time participants, and staff observed that families often stay to use other library resources. Excitement about the new series has activated patrons to spread the word. A participant in a Chinese story time shared the event information on a Chinese community Facebook page, which brought in many new people who had not previously known about the library's Chinese language materials. Consistent with these observations, PPL saw an uptick in circulation of materials in the languages featured in the new series. A staff member explained, "Whether or not… they're new library users, we've definitely seen them connecting with the library and library resources in a way that they haven't before. I think at the Maribelle M. Davis Library where they had the Story Time Around the World series, the circulation of [the books in the Junior World Language collection] doubled within about a year."

Appendix 2: Data Visualizations

Interactive visualization summarizing the field-testing results:
https://public.tableau.com/views/ACRLProjectOutcomeField-Testing/Story?:embed=y&:display_count=yes&publish=yes

Interactive visualization of the field-testing results for the individual surveys, with a breakdown by Carnegie Class for benchmarking: https://public.tableau.com/views/Field-TestingBenchmarks/Benchmarks?:embed=y&:display_count=yes

Aligning Textbook Affordability Efforts with State Performance Funding Metrics

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Introduction and Context

It is likely that many, if not most, student-facing librarians have been asked whether the library carries their course textbook. Certainly, that has been the case at the University of Central Florida Libraries reference and circulation desks, where statistics indicate that over 10% of all reference questions the first two months of the semester are directly related to acquiring course materials.[1] While it is conceivable that some students have the textbook and simply did not bring it with them to the library, it is also very possible that they do not have access to the readings because they have delayed or decided not to purchase the textbook. As reported by economist Barry Ritholz, textbook costs have almost doubled over the past twenty years, even controlling for a 55% inflation rate.[2] Some commercial publishers have effectively priced textbooks out of the market for many students.

In 2016, the Florida Virtual Campus (FLVC) administered a statewide survey to Florida higher education students to examine how the cost of textbooks impacted their education, purchasing behaviors, and academic success. More than 22,000 students responded to the invitation to take the survey, and the FLVC ultimately reported that "the high cost of textbooks is forcing many Florida higher education students to make decisions that compromise their academic success."[3] Disaggregated survey responses specific to the home institution, the University of Central Florida (UCF), were obtained and analyzed. Of the 1,975 UCF students who responded to the FLVC survey, 53% indicated that they "frequently" or "occasionally" had not purchased a textbook due to cost, and 19% attributed obtaining a poor course grade to not having the textbook.

Research suggests that students' lack of access to course materials from day one may place them at an academic disadvantage.[4] This, in turn, has sparked a response from legislators, higher education associations, administrators, and, on the frontlines, course instructors and campus academic support units.

Federal legislation, specifically the 2008 *Higher Education Opportunity Act*, contains a section that requires institutions to communicate the price of course materials to students at the time of registration for the purpose of ensuring "that students have access to affordable course materials by decreasing costs to students and enhancing transparency and disclosure with respect to the selection, purchase, sale, and use of course materials."[5] In 2015, the *Affordable College Textbook Act* (S.2176) acknowledged that the high cost of college textbooks was a barrier for many students in achieving a higher education and specifically called for expansion in the use of open textbooks to achieve savings for students.[6] Just this year Congress funded a $5 million grant to create open textbooks with the promise to continue funding next year.[7]

Complementing federal activity, over half of all US states have legislation that contains provisions for activity to reduce the cost of course materials for students.[8] Within Florida, Statute 1004.085, *Textbook and Instructional Materials Affordability*,[9] explicitly authorizes institutional boards of trustees to adopt policies for the use of innovative pricing techniques and payment options for textbooks and instructional materials. Also, for the express purpose of allowing students time to shop for affordable options, each Florida system college and university must post a list of all required and recommended course materials at least 45 days prior to the first day of class for each term. A final requirement of the legislation includes an annual report submitted by boards of trustees to the respective chancellors of the college and university systems, highlighting cost variances, institutional initiatives designed to reduce the cost of textbooks, and courses that

did not meet the 45-day posting deadline. These reports are then presented by the chancellors to the State Board of Education and the Board of Governors.

Accompanying Florida textbook affordability legislation is performance funding for state system universities. With the national trend moving away from funding institutions based solely on FTE student enrollments to aligning funding models with state goals and priorities, many of these incentives are based on performance indicators such as completion rates, time to degree, and number of degrees awarded in high-need areas, among others. In 2015, 32 states had been identified that had transitioned to performance funding with an additional five states in transition.[10] It is likely the level of integration is higher now. Both Florida college and university systems have performance metrics, with university funding allocations based on performance on ten metrics.[11]

Of the ten metrics for Florida system universities, those most pertinent to textbook affordability efforts are Metric 3: Net tuition and fees per 120 credit hours, Metric 4: Four year graduation rate for full time FTIC, and Metric 5: Academic progress rate of second year retention with GPA above 2.0.[12] Although not an outcome of adopting affordable textbooks, Metric 7: University access rate, or percent of undergraduates with a Pell Grant, is supported by access to no/low-cost course materials. A sub-metric of Metric 3, which addresses the cost of a college education, is access to affordable course materials. In 2014, UCF scored well on this metric compared to other FL system institutions, with the cost of attaining a college degree at a reported $21,060.[13] By 2016, this cost had increased to $24,190.[14] Although still relatively low in comparison to other state system universities, the needle is moving up, which may result in a less favorable rating and a drop in the funding allocation, and this funding comprises a significant portion of the university operating budget.

The Florida performance funding model requires that state system universities contribute a portion of their institutional budget to be allocated based on performance. If the institution scores 51 or higher on the scale, their full institutional funding is restored. For fiscal year 2017–2018, the University of Central Florida scored 78 points[15] and received their original investment of $40,062,707 back, plus an additional $35,692,230 in state investment funding, for a total allocation of $75,754,937.[16] With millions of dollars in funding on the line, performance metrics in the state have serious implications for institutions. Consequently, administrators are exploring every option to maximize performance on the metrics, and student access to affordable course materials is of increasing interest across campus.

Performance funding metrics, along with metrics associated with the institution's bid for preeminence,[17] both support and complement UCF's Collective Impact Strategic Plan (CISP).[18] Each of the three drivers has metrics that are unique to each plan, as well as metrics that are shared across plans. Unique performance funding metrics range from number of students receiving Pell Grants (as an indicator of access), to median wages of students receiving a bachelor's degree, and on to the number of degrees awarded in identified areas of emphasis.[19] Unique preeminence metrics include the number of National Academy members, institutional and research ranking at the national level, and entering student profiles (SAT and GPA).[20] Unique CISP metrics seek to increase the number of faculty, graduate students, post-docs, patents, research funding, and diversity.[21] The metrics that are shared across all three plans are most focused on student success and include first year retention rates, time to graduation, overall number of degrees awarded, and the cost to obtain a degree. Textbook affordability serenely resides at the intersection of the overlapping metrics of all three plans (see Figure 1) by directly reducing the cost to obtain a college degree and being positively correlated to higher student academic performance, including higher GPA, increased retention rates, and quicker time to graduation.[22] Access to affordable textbooks also supports Pell Grant recipients and others with financial need.

Fig 1. Relation of textbook affordability metrics to institutional goals
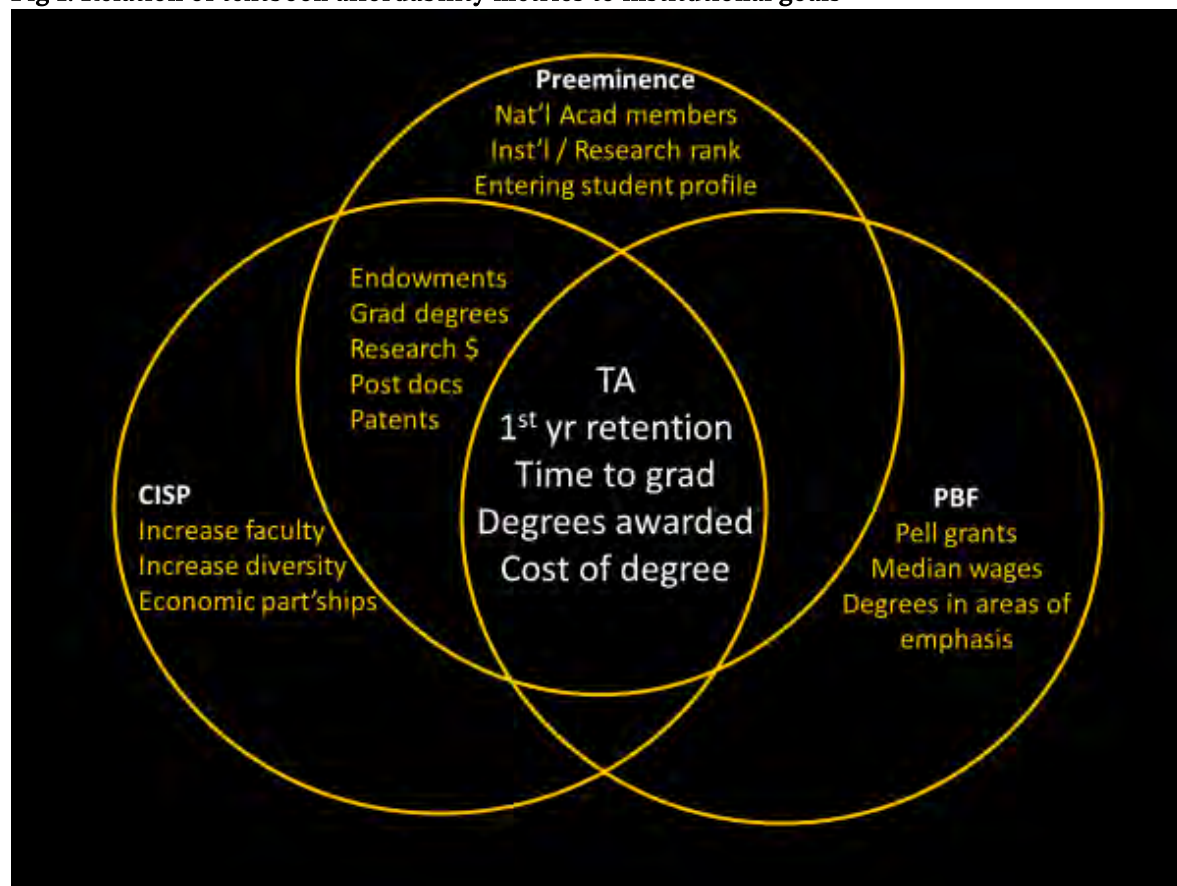
Textbook Affordability Model at UCF

This environment served as an impetus for librarians and instructional designers to form a small working group to promote and facilitate adoption of affordable textbooks. Beginning in summer 2016, and in collaboration with other campus partners, this grassroots effort has promoted affordable course materials and pursued three models to help faculty transition from commercially produced textbooks to no/low-cost alternatives. These models consist of adopting an existing open educational resource (OER); creating an OER using copyright compliant, openly accessible materials; and using library e-books as one-to-one replacements of the current textbook. Just this fall, a print textbook reserve collection was implemented, which adds a fourth model.

Faculty adoption of existing OER has been most successful at the GEP level, and OpenStax texts (http://openstax.org) are by far the most adopted. Our work with the faculty development center has been especially fruitful in reaching GEP-level instructors. The faculty development center offers programs which provide opportunities to offer textbook affordability sessions directly to faculty. These programs include week-long faculty development institutes and "Teaching and Learning Days," which are dedicated to a particular theme and only require a few hours of commitment. Another is a recent, large-scale initiative to "refresh" the GEP, which seeks to re-envision GEP courses into thematic strands, increase active learning, provide transparent assignments and consistent student learning outcomes across the GEP, and most importantly for textbook affordability, offer an opportunity to revisit course materials. Our work with the faculty center has led to several successful faculty adoptions of no/low-cost course materials in addition to invitations to present at faculty department meetings. The department meeting presentations, likewise, have resulted in opportunities to work directly with the teaching faculty.

A second model, creating an OER using copyright compliant, openly accessible materials, has been the most labor-intensive and yet remains one of the most rewarding efforts to date. UCF Libraries employs a subject librarian model, whereby librarians are assigned to work with faculty and students in specific academic programs. Supporting this model are various professional positions that have functional roles. In this particular instance, a subject librarian in English recruited a faculty member teaching medieval literature to embark on a project to "break apart" his commercially produced anthology of medieval literature and pull together an openly accessible list of readings. Over the course of a semester this was accomplished with input from the instructor, who determined quality of readings and translations; the subject librarian, who looked for potential readings; the scholarly communication librarian and adjunct, who confirmed copyright or requested permission to use readings not in the public domain; and an instructional designer, who took low-quality PDF scans and reformatted them into line-numbered text. With 68,000 students and 2,000 faculty—and limited library staff and resources—it quickly became apparent that this type of project was not scalable at our institution.

The third model, using library e-books as one-to-one replacements of the current textbook, tends to support upper level and graduate courses. To date we have approached this model two ways; the first is running the university textbook list against library holdings and the second is through subject librarian promotion. Running the booklist first required obtaining it from the university bookstore, which involved submitting a request through the ***Higher Education Opportunity Act*** (HEOA). Once the booklist was received, the acquisitions librarian and an instructional designer devised a way to run it against library holdings. E-book candidates were further checked by ISBN, URL, user limits, and DRM.

The e-book candidates that made it to this round were matched against course data, including number of enrollments, course number, and instructor. We were initially excited to see that a potential savings of $800,000 (calculation based on the new price of the textbook by number of student enrollments) could be realized if all faculty adopted all identified library-sourced e-books. Individual emails were sent to the instructors of the courses and their department chairs, with notes stating that the text was a one-to-one replacement, and included potential savings by course, the URL, sample text to put in the syllabus, and instructions on how to create a note in the faculty-facing textbook adoption platform.

Unfortunately, we failed to recognize that many textbooks now require an online access code and faculty were quick to point out that the online platforms were necessary to their teaching; this access was used by students to submit homework, take quizzes and tests, and in some instances, communicate with the instructor. One text that supported a differential equations course alone accounted for half of the projected possible savings but required a key code for online access. Ultimately, we tracked e-book adoptions that resulted in $37,000 in student savings, generated goodwill with the faculty, and learned a valuable lesson.

Since that experience, we have been more successful in leveraging library collections to support textbook affordability through the efforts of subject librarians, who work one-on-one with their faculty. Several have sent suggested e-books to faculty, while others have taken all assigned textbooks in their programs and identified e-books for purchase that could be added to the collection. The process can be fairly time-consuming on the front end, but only requires faculty to update their syllabi, which has translated to a high adoption rate. In the rare instances where faculty are reluctant to add the e-book to their syllabus or make a note in the faculty textbook adoption platform for students to come to class before purchasing materials, we have worked with an instructional designer colleague to send emails directly to students enrolled in these courses, alerting them to the library-sourced e-book option.

A final library initiative, implemented this fall, is the print textbook reserve collection. While faculty have always had the option to place their course materials on reserve (within allowances offered by Fair Use), the library consciously decided to purchase selected course textbooks for the 25 highest drop, fail, withdrawal (DFW) rate GEP courses, concentrating on those with the most expensive textbooks and the highest number of student enrollments. This collection supports over 13,000 students enrolled in 432 course sections, with

initial funding of $10,000 provided by the library. It is interesting to note that while the average cost of a new textbook at UCF is $79, with a range of $0 to $766, the average cost of a textbook in the 25 high DFW courses is $178, with a range from $12 to $340. It may also be of interest to note that we were able to purchase a total of 57 textbooks with the initial $10,000 in funding support. Since implementation, the collection has enjoyed approximately 2,000 circulations. Certainly, if the number of circulations is any indication, the collection has been well received by students since its launch.

Results

Information related to affordable adoptions has been tracked since 2016, with faculty name and college, course information, year and semester of adoption, type of adoption, cost of the traditional text, and savings calculated as new cost of the old textbook by number of student enrollments collected. From spring 2016 through fall 2018, 122 unique faculty teaching 274 sections have reached 12,314 students, potentially saving them $1,050,172 in textbook costs. Again, potential savings are calculated as the cost of a new course text by number of student enrollments. At every milestone the author has sent emails to campus stakeholders, including the vice president the library reports to, alerting them to our progress.

Some faculty have adopted open resources without facilitation by librarians or instructional designers, and much of the support provided to faculty who do require it is by instructional designers. These colleagues routinely rearrange open textbook chapters, embed in the learning management system, or help guide the creation of ancillary materials. Certainly, the textbook affordability initiative would not be as successful as it is without being able to rely on each other's respective strengths. But adoption of library-sourced e-books as one-to-one replacements of the existing course text and support of the 25 high DFW, high enrollment GEP courses through a print textbook reserve collection are contributions unique to the library. While we report total savings and celebrate decreasing the cost of course materials as a group, it is equally important to communicate the library's contribution, especially during times of scarce funding.

To that end, the library is quick to acknowledge the work of the instructional designers and other campus partners, while also describing our unique contributions to the initiative. In addition to overall savings, this entails reporting by type of adoption, and growth over time by type of adoption (see Figures 2 and 3). Overall, using library-sourced e-books has resulted in almost half of all savings tracked to date. Yet, a deeper look at savings by type of adoption over time reveals that the use of library e-books is gaining traction, outpacing use of open textbooks almost four to one in the fall 2018 semester.

Figure 2. Savings by type of adoption: existing OER, library-sourced, or created OER
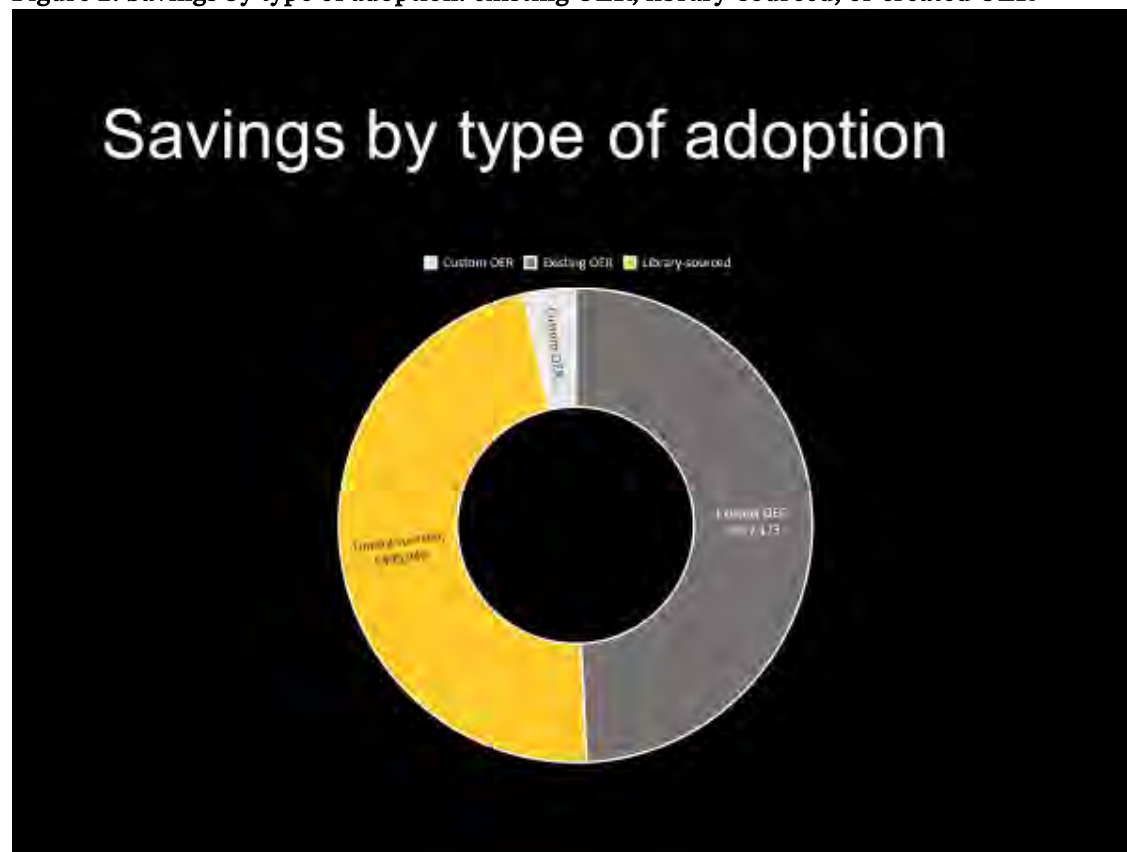
Figure 3. Savings by semester and type of adoption
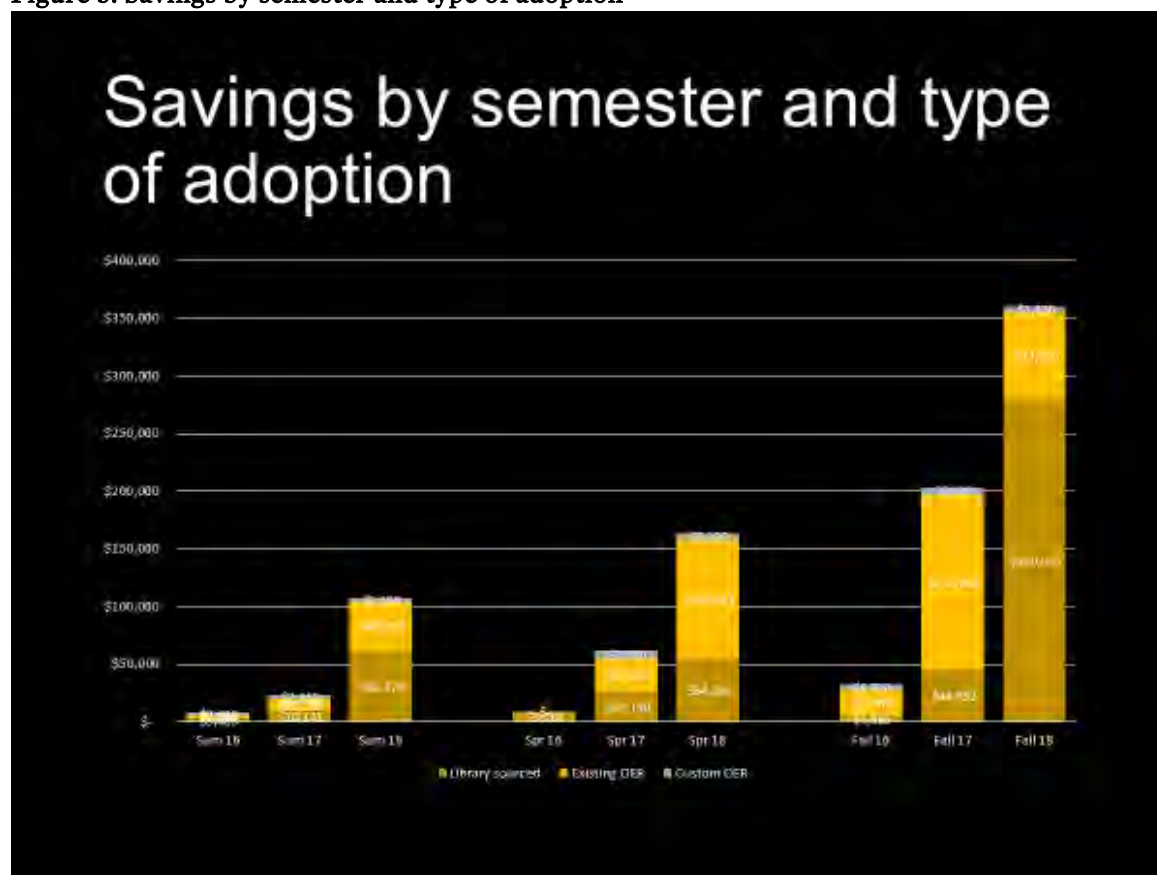
Dissemination

A significant amount of effort has been devoted to disseminating results of this initiative to institutional stakeholders, with audiences consisting of campus partners (such as the faculty development center, transfer student services, and advisors and other student academic support groups), faculty, student groups, and administrators. Outlets range from email blasts and digital signs to articles in institutional newsletters, on to direct presentations, meetings, and formal reports to university administrators. In every case, the message is customized based on audience interests and potential for support, collaboration, or other involvement.

Our message to campus partners is to let them know how textbook costs impact student academic outcomes, how we can collaborate, and to recruit support in the form of goodwill and partnerships. For example, communication with the faculty development center, which also works to support institutional goals, centers on student success metrics and opportunities to work directly with faculty who are revising courses or interested in improving their teaching or student learning outcomes. Similarly, we alerted academic advisors that the library was launching the print textbook reserve collection and invited them to the kickoff, which included refreshments and handouts. Shortly after, we presented to all GEP advisors on the topic, focusing on the cost of textbooks in the high DFW, high enrollment GEP courses and how to work with students to reduce their textbook costs. They were quite surprised to find that if a student enrolled in selected sections of microeconomics, chemistry, biology, and philosophy—all GEP courses—their textbooks would run right at $1,000. With the cost of tuition and fees to attend UCF full time for two semesters at approximately $6,000 and one semester costing approximately $3,000,[23] books for this course load can add an additional 33% to tuition and fees.

With faculty, we hope to communicate the impact of high cost textbooks on student behaviors of delaying or not purchasing the text, how they can reduce the cost of course materials, and to recruit support in the form of no/low cost adoptions and testimonials. Presentations have been most effective, some offered at the faculty development center's workshops and institutes, as well as at faculty department meetings. Recent presentations to the Faculty Senate Steering and full Faculty Senate meetings resulted in the topic of textbook affordability being assigned to committee, with the endorsement of the Senate that institutional resources be allocated to provide necessary faculty training.

Needless to say, student groups have been exceptionally receptive, and our communication with them is to let them know that the library is a partner and is taking concrete measures to support their success, and to recruit support in the form of book drives and funding. As mentioned earlier, some students receive email blasts that alert them the library has their text as an e-book or see web banners about the print textbook reserve collection, but we have also presented to library student advisory boards and to the Student Government Association (SGA). The SGA presentation resulted in additional funding to expand the print textbook reserve collection. As such, the SGA is a partner, and their role will be acknowledged in any campus presentations, newsletter articles, and on digital signs.

And of course, information is sent to university administrators, with the goals of communicating the importance of textbook affordability in supporting student success, demonstrating how the library contributes to that effort, and recruiting support in the form of communication and additional resources. Initially, savings and activities were reported to pertinent vice provosts and vice presidents, as well as heads of various academic success units. It wasn't until a vice provost forwarded our email to the institutional effectiveness unit that we were invited to report savings for performance-based funding. Now, several meetings later, we have refined the process to collect additional needed data points and report metrics in support of the "cost of books and supplies." As mentioned earlier, the majority of states have moved to a performance-based funding model for higher education. If demonstrating the value of the library is of importance, library administrators would do well to scan the metrics and position their libraries to collect and report metrics most relevant to them.

Further, we have found that administrators respond quickly and positively when we directly connect the dots between the textbook affordability initiative and achieving institutional goals and metrics. Another best practice is to use locally collected data whenever possible. As noted before, large-scale research suggests that students who have access to no/low-cost course materials enjoy better academic outcomes and students in Florida who answered the FLVC survey say that textbook costs have impacted their academic behaviors. But it is much more meaningful to administrators to describe outcomes and behaviors of the students at the home institution.

In addition to obtaining institution-specific responses to the statewide survey, we have administered student surveys (led by our instructional designer colleagues) and conducted student focus groups. Institutional survey data and focus group comments corroborate national and state research reports, and also make the story more compelling. Of course, reporting results of larger scale studies is a valid strategy, but when the president hears that 83% of our students frequently or occasionally delay purchasing textbooks due to cost, it sends a more personal message that says, "These are **our** students, and **our** students are struggling to pay for course materials."

Outcomes

As noted in the previous section, campus partners were consciously recruited through dissemination of the textbook affordability project, with responses ranging from increased communication and interest from student advisors, to increased collaboration and awareness with faculty and students, on to access to faculty at workshops and through GEP refresh from the faculty development center. Metrics reporting to the institutional effectiveness unit, who compiles and submits reports for performance-based funding and

preeminence, has led to a more robust relationship. Prior to textbook affordability, the library had received little traction in its request for assistance with a data dashboard of library interactions and key student success metrics. That project is now back on track; perhaps due to reporting of metrics, perhaps due to increased communication between the two entities.

Interest continues to grow at the broader institutional level and consequently, several other outcomes have been realized or are on the horizon. In addition to performance-based funding metrics, the associate vice provost for the division of Teaching and Learning is primarily responsible for textbook affordability reports to the board of governors and the state legislature. As such, she is working with the library to include textbook affordability advice and updates in her periodic newsletters to faculty, collaborating on a campus-wide email to faculty acknowledging their efforts in this area, and discussing options for the division to host a unit-agnostic website dedicated to textbook affordability.

Similarly, the vice provost for digital learning, which includes the instructional design unit, has taken steps to formalize the relationship between the library, Digital Learning, and textbook affordability. The vice provost has allocated an impressive suite of resources to support this collaboration and identified four areas of strategic emphasis; including OER adoption, use of library-sourced course materials, partnering with other institutions to identify low-cost courses, and implementing a platform whereby large volume purchases result in reduced course materials costs. Corollary to these strategic areas is the need for forward-facing communication, standardized metrics reporting, and a committee or advisory board comprised of campus stakeholders.

Given the library's staffing levels relative to an institution of over 68,000 students, perhaps the outcome with the greatest potential for impact is the new textbook affordability/student success librarian position, which recently was funded by the Student Success Investment Model (SSIM), an initiative out of the Provost's Office. The SSIM was founded by the provost for campus units that do not generate funding from teaching student credit hours, but who have potential to increase student success. Initially, members included such high-profile units like student development and advising, graduate studies, undergraduate studies, and the honors college. The vice president for information technologies, which includes the library, advocated for the library to hold membership on the committee and was successful after presenting data and study results indicating how the library supports student success. Subsequent to achieving membership, each unit submitted a request for funding, presented rationale for the request, and then debated merits of each proposal and voted on funding.

The library was able to present compelling evidence of its textbook affordability work, related results to performance-funding metrics, and demonstrated how a dedicated position could accelerate work in this area. This illustrates that the topic is of interest to high-level administrators and that they think it has the potential to positively impact student success, performance funding, and institutional goals. At the time of this writing, a successful search has been conducted and the new textbook affordability librarian will soon begin work.

Ostensibly, the primary purpose of this paper was to illustrate how the library tied textbook affordability efforts to performance-based funding, and that aspect of the initiative has been successful but also continues to mature. Other outcomes, some unforeseen, also have been realized. Among them are strengthening faculty relations through subject librarian collaboration, elevating the perception of the library with pertinent campus academic support partners, sending a strong message to administrators that the library plays a key role in student success, and providing a venue for the library to meet its primary mission of supporting excellence in teaching and learning.

What is more difficult to capture is the response of students who now have access to affordable course materials. One professor who replaced a $190 astronomy textbook with an OpenStax version commented, "When I announced to my class of 200 students that they could freely access the textbook online, I received

a standing ovation. I had no idea what it meant to them." And while sending metrics for performance-based funding reports remains a key goal, student gratitude for reducing the cost of a college education—and thereby making higher education more accessible—may be the greatest motivator of all.

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Finding Hidden Treasures in the Data

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Introduction

Librarians rely on statistics to capture who their users are and what resources and services they use. For an academic campus, the number of students, faculty, and researchers provide a sense of potential users of library services and resources. But who uses the services and resources and what do they use? Library staff can spend a lot of time tracking, consolidating, and analyzing the amount of materials that circulate, usage of e-resources, instructional sessions taught, questions asked at service points, and consultations in order to identify resources and services that need be supported and continued. Those numbers could also help identify areas of users' needs that that the library staff could address.

With the widespread adoption of and patron preference for e-resources, the data collection process can be somewhat easier with vendor-provided statistics. While these reports reveal how many times e-resources were accessed and articles were downloaded, they do not capture all aspects of user behavior nor do they provide a big picture perspective regarding overall usage. On the other hand, locally collected evidence obtained from the library's authentication system can be utilized to illustrate a broader picture of users' behaviors with e-resources, particularly the differences between user groups.

Literature Review

Shifting collections from print to electronic format has made it easier for libraries to gather usage numbers. In a print-only environment, circulation statistics and in-house use browse-counts can be employed. However capturing journal use is challenging. Shelving counts for journals used in a library are an option, but require staff resources to track numbers, especially if done at the title level, and treat the use of an individual issue the same as a bound volume with multiple issues.[1] In addition, staff cannot tell who used the journals and how much of the journals were used.

In contrast, usage of e-resources can be collected by vendors and then passed along to the libraries for analysis. Initially, the challenge with analyzing electronic usage was the lack of standards and established practices for data collection and reporting. Part of that challenge has been addressed with Project COUNTER's code of practice regarding what usage to count and how to report those counts. Published results of surveys have identified the kinds of data that librarians collected and how they used that information.[2] One use for that data is to inform the collection development and management process. Some librarians have incorporated usage reports into decision models for subscription renewals.[3]

In addition to the vendors' usage reports, librarians and researchers have made use of other vendor reports and locally collected statistics to determine usage and identify users' behaviors. Sources of statistics included web server logs,[4] OpenURL link resolver reports,[5] consortial usage reports,[6] Google Analytics,[7] vendor reports,[8] and EZproxy server logs.[9]

Attempts to get more granular data about patrons' behavior is not new. Responses from a survey of 22 libraries in the Association of Research Libraries in 2000 indicated that libraries were mapping click-throughs to IP addresses in order to identify schools and departments on the campus. Only one library indicated that it was using its proxy server to collect user information, while another had plans to do so.[10]

One of the proxy server systems available to libraries, EZproxy, is specifically mentioned in a small number of published articles. Most described using EZproxy to enable, manage, and monitor remote users' access to library resources.[11] There are even fewer studies using EZproxy log data as a tool to track patron usage of electronic resources in place of vendor-provided statistics.[12]

Method

The University of Hawai'i at Mānoa Library, serves an "R1" research land-, sea-, and space-grant research institution. The library requires almost all of its patrons to be authenticated through an EZproxy server in order to access e-resources even when they are on campus. There are a few exceptions. Staff and classroom computers directly connected to the UHM Library's computer network bypass authentication altogether. Some networked computers on campus are authenticated based on their IP addresses. Among total entries (346,955) into the EZproxy server, approximately 12,000 were from IP authenticated computers. Students and staff using other computers on campus with either network or wireless Internet access or computers off campus must login with their university username and password. This unique arrangement allows the library to collect rich data about its users' behaviors.

The EZproxy server logs all activities while users interact with resources once they login. This generates a tremendous amount of data. Because of the volume of data, this study limits its analysis to data recorded when users logged into the server (i.e., entry points) during a one-year period from July 1, 2016 to June 30, 2017.

A staff member in the library's information technology department extracted the entry point data from the log files. *Grep* and *sed* commands and shell scripting were used to connect commands and batch process the log files down to a common string that appears once per user session when the user is required to enter a username and password. That common string, *connect?session*, appears in the log as follows:

> *<IP address> - <user ID> <time stamp>*
> *https://eres.library.manoa.hawaii.edu:443/connect?session=<session code>&url=<URL of the e-resource being accessed>*

Once the line of entry point data was extracted, additional steps were taken to clean up the data so that only the following information remained:

- IP address of the computer being used;
- User ID number;
- Date and time stamp identifying when the user logged into the EZproxy server;
- URL of the e-resource (e.g., database, e-journal, journal article, or e-book) being requested.

The filtered data was loaded into a Microsoft Access database to perform additional data clean up and to facilitate the analysis process. Microsoft Access enabled the matching of user ID numbers to user group categories (i.e., undergraduate student, graduate student, faculty/staff) with information extracted from the library's integrated library system (ILS). Once user groups were added to the data set, the user ID numbers were changed to random numbers to make them unidentifiable. Microsoft Access was also used to convert the date and time stamp (e.g., 7/1/2016 10:22:25 PM) into a day of the week (e.g., Tuesday) and hour of the day (e.g., 18). Once adjustments to the data was completed, the data was then sorted, counted, and queried in Microsoft Access.

Findings and Discussion
Who Used the Resources? How Often Did They Use Them?

During the 12-month period, the EZproxy server log recorded 334,821 entries by 18,911 unique users. Those unique users represent a large proportion of the UHM population (82.7%) which totaled 22,856 individuals during the fall 2016 semester. Out of the 13,132 undergraduate students, 77.7% logged in at least once during the year; 89.7% of the 4,822 graduate students logged in at least once; and 91.3% of the 4,800 faculty/staff members logged in at least once.

Table 1. Number of users who accessed e-resources vs. the campus population in the fall 2016 semester.

Group	Users	Potential Users	%
TOTAL	18,911	22,856	82.7%
Undergraduates	10,201	13,132	77.7%
Graduate students	4,326	4,924	87.9%
Faculty/staff	4,384	4,800	91.3%

The large percentage of faculty/staff members who accessed e-resources was unforeseen. Since the library's ILS does not distinguish between faculty members (i.e., faculty, researchers, extension agents, specialists, and librarians) and support staff (i.e., clerks, secretaries, grounds and maintenance staff), we did not expect the percentage to be as high as it was. With support staff making up 46% of this group, having 91.4% of the entire group logging in at least once was surprising since support staff generally are not expected to use library e-resources.

Faculty/staff members recorded the most entries compared to graduate students and undergraduate students. Even though more than half of the unique users were undergraduates, they had the least entries compared to graduate students and faculty/staff as shown in Figure 1.

Figure 1. Number of users who accessed EZproxy at least once and total entries by each group
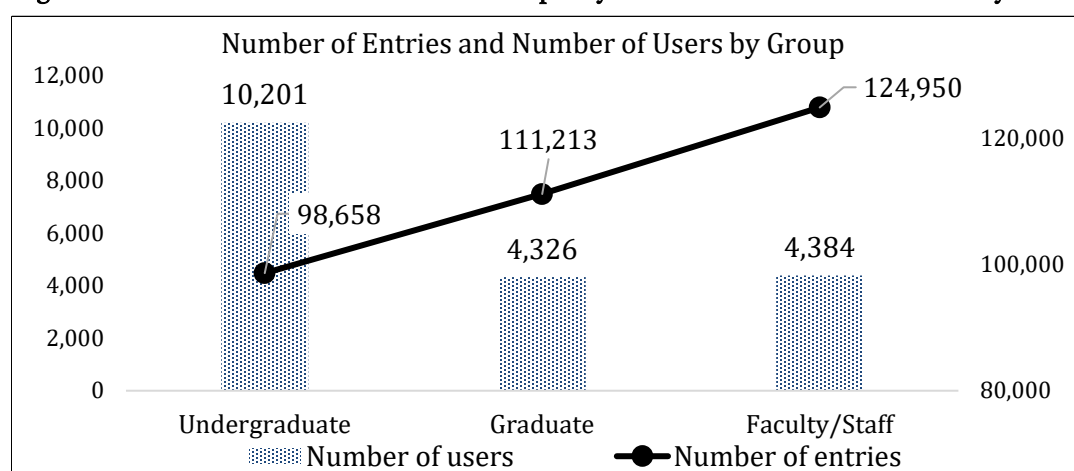
As a result, those who used library resources very little (i.e., five times or fewer in the year) were mostly undergraduates (64.9%). Figure 2 shows that those who used resources at least once a week were primarily faculty/staff members and graduate students. Out of the 1,563 users who logged in over 50 times during the year, 48.0% were faculty/staff members and 42.3% were graduate students, while undergraduates made up only 9.7% of heavy users.

Figure 2. Group difference in number of times e-resources were accessed

Number Users by Entry

Undergraduates · Graduates · Faculty/Staff

Values shown per "Number of entries per user per year" category:

Entries	Undergraduates	Graduates	Faculty/Staff
1	1662	437	564
2	1167	310	303
3	953*	224	245
4	732	183	185
5	616	166	153
6~10	2055	626	557
11~20	1750	763	708
21~30	695	418	447
31~40	287	319	296
41~50	133	218	176
51~100	136	478	505
>101	15	184	245
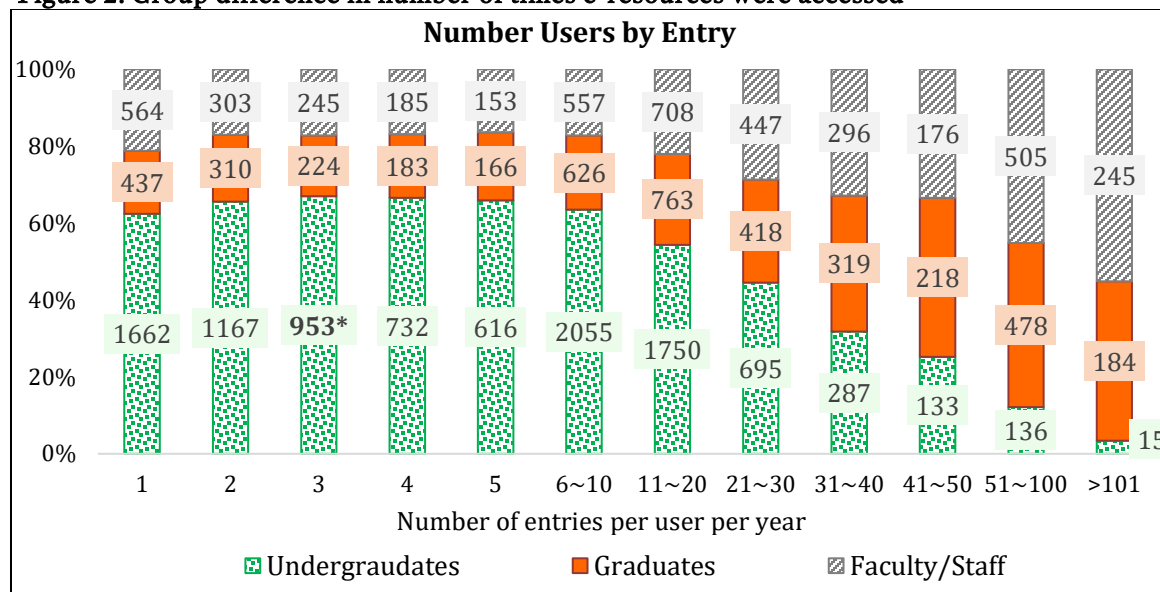
*How to read the graph: There were 953 undergraduate students who accessed EZproxy three times between 7/1/2016 and 6/30/2017.

When Did Users Access Resources?

The time stamp in the EZproxy log identified patterns in when users accessed library e-resources. Overall usage was high during the day, with a slight dip during mid-day (i.e., lunch time), tapered off at the end of the day, and went up again during the evening. Over the course of the week, usage on Sundays had a slight rebound after a period of low usage that began Friday evenings.

When comparing the data between groups, differences surfaced as seen in Figure 3. Faculty/staff members' usage was much higher during weekday work hours. It tended to slow down in the evening while both undergraduate and graduate students rebounded to almost the same level as during the daytime. While both student groups accessed e-resources during the weekends at a slightly lower rate, usage by faculty/staff members was about half of what it was during weekdays.

Figure 3. Group difference in time of entry
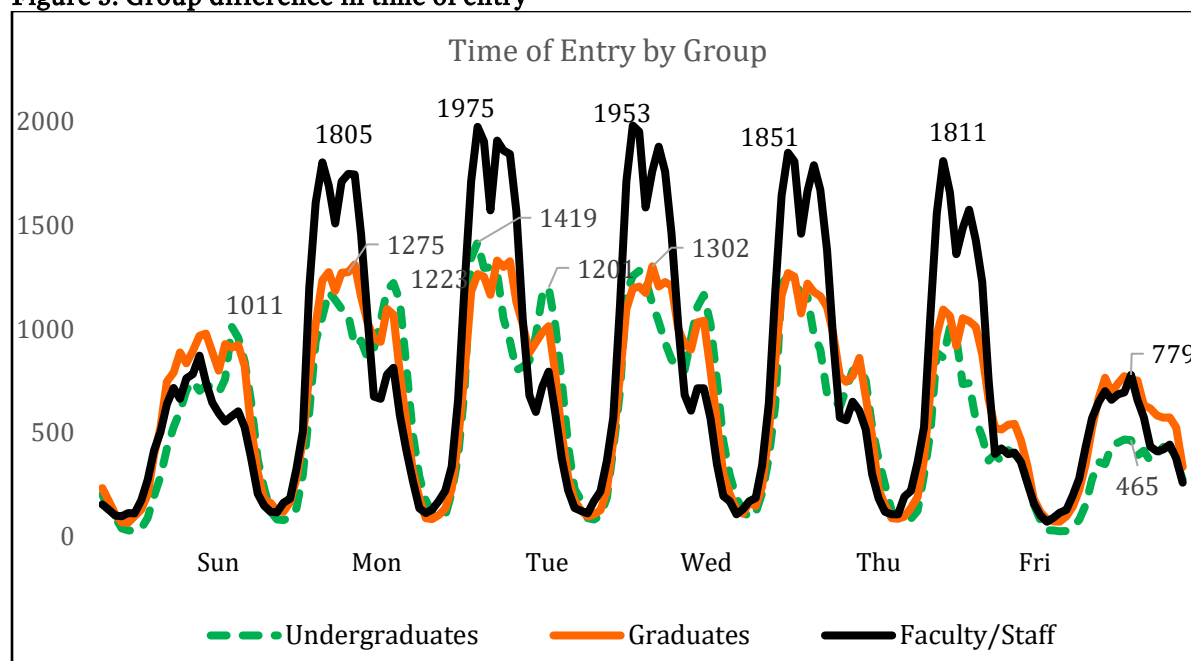
This study complements the findings of previous studies that analyzed e-resource usage. Tenopir and Read analyzed 93 academic libraries usage of resources from a single database aggregator to see the time of day, week, and month academic users were accessing databases.[13] The data which was collected over a six-month period showed similar patterns of use when it came to the busiest time of day (11 a.m. to 5 p.m.) and days of the week (Mondays and Tuesday). In their 2001 review of use data from 51 vendors, Blecic, Fiscella, and Wimberly obtained data about uses by the hour from only four vendors.[14] Although the data from the vendors could not be consolidated because they covered different time periods, the authors saw fairly similar patterns between the vendors when it came to high and peak usage across the e-resources. The usage patterns are also described in a later study by Tripathi, Kumar, and Jeevan which looked at JSTOR download patterns at Indira Ghandi National Open University (IGNOU).[15] Most of the requests (86.6%) were made between 11:30 a.m. and 6:30 p.m. with the peak period occurring between 4:30 p.m. and 5:30 p.m.). Since JSTOR was restricted to IP addresses on the IGNOU campus, usage primarily took place during the day. However, requests were made outside of the library's normal business hours (9:30 a.m.–6:00 p.m.) reflecting the possibility that patrons would access resources from home, if it were possible, and thereby spread usage throughout all hours of the day.

Where Were Users When Accessing Resources?

Location of users were determined by the computers' IP addresses recorded by the EZproxy server. There are three ways that users are authenticated when they access the library's e-resources. The first one is bypassing authentication. This applies only to the staff computers and a few classroom and public computers connected to the library's network. Since users on these computers do not have to log into the EZproxy server, their activity is not recorded.

The second one is by the computer's IP address. Only two sets of computers fall in this category: those at the East-West Center (EWC) and those in the medical school's library and computer lab. EZproxy recorded 11,972 entries from these computers. EWC had 1,468 accesses which were most likely from the Center's researchers. The medical school logged 10,504 accesses which were probably by medical school students who are the primary users of the computers in the library and computer lab. This method unfortunately does not document who the users are. Because of this, the data for these entry points are excluded from this study's analysis.

The third way is authentication by logging in with one's school username and password. Users need to login from all computers, other than those described in the previous paragraph, to gain access to the library's e-resources. These computers included those that are networked across the campus, those that use Wi-Fi access on campus and in the dormitories, or those located off-campus.

Of the 334,821 entries for this third method of access, users in all groups were more likely to access the library's e-resources from off-campus computers (see Figure 4). Off-campus accesses accounted for 57.5 % of all accesses. For the 142,205 entries made on-campus, EZproxy documented 86,714 entries via the campus Wi-Fi (61%) and 55,491 entries via networked computers (39%). Among the entries from on-campus networked computers, 65% were from faculty/staff; 23% from graduate students; and 13% from undergraduate students.

Figure 4. Entry location by group
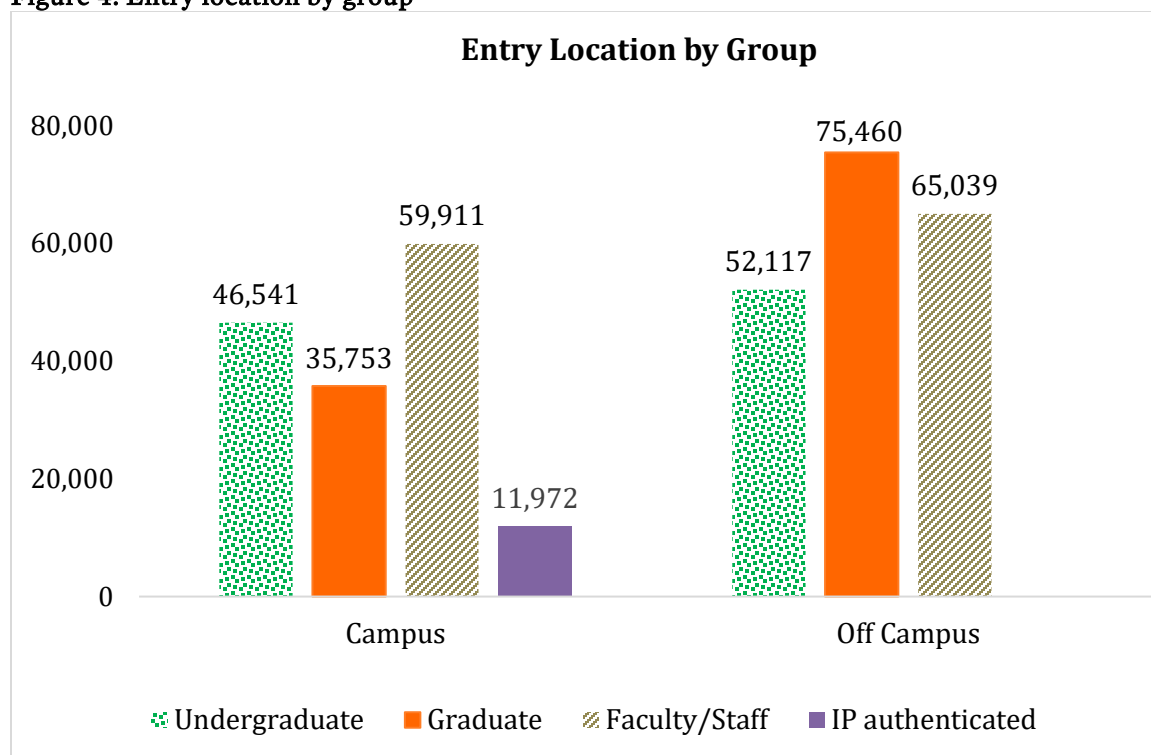
Since undergraduate students have limited access to the networked computers on campus, it makes sense that their access via networked computers were least among the three groups. Among the undergraduate students' 7,143 entries from networked computers, roughly half of them (3,460) were from the computer labs in the library. Because the computers labs are managed the campus's information technology department, they are connected to a network separate from the library's. Because of this arrangement, computer lab users are required to login to use library e-resources even though they are in the library building.

The lack of access to networked computers also contributed to undergraduate students' on-campus Wi-Fi accesses to be the greatest among the three groups:

- 85% of their 46,541 entry points on campus came through the Wi-Fi
- 2,308 undergraduate students used only the campus Wi-Fi
- 2,682 only accessed from off-campus computers
- 4,964 used both

Undergraduate students' on-campus usage at night (11 p.m.–2 a.m.) was higher than graduate students' usage. This difference may be attributed to the fact that on campus residences are primarily for undergraduate students.

Figure 5. Undergraduate student entry points by location and time

Time of Entry - Undergraduate

4,735

4,481
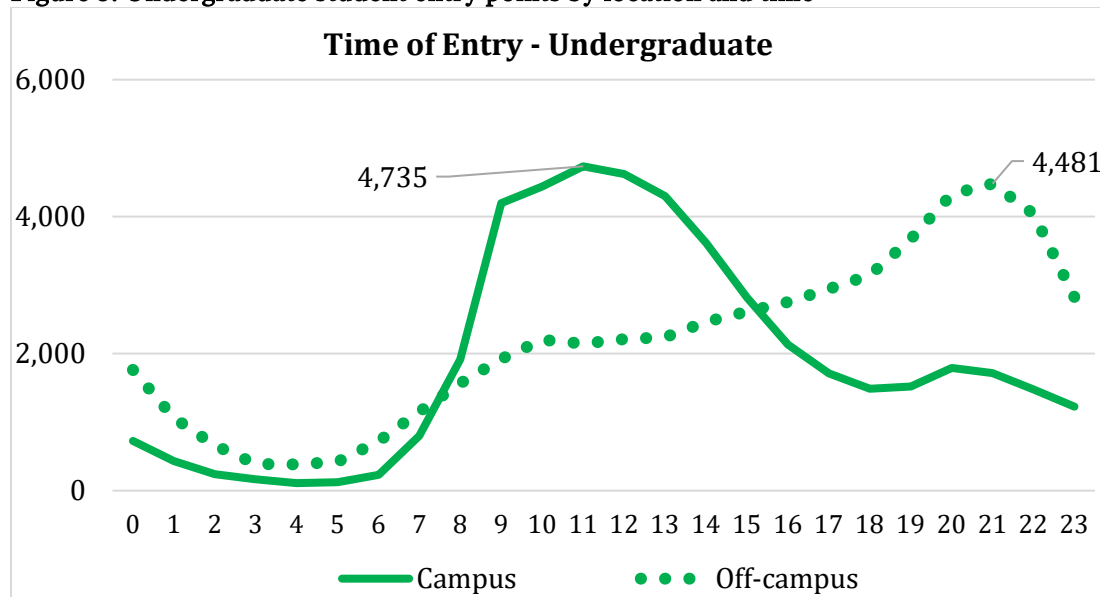
Figure 6. Graduate student entry points by location and time

Time of Entry - Graduate

5,457

3,755
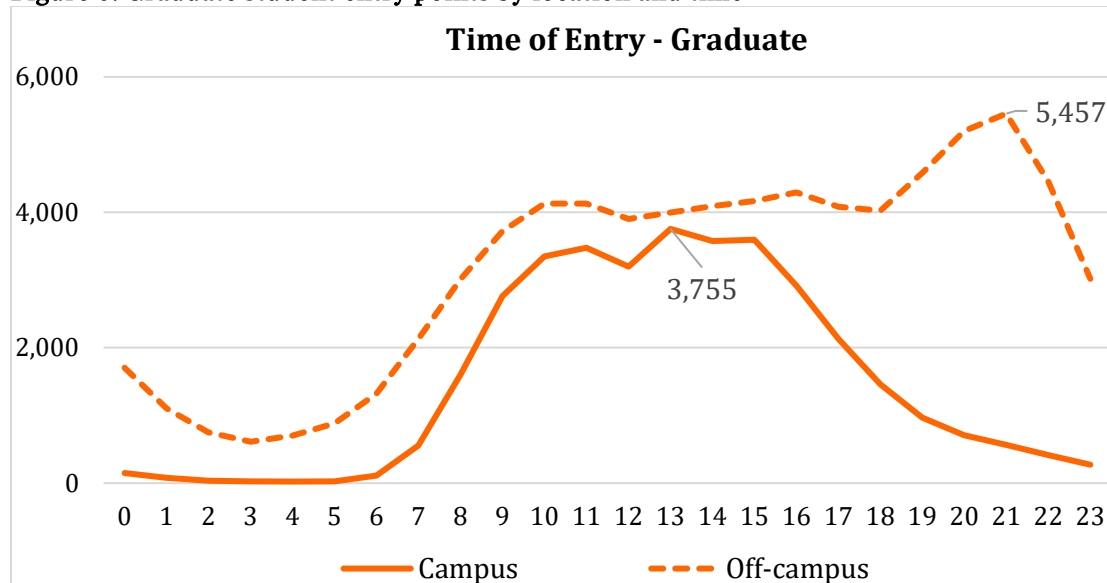
Figure 7. Faculty/staff entry points by location and time
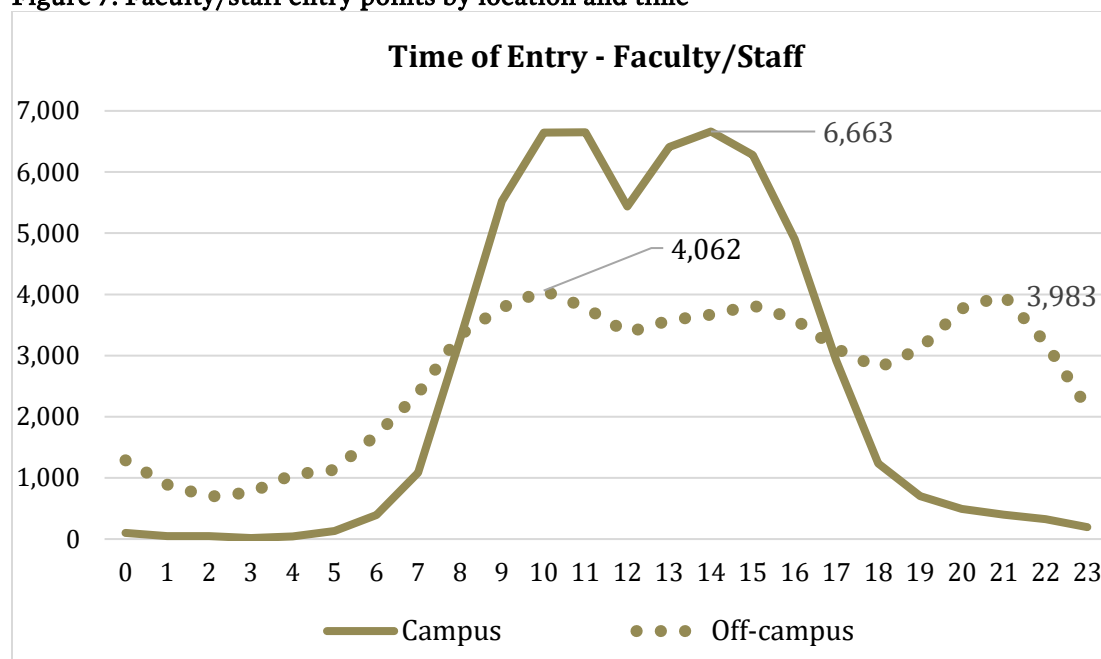
Figure 7 shows that faculty/staff usage by location and time also dropped in the evenings like both student groups. As expected, faculty/staff on-campus usage in the evenings did not rebound since they do not have on campus housing. In addition, due to the campus' energy conservation practices, some offices do not have any air conditioning after 5 p.m.

Data clearly shows that off-campus access at night far surpassed the on-campus Wi-Fi access for graduate students. Similarly undergraduate off-campus access to e-resources increased significantly in the evenings. Currently the library does not offer chat-reference. Data like this could be used to indicate the need for such support.

What E-Resources Did Users Want When Logging In?

The URL in the EZproxy log entry points identified what e-resources (i.e., journal articles, e-books, e-journals, or databases) users were attempting to access when logging in. More than half of the users (59.18%) accessed a database. The next highest category of e-resource was journal articles followed by e-journals and e-books. All three user groups tended to access mostly databases and articles, but differed when it came to e-journals and e-books. The students' initial e-resource tended to be more e-books than e-journals while faculty/staff accessed e-journals about 2.5 times more than e-books.

There were 70,060 article-level entries for 60,008 unique articles. These were found by searching "*doi* or *article* or *document*" within the URLs. 6,498 articles were accessed more than once ranging from two to 126 times by 4,388 users during the 12-month period. At first glance, having more than 20% of entries to be for specific journal articles was unexpected. Until an analysis of what web pages or websites users were coming from, we assume that users are selecting articles found by searching the library's discovery tool (One Search Mānoa), which does not require a login.

Figure 8. Journal article entries by user group

Article Level Entries by Group

Undergraduate: # of Users 4,913; # of Entries 21,190
Graduate: # of Users 2,573; # of Entries 23,267
Faculty/Staff: # of Users 2,147; # of Entries 25,603

☒ # of Users ■ # of Entries
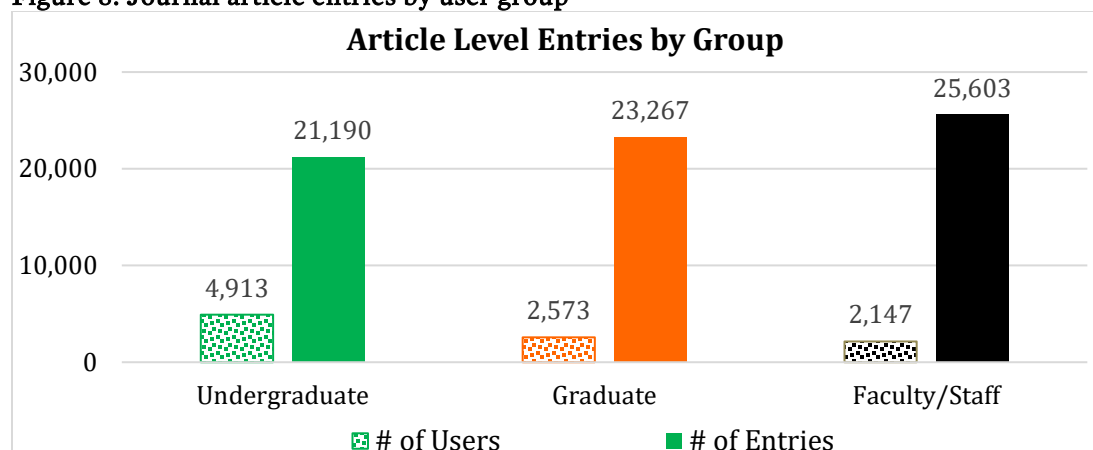
For e-books, there were 29,840 entries. Since eBrary and EBL were the primary vendors for the library's e-books at the time, these entries were found by searching the log data for "*ebrary*" or "*eblib*" within the URLs. Nine thousand, six hundred forty entries represented single access to an e-book. Three thousand fifty-four e-books were accessed more than once, ranging from two to 601 times, for a total of 20,200 entries. Among those 3,054 e-books, 2,249 of them were accessed more than once by a same user.

Because these statistics are for only entry points, we are not able within the context of this study to see the overall scope of repeated access to journal articles or e-books. While the number of articles (10.8%) and e-books (24.1%) with multiple entries are relatively small, it would be useful to get a better idea of the extent of repeated access. Previous studies have identified factors affecting how e-journal article usage are counted including e-journal interfaces, linking from search portals like Google Scholar, and double counting articles that are viewed and then printed or emailed.[16] Even with the limitation of using only entry point data, this study gives us a glimpse that the vendor provided usage statistics may be inflated if libraries wanted to give more weight to the unique views and downloads by unique users.

Figure 9. E-book entries by user group

Ebook Level Entries by Group

Undergraduate: # of users 2,864; # of ebook entries 11,918
Graduate: # of users 1,611; # of ebook entries 10,129
Faculty/Staff: # of users 1,222; # of ebook entries 7,793

☒ # of users ■ # of ebook entries
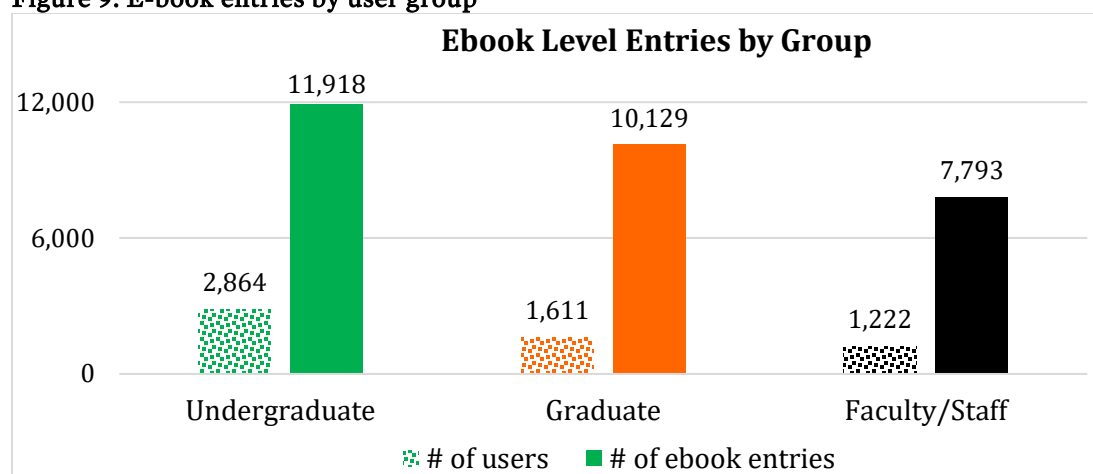
While it was fairly straightforward to identify article-level and e-book-level entries, determining journal-level entries was challenging. One reason was that searching the URLs for journal-level entries proved difficult due to variations in the way vendor websites identified journals. Even a single vendor could identify a journal in more than one way. EBSCO, for example, could have *jn=* or *jnnpd* for journal-level URLs.

Another reason is that the string "*journal*" in a URL could be for article-level entries. In the example below, the URL for an article in an EBSCOhost database includes the word journal because that word is included in the journal title:

> *openurl.ebscohost.com/linksvc/linking.aspx?sid=a9h&date=2003-04&issn=1472-5886&stitle=&issue=1&volume=2&spage=59&genre=article&title=Journal%20of%20modern%20Jewish%20studies&epage=78*

In the end, a complex Microsoft Access query was used to identify journal-level entries:

> *[NOT (Like "*article*" or Like "*doi*") AND ((Like "*journal*" Or Like "*jn=*" Or Like "*jnnpd*" Or Like "*loi*" Or Like "*issn*")]*

This query yielded 37,987 entries. The number of unique journals that were accessed was 17,911.

As stated previously, faculty/staff were more likely to access e-journals (20,741 entries) than e-books (7,793 entries). They also had more journal-level entries than undergraduate and graduate students combined. This is an expected behavior since faculty/staff are familiar with the journals needed for their disciplines. We believe that journal-level entries come from the A–Z e-journal list on the library website. Until an analysis of what web pages or websites users were coming from can be done, this is only an assumption.

Figure 10. E-journal entries by user group
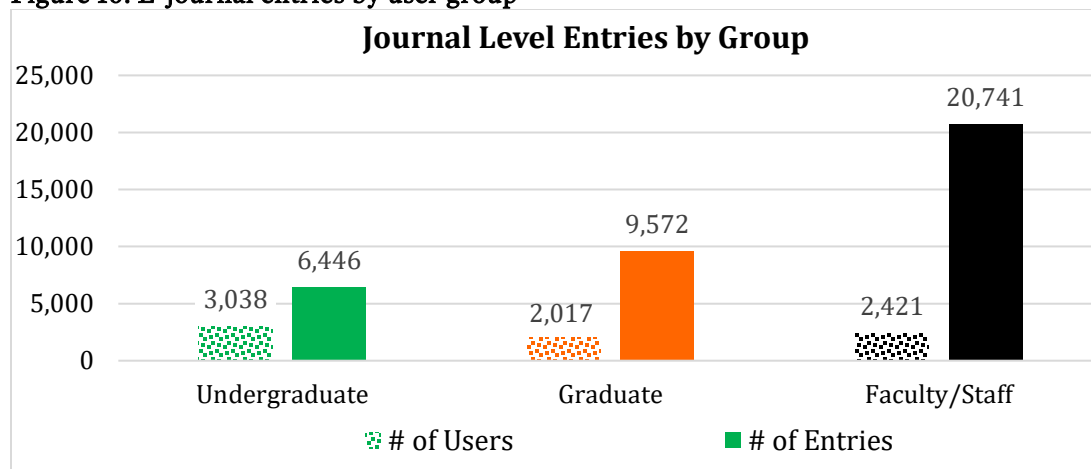
What Platforms Did Users Request the Most?

Databases were the resources that most users wanted when logging into the EZproxy server. One challenge in identifying the most requested databases is that some are available on multiple platforms, e.g., Medline and ERIC. Another factor in the analysis is that some vendors provided multiple databases on their platforms (e.g., EBSCO, Web of Science, and ProQuest). Rather than analyzing databases, the decision was made to analyze requests by vendor (i.e., hosts). The initial review was to count the number of host level entries. Figure 11 shows the platforms that had over 3,000 entries during the year.

Figure 11. Platforms with greater than 3,000 entries

Platforms with Greater Than 3,000 Entries

Platform	Entries
EBSCO	57,524
PUBMED	44,283
ebrary+ebl	30,000
JSTOR	19,944
WOS	16,085
dx.doi.org	**15,426**
ScienceDirect	14,950
ProQuest	
Wiley	11,396
accessmedicine	
Springer	8,055
clinicalkey	
APA	5,285
Muse	
SciFinder	4,734
TandFonline	
Sage	3,692
FilmsOnDd	
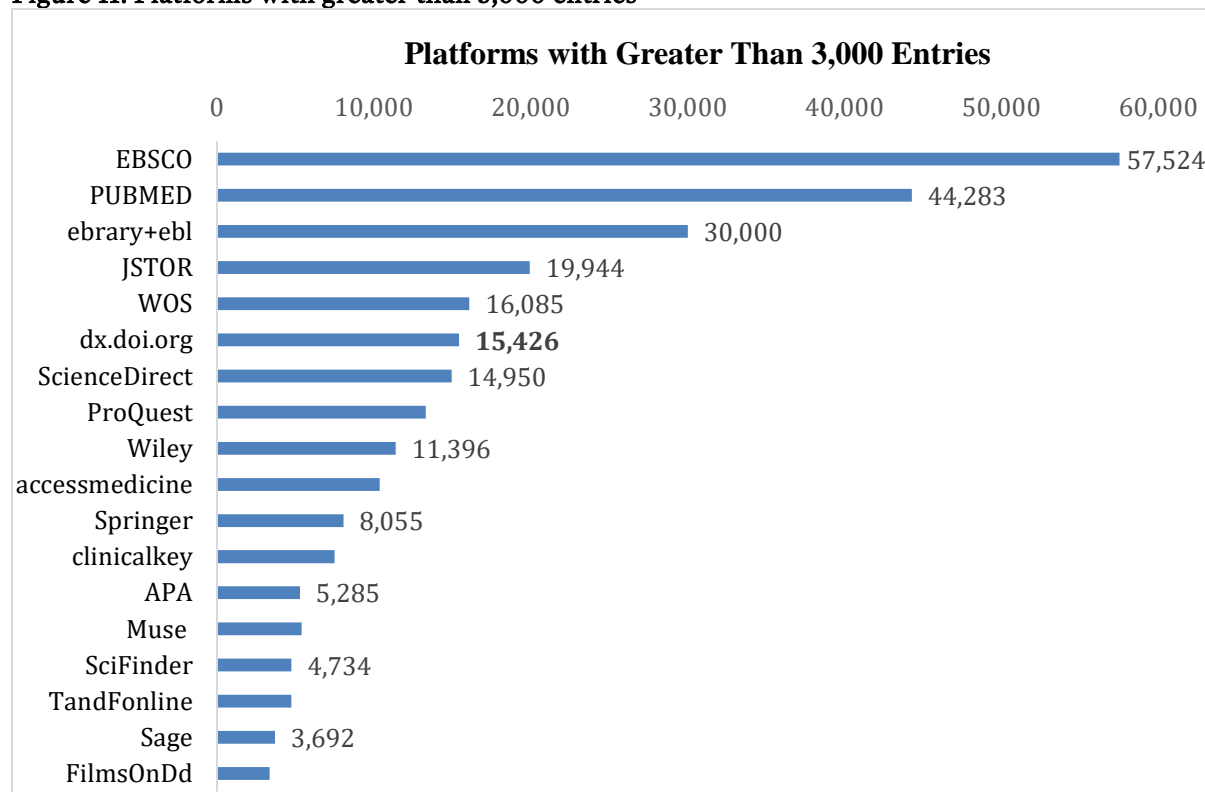
One odd URL that appeared on the list of those with over 3,000 entry points was dx.doi.org. That host level URL does not take users to a specific platform, but directs them to web sites for vendors. This necessitated a closer look at those URLs to identify what e-resources were being requested and which platforms hosted them. Below is one example of a dx.doi.org URL for a journal article: ***dx.doi.org/10.1088/0953-8984/25/2/025402?nosfx=y***

Article from Journal of Physics: Condensed Matter (IOP Science)

Once the actual platforms and type of e-resource were identified, the entry counts for the different platforms were re-calculated. This led to a slight change to the list of platforms with more than 3,000 entries. As seen in Figure 12, ScienceDirect jumped from seventh on the list to fourth. Nature, which was not initially listed, appeared with more entries than Sage and Films on Demand.

Figure 12. Platforms with greater than 3,000 entries
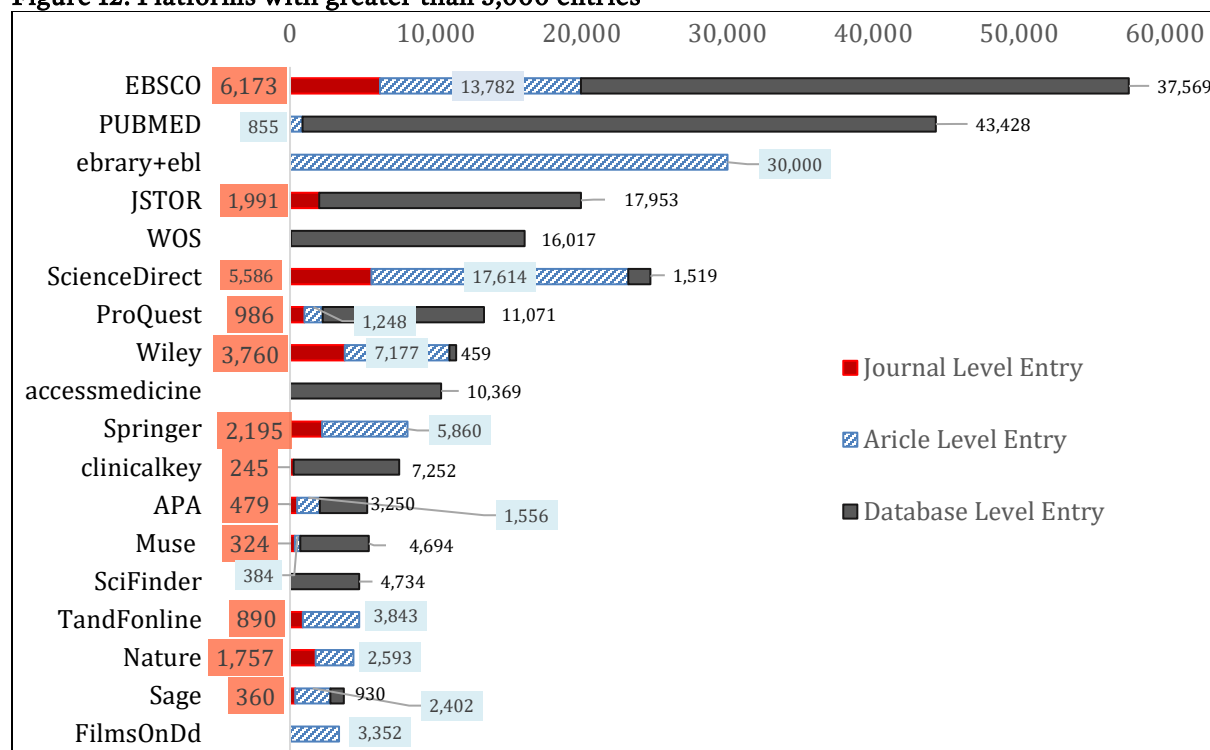
Further analysis of the 18 most used platforms revealed whether articles, journals, or databases were being requested and what user groups were accessing those platforms. EBSCO had the most entries with 57,524. Among those entries, 11% were journal-level entries, 22% were article-level entries, and the rest (67%) were directed to specific databases. PubMed came in second with 44,283 entries.

Limitations

This study has some limitations related to the data that was used and the analysis that was done. First, the data only included information related the e-resources that users accessed when they first logged into the EZproxy server. The subsequent e-resources that users accessed after their initial entry point were not considered in this analysis because of the amount of data contained within the logs. This means that the data and analysis only considered a portion of what the patrons used during the 12-month period.

Second, all of the university's employees are assigned the same user group status in the library's ILS regardless of their role as a faculty or a staff member. This means that usage by faculty could not be distinguished from usage by employees who are support staff such as secretaries.

Third, the URLs for journal-level entries are structured differently between vendors (i.e., publishers and aggregators). A closer look at all entries revealed that a more complex query was needed to separate journal-level URLs from article-level ones. Even after the query was performed, it is possible that all variations would not be included.

Conclusion

This study revealed that most people affiliated with the University of Hawai'i at Mānoa are using the library's e-resources. Breaking down usage by user groups revealed differences in undergraduate students, graduate students and faculty/staff members accessed the e-resources, where they were at, and what they accessed. While this study was able to show distinctions between the user groups, reviewing the data raised other questions: Why did so many entry points (20.9%) go directly to journal articles? What webpages or web tools are directing users to the e-resources?

To answer these questions, the library needs to analyze data from other sources to see what resources and tools are used to link to e-resources: OpenURL link resolvers, database lists, discovery tools, and website analytics. In addition to looking at other data sources, a future study may also need to take consideration the library's transition from Voyager as its ILS and SFX as its Open URL link resolver to Alma.

Acknowledgements

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Smart Data, Smart Library: Assessing Implied Value through Big Data

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Abstract

The growing expenditure on electronic resources has become a new norm for academic libraries. It is crucial for library administration to measure the impact of such investment consistently and persistently, and then develop collection strategies. Big data technology provides such an arena for management to gain insights through meaningful data and allow libraries to optimize collection operations in real time. The purpose of this study is to assess the implied value of a research library by analyzing Cost per Use with BigQuery—a cloud-based data warehouse. The authors developed a systematic approach to process structured data including e-resource usage and interlibrary loan transactions, and then analyzed the data in BigQuery. Google Data Studio was employed to visualize the results. The findings of this study not only manifest the implied and exchange values of the research library but also offer an innovative approach to predict the future collection needs. The methodology employed in the study also provides a new opportunity for libraries to adopt big data technology and artificial intelligence to tackle intricate problems and make smart and informed decisions in this big data era.

Introduction

Academic libraries have been working tirelessly to sustain library collections to meet the needs of teaching and research. However, the exponential cost increase of electronic resources has surpassed what the library budget can afford. Meanwhile, the open-access movement has made more and more scholarly publications freely available to the public. It is impossible to develop an effective collection strategy without assessing the values that library collections have brought to users.

The impact of electronic resources on teaching and research has changed the landscape of collection development. For example, 89% of the overall use of library collections at the University of Massachusetts Amherst happens outside of the library buildings and 53% of the use is to support teaching or class work. In STEM disciplines, 92% of use by graduate engineering students also occurs outside of the libraries and 45% of the use is for their theses or dissertations.[1] Academic libraries have met these requirements by subscribing to electronic resources and creating digital collections over the last decade. Researchers and students have been enjoying convenient access to these rich and diverse resources. However, with the growth of digital resources, subscriptions to online resources have become the primary consumption of the collection budget. It has never been so crucial for libraries to examine their collection strategies critically and seek solutions to this challenge which libraries face today and tomorrow.

Measurement

It has been 16 years since the COUNTER initiative was launched. The COUNTER Code of Practice provides a mechanism for libraries and publishers to gather usage statistics consistently across publishers and libraries. One of the metrics listed in the code is *Journal Report 1* (JR1) which is the number of successful full-text articles requested by month and journal title.[2] Therefore, it is possible to calculate the *Cost per Use* (CPU) with JR1 and journal cost. CPU is a widely accepted criterion to assess electronic journal subscriptions, but is by no means the only metric for libraries to adopt. Every library is different and unique. Libraries must conduct assessment and interpret findings in their respective contexts.

It is complicated to measure the value that an academic library brings to the university or college. Student success might be the results of contributions from many campus constituents. Studies have been conducted

to assess library values with appropriate measure indicators, as Tenopir pointed out that libraries could measure implied value with usage statistics.[3] However, libraries must consider the cost when assessing the value. CPU potentially integrates the use value into the exchance value in the way of a ratio, which allows both elements considered in a calculated value. CPU is a relative value determined by both use value and exchange value.[4] Therefore, CPU can be a consistent means to measure the implied value of electronic resources as well as exchange value.

This study explores a systematical method to consolidate and analyze the big data including usage statistics, interlibrary loan transactions, and operational and institutional data in BigQuery to assess the library-implied value and provide evidence for management to make evidence-based decisions and develop collection strategies in its respective context.

Methodology

Libraries have adopted various tools to collect usage statistics systematically and run operations with integrated library systems (ILS). However, the communication between different information systems has not been directly established. To resolve this problem, the authors developed a process to gather, process, and analyze structured data in BigQuery.

BigQuery is a product of Google Cloud Platform,[5] which is a suite of cloud computing services. Except for a set of management tools, the Google Cloud Platform provides a series of modular cloud services including computing, data storage, data analytics and machine learning. BigQuery is a scalable and fully managed enterprise data warehouse for analytics. Currently the cloud platform is free through a registration service.

Data Source

The authors generated the *Journal Report 1* (JR1) for 2015, 2016, and 2017 individually with the EBSCO Usage Consolidation. The cost of each e-journal is critical to this project. To facilitate a large amount of data processing, the authors chose the *Collection Assessment Reports* in EBSCONet and the Journal-holding Report generated in EBSCO Holding Management. The acquisitions data in the integrated iibrary iystem (Aleph) supplements the cost data that is not available in the EBSCONet reports. The most requested journal reports for each calendar year from 2015 to 2017 were created with ILLiad reporting. The ILL expenditure was a part of the ILL operational data.

Data Cleanup and Preparation

Data cleanup is a crucial step before analyzing data. To select the data that is meaningful to the final results, the authors believe that at least 70% of data analysis involves cleaning and selecting the most useful data. It is worth pointing out that saving a copy of the original data may prevent researchers from losing data permanently. The first step is to identify whether an Excel workbook contains irrelevant or excessive data, such as plots, graphs, irrelevant headings, or explanation information in reports. Such data should also be removed. It is necessary to add the data that is missing. For example, if a journal has not been assigned one of the four subject categories—namely STEM, arts and humanities, health science, and social science—give it a category. If no cost information is included for a journal or journal package, add the data correspondingly. These data manipulations can be easily handled in Excel.

The second step is to convert Excel worksheets to CSV files. BigQuery only accepts some specific file formats, including CSV, JSON, Avro, Parquet, and ORC. At present, there is no way to upload an entire Excel workbook at a time. Data must be transmitted from a single worksheet. In this study, all data sources obtained are Excel workbooks with multi-worksheets. The converting process is simple. However, if Excel spreadsheets contain non-ASCII (American Standard Code for Information Interchange) symbols, such as foreign characters (tildes, accents, etc.) or hieroglyphs, a particular treatment should be taken.[6]

Import Data into BigQuery

A local data source can be loaded either via a BigQuery web UI or CLI (command-line interface). Below is the process of loading data into BigQuery with a web UI:

- Create a new project in BigQuery.
- Create a dataset in the new project. The authors created three datasets, namely *ILL*, *Journal_database_Usage*, and *SBU_Institutional_data* (see Figure 1) for this project.
- Create tables within a dataset.
- Import an Excel worksheet into a BigQuery table. In this study, the authors uploaded interlibrary loan transactions and journal usage statistics from 2015 to 2017 into the dataset *ILL* and *Journal_database_Usage* created in the previous step respectively, and then import Stony Brook University institutional data into the dataset *SBU_Institutional_data* as well.

Figure 1. BigQuery Datasets andTables
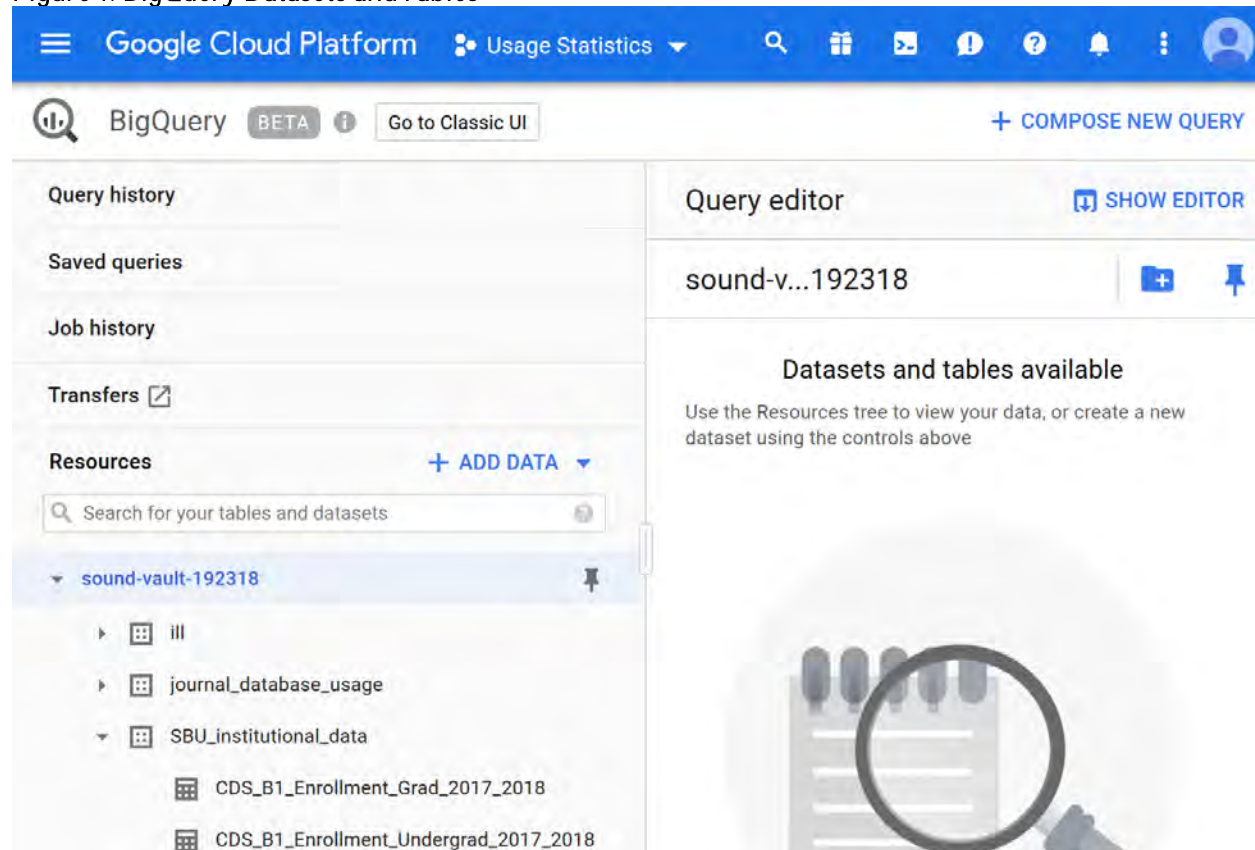
Data Analysis

The authors analyzed data and sought the relationship among variables by operating SQL (Structured Query Language) queries in BigQuery. The BigQuery standard SQL complies with the 2011 SQL standard and has extensions that support querying nested and repeated data. By default, BigQuery runs interactive query jobs on demand, which means that the query is executed as soon as possible. Query results are always saved to either a temporary or a permanent table.

Data Visualization

Google Data Studio is a business intelligence tool used to visualize data through dashboards and reports. Besides Google analytics products, it also collaborates with Facebook, Amazon, YouTube, and more than 120 business partners to meet various needs. In consideration of adopting BigQuery for future studies, the authors decided to choose the Google Data Studio as the data visualization tool for this study. When a query is finished, it can be imported into Google Data Studio for data visualization.

Results
Library Collection Budget
The library collection budget is consistent with the resource expenditure. Figure 2 shows the change of the Stony Brook University (SBU) Library collection budget from 2015 to 2017. Compared to the budget for 2015, it stays flat for 2016, but slightly increases for 2017. The finding also signifies that most of the budget is spent on electronic journal subscriptions. For instance, 64% of the total budget was spent on e-journals in 2015 and 62% in 2016, but this expenditure jumped to 84% of the entire collection budget in 2017.

When examining the expenditure on e-packages, it shows that 69% of e-journal budget is for e-packages in 2015 and the number shifted to 56% in 2016 and 62% in 2017 respectively, which indicates a growing expenditure on e-packages over the last three years. Higher spending on e-packages in 2015 was due to one-time purchased backfiles.

Notably, more than half of the e-journals were subscribed to through e-packages or big deals. It is common for libraries to subscribe to e-journals via a Consortium Member License Agreement to bring down the cost of per journal title. The SBU expenditure for the fiscal period 2015–2017 is in accord with this practice.

Figure 2. SBU Library Collection Budget
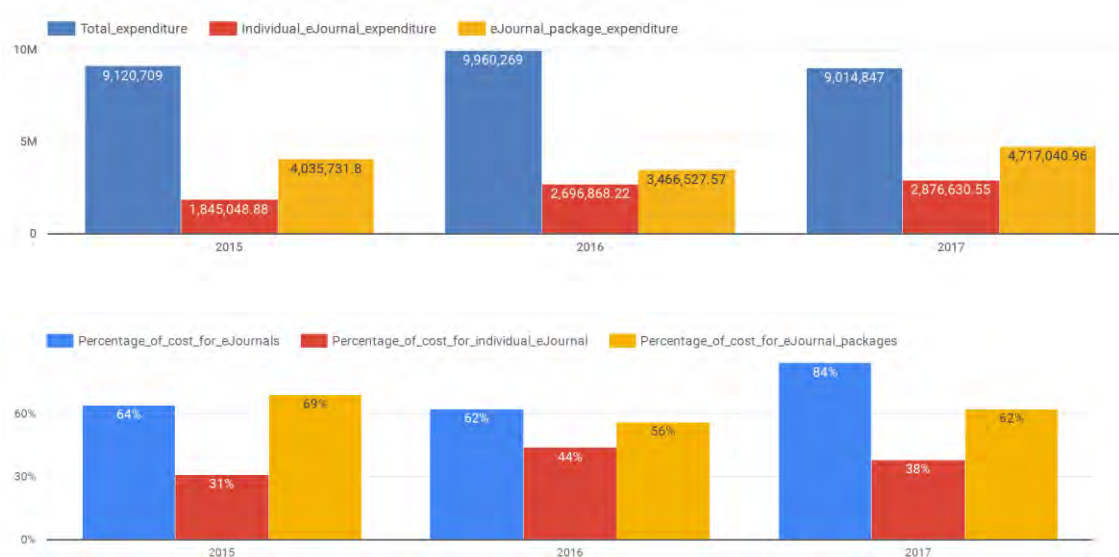
Average CPU for Individual Journal Subscriptions

The SBU Libraries tracks the usage statistics for primary electronic resources through EBSCO Usage Consolidation. The JR1 shows that 88% of e-journals were used at least once in 2015. The same ratio is 60% for 2016 and 95% for 2017 similarly. These e-journals are available to SBU users through licensed e-journals or full-text databases. In this study, the authors firstly calculated CPU for each journal by dividing the journal cost by the value of *Reporting Period Total Use* in JR1, where the journal cost is grouped by a subscription model, such as individual subscription, e-package, or database, then computed the average CPU for each subject category. Figure 3 is the CPU for individual journal subscriptions.

Figure 3. Average CPU for Individual Journal Subscriptions
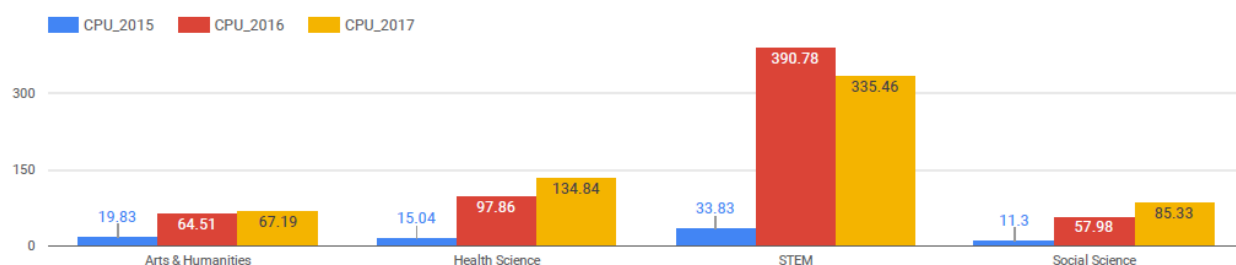
The results show that the average CPU increases across STEM, health science, social science, and arts and humanities over the last three consecutive years. The average CPU for this period is $253 for STEM, $83 for health science, $52 for social science, and $51 for arts and humanities. Overall, the average CPU for individual subscriptions is about $110. Surprisingly, the average CPU for STEM in 2016 is about three times higher than it is for health science but decreased to 1.5 times in 2017. The possible factors include the increase of cost per title, less use, or a combination of both elements. It is worth mentioning that a study on periodical price also signifies that the cost growth in 2016 is more than the increase in 2017.[7]

However, the results also raise the concern on the effectiveness of the traditional journal subscription model. Would it be more cost-effective to purchase an article via pay-per-view (PPV) rather than a journal subscription? Especially in the STEM field, SBU might not consider a journal subscription until the number of PPV reaches a predefined limit. Libraries may implement the decision-making process with a prediction model. The model should consider the factors including discipline, labor cost, access convenience, and business transactions. On the other hand, publishers, vendors, and libraries could develop a new subscription model collectively to sustain the journal affordability.

Average CPU for e-Packages (CPUP)

To compare CPUs for two subscription models, the authors utilized the same method to calculate CPU for e-packages (CPUP) (see Figure 4).

Figure 4. Average CPU for e-Packages (CPUP)
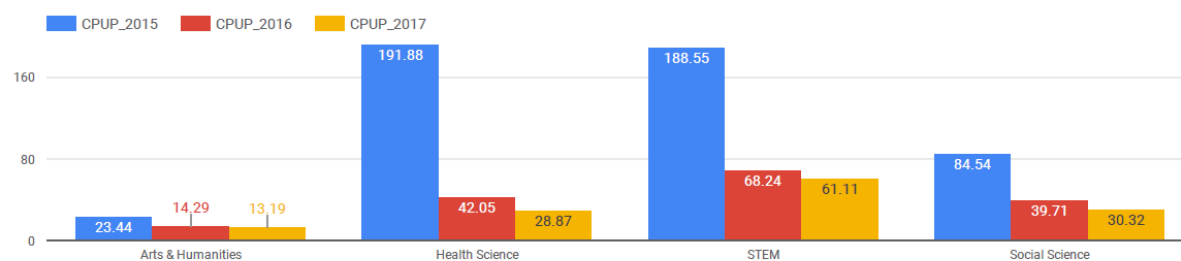
Figure 4 shows that CPUP dramatically decreased across four domains and is much lower than for individual journal subscriptions. The CPUP is $106 for STEM, $87.6 for health science, $51.5 for social science, and $17 for arts and humanities. Remarkably, the CPUP for STEM is only 42% of the CPU for individual journals.

Likewise, the high CPUP for 2015 across four subjects is expected as a result of one-time purchased back files. The findings demonstrate the e-package model is more cost-effective than the journal subscription model for SBU Libraries, but the annual increase rate for e-packages could affect its efficiency. The authors also suggest that libraries should closely monitor the usage to timely adjust journal titles selected in a respective e-package.

Cost Per View (CPV) for ILL

The SBU Libraries adopt the pay-per-view model to acquire articles that cannot be fulfilled via ILL or when the charge of an ILL article is higher than the PPV price. Dividing total cost by the number of pay-per-view articles, the authors calculated the average CPV for the period of 2015 to 2017 (see Figure 5).

Figure 5: Average CPV for ILL

Figure 5 indicates that the average CPV is $32.42 for the last three years. If looking into the CPV for each year, the difference is less than $5 among 2015, 2016 and 2017.

To understand the relationship among CPU, CPUP and CPV, the authors compared CPU with the CPV in Figure 6.

Figure 6. Comparison of CPU, CPUP, and CPV
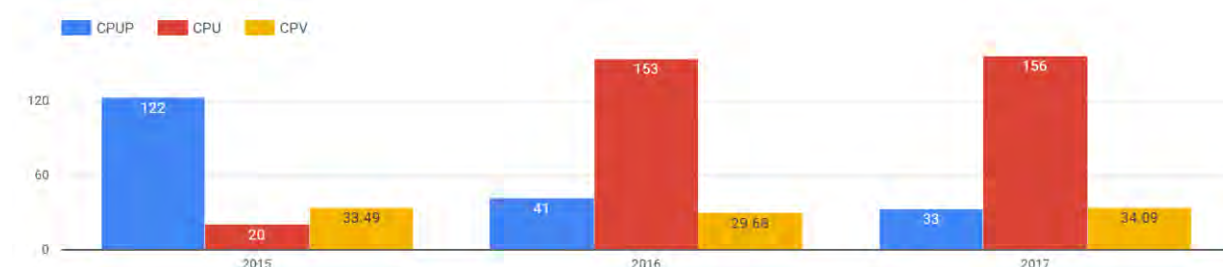
The average CPV is $33.49 for 2015, $29.68 for 2016 and $34.09 for 2017. While CPU for individual journals is $20 for 2015, $153 for 2016 and $156 for 2017, CPU for e-packages is $122 for 2015, $41 for 2016, and $33 for 2017. In consideration of one-time purchased back files in 2015, the PPV model is the least expensive, e-package is next, and the individual journal subscription model is most expensive for SBU Libraries. Therefore, the pay-per-view model is more effective than journal subscriptions and e-packages when the number of requested articles via ILL is manageable without increasing personnel.

Most Requested ILL Journals

To recognize the pattern of CPV articles, the authors tracked the journals that were requested more than once via ILL from 2015 to 2017 and grouped them by four disciplines as well.

Figure 7: Most Requested Journals via ILL
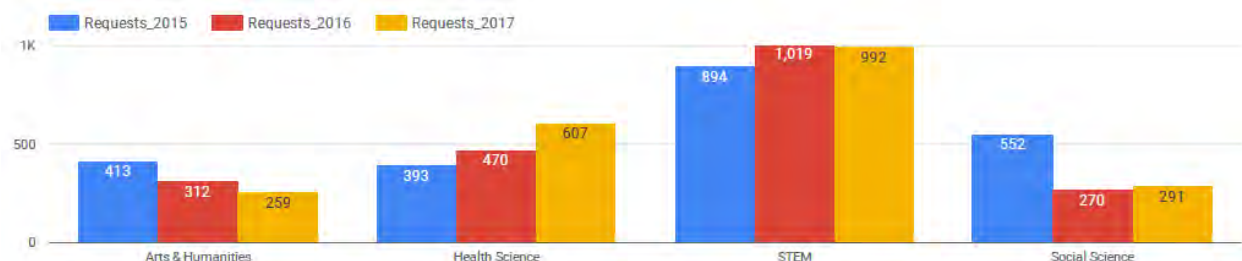
Figure 7 shows that STEM articles are highly requested and account for nearly half of ILL borrowing transactions. The total number of most requested journals is 2,095 for STEM and 1,470 for health science for the last three years. The numbers of most requested journals in both disciplines present a steady growth from 2015 to 2017. On the contrary, the numbers of most requested journals for arts and humanities and social science decrease, which means that the effort put into collection development in these disciplines is rewarding. It also suggests that the electronic resources for STEM and health science need to be improved. For example, the library should actively review journal titles selected in e-packages and add high quality open-access journals to the collection.

Conclusions

Academic libraries have supported universities and colleges to achieve their educational missions for decades. Today, it is even more important for libraries to articulate their values to gain more support to meet the ever-changing needs of users in this digital age. CPU incorporates exchange value into implied value and can be an essential metric of measuring library values and effectiveness in the respective context. The purpose of this study is to assess the implied value of library collections with CPU by utilizing big data technology.

The study shows that the cost of e-journal subscriptions has increased dramatically from 2015 to 2017. Particularly, the expenditure on e-journals reached 84% of the library collection budget in 2017. Also, the CPU for e-packages in the STEM field is about 42% of the CPU for journal subscriptions. The findings indicate that the e-package model is more cost-effective than a journal subscription, especially for STEM and art and humanities at SBU Libraries.

The PPV model can be a valuable addition to the e-package and journal subscription models, which allows libraries to provide resources beyond existing collections in a cost-effective manner. SBU Libraries has employed this model to acquire articles on STEM and health science for a few years.

Libraries may improve the journal subscription model by developing a prediction model to alert the Acquisition Department when to switch from a pay-per-view model over to a journal subscription by adopting big data technology and artificial intelligence. In the meantime, publishers, vendors, and libraries can develop a more sustainable PPV model collectively to meet the emerging and growing needs of scholars. The ability to add and maintain high-quality open-access content to library collections is also critical to library success.

Endnotes

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Library Continuous Improvement through Collaboration on an Institution-Wide Assessment Initiative

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Introduction

When assessment professionals in universities and academic libraries look past the methods and tools that they employ to the forces that motivate their work, they find three prime drivers. First is a motive for discovery. Opinions are held, behaviors are exhibited, and patterns exist within organizations that are unknown, yet we intuit that such knowledge would impact our decisions. Assessments of this type are commonly time- and resource-intensive, as the professional looks under many stones with the hope of gaining insight. The second driver is advocacy. Academic libraries compete for limited resources with other university departments. The university itself may compete for state funds against sister institutions. This competition engenders a motivation to advocate for stakeholder wants and needs and to gather compelling evidence to support them. The third and final driver is to demonstrate value. This motivation has become a dominant theme in the library assessment literature of recent years.[1] It is related perhaps to the advocacy agenda, but it is also associated with demands for accountability. As providers of state- and university-level funds want assurances that these resources are being put to good use, so also do accreditation agencies seek to ensure quality educational experiences for students.

It is in this light—the motivation to demonstrate value—that Kennesaw State University (KSU) launched a continuous improvement plan (CIP) known as **_Improve KSU_** during the 2016–17 academic year. With a focus on student learning and performance outcomes, the library is an ideal connector between the two, "capable of crossing traditional boundaries between disciplinary programs and organizational units."[2] Having now completed the second full year of the cycle, assessment professionals within KSU's Office of Institutional Effectiveness (OIE) and the KSU Library System (KSULS) have their first opportunity to identify improvements for the articulated outcomes and to begin refining the CIP based on lessons learned.

Literature Review

The integration of continuous improvement into the culture and framework of an institution supports a desire for excellence and is one of the crossroads for higher education. The New Leadership Alliance for Student Learning and Accountability charges institutions of higher education to take responsibility for assessing and improving student learning and to ensure that students have developed the requisite skills to be successful and responsible citizens.[3]

Institutions of higher education must strive to continuously improve by employing integrated, institution-wide, research-based planning and evaluation processes that will ensure it is effectively accomplishing its mission. The vision, mission, and strategic plan serve as the blueprints for defining the fundamental criteria for assessing institutional effectiveness, which provides evidence for the achievement and success of an institution. An institution-wide approach to assessment requires that all faculty, staff, administrators, and students contribute to achieving continuous improvement and quality enhancement. Furthermore, units and programs must identify outcomes, assess the outcomes, relate those outcomes to the university mission, vision, and/or strategic plan, analyze the results of the assessments, and demonstrate improvements for those units and/or programs.

Assessment tells us the extent to which students have learned what we expect them to learn, how satisfied our internal/external customers are, how efficient or cost effective our processes are, and so on. This is further amplified by Kuh et al (2015): "assessment's purpose is to answer questions, shape better policies, make better decisions—all designed to improve student success and strengthen institutional performance."[4]

Over the last twenty years, much has been written about assessment and why it is important, but less has been written on how to implement assessment systems.[5] Furthermore, there is agreement that one of the most challenging aspects of assessment is actually using results.[6] "Doing assessment, simply performing assessment activities, is not the same as using assessment results."[7]

In recent years, several articles have specifically addressed how to use results and how many institutions have not yet mastered that concept.[8] In a study on use of results, only six percent of the institutions included evidence that student learning had improved.[9] According to Kuh:

> . . . most colleges and universities were using multiple measures to determine student learning outcomes. At the same time, relatively few schools were 'closing the loop,' or using the information in any material way to intentionally modify policy and practice. Rarer still were colleges or universities where changes in policies or practices made a positive difference in student attainment.[10]

The **Principles of Good Practice in Assessing Learning** outlines nine items that constitute quality and effective assessment practice.[11] The Kennesaw State University (KSU) **Improve KSU** initiative addresses all of these in its approach. For example, "assessment is most effective when it reflects an understanding of learning as multidimensional, integrated, and revealed in performance over time" and "assessment is most likely to lead to improvement when it is part of a larger set of conditions that promote change." Kennesaw State has made an intentional effort to answer the call to create assessment processes that are focused on the use of results for continuous improvement.

Methodology

In 2015, Kennesaw State University and Southern Polytechnic State University consolidated to form a new university. This served as the impetus for the institution to recreate and redesign the campus-wide assessment process. An operational workgroup for institutional effectiveness comprised of respresentatives from across campus developed **Improve KSU**, a centralized, continuous improvement process for collecting student outcomes assessment information. The initiative has several goals:

- Build a culture of assessment and continuous improvement as a university
- Help drive our narrative as an institution
- Improve tracking of the strategic plan
- Compliance with accreditation standards
- Track assessment results and progress in a central location

In higher education and specifically at KSU, assessment focuses on specific expected outcomes pertaining to student learning and/or performance of administrative, operational, and student affairs units within the university. Student learning outcomes define expected knowledge, skills, attitudes, and competencies that students are expected to acquire. Performance outcomes are specific goals for an educational program or administrative, operational, or student affairs unit.

Figure 1 illustrates the process of KSU's university-wide, continuous improvement initiative, **Improve KSU.**

Figure 1: KSU's Continuous Improvement Model
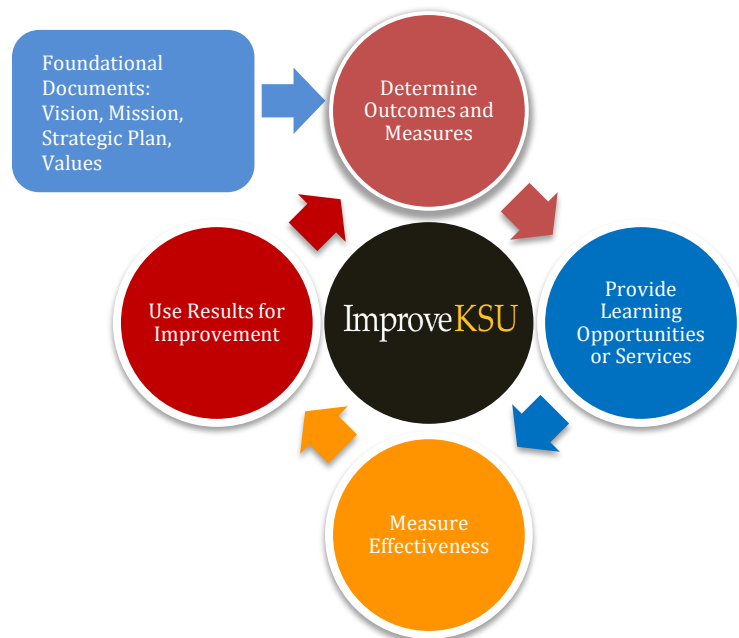
Units should first identify their purpose through foundational documents such as vision, mission, strategic plans, and values statements. From this, outcomes and measures should be identified that directly align with the foundational documents. Learning opportunities or services must then be provided so students have the opportunity to achieve the identified outcomes. Assessment methods are then employed to measure effectiveness. Finally, the results should be used for improvement and the assessment cycle continued.

Through **Improve KSU**, each educational program and administrative, operational, and student affairs unit is expected to document its assessment activities in annual "Assessment Plan and Improvement Reports" that are written by unit leaders and archived centrally by the Office of Institutional Effectiveness (OIE). These annual reports are expected to address the following key elements of KSU's institutional effectiveness process:

1. Identification of meaningful and measurable student outcomes (at least three for each academic and student services unit)
2. Identification of multiple measurement methods and data sources to determine the extent to which each outcome is achieved
3. Summarized measurement results of the extent to which each outcome was achieved
4. Analysis and interpretation of the measurement results that identify key assessment findings and opportunities for improvement of the service
5. Efforts underway to make specific improvements to the service as informed by assessment findings
6. Follow-up assessments that verify the effectiveness of past improvement initiatives and efforts and suggest additional avenues for continuing improvement

Rubrics are used to evaluate the strength of individual assessment plans and improvement reports. The rubrics provide a qualitative approach to generating constructive feedback that guides units to strengthen their outcomes, assessment measures, and strategies for improvement.

The University Assessment Council (UAC) oversees ongoing assessment to improve administrative, academic and student support services, educational programs, and student learning. The UAC fosters full participation in outcomes-based assessment. The UAC responsibilities include:

- Propose and assist in the implementation of university institutional effectiveness (IE) policies and procedures
- Monitor the assessment of the KSU Strategic Plan
- Monitor the quality of program and unit assessment results, reports, and plans
- Provide an annual report to the president documenting strengths and weaknesses of the university's overall effort in assessment and institutional effectiveness
- Serve as a cross-campus forum for the exchange of ideas, information, and advice on methods and practices of assessment
- Keep the university community apprised of expectations for assessment, including expectations related to KSU's regional accreditation
- Work with those who engage in assessment activities to help them understand (or enhance) their activities
- Promote collaboration, optimizing the use of shared tools and resources among areas

Findings
Macro-level

The Office of Institutional Effectiveness (OIE) assessment team reviews the over 400 assessment plan and improvement reports and provides qualitative feedback using a rubric. One of the strategies the office uses for continuous improvement is to track the type of outcomes identified throughout campus. As previously mentioned, these are divided into learning and performance outcomes. Several outcome themes were developed by the assessment team and include: alumni; branding, visibility, and communication; partnerships and collaboration (internal or external); customer service; external funding through grants, contracts, or donations; productivity; process improvement or efficiency; usage and participation rates; user satisfaction; recruitment and enrollment; retention, progression, and graduation rates; research and creative activity or the scholarship of teaching and learning; professional development and training; constituent education; technology-enhanced learning; program quality and curriculum; and other. Each outcome is coded to one of the above themes. OIE is then able to develop a narrative for the institution regarding identified areas of improvement. Figure 2 shows the top six outcome areas identified in unit performance outcomes: retention, progression, and graduation (46%); recruitment and enrollment (13%); research and creative activity (11%); high impact practices (11%); program quality (10%); and branding, visibility, and communication (9%). The idea is that this type of information will then help inform campus-wide strategic initiatives, but also help show units how their work aligns amongst each other and the institution.

Figure 2: Top Six Outcome Areas Identified in Performance Outcomes (2016–2017)
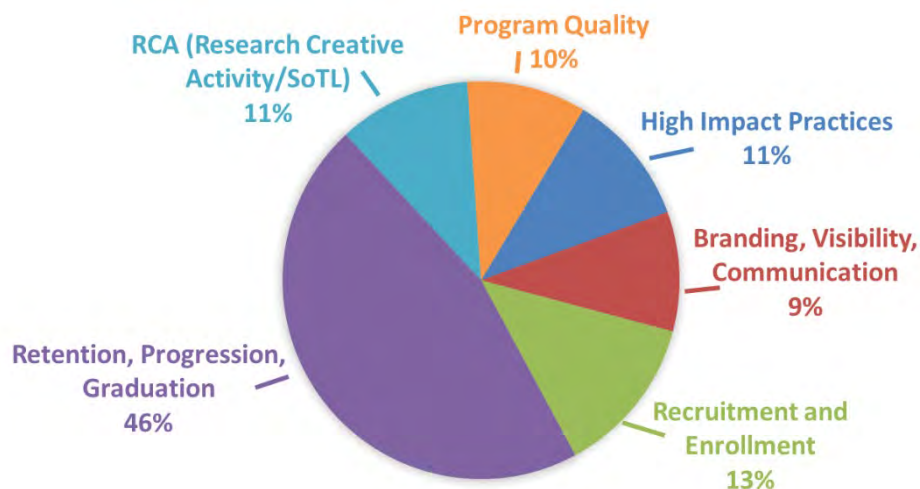
With over 400 units reporting outcomes, measures, results, trends, and areas of improvement, it would be difficult to list all of this information within this paper. To that end, the university has placed an emphasis on student success intitiatives. Strategies for improvement include increasing the number of students participating in high-impact practices, decreasing the number of students completing over 120 credit hours for graduation, increasing the number of students who complete 30 hours in the first year, and decreasing the number of students with undeclared majors. Ideally, the strategies that units implement for improvement should yield an overall improvement at the university level.

Micro-Level

With 24 outcomes distributed across the library system and its constituent units, it is not feasible to share all the findings within the limits of this paper. However, highlighting a few choice results should serve to illustrate the types of data that the KSU Library System is tracking and some of the issues that can arise.

Historically, the number of faculty and staff of the KSU Library System has failed to keep pace with the rapid enrollment growth of the university. In recent years, however, library administration has made a dedicated push to bring our personnel numbers more in line with our state peers. This is made especially challenging by the fact that our enrollment far exceeds those of our peers.

Table 1 illustrates the point. Despite a net gain of two library employees from FY 2017 to FY 2018, student headcount/library personnel actually slipped from 615.78 to 625.32 due to a significant enrollment increase over the same period. As of this writing, however, the KSU Library System has 63 employees. As such, the expectation is that next year's results will show a lot of improvement.

Table 1: Library System-level Result—Headcount/Library Personnel for KSU and 3 Georgia Comparators[12]

	# of Library Personnel		University Student Headcount		Headcount/Library Personnel	
Year	**FY 2017**	**FY 2018**	**FY 2017**	**FY 2018**	**FY 2017**	**FY 2018**
KSU	54	56	33,252	35,018	615.78	625.32
GA Comp. #1	57	57	20,459	20,418	358.93	358.21
GA Comp. #2	40	37.1	12,834	13,308	320.85	358.32
GA Comp. #3	40.3	39	11,302	11,375	280.45	291.67

At the unit level, the Technical Services Unit defined an outcome with the goal of decreasing the length of time to receive and process print and electronic books. As KSULS strives to modernize its collection, processing efficiencies becomes critical. To this end, the Technical Services Unit randomly sampled shelf-ready, book firm orders, and eBook firm orders. Each sampled title received date stamps for selection date, order date, received date, and check-in date, allowing the unit to track the number of days from the initial selection of a title to its full discoverability within the catalog. Moreover, the multiple date stamps provide a level of detail necessary to document where efficiencies may have been made in the workflow, or where bottlenecks may exist. Table 2 compares these findings for the 2017 and the 2018 years of ***Improve KSU***.

Table 2: Library Unit-level Result—Processing Time (in days) for a Sample of Monographs by Order Type[13]

	Random Sample Size		Processing Time in Days	
Year	2017	2018	2017	2018
Shelf Ready Orders	89	139	57.5 days	43.5 days
Book Firm Orders	11	75	59.4 days	78.6 days
eBook Firm Orders	50	77	17.6 days	13.5 days

Table 2 documents significant improvements in processing time for both shelf-ready orders and eBook firm orders. However, the time to order, receive, and process book firm orders has increased. By looking at the detail (not provided), one sees that the delay is confined to the final segment of the workflow, the check-in process. Perhaps some known issue—for example, vacant positions or a change in leadership—accounts for the lag. Or, the apparent decrease in efficiency may be more of a mirage based on the comparatively small sample of orders in 2017. In any case, the consistent and methodical tracking of this data provides the director of technical services and other decision makers the essential business intelligence to take corrective action on this mission-critical work process.

One of the innovations for assessment as practiced at KSU is the intentional tying of decision-making to assessment results within the report template. This connection is made as the responsible individual (usually a library unit director) documents possible courses of action within the **Brainstorming** section of the template and then focuses in on a specific strategy or strategies within the **Strategy for Improvement** section of the template. The excerpts below document the director of library facilities' thinking and plan to increase library seating.

Brainstorming: To meet generally accepted seating guidelines for academic libraries that suggest a minimum of 10% of FTE, the Library System needs to add considerably more seats, particularly at the Sturgis Library. Short-term solutions focus on re-locating carrels from the Johnson Library to Sturgis, as the Marietta-based library acquires new furnishings. Inexpensive, flexible types of casual seating, such as beanbags, could be purchased. Longer-term strategies need to consider how we utilize new spaces for seating as the Academic Learning Center is built in the next several years. This will provide an opportunity for the Sturgis Library to expand services and functions on its fourth floor and into the Pilcher Building, and re-locate collections. Johnson Library also has potential opportunities to utilize new spaces for added seating capacity as non-library departments such as CETL move out of the Johnson Library (C Building).[14]

Strategies for Improvement: Add approximately 50 carrels on areas of the Sturgis Library third floor where there is empty book shelving. These carrels are to be moved from the Johnson Library prior to installing new carrel furniture in the initial renovation phase in fall 2017. Another strategy to alleviate the strain on seating at the Sturgis Library will be flexible use of existing spaces. Classrooms and meeting spaces not in use can be made available for group and individual study during peak study periods and final exams.[15]

Narrations of this kind provide valuable context for library and university administrators as well as for accreditation agencies seeking to understand institutional value. It also serves as a repository of institutional memory, as library employees come and go, but the library's Continuous Improvement Plan continues on.

Lessons Learned

Following two years of **Improve KSU**, the authors have observed several factors that limit the effectiveness of outcome assessment and continuous improvement at the unit and library levels.

First, while the institution follows the SMART acronym for outcomes (specific, measurable, achievable, relevant, and time-bound), the achievable part is often the most difficult. Many units want to set targets, which are often arbitrary, and continue to meet that target year after year. While that may be one goal, for the purposes of this initiative, it is about identifying areas of improvement. Once units have several years of data, they may find that they can set appropriate targets that support the continuous improvement mindset. In addition, it is not always clear from the outset if there is room for improvement on an outcome. For example, in the first year of the CIP, the library's Access Services Unit was interested in improving customer satisfaction at the main checkout desk. In a standard, fifteen-question survey administered to walk-up library patrons, participants were asked to rate their satisfaction with the helpfulness of library staff at the checkout desk. Out of 291 responses, 78.7% reported being very satisfied with checkout staff helpfulness, with another 14.4% reporting that they were satisfied. With 93% satisfaction, and only 1.4% claiming any degree of dissatisfaction, improving this outcome (at least as measured by this survey item) should no doubt prove difficult. Further, the survey item did include a "Not Applicable" response option for students who may have had no interaction with checkout staff. Indeed, when the question was asked again for the FY 2018 cycle of *Improve KSU*, 77.7% of respondents reported being very satisfied, 11.6% reported being satisfied, and only 0.9% reported a degree of dissatisfaction (328 responses).

A second main factor contributing to meaningful outcome assessment is the extent to which the outcome is patron-focused. In the first year of *Improve KSU*, the library system defined several outcomes relating to the training of faculty and staff. In year two, these were phased out in favor of more outward-facing outcomes. The trainings are better understood as interventions toward some larger goal, for example, a reduction in cataloging errors or higher rates of satisfaction at library service points. At the university level, the message is that outcomes should be meaningful and informative to the work. As demonstrated in the library example above, the outward-facing outcomes more often help to inform units in their quest for quality and improvement.

Finally, experience has taught that the most meaningful outcomes are mission critical. It is important to ask "what is the core mission of the unit defining the outcome (as shown in Fig. 1, the KSU Continuous Improvement Model)?" For a unit providing information literacy instruction, this might be evidence that students are learning new skills or, even better, applying them in their course work. These types of outcomes also provide evidence of impact and are more meaningful in nature. According to Gilchrist and Oakleaf, "academic librarians ...too, need to provide evidence of their value and direct contributions to student learning and success through well-designed outcomes assessment processes."[16]

Any credible claim of improvement requires consistency both in the language of the outcome and in its measures. If this rule is held too strictly, of course, poorly worded outcomes and inexact measures would remain in perpetuity. The need for consistency, therefore, must be weighed against the need to define outcomes that are improvable, mission-critical, and patron-focused. To this end, the KSU Library System is revising forward, attempting to stay the course for at least two outcomes each cycle while substituting the weakest outcome for one that is more mission-critical and patron-focused.

The single largest change to the library's implementation of *Improve KSU* in the third year will be a move away from unit-based assessment and toward assessment of four strategic priorities: library resource management, library facilities, library services, and library organization (which, in essence, sits atop the other three). This makes sense because the work of libraries frequently requires collaboration of multiple units (think collection development and technical services), making it difficult to cleanly map an outcome to a single unit without involving others. Fortunately, most of the better outcomes from year two of the cycle map very cleanly to this new schema. Plus, there is a conservation of effort in that the library system will be defining and measuring 12 outcomes rather than 24.

Improve KSU requires and encourages units, like the library, to outline their strategies for improvement. As shown in the example above, this can sometimes mean adjusting the assessment plan or even the outcomes so they can be more meaningful, informative, and manageable. As the institution and units mature in the

assessment cycle, units will identify specific strategies for improvement in the learning opportunities and services provided.

Much like the units participating in **Improve KSU**, the initiative itself must follow a continuous improvement plan. The identified strategies are to first improve assessment synergy throughout the university to help reduce redundancy and increase the effectiveness of multiple assessment initiatives across the university. Second, units should place a greater focus on improvement and use of results. This was the area that needed the most improvement and so there will be more professional development and training opportunities focused on this part of the cycle. Finally, the online template, resource and educational materials, and feedback forms were all edited for clarity and ease of use by constituents.

Conclusion

Among the primary motivations of assessment work within universities and academic libraries is the compulsion to demonstrate value to a diverse group of stakeholders, including administrators, accreditation bodies, students, faculty, and the broader community. Specifically, the demonstrated improvement over time of well-crafted and consistently measured outcomes is an effective way of demonstrating value, especially when these outcomes are defined at various levels within the institution (unit/departmental/university). At each level, such outcome assessment encourages leadership to think deeply about what value it adds to the institution and how to most effectively demonstrate it. The process of continuous improvement is ever-changing by definition, and the **Improve KSU** initiative represents the effort by Kennesaw State University to provide a high-quality and evolving experience for all involved.

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Is There a (Data) Point? Are All of These Measures Useful?

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Introduction

Collection evaluation is time consuming, and collaboration between collection librarians and liaison librarians can lead to more meaningful assessment and context of usage of library resources. Each collection assessment tool offers a unique perspective and comes with its own set of advantages and disadvantages for different types of collections, subjects and ease of use. It can be overwhelming to select a tool and find time to use it to its full potential in order to fully evaluate a collection.

While COUNTER statistics have become one standard that captures usage of electronic journals ("e-journals"), many libraries look for additional data to help assess how their collections are used, to add depth to the analysis. Citation analysis, for instance, is another way that libraries can count usage, as it is considered a standard and valid measure.[1] A project described by De Groote, Blecic, and Martin is a good example where local citation data was combined with COUNTER statistics and data from their link resolver to get a better understanding of usage.[2] Citation data can be pulled from databases like Web of Science or Scopus,[3] and indexing companies like Clarivate (formerly Thomson Reuters) also sell their data to be analyzed.[4]

At McGill University Library, collection services librarians collaborated with liaison librarians to gather data from multiple sources, including a yearlong ARL MINES for Libraries® survey (https://www.arl.org/focus-areas/statistics-assessment/mines-for-libraries), 1Science reports comparing usage and faculty citation data against the library's holdings, results from faculty surveys on their preferred journals for teaching, as well as traditional vendor-supplied statistics.

Of the 40,000 students attending McGill University, 252 are part of the Faculty of Dentistry. The bulk of these students are undergraduates (153), and the remaining consist of residents and fellows (28), master's students (38), doctoral students (25), and postdoc students (8).[5] In these proceedings, data from the Faculty of Dentistry is used as an example to showcase what can be learned by combining data from multiple tools.

Research Questions

To gain a deep understanding of how faculty and students use e-journal collections to help inform collection development and promotion, the tools mentioned above were used to examine the following research questions:

- Which e-journals were being used, and by whom?
- Are the journals that faculty cite and publish in the same journals being downloaded the most often? What kind of coverage does the library provide to these e-journals?
- How do results of "priority" or "top" e-journals differ depending on the measurement tool used?
- Do some of the tools provide more comprehensive information for different subject areas? Is one type of tool better for certain tasks or questions?

Methodology

This analysis makes use of the data sources described below. The list of journals was retrieved from Scopus using the "Sources" database. There were a total of 238 journals in the listing.

Data were analyzed in R (version 3.5.1)[6] within RStudio (version 1.1.462).[7]

MINES for Libraries (Measuring the Impact of Networked Electronic Services) is an online survey protocol from the Association of Research Libraries (ARL) (https://www.arl.org/resources/mines-for-libraries-final-report/). The protocol allows libraries to create customized online surveys, configured to pop-up when a patron clicks on an e-resource from the library catalogue or discovery system. Libraries work with ARL to determine the optimal configuration and timing of the survey, depending on the library's needs. For example, the survey can be set up to run for a short time, such as a single day or a week, and appear every time an e-resource link is selected. Alternatively, it can be run for a longer period, such as a year, and configured to pop up every *nth* time an e-resource is selected. At McGill, it was configured through the EZproxy settings and appeared every 200th time an e-resource was accessed. ARL suggested this timing as a way to collect enough data points over time without being too disruptive to library patrons. The survey ran for a year, starting in September 2015.

The **Journal Usage Project (JUP)** was an online survey conducted with faculty across Canada, administered by the Canadian Research Knowledge Network (CRKN), a Canadian consortium for licensing content (https://www.crkn-rcdr.ca/en/journal-usage-project). Each participating institution had to obtain approval from its ethics board. The survey asked teaching professors to specify top journals they prefer for teaching and research. When a journal was indicated by a professor as being a "top" journal, it was considered a "mention" in the survey results. For example, if three professors wrote that a journal was their top choice, that journal had "3 mentions" in the results. The researchers combined the survey results with usage data pulled from Web of Science, including article downloads, as well as the number of faculty publications and citations within a given journal. At McGill University, this survey was sent out in January 2017 and ran for six weeks.

1Science created a custom report specific to the library's requests, on data pulled from Web of Science covering 2006–2015. The report included article downloads, as well as the number of publications written and/or cited by McGill faculty and indexed in Web of Science during that time period.

Results
MINES

The MINES survey resulted in 4,413 responses, with 47 (1.07%) participants self-identifying as being part of the Faculty of Dentistry. Within this group, the subset with the most participants was graduate students, as shown in Table 1. The MINES survey asked the participants to identify the location from where they were accessing the library e-resource. The undergraduate and graduate students indicated they were off-campus, while the residents indicated they were in a McGill-affiliated hospital, as shown below.

Table 1: MINES participants in the Faculty of Dentistry, by location

	Off-campus	On campus (library)	On campus (not library)	McGill-affiliated hospital	Total
Undergraduate	5	3	3	0	11
Graduate	16	2	3	0	21
Post-doc	0	0	1	1	2
Resident	1	0	0	4	5
Faculty	1	1	1	2	5
Research staff	0	0	1	0	1
Other	0	1	0	0	1

One of the primary reasons that libraries use MINES is to survey the patron's *purpose* for selecting an e-resource, such as whether the item will be used for an assignment or for writing a thesis, as well as the *reason why* they selected the specific e-resource, such as a librarian recommended it or it was an important resource in the field. For the Faculty of Dentistry participants, the top two purposes selected were thesis/dissertation with 14/47 participants (29.8%) and coursework/assignment with 12/47 participants (25.5%). The highest result selected as the "reason" for choosing the specific e-resource was "important resource in my field," with 27/47 (57.4%) participants.

Journal Usage Project

As shown in Table 2, each measurement results in a different "top" journal for the JUP. For example, the Journal of the American Dental Association was the top journal mentioned by faculty, yet it was 19th in the top downloads for 2015.

Table 2: JUP top results

Top downloads (2015)	Top downloads (Average 2011–2015)	Top mentions (faculty)
Journal of Endodontics	*Journal of Oral and Maxillofacial Surgery*	*Journal of the American Dental Association*
Journal of Oral and Maxillofacial Surgery	*Journal of Endodontics*	*International Journal of Dental Research*
Journal of Prosthetic Dentistry	*Journal of Prosthetic Dentistry*	*Journal of Dental Research*
Journal of Dental Research	*American Journal of Orthodontics and Dentofacial Orthopedics*	*Oral Oncology*

Top downloads (2015)	Top downloads (Average 2011–2015)	Top mentions (faculty)
Dental Materials	*Journal of Dental Research*	*Journal of Public Health Dentistry*
Australian Dental Journal	*Journal of Clinical Periodontology*	*Special Care in Dentistry*
Dental Clinics of North America	*Journal of Dentistry*	*Implant Dentistry*
International Endodontic Journal	*Clinical Oral Implants Research*	*Gerodontology*
Journal of Clinical Periodontology	*International Endodontic Journal*	*JDR Clinical & Translational Research*
American Journal of Orthodontics and Dentofacial Orthopedics	*Journal of Oral Rehabilitation*	*Australian Dental Journal*
Journal of Dentistry	*Dental Clinics of North America*	*Journal of Dental Education*
International Journal of Oral and Maxillofacial Surgery	*Oral Oncology*	*Community Dental Health*
Oral and Maxillofacial Surgery Clinics of North America	*Journal of Periodontal Research*	*Journal of Dentistry*
Clinical Oral Implants Research	*International Journal of Oral and Maxillofacial Surgery*	*California Dental Journal*
Oral Oncology	*Journal of Oral Pathology & Medicine*	*Journal of the Canadian Dental Association*
British Journal of Oral and Maxillofacial Surgery	*Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontology*	
Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology	*Oral and Maxillofacial Surgery Clinics of North America*	
Journal of the American Dental Association	*British Journal of Oral and Maxillofacial Surgery*	
Journal of Cranio-Maxillofacial Surgery	*Dental Materials*	
	Journal of Public Health Dentistry	

Combining results from the 1Science report with the JUP "faculty mentions" and journals in which faculty publish shows even more differences for the "top" journal as shown in Table 3.

Table 3: Combination of 1Science report with JUP results

Journal	Top downloads (2015)	Mentions	Faculty publications
Australian Dental Journal	*1223*	*2*	*0*
California Dental Journal	*N/A*	*1*	*0*
Community Dental Health	*N/A*	*2*	*2*
Dental Clinics of North America	*1175*	*0*	*0*
Dental Materials	*1285*	*0*	*0*
Gerodontology	*N/A*	*N/A*	*1*
Implant Dentistry	*382*	*2*	*0*
International Endodontic Journal	*1188*	*0*	*0*
International Journal of Dental Research	*N/A*	*4*	*0*
JDR Clinical and Translational Research	*N/A*	*2*	*0*
Journal of Clinical Periodontology	*1105*	*0*	*3*
Journal of Dental Education	*N/A*	*N/A*	*8*
Journal of Dental Research	*1437*	*4*	*23*
Journal of Dentistry	*1062*	*1*	*4*
Journal of Endodontics	*4401*	*0*	*0*
Journal of Oral and Maxillofacial Surgery	*2386*	*0*	*1*
Journal of Oral Rehabilitation	*567*	*1*	*2*
Journal of Periodontal Research	*207*	*0*	*0*
Journal of Prosthetic Dentistry	*1675*	*0*	*0*
Journal of the American Dental Association	*651*	*5*	*0*
Journal of the Canadian Dental Association	*0*	*1*	*5*
Oral Oncology	*11*	*1*	*1*
Special Care in Dentistry	*198*	*2*	*0*

Comparing data from different measurement tools allows for deeper analysis and requires a knowledge of the subject area. The *Journal of Dental Research* ranks high for all measures—downloads, "mentions," and publications. Also, the J*ournal of the American Dental Association* was a top "mentioned" journal by the faculty in the JUP, but it was not the top journal according to faculty publications and downloads. However, the download data for some journals is suspect due to the way it was pulled and input errors, and requires further analysis. *Special Care Dentistry* was mentioned twice by faculty as being important, yet the data

shows that McGill faculty has not published in this journal. The *Journal of Dental Education* is an important journal within the faculty, but it was not in JUP data.

Discussion

The results highlight a frequent mismatch between faculty opinions of significant journals in their field, and journals that are downloaded. Journals appeared to fall into one of three classes:

1. Journals where usage data matches with faculty perspectives. For example, the *Journal of Dental Research* has many downloads, is popular for faculty publications, and has many "mentions" as a top journal.

2. Journals with many downloads, but faculty appear to believe the journal is less significant; for example *Journal of Oral and Maxillofacial Surgery*.

3. Journals which appear to seem important to faculty, but where this popularity is not borne out by downloads or publications; for example *Special Care Dentistry*.

This clearly demonstrates that when using these types of tools to assess a collection, one must fully understand the advantages of the tool as well as its bias and limitations. Whenever possible, it is best to use multiple tools before making decisions. Fortunately for the McGill Library, regardless of the tool, the library had full or recent coverage of all of the e-journals considered as "top journals."

Not surprisingly, findings show that each tool has advantages and challenges. One disadvantage of the 1Science report and the JUP data is their reliance on Web of Science. Web of Science is popular for these types of data pulls. However, it is not exhaustive, and many journals used by the library's patrons are not indexed in the Web of Science, and therefore excluded from this type of analysis. While this paper uses the field of dentistry as an example, the full research project covered other subjects and, predictably, Web of Science was found to include more of the journals analyzed for the physical and health sciences than for the arts and humanities subjects. This should be kept in mind when selecting a tool that relies on Web of Science data.

Similarly, many popular journals for dentistry are not included in this analysis, as they are not categorized as dental journals. Journals used by the faculty can be in various categories, such as health, biomedical, psychology, etc. 1Science, in particular, has grouped journals by subject and, in doing so, may result in an incomplete picture of the faculty publications. Another future step in analyzing the collection could be to pull a composite list of dental journals and then reverse-lookup the titles in the various tools, regardless of the category that the tool uses.

None of these tools captured access to open access journals. Many fields, including dentistry, have one or two key journals that are open access. Individual title analysis is sometimes possible using COUNTER data, but having to rely on pulling each title separately is extremely time-consuming. As open access becomes increasingly important, it will become important for these types of assessment tools to find ways to capture usage of these titles.

Whenever collecting usage data, considering the time period is essential. As much of this data for these tools ended with 2015, some current journals are missing or the usage data is quite different. This could be due to changes in the journal content or how the journal is accessed, which is reflected in the usage data. For example, the *Journal of the American Dental Association* is accessed differently than it was in 2015, so usage data for more recent time periods are different than they were in 2015.

The results of the MINES survey offered a different perspective than the other tools, and provided insight into how some people are using the library's electronic resources. Like any tool, one must consider the context and composition of the faculty being analyzed is especially important when using MINES data. The

data collected for the Faculty of Dentistry showed that the highest portion of participants were graduate students. The primary purpose for these participants was "thesis/dissertation," which is consistent with participants who indicated they are graduate students. However, the faculty consists of 61% undergraduate students, demonstrating an inconsistency between the composition of the survey participants and the makeup of the faculty's student population. Given the low sample size for this faculty, further studies are needed to make conclusions. While not representative of the faculty, it can still be useful data. For example, the library can now investigate further within the faculty to determine if and how undergraduates and graduates are using the library differently. When speaking with graduate students within the faculty, the liaison librarian can focus finding resources for theses and dissertations, knowing that some students indicated this was the purpose for using the library.

The project highlighted that a single tool or single data source was not shown to be generally "better" than another, and one data source does not provide the entire picture. Using a combination of faculty feedback alongside usage provides more reliable data and helps librarians better understand the collection. As trends change, ongoing sampling and bibliometric analysis would be beneficial.

Limitations

There are several limitations in this research project. Regarding the MINES data, results are based on a small sample that was shown not to be representative of the faculty composition. To gain this type of insight into just the Faculty of Dentistry, further research would be needed in order to make conclusions.

Source data were taken at different times (JUP faculty survey was in 2017, Web of Science data was from 2015, the 1Science report was provided 2015, and MINES was conducted 2015–2016). Results are indicative of interesting trends in collections usage for this particular discipline, but should be interpreted with caution. The date range of the source data provides a broader picture of collection usage trends; however, different data from different source dates were compared.

Some of the data pulled by the tools was incorrect due to how the data pull was set up, resulting in inconsistent download data. For example, the JUP and 1Science both pulled from Web of Science in 2015 but some titles had different values for the same measurement (article downloads). It was discovered later that this was due to how the data was pulled.

Additionally, download data for open access journals was not considered, as they were not captured by the tools used in this project. This creates the risk of missing significant information on open access journals such as *BMC Oral Health* and *BDJ Open*, key journals in the field.

A significant issue with research into use of collection in dentistry, and one which is shared by many other disciplines, is that many journals are popular publication venues and sources of information for dental researchers (e.g., *Journal of Bone and Mineral Research*), but are not specifically dental journals.

Conclusion

This project demonstrated that each tool and dataset provided a different picture of the collection and suggested different journals as being "top" or significant. This is critical when using tools for collection development and weeding decisions, as relying on a single tool may provide only one aspect of usage. It is also important when conducting liaison work, such as when learning about the collection and reaching out to faculty and students. While going through the exercise is worth the effort for many collections, one must keep the limitations of each tool in mind. Going forward, more work is needed to correct suspect data as well as to determine usage statistics on open access titles as these are not well captured by these tools. Also, the McGill Library will need to review journal titles that were mentioned by the faculty as important but to which the library does not have full access.

Notes

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Using Student Survey Data to Build Campus Collaborations

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Introduction
Since 2004, the University of Chicago Library has sought to understand the research, teaching, and learning needs of its users through periodic surveys of its campus stakeholders. This paper presents the findings of the library's 2017 Survey of Undergraduates and explores how a shift in focus of the survey program from measuring patron satisfaction to understanding student needs provided the library with new ways to make use of survey data for strategic communication with campus partners, particularly around the development of student research skills and opportunities.

Library Survey Program, 2004—2013
The University of Chicago Library's use of LibQUAL+ in 2004 and 2007 provided the foundation for its survey program by helping establish baselines and benchmarks for library collections, services, and spaces based on feedback from a sampling of students and faculty. From 2010–2013, the library built on the findings of the two LibQUAL+ projects by surveying, in turn, graduate students, undergraduates, and faculty using locally-developed instruments that explored user satisfaction while posing more specific questions about current and future services. Findings from these institution-specific surveys informed the development of policies, services, and strategic initiatives, but proved to be of limited use in communicating with the campus or other external stakeholders.

Ithaka S+R Surveys, 2015—2017
Beginning in 2015, the library changed its approach to its survey program by partnering with Ithaka S+R to administer their student survey first to all enrolled graduate and professional school students, then to all enrolled undergraduates two years later. Unlike the library's previous surveys, which focused on the library itself, the Ithaka S+R student instrument is situated as a survey about the experiences, needs, and perceptions of the student, with modules exploring higher education objectives, research and teaching practices, and the role of the library. As a result, responses to these surveys provided insight into a range of student experiences and needs that might not otherwise have been expressed to or heard by the library, and resulted in findings that could be used by both the library and its campus partners.

Analysis of the 2017 Survey of Undergraduates
For LibQUAL+ and the locally developed surveys, the University of Chicago Library's analysis and reporting focused on generating high-level summaries for library administration. Staff survey teams were directed to describe broad themes, rather than identify areas for action. Once the survey team had completed its analysis and reporting, library administration would conduct their own analysis, reviewing the previously-identified themes in order to assign action items. This second phase of analysis was not incorporated into survey reporting.

The survey team produced a similar high-level summary of the 2015 Survey of Graduate and Professional School Students, but it proved to not be useful for decision-making, in part because the challenges identified were not uniquely within the purview of the library. As a result, the 2017 survey team centered their reporting on emergent themes, specifically research skills and opportunities, the impact of library instruction, and the use of the library's physical spaces, rather than trying to generate a high-level summary that could not hope to represent the richness of the data. This thematic approach to reporting resulted in the development of compelling messages for a variety of audiences.

Findings of the 2017 Survey of Undergraduates

Undergraduates hope but often fail to have opportunities to conduct original research.

While the majority of undergraduate respondents indicated that it is important to have had the opportunity to collaborate on research projects with professors or advisors, less than half of respondents—to both student surveys—reported having had an opportunity to do so. Survey responses additionally confirm the perception that undergraduates are not often assigned original research; in fact, the most frequently assigned types of work are problem sets, which are regularly assigned to 64% of respondents, as well as responses to assigned readings, regularly assigned to 57% of respondents. Although less than 40% of undergraduate respondents in their fourth year reported being assigned research papers, the majority of undergraduate respondents indicated that it is important to them to acquire nearly all research skills explored in this survey.

Undergraduates feel relatively confident in their research and writing skills.

Nearly half of undergraduate respondents rated their abilities on common research tasks as 'good' or 'very good':

- Synthesizing or incorporating academic information into research projects (48%)
- Evaluating academic sources of information (47%)
- Writing according to academic or discipline-specific standards (47%)
- Locating academic sources of information (46%)

Respondents were particularly confident in their ability to use information ethically (61%).

Increasing confidence in these skills positively correlates with time at the university, and respondents with declared majors were consistently more confident in their skills than those who had not declared a major. Despite the high levels of confidence in search skills expressed, a plurality of undergraduate respondents (43%) reported starting their most recent research project by using a general search engine such as Google.

Undergraduates report frequent use of library spaces.

Ninety-three percent of undergraduate respondents indicated that it is very or extremely useful that the library makes study space available. In fact, 88% of undergraduate respondents visit the library at least weekly, a stunning number confirmed by entry control logs that, in early 2018, indicated that only one currently-enrolled undergraduate had not visited the library. Eighty percent of respondents reported staying for at least an hour when they visit.

Undergraduates do more than just "hang out" at the library.

The majority of undergraduate respondents visit the library at least weekly to work on a paper or assignment (62%). More than two-thirds of respondents visit at least quarterly to work on a paper or assignment (93%); study for an exam (87%); or work or study with a group of two or more people, but not on a group project (81%).

Undergraduates benefit from library collections.

Eight-nine percent of undergraduate respondents feel that it is very or extremely useful that the library "pays for resources that I need for my coursework or research projects, from academic journals to books to electronic databases," and 78% place the same value on the library's provision of its e-reserves system. The majority of respondents visit *at least quarterly* to use an online (64%) or physical (55%) resource.

Undergraduate research skills improve with library instruction.

Undergraduate respondents' self-assessments mirror the perceptions of graduate student respondents with teaching responsibilities, only 13% of whom disagreed with the assertion that their students had poor research skills. However, both recent student surveys demonstrated that it is not clear who should have primary responsibility for supporting the development of these skills. Undergraduate respondents generally perceive the development of research skills to be the responsibility of faculty members rather than librarians, while graduate students with teaching responsibilities indicated that responsibility for developing research skills should fall first to the student, then their instructor, and then the library.

While a minority of respondents expect the library to have responsibility for the development of student research skills, survey responses clearly indicate that library instruction has an impact in this area. Undergraduate respondents who received library instruction—in any form—consistently gave a higher rating to their current research skills than those who did not receive instruction. In particular, respondents who received instruction were more likely to rate as 'good' their skills in synthesizing or incorporating academic information into research projects, locating academic sources of information, and situating research projects within the existing literature. Respondents who received instruction were less likely to start their research from a general search engine than respondents who did not receive instruction; they were also more likely to start their research from an academic search engine or from the library's website.

Building Campus Partnerships
The new approach to survey analysis, reporting, and communication introduced with the 2017 Survey of Undergraduates facilitated more timely and agile use of survey findings with both internal and external audiences. Presentations and updates focused on the survey's themes were given at the library's monthly all-staff meeting. Shorter reports and talking points, distributed via the library's intranet, allowed library staff to engage in conversations with a wider range of campus partners by focusing on issues that broadly impact undergraduates and exploring areas of shared responsibility. By shifting its focus to the students' challenges rather than the library's existing solutions and historical strengths, the library was able to expand outreach broadly to groups on campus that support undergraduate outreach, research, and learning.

Library Student Advisory Group
The Library Student Advisory Group (LSAG) has served as a crucial sounding board for the library's survey program. Advice from the group's undergraduate and graduate student members shaped aspects of the promotion, analysis, and reporting for both Ithaka S+R surveys. In return, this group was the first external audience for the findings of both survey projects, providing an opportunity for the survey team to be held accountable by the project's participants by seeking their input on both the validity of the project's findings as well as the efficacy of the messages the library intended to communicate to other campus stakeholders.

Two themes from the 2017 Survey of Undergraduates seemed to be most appropriate for this audience: the use of the library's spaces and services, and the impact of library instruction on student learning. LSAG had previously advised the survey team to explore possible relationships between campus residential housing and use of aspects of the library, so presentations to this group highlighted the response rates by campus housing affiliation, and confirmed that participants tended to prefer the campus library closest to their residence hall, the only meaningful difference in use or behavior noted during analysis by residential location.

Having reported back on the aspects of the project directly informed by the group's input, the survey team also presented LSAG with specific areas of concern that had emerged from the data in order to get feedback on the library's considered path of action. For example, survey responses echoed longstanding concerns about the availability of a quiet twenty-four hour study space. In response, the library conducted interviews with users of its all night study space in order to develop a more complete understanding of the problem. These data and possible next steps were shared with LSAG by a member of the library administration in

order to determine whether the library's potential solutions seemed reasonable to those who had expressed this need.

The survey team also shared the findings related to student research skills and opportunities. Both topics seemed to resonate with LSAG members based on their experiences as students and instructors, though they seemed less impressed by the findings that indicated the impact of library instruction. Observing the varied levels of engagement was informative as the library and the survey team prepared to take the project's findings to other campus audiences.

Chicago Center for Teaching

The Chicago Center for Teaching[1] (CCT) supports faculty and graduate student instructors by providing instructional resources, pedagogical training, and professional development opportunities. While the University of Chicago Library had worked with the CCT in the past, this partnership had been limited to a few isolated workshops on assignment design. The findings of the 2015 and 2017 surveys related to the development of student research skills created an opportunity to build on this historical relationship in hopes of providing more systematic support for student learning in these areas.

Outreach by library administration to the CCT resulted in a series of meetings, first with the CCT's executive director, then with other CCT staff members. In these meetings, library staff highlighted the ambiguity expressed by both undergraduate and graduate respondents with regards to the development of research skills. This message was appropriate for several reasons. First, it acknowledged that while students enter the university feeling confident in their research skills, both the CCT and the library recognize that those skills need to be expanded and refined in order for students to be prepared to do undergraduate and graduate level work. Second, it demonstrated that graduate student instructors—the CCT's primary audience—believed that students themselves are responsible for developing their own research skills, rather than their instructors or the library. Finally, it provided an opportunity for the library to demonstrate—with data—that the instruction it provides has a positive impact on students' confidence in their research skills.

The library approached these conversations with the hope of identifying opportunities to collaborate with CCT staff around the development of student research skills. The most immediate outcome of these conversations was the formation of a quarterly "teaching talk" hosted by the library with CCT staff and other campus units that support academic technologies and instructional design. While it remains to be seen whether these conversations will yield more instructional opportunities for the library (for example, more invitations to collaborate on the development of assignments or course-integrated instruction), they have provided important opportunities to challenge perceptions of the library and its role in supporting student learning.

Center for Research and Fellowships

Another partner identified for outreach using survey data was the College's Center for Research and Fellowships (CCRF).[2] The CCRF's initial focus was on advising undergraduates who were seeking competitive fellowships and grants (for example, the Rhodes Scholarships). Recently, the scope of its work has expanded to include supporting undergraduate research broadly through promoting and developing research opportunities within the university and beyond. While outreach to the CCRF was already underway, the 2015 and 2017 survey findings regarding student expectations for research opportunities at the university provided new urgency for building this relationship. The 2017 survey in particular demonstrated that undergraduates have limited opportunities to develop research skills—much less conduct original research—in the context of the college curriculum. Since the CCRF serves as a gatekeeper to undergraduate research opportunities, the library felt it was crucial to communicate the importance of developing research skills so that students are prepared to succeed when research opportunities arise.

Instead of approaching the initial meeting with the director of the CCRF with a list of services the library could provide, the library came prepared to demonstrate a shared understanding of the challenges faced by students hoping to conduct original research at the university. In this meeting, the library highlighted the

high expectations student respondents had for research experiences with university faculty, along with their desire to develop research skills during their time at the university. This led to a broader discussion about the limited access to research opportunities for students in the humanities and social sciences, the need for additional research instruction in the college curriculum, and the scope of the library's current services in these areas.

By sharing its knowledge of student needs—grounded in survey data—along with possible strategies for addressing these needs, the library was able to demonstrate its appropriateness as a key partner in developing new undergraduate research programs and opportunities. A significant collaboration has emerged out of this partnership resulting in new programming and services, including the library hosting a week of programming focused on undergraduate research, a library research guide for Fulbright applicants, library office hours for CCRF staff, and training for the Chicago Summer Institute fellows, a new program supporting undergraduate research in the humanities and social sciences.

Outreach to Faculty and University Administration

In the past, reports on library surveys were typically posted on its public website, along with a brief executive summary and a description of areas for response.[3] A news story on the library's website normally accompanied the release of the report, completing the cycle of reporting. Changes to the survey program in 2015 and 2017 resulted in findings that necessitated different strategies for publication.

Findings from the undergraduate survey were used to develop an article in the library's faculty newsletter, *Libra,* which used survey data to highlight the impact of instruction on undergraduate respondents' perceptions of their research skills.[4] To expand upon outreach to faculty, additional talking points highlighting the survey findings were developed for the library's subject librarians, who are responsible for outreach to the departments and constituents they serve.

Office of the Dean of Students in the College

Following the success of outreach efforts with the College Center for Research and Fellowships, the library contacted the Office of the Dean of Students in the college.[5] This office oversees undergraduate advising and support services, and works closely with college faculty on the curriculum. In preparation for a meeting with two associate deans of the college, a summary of findings and talking points detailing the library's role in supporting undergraduate academics were created using the data on coursework and research.

However, in this instance, the survey findings did not resonate with the audience as anticipated. It was clear that the associate deans were more interested in learning about library spaces, in particular the growing need for study space for undergraduates, than in the talking points that highlighted issues from the survey. Although the need for space was expressed by survey respondents, it was one of many that the library hoped to address in the context of this meeting. While more communication prior to the meeting could have facilitated more meaningful reporting on survey findings related to the topics of interest, the disconnect between the deans' interests and library's message demonstrate the importance of using data to illustrate how the roles of the library continue to shift to meet the changing needs of its constituents.

Office of Institutional Analysis

By contrast, discussing survey initiatives with new staff in the Office of Institutional Analysis laid the groundwork for what will hopefully be a productive partnership. The Office of Institutional Analysis, part of the Office of the Executive Vice President, coordinates and conducts analysis and assessment campus-wide. Personnel changes in this office necessitated building new relationships; the library used this opportunity to present its survey program in hopes of fostering a more robust data-sharing relationship than existed with previous personnel.

While the survey findings were not shared in the context of this initial meeting, the surveys themselves may have created new opportunities for collaboration and data sharing, as they contain data that parallel those collected by the campus through other survey instruments. As a result of this meeting, the library has been

offered access to campus survey data to which it has never had access; in return, it intends to share survey findings, and hopes this office will partner to support future survey initiatives.

Conclusion

The library continues to draw on survey findings to inform outreach and strategic decision-making. Survey findings have already contributed to the development of a new Center for Digital Scholarship at the library and will be used to shape its services to the campus. Reports and presentation materials may be developed for specific collegiate divisions or majors since materials that directly relate to specific groups of students are more likely to resonate with campus faculty and administrators. Infographics using data or survey comments may help alumni or potential donors better understand the experience of undergraduates on campus and the library's role in supporting academics and the student experience.[6] Finally, handouts or giveaways for prospective students highlighting survey findings may be helpful in promoting the role of the library in student life.

After creating and administering surveys of library users for nearly a decade, the University of Chicago Library shifted from designing surveys for internal use to engaging in outward-looking projects that centered on the experience of students in the broader university context. This shift in focus and strategy allowed the library to take an institution-wide perspective in its analyses and communication. Rather than producing high-level summary reports for library administrators, short, thematic reports were created focusing on student life and learning. These reports provided talking points for staff to use in their campus outreach, opening conversations which set the groundwork for new partnerships and expanded support for student needs. The library's survey findings continue to be mined for use in strategic communication with its various stakeholders as the library seeks to define and describe its ever-expanding role in supporting the university's mission.

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Endnotes

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Step Aside, Tableau: The Pros and Cons of Analyzing and Reporting Ithaka S+R Survey Results Using Google Data Studio

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Introduction

In the fall of 2017, Georgetown University Library conducted the Ithaka S+R survey on its Main, School of Continuing Studies, and Qatar campuses for undergraduate students, graduate and professional students, and faculty. Each user group received a customized survey instrument which included between 20 and 50 questions, some of which had multiple sub-questions. Almost all questions gathered categorical or ordinal data; very few questions asked for free-text responses. The categorical and ordinal data could be easily aggregated for analysis of trends across various subgroups in a spreadsheet program (like Excel), but the sheer quantity of data available would have resulted in scores of tabs and graphs. With nearly 2,000 responses to analyze and communicate to stakeholders, researchers faced the challenge of finding a presentation tool that would allow them to share the data dynamically and encourage exploration, but without overwhelming colleagues at different data visualization skill levels.

For this task, many libraries have chosen Tableau, one of the leaders in the field of analytics and business intelligence. While Tableau's menu of data visualization options was impressive, its steep price tag and blog-like layout were less appealing, and we decided to consider other options. As a Google campus, Georgetown University relies upon the Google Apps Suite for email, collaboration tools, and synchronized cloud and desktop file storage. Our discovery of Google Data Studio's beta version (now fully integrated as part of the Google Apps Suite) provided us with an opportunity to use a free tool that was already seamlessly integrated with our workflows, security, and file structure. However, it also presented challenges worth sharing to help others benefit from our experience.

To Avoid Drowning in Survey Data, We Identified Our Priorities

A fresh dataset is enticing to a data analyst, with all of its possibilities for data visualizations and potential findings. While it can be tempting to exhaustively explore a dataset, with a deadline for the completed report already looming in the distance, decisions about where to focus and how to present the data need to be made quickly. Our research team chose to wait until we had the raw data back from Ithaka S+R before deciding how to move forward with the analysis. Once we understood how the data were formatted, coded, and described, it was easier to give our analysis a clear direction by focusing on our previously-identified priorities. Below is a list of priorities, including our criteria for analyzing and reporting, that we considered before we began our analysis.

Priority 1: Use the dataset to actively engage with stakeholders.

With three campuses and six libraries, we needed to find ways to present slices of the data that would be relevant to each of our various stakeholders. The Ithaka S+R Survey was the largest survey conducted in over a decade by Georgetown University Library, and we wanted to ensure that the data were used vigorously before their shelf life expired. Although the survey topics were broad and the findings were relevant to the vast majority of library staff, we would have to compete for attention in a year that also saw a new dean of the library and long-awaited transition to a new ILS. To actively engage with stakeholders through the dataset, we looked for a tool that would allow us to slice the data dynamically and zoom in to study subsets of our respondents or focus on specific topics.

Priority 2: Provide data visualizations alongside analysis and context.

Early feedback from stakeholders suggested that it was meaningful to explore the dataset without analysis notes or summarized findings. In other words, our stakeholders wanted to be able to draw their own conclusions as they looked at our graphs. On the other hand, as researchers, we felt that it was important to provide analytical observations about the data, drawing attention to important trends and findings in the descriptive statistics. To achieve both views of the data, we wanted a tool that would give us a layered approach so that at first our audience would see just the data, and then they could choose to see our analysis.

Priority 3: Make it appealing to view and easy to navigate results without a start-to-finish linear requirement.

We wanted to benefit from working with the library's communications and marketing coordinator to make our results visually appealing, with colors and logos to suggest familiarity and a cohesive package of information that looked like it was an official report of the Georgetown University Library. To get the look we were going for, we needed a tool that gave us control over the design of the digital page so that we could create a clean and simple look no matter how complicated the data. We wanted something that would feel browsable, interesting to flip through and explore, and able to stand on its own without a lengthy introduction about the technical aspects of using the tool. If someone had to be in the room with the viewer to explain how to explore the data, that was a deal-breaker. We also wanted to avoid tools that required viewers to go through every page before moving on to the next, since topics included in the survey would have varying levels of appeal to different stakeholders.

Priority 4: Use tools that are already available.

Initially, Georgetown University Library had planned to conduct the Ithaka S+R Survey in the spring of 2018. But when several administrative details aligned in support of a fall 2017 launch, we moved up our timeline by six months and committed to working with a four-week pre-launch timeline. Unsurprisingly, we were not able to spend much time considering our analysis needs prior to launch. Because we did not plan in advance, we had not included a budget proposal for any new analysis software. It might have been possible to get a few more Tableau licenses for the whole project team, but not without sacrificing other priorities for the division. By completing the analysis with tools that we already had available on all of our computers, we would save valuable time and money.

Priority 5: Protect data and share selectively.

The library shares reports and data internally via its Staff Wiki (intranet), but we do not typically share our data and reports publicly through our website. While we planned to share our Ithaka S+R Survey results more broadly than most of our previous assessment projects, we knew that we did not want to make the data publicly available. To maintain transparency and openness about the results among staff while maintaining them securely, we would need a tool that was password-protected and that would not reveal the entirety of the underlying dataset to viewers.

Google Data Studio, Explained

Google Data Studio (GDS) is a data visualization and dashboard-building tool that uses data connectors as an active pipeline between a dataset and the interactive front-end interface. The dataset can live on the web, in a Google Sheet, or as a .csv file. As the data in the background update, GDS reflects the changes. Data can be cleaned and formatted using functions within the GDS editor's interface, or data can be prepared ahead of time in Excel or Google Sheets. Permissions, both for collaborative editing and sharing with viewers, work similarly to other tools in the Google Apps Suite. When we were considering GDS for the Ithaka S+R Survey project, it was still in beta, but in September 2018, Google moved GDS out of its beta phase, and it continues to roll out updates to the editing and viewing interfaces.

The Benefits of Using Google Data Studio to Meet our Priorities

While we were somewhat concerned that attempting to use a product in beta for analysis and reporting would backfire, it seemed to be the best fit given our priorities, and we were curious enough about Google Data Studio to give it a try. We worked with the data in GDS for about three weeks, then requested some feedback from our Assessment Steering Committee. Their positive feedback gave us the green light to move forward with analyzing the whole dataset in GDS. Overall, our experience was mostly positive and we were able to meet our priorities for analysis and reporting. Below is a summary of the benefits of GDS that the research team found most appealing.

GDS offers customizable features for presenting basic data visualizations, with multiple filters to isolate data within subgroups. For the Ithaka S+R Survey results, we created filters for "school," "primary library" (i.e., the library location that respondents indicated that they visited most often), and "gender." This tailored view of the data allows users to actively engage with the dataset, deciding whether to zoom in tightly on a specific subgroup or zoom out to get a broad view of the data. Instead of making separate static reports for each potential group of stakeholders, we created filter buttons to allow users to choose their own view of the data. It is worth noting that there is a learning curve for structuring the dataset appropriately for the filters to work, but within GDS there are examples to follow. We also used scorecards to display dynamic n counts, which update automatically as filters are applied or removed. Image 1 shows how these features are combined on a typical report page.

Image 1: Sample GDS graph from the Ithaka S+R Survey
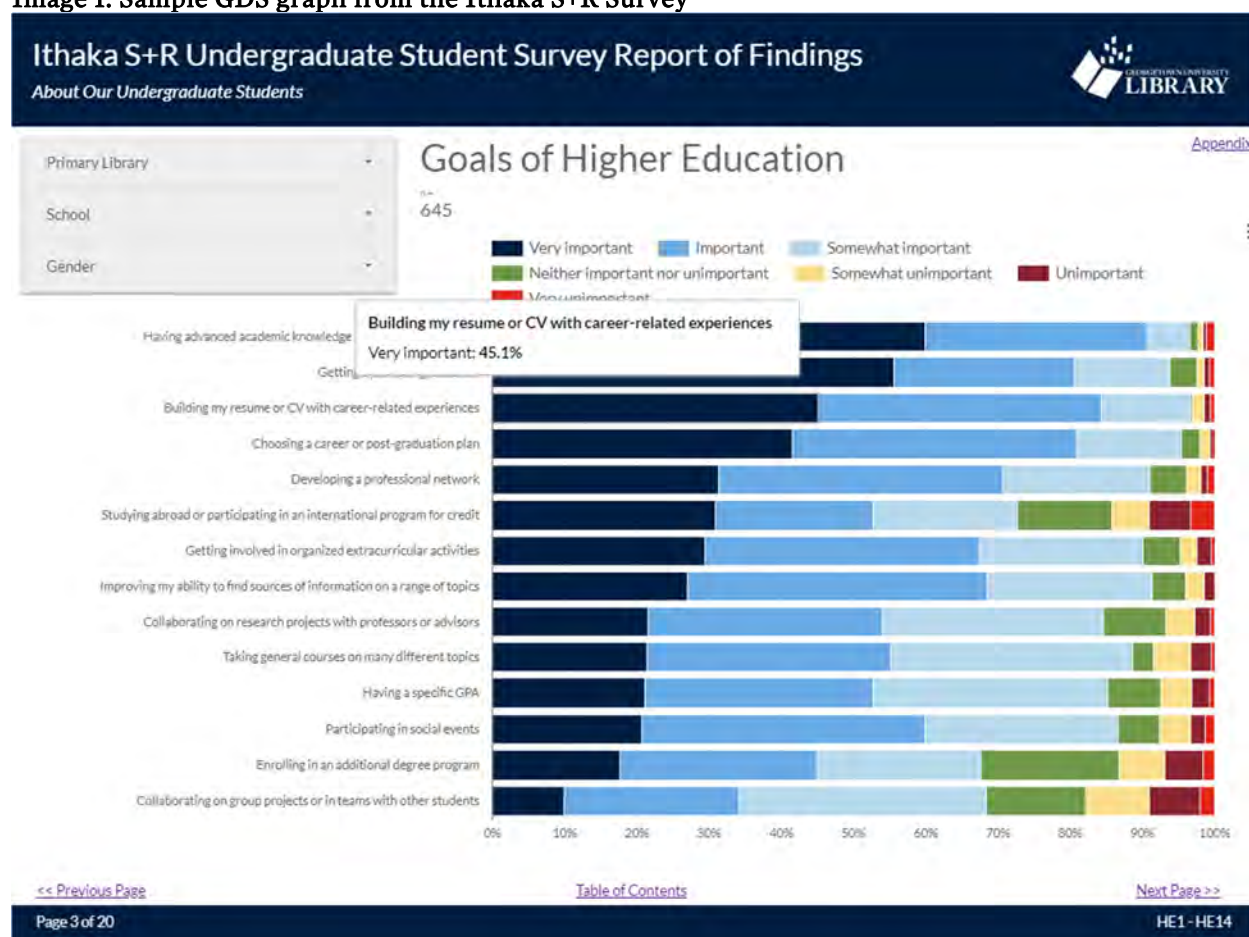
Features include customized formatting, multiple filters, automatically updating n count, tooltips, data download option, and links to other pages.

The layout of Google Data Studio is like a slide deck with a unique URL for each slide. For some of our users, flipping through the slide deck to make their own observations was their preference. But for users who wanted a prepared analysis, we included a link on most slides that would pop-out an appendix slide with an additional view of the data, as well as a few digital "sticky notes" highlighting our observations about the results to the question. By layering the analysis behind the results, GDS gave us a way to present the analysis and its context alongside robust views of the data. Image 2 shows a close-up of a sticky note from one of our report's appendices.

Image 2: Detail of GDS sticky note highlighting an observation from the data
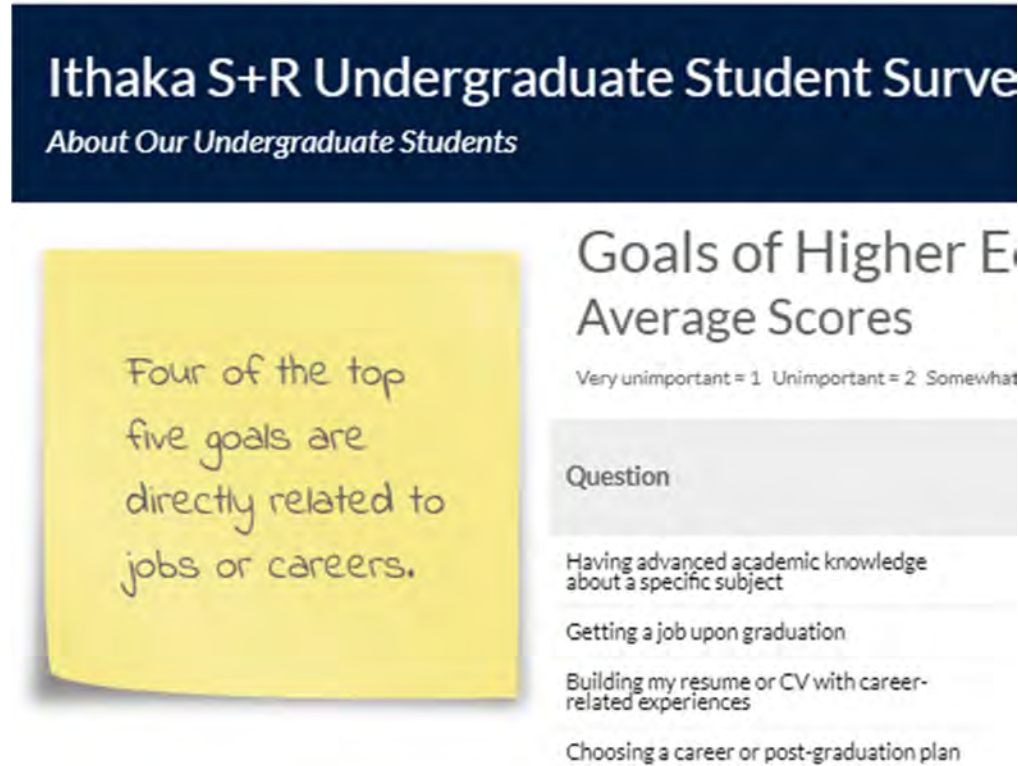
While sticky notes are not a standard "shape" for GDS, a simple image with a CC0 license can be easily imported and then layered behind a text box.

While extensive training was not necessary for users to explore the dataset on their own, the library assessment team held a one-hour, hands-on training session for the library's Leadership Council, demonstrating how to explore the data and use filters to make observations within subgroups. We also hosted several trainings open to all library staff, though these were only lightly attended. Thanks to feedback from staff members, we added more navigational details to the report, such as question numbers and overlap indicators within the tables of contents, to facilitate comparisons within topics and across surveys.

Image 3: One section of the Graduate and Professional Student Survey table of contents

Library Spaces

Many of the questions about library spaces were the same (or similar) on all three surveys. In this view of the Graduate and Professional Student Survey table of contents, we are directing users to also explore the Undergraduate Student [u] and Faculty [f] Surveys. The original survey question numbers are included to help viewers who may be interested in looking up the exact phrasing of a question.

Google Data Studio allowed us to use the visual identity of Georgetown University to customize the look and feel of the report. Banners, logos, and even the colors of the bars on our bar graph were easily customized with Hex codes. To help with navigation, we used headers to indicate the name of the survey instrument and the section and topic of the survey. Viewers can browse, flip, and explore as if they were looking at a digital magazine. Viewers can also use the table of contents to select which topic they want to jump to. At the bottom of every page, we included a link to the table of contents, as well as a link to advance them forward or backward within the slide deck. We connected all three survey instruments to one digital "cover page" (see Image 4) so that all three sets of results were available via one link.

Image 4: Digital Cover Page for the Ithaka S+R Survey Report of Findings

Ithaka S+R Survey Report of Findings

Undergraduate Student Survey Report of Findings

Graduate and Professional Student Survey Report of Findings

Faculty Survey Report of Findings

The cover page was set up as a separate report in GDS with just one page of content. This page linked out to the three sets of survey results, each contained within its separate GDS report.

The availability of Google Data Studio as part of the Google Apps Suite, even though it was in beta throughout our analysis and reporting phase, was of enormous benefit to us. Because it is a Google product and we are a Google campus, it fit in well with the systems we were already using to analyze and store our data. Viewers had seamless access to the reports without downloading any new software or setting up an account with a third party. It was available on all of our machines via web browser at no any additional cost. It also meant that collaboration was easy to coordinate because, like many Google Apps, GDS allows for multiple report editors. Like other Google Apps tools that we use, GDS report access is controlled using individual email addresses or Google Groups. We could also grant temporary access to people outside of the organization for demonstration purposes. GDS does allow report viewers to download data from its interface, but the data are downloaded at the aggregated level and are not linked back to individual respondents in the underlying dataset. See Image 5 for a view of the permissions interface.

Image 5: Sharing settings within GDS

The options to share with collaborative editors and viewers are very similar to other Google Apps, but there is not currently a way to give permission for anyone to add comments within GDS.

To ease our minds about using a product still in beta, we discussed an exit strategy that we would use if Google decided to shut down GDS while we were in the middle of developing the report. Fortunately, because the underlying dataset lives in a Google Sheet and feeds to GDS, we knew that most of our analysis work would be preserved if we needed to leave GDS behind. We also learned that GDS exports nicely to a PDF (see Image 6) without additional formatting, and while we did not design the report with a print version in mind, it was nice to be able to provide a printed PDF copy as part of the welcome packet for our new dean of the library.

Image 6: Detail of PDF download options
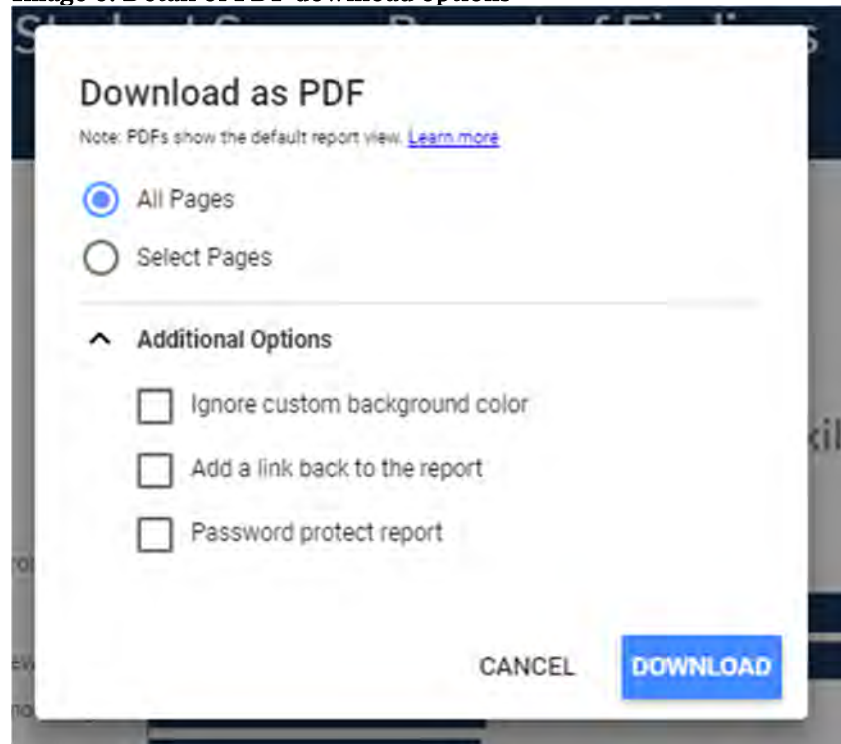
The export-to-PDF feature is relatively new to GDS. While a big time-saver (previously, print-to-PDF had to be executed on each page separately), we have noticed occasional glitches with the display of data visualizations on the exported PDF.

Room for Improvement

As a tool for actively engaging with stakeholders, we expected that viewers would explore the dataset on their own. Unfortunately, in a couple of cases, we were alerted by colleagues that a graph (or a series of graphs) was unexpectedly broken. Because GDS was in beta at the time, frequent and unannounced updates would occasionally cause our graphs to break because of updated data formatting restrictions. Now that GDS has moved into full production mode, we have not experienced any breakage in months. See Image 7 for a view of a broken GDS graph.

Image 7: Detail of graph in GDS with a broken data connection
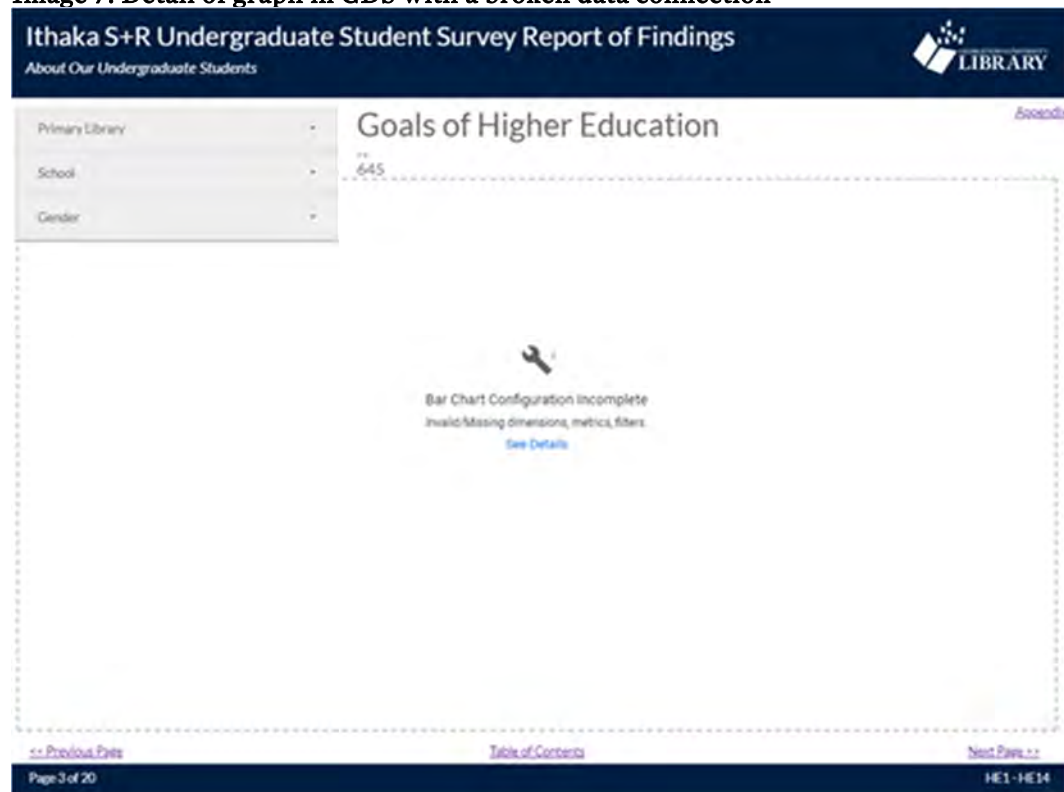
Seeing an error message is never a good sign, but we quickly learned that fixing our graphs was much easier when we were consistent with how we formatted our data fields behind the scenes in GDS. Once we identified the solution for fixing one graph, we could easily apply that approach to all broken graphs.

The data visualization filters have behaved predictably and without glitches, but one disadvantage of the page-level filter is that, if you are interested in seeing all results for one subgroup throughout the entire report, you have to select that filter for every data visualization separately. If the filters could be placed at a higher level and then applied across the report, it would be a big time-saver for report viewers.

Having the appendices pop-out to provide additional context and analysis was a major benefit of GDS. But with multiple GDS tabs open at one time, the processing speed often slows down, and a viewer might wait 10–30 seconds for the graph to appear in a separate tab. This delay was frustrating when editing the graphs and page layout. Completing a series of quick updates across all pages on the report seemed to take more time than it was worth for minor adjustments.

In terms of formatting options, font selection has been improved recently, but the options for formatting within the data visualizations are still rather limited. For instance, the graph legend cannot be stretched across the entire length of the graph canvas; instead, the legend awkwardly begins wrapping at the Y-axis. It would also be beneficial to have more shapes available, although inserting an image of any shape from an external source and then sizing it to fit your needs works well in most instances.

For collaboration, Google Data Studio only allows the report owner to connect and reconnect a data source. Any user with editing privileges can access the underlying dataset (if it has been shared with them), and update the content in the data source, but if the structure of the data source changes, only the owner of the report can refresh the fields within GDS. This was inconvenient for our team, because it meant that we had to wait for the graph's "owner" to refresh the dataset. However, we established a workflow to manage the inconvenience.

Likely Future Use of Google Data Studio at Georgetown University Library

A year after we began working with Google Data Studio, we have continued to find additional reasons to keep using it.

We are using GDS for smaller assessment project reports on a regular basis. By using filters, we can quickly answer questions about how a subset of our participants responded to a particular question. We can add the analysis right alongside the descriptive statistics and include recommendations for future actions in the final page. After completing hundreds of graphs and tables for the Ithaka S+R Survey results, every other report feels like a snap. In summer 2019, Library Assessment plans to support the library's culture of assessment by offering its first Google Data Studio training for library staff.

As for the Ithaka S+R Survey Results, our Assessment Steering Committee is working through the data with a deadline of April 2019 to identify actionable findings and prepare a list of recommendations. We have been able to complete our work efficiently in Google Data Studio, and in general, we think that the risk of exploring this new tool for the Ithaka S+R Survey analysis and reporting has paid off.

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Knowing our Users: Deriving Value from the Ithaka S+R Local Surveys at the University of Missouri

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Introduction

Founded in 1839 as the first public university west of the Mississippi River, the University of Missouri (MU) has an enrollment of over 30,000 students from around the state, nation, and globe. MU is a comprehensive educational institution with more than 300 degree programs and is one of only six public universities in the US that claim a medical, veterinary, and law school on the same campus. MU is also one of only 60 public and private US universities invited to membership in the Association of American Universities (AAU). This year we are celebrating our first Nobel Prize winner, George P. Smith. The University of Missouri Libraries belong to the Association of Research Libraries (ARL), the Greater Western Library Alliance (GWLA), and the statewide MOBIUS consortium.

In 2017, the libraries worked with Ithaka S+R to distribute the Ithaka S+R Local Graduate Student Survey and the Ithaka S+R Local Faculty Survey with the goal of gathering information from these user groups to help us evaluate our services and inform strategic planning for the future. A secondary goal was to use evidence derived from the results to engage campus partners in the process of helping us define and evolve our services, especially those related to emerging aspects of scholarly communication, research data management, and space planning.

Background

For more than a decade the libraries have been making important changes to our operations as a result of scholarly content moving online and our need to preserve knowledge, both print and digital, for future generations. Many of our traditional services, such as print collections, are still in high demand, yet we find we must dedicate an increased number of staff to new areas such as managing and preserving digital content. In support of researchers, our librarians are on the front lines of a battle to rein in the costs of scholarly communication by advocating for open access and digital curation initiatives that make content accessible to all. The libraries have an established institutional repository and work with faculty on open access, data management, author identify management, and scholarly metrics. As teaching pedagogy has moved to incorporate more active learning, team projects, and knowledge creation, our library spaces have been transforming to meet the learning and technology needs of today's students.

The libraries have an assessment team made up of the associate director for research, access, and instructional services, our communications officer, and two faculty librarians. We do not have dedicated assessment staff. Implementation and analysis of large-scale surveys is not something we attempt to do annually due to the costs involved, both in terms of fees and staff time. Prior to 2017, the libraries had conducted ARL's LibQUAL survey in 2003 and LibQUAL Lite in 2012. Though we saw value in repeating LibQUAL Lite again, the committee investigated the Ithaka surveys as an option that could aid us in campus conversations about our strategic directions by providing more data about how our users accomplish their scholarly work.

The libraries' management team approved implementation of the Ithaka S+R Local Faculty Survey and Local Graduate Student Survey in August 2017. To keep costs and our commitment of staff time manageable, we chose not to implement the undergraduate student survey in 2017. We also determined not to contract with Ithaka S+R for a custom analysis of the survey data. Though our assessment team proposed a spring 2018 implementation, we were encouraged to implement in October 2017 in order to be able to use data for strategic planning as soon as possible.

Survey Implementation

With the decision to launch the survey on October 2, our team began preparations in earnest. We first contacted the Provost's Office and the Office of Institutional Research (IR) to ensure support from the provost and that we would not be conflicting with another major survey effort on campus. IR staff worked closely with us to create the faculty survey population distribution list, provide official lists of academic departments that allowed us to customize demographic questions, and to test the survey instrument. They also advised us on working with the campus Institutional Review Board (IRB), with other campus partners such as IT for white listing, and with Student Information Systems for preparation of the graduate and professional student survey population list. We contacted our law library—an administratively-separate library on campus—to determine whether law faculty and students would participate in the survey. Ultimately, they decided this was not the right time for them. One other partner that we consulted was the Office of Graduate Studies. The associate vice chancellor for graduate studies reviewed the survey instrument and sent us several requests for minor changes that we were able to implement. We were very grateful to Christine Wolff Eisenberg at Ithaka for her steady guidance, patience, and quick responses to our many questions between mid-August and the October launch. We spent the most time on the following activities: selecting additional survey modules; determining who would receive additional survey modules; customizing some aspects of each survey; finalizing a faculty population list; and deciding upon survey incentives.

It took several phone meetings with Ithaka to come to a decision about which modules to add to the core survey. Looking closely at the module questions, understanding how the modules could be distributed, and debating on the merits of adding any additional length to the survey was a lengthy process. Ultimately, in consultation with our libraries' management team, we determined that faculty would randomly receive either the library space planning or the scholarly communication and market research modules. Graduate and professional students would receive either library space planning or research practices. We chose space planning for both surveys in anticipation of expanding our off-site shelving facility, which would lead to some opportunities to develop our existing on-campus spaces. Scholarly communication and research practices, and to some extent, market research, were chosen to help us with strategic conversations about the role of libraries in supporting access to scholarship, publishing, open access, and data management.

In consultation with IR and the Office of Graduate Studies, our team added or modified questions in both surveys. Changes to both surveys included:

- Changing the language "library building" to "campus library location" with added drop-downs for specific campus libraries to better reflect our special libraries that operate in specific schools/colleges
- Adding the name of our institutional repository to relevant questions

Changes to the faculty survey included:

- Adding a demographic question to identify primary college/school and department
- Adding a demographic question to identify faculty rank
- Removing some questions from the "Market Research" module to reduce the length of the survey

Changes to the graduate student survey included:

- Adding primary college/school and department
- Adding a demographic question to help us determine the degree to which the responder was an online student, as defined by the University of Missouri. We worked on this question with the director of our distance learning program.
- Ensuring that language referring to degree programs was consistent with our campus
- Modifying the question about forms of employment to include assistantships

- Requesting that one non-demographic question from the core questions be included in our stratified response results in order to allow us to more easily look at results for MA students versus PhD students

Questions from IR regarding which faculty would receive the survey proved to be more time-consuming than anticipated, especially when we looked at faculty who were instructors under University of Missouri Extension. For example, some instructors might teach only a few times per year as part of the fire safety training program. We did not include this type of faculty, but in general leaned towards inclusion. In regards to incentives, we wanted to do something other than a gift card drawing, such as offering recipients an option to support a donation to a selected charity. However, upon investigation, other options could not be worked out easily due to campus financial rules. We decided to give survey participants the option to opt-in to a random drawing for a $25.00 Amazon gift card after completing the survey. We approved and ultimately distributed ten gift cards to faculty and twenty gift cards to graduate students.

Ultimately, Ithaka sent the survey links and reminders directly to 2,100 faculty and 6,000 graduate and professional students. In addition, our communications officer coordinated a marketing campaign to promote the survey. Once launched, we kept in close touch with Ithaka about response rates and made several efforts to increase the number of survey completions. Ultimately, we were disappointed in the percentage response rate, a consistent 14% for both surveys. However, campus IR felt that the response rate would still yield valid results and that survey fatigue was a likely factor. It should be noted that a fairly significant number clicked into the survey or started the survey without completing, indicating that our concern about time of completion was a factor. Criticism of the survey length was an oft repeated survey comment. On the plus side, we had good representation across disciplines. We were interested to note that 1/3 of graduate and professional student respondents described themselves as campus students, 1/3 as hybrid campus/online students, and 1/3 as online students. We also noted that more PhD level graduate and professional students responded than master's degree students.

Key Findings
We received the survey results from Ithaka right on schedule. This included a full report of aggregated results for each population group, the full data sets for each population, and the stratified data sets for each population. We began by looking at the aggregated data to determine key findings that could be shared with the libraries and our users. Ultimately, we created a summary document for each survey to be released with the full aggregated results.

Both surveys explored perspectives on the role of the library. Responses showed very strong support for our traditional strengths of paying for shared resources and organizing, preserving, and maintaining resources. Here are some of the results that we chose to emphasize in the summaries:

Discovery
- The library is still used for discovery, but is not always a starting point. However, 73% of faculty indicated that they see the library as a gateway for locating information.
- Forty percent of graduate and professional students begin research with Google Scholar or JSTOR.
- More than half of faculty respondents felt that undergraduate students have poor skills related to locating and evaluating scholarly information.
- Fifty-nine percent of faculty indicated that librarians contribute significantly to their student's learning.
- A high percentage of graduate students responded that improving their ability to find sources of information on a range of topics was very important or important. However, less than 50% agree or strongly agree that library staff help them develop research skills and only 31% have been directed by an instructor to consult with a librarian.

Collections
- Both faculty and graduate students continue to value the libraries for providing access to resources needed for research and learning.
- While access to journal articles is the overwhelming need, all types of materials are used.
- The transition to online journals is complete, but the print book is still of high value. Over 50% of graduate students indicate use of print collections sometimes or regularly.
- Sixty-four percent of our graduate students indicate that accessibility of needed books and journals is an important or very important consideration when choosing a research topic for a dissertation or thesis.

Scholarly Communication
- Our faculty and graduate students value the principle of public access to research and are supportive of federal mandates. However, few faculty negotiate author agreements.
- Sixty-seven percent of faculty have at least one of their peer-reviewed journal articles or conference proceedings available for free online. Twenty-three percent of respondents have made content available in our local repository. Forty-nine percent of faculty indicate they have published in an open access disciplinary repository.
- A high percentage of faculty respondents would be happy to see the current subscription-based model replaced by an open access publication system.
- Only 37% of faculty respondents indicate that they consider whether a journal makes articles freely available when deciding on publication.
- There is a need for dissemination support services, such as helping to determine where to publish, negotiating favorable publication contracts, assessing impact, and managing a list of scholarly outputs. Comments suggest that some faculty had never thought of looking to the libraries for these types of services, but could now see why the libraries could be helpful.

Data Management
- Faculty are producing all types of data.
- Many faculty are confident in their ability to manage data, but some do express difficulty with managing data/media.
- Fifty-one percent of faculty respondents indicated that having the library assist with data management would be valuable.

Space Planning
- Over 90% of our faculty have been in a campus library; 60% had been in within the last month. However, most faculty had a visit duration of under 30 minutes.
- Graduate students use campus libraries for study, access to materials, computing, and printing. Forty-eight percent indicated a stay of more than an hour when they visit the library.
- Our graduate students value access to digital media tools and advanced software applications. Seventy-eight percent indicated that a digital media commons or maker space would be "extremely useful."
- Our graduate students are online and often working part-time or full-time jobs.
- There is a continuing need for more power outlets.

Sharing Results
Working with the results has been a slow process for us and we plan to continue this work at least through the current academic year. We have completed a summary of key findings for each survey that includes recommendations for library priorities. Recommendations stemming from the faculty survey are:

1. Actively share information with faculty about the cost of access to scholarly publications and work with faculty to support open access as a means to ensure global access to scholarship.

2. Advocate for library collections that support scholarly research and teaching across the disciplines.

3. Collaborate with Research Computing and the Office of Research to support faculty needing to manage data for preservation and access.

4. Promote best practices for negotiating with publishers, author identity management, and using impact metrics.

5. Assess impact of library support for teaching and work with campus partners on how to best support student learning.

Recommendations stemming from the graduate and professional student survey are:

1. Collaborate with the Office of Graduate Studies and graduate program directors to improve communication with graduate students and graduate advisors about library services and resources.

2. Advocate for collections that support graduate and professional student research across the disciplines.

3. Continue to advance and promote the libraries' capacity to provide services and resources virtually.

4. Work with the University Libraries Student Advisory Council to ensure library spaces provide digital media and software applications that support coursework and research demands.

The summaries of key findings and full aggregated results have been shared with our campus community via our library communication channels, including NewsHub posts and social media. The summaries, along with the full results provided by Ithaka, are posted on our website and can be easily shared with individuals as we continue to talk about them over time. We presented on the results at a library staff advisory group meeting and the documents are posted on our staff website with other reports. We also presented the results to our campus library committee.

Our focus since completing the initial reports has been to use the results as a means of generating discussion with key stakeholders on campus. For example, we met with the vice chancellor for graduate studies to review the results. This gave us an opportunity to explore some of the results and to discuss library priorities. The meeting also helped us to prioritize our need to create new summary reports based on some of the stratified data available to us. Priorities for the Office of Graduate Studies are results by discipline, results by online versus campus student, and results by students in MA versus PhD programs. Notably, almost half of our graduate students are in online programs and it will be important to look at how their responses compare to campus students. As a further step, our Office of Graduate Studies is very interested in looking at international student responses. Developing a version of the summary report focused on international students could also be shared with the MU International Center and our ESL programs. The associate vice chancellor for graduate studies is supportive of our recommended goals and plans to share our data in meetings with associate deans on campus. At our meeting with the Faculty Affairs Committee of our Faculty Council, we focused on sharing responses related to publishing and data management. We learned there was agreement about the need to address the cost of scholarly journals and that there was some support for the idea of a campus open access policy and reaching out to faculty about opportunities to negotiate publishing contracts.

Internally, we have asked our Instruction Advisory Committee to look closely at all data related to teaching and learning. The goal here is to use some of these data as we speak with departments about how they integrate information literacy into their programs, in our promotional material about library instruction, and in conversations with our new Teaching for Learning Center on campus. We are asking our digital scholarship librarian to take a closer look at data related to open access, author rights, citation metrics, and data management with the goal of sharing this data with our Cyberinfrastructure Council and our associate

deans of research. Finally, we have asked our e-learning librarian to begin looking at what we need to learn from the results about online students. Some online students indicated in comments that much of the survey was not relevant to them. With growing online programs, we want to ensure that libraries are seen as relevant by this population.

Concluding Thoughts or What We Would Change

As with most surveys, the survey responses have led to the need to ask more questions. We still need to determine if and how we can dig deeper into these responses. What would we change? Based on survey comments, we would definitely choose no more than one additional module for each survey. With more time, we may have done even more to customize the survey by modifying or eliminating module questions. We would have benefited from a core set of questions for both the faculty and the graduate student surveys that used the same language and response options. Finally, without a sophisticated data analyst at our disposal, the variance in the Likert scales has proven labor intensive for us to work with as we try to present the data. More recently, space planning has become an urgent topic for our libraries. Data from undergraduates would be very helpful for us as we have space conversations with our campus. Given the difficulty we have found in dedicating time to survey analysis and reporting, we may well have been wise to contract with Ithaka for a custom analysis that could have been easily shared with our campus community in a timelier manner. We may have benefited from being able to present an externally produced analysis of the results as an objective picture of how our faculty and graduate students view the role and value of the libraries. Overall, the Ithaka survey results do help us to better understand the goals our users have for their academic teaching, research, and learning. We know more about their thoughts on scholarly communication and data management and have more information that can be used for space planning. Most importantly, the results are giving us a renewed opportunity to discuss our strategic directions with key stakeholders both within and outside of the libraries.

Assessing the User Needs of STEM Graduate Students: A Comparative Analysis

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Abstract

This paper reports on findings of a local version of the Ithaka S+R Graduate and Professional Student Survey administered at Auburn University during the 2018 spring semester. It offers a comparative analysis of the survey responses of Auburn STEM and non-STEM graduate students, with a focus on questions related to (a) patterns of information discovery and usage, (b) research skills that respondents believe contribute to academic and professional success, and (c) respondents' perceptions regarding the library's role in supporting different parts of the research cycle. The authors reflect on the implications that disciplinary differences in research practices and expectations have for research support services tailored to the specific needs of STEM students.

Introduction

Graduate students are significant contributors to research activity on university campuses, and their professional education is central to the mission of their home institutions. Supporting the research needs of this population is thus of prime importance for academic libraries. However, graduate students are not a monolithic group. As library services for graduate students have expanded from providing access to collections to offering support throughout the entire research cycle, understanding disciplinary differences in researcher practices and expectations has proven vital to effective liaison services.

At Auburn University, students enrolled in STEM fields make up a significant portion of the graduate student population. Auburn is a land-grant and public research university with graduate and professional programs in a number of STEM fields, including life and physical sciences, mathematics, engineering, agriculture, forestry, nursing, pharmacy, and veterinary medicine. In 2018, out of a total enrollment of 5,812 graduate/professional students, 1,958, or about 34%, were STEM students.[1] Given these campus demographics, Auburn University Libraries (AUL) faculty were interested in learning more about the specific research needs of STEM students and exploring how, or whether, these needs differed from those of non-STEM students.

In December 2017, prompted in part by ongoing discussions and self-studies around librarians' evolving liaison roles, AUL librarians decided to move forward with participation in two large user surveys: the Ithaka S+R Faculty survey and the Ithaka S+R Graduate and Professional Student survey.[2] Library staff recognized that a more in-depth understanding of the research practices of Auburn faculty and graduate students would help librarians prioritize the resources and services that would be of most benefit to these user groups. They selected the Ithaka S+R surveys because they found the surveys' focus on researcher practices and perceptions to be well aligned with these objectives.

Because demographic data gathered by the Ithaka S+R Graduate and Professional Student survey included participants' academic programs, the authors of this study saw an opportunity to conduct a comparative analysis of the user needs of STEM and non-STEM students. They decided to focus on three areas of particular relevance for their work as subject liaison librarians: graduate students' patterns of information discovery and usage; their perceptions about the research skills needed for academic and professional success; and their views regarding the library's role in supporting different parts of the research cycle.

Methodology

In spring 2018, AUL librarians and Ithaka S+R staff prepared to implement local versions of the two surveys. The Graduate and Professional Student survey consists of modules focused on students' goals for their

higher education experience; their information discovery practices and resource use for coursework and research; and their perceptions of the role of the library in supporting their scholarly work. Library faculty also elected to include two optional survey modules, one focused on graduate students' attitudes toward conducting original research and the other on graduate student roles and activities as members of research groups and labs on campus. (The latter module was administered only to STEM students.)

After obtaining approval for the study from Auburn University's Institutional Review Board (IRB), library staff requested names, emails, and basic demographic information from the campus Office of Institutional Research. Invitations to participate in the survey were emailed to graduate students by Ithaka S+R. Library staff also promoted the survey in the campus graduate student newsletter and through social media on the Graduate Student Council's Facebook page. As an incentive for participation, students who completed the survey could choose to be entered in a drawing to win one of two Apple iPads.

Ithaka S+R distributed email invitations to 5,524 Auburn University graduate and professional students on March 24, 2018. Students received four additional reminder emails before the survey closed on April 29, 2018. About 27% (n=1,488) of those receiving the email clicked on the survey link; about 24% (n=1,337) started the survey. The response rate for participants who completed the survey was about 20% (n=1,105). Due to the survey flow and skip patterns, not all graduate and professional student participants received every question in the survey.

After receiving the Ithaka S+R Graduate and Professional Student survey report and cross tab stratifications of responses by demographic characteristics, the authors identified the specific subset of survey questions they thought were best aligned with their research focus. (See Appendices A, B, and C for lists of the survey questions and responses selected for analysis.) The subpopulation of STEM students was identified using responses to the question, "At this college or university, are you pursuing a degree in a STEM field or discipline?" The survey defines a STEM degree as "a science, technology, engineering or mathematics degree including computer/information sciences, life sciences, physical sciences, health sciences, agricultural sciences, and medical and veterinary fields." Findings of this study are discussed below.

Patterns of Information Use and Discovery

Ithaka S +R survey responses revealed both similarities and differences between STEM and non-STEM graduate students with respect to information use and discovery. Over half of STEM students (60%) and non-STEM students (59%) at the coursework stage of their programs found it "easy" or "somewhat easy" to access information needed for coursework and research projects. Among students seeking information for their dissertations, confidence levels were higher for STEM students but lower for non-STEM students. Sixty-six percent of STEM students and 56% of non-STEM students reported it was "easy" or "somewhat easy" to access information. STEM and non-STEM students diverged to a considerable degree on whether or not they viewed the library as "a starting point" for locating information, resources, or citations. Less than half of STEM students (41%) "agreed" or "strongly agreed" that the library was "a starting point" for their research while over half of non-STEM students (59%) held this view (see figure 1). Differences between the types of information used by STEM and non-STEM graduate students may possibly account for differences in their information seeking behaviors. At the coursework stage of their graduate programs, STEM students were more likely than non-STEM students to be making "regular" use of online video tutorials such as Khan Academy, Lynda.com, YouTube (26% STEM; 22% non-STEM), and online education resources such as Wikipedia and online study guides (41% STEM; 35% non-STEM), as well as other non-library resources. In contrast, non-STEM students at the coursework stage were making "regular" use of sources strongly associated with libraries: print books (48% non-STEM; 32% STEM), journal articles (75% non-STEM; 57% STEM), and historical documents (10% non-STEM; 7% STEM). However, there were also nuances between the two groups in the use of specific source types. For example, while there was a significant difference in the frequency of use of print books by STEM and non-STEM students, the gap closed considerably when students reported on their use of e-books. Over 25% of STEM students reported "regular" use of e-books, compared to 29% of non-STEM students. In the case of e-textbooks, the percentage of "regular" use by STEM students was the same as non-STEM (37% for both groups).

Figure 1

The library serves as a starting point for locating information, resources, or citations that I use for my coursework or research projects.
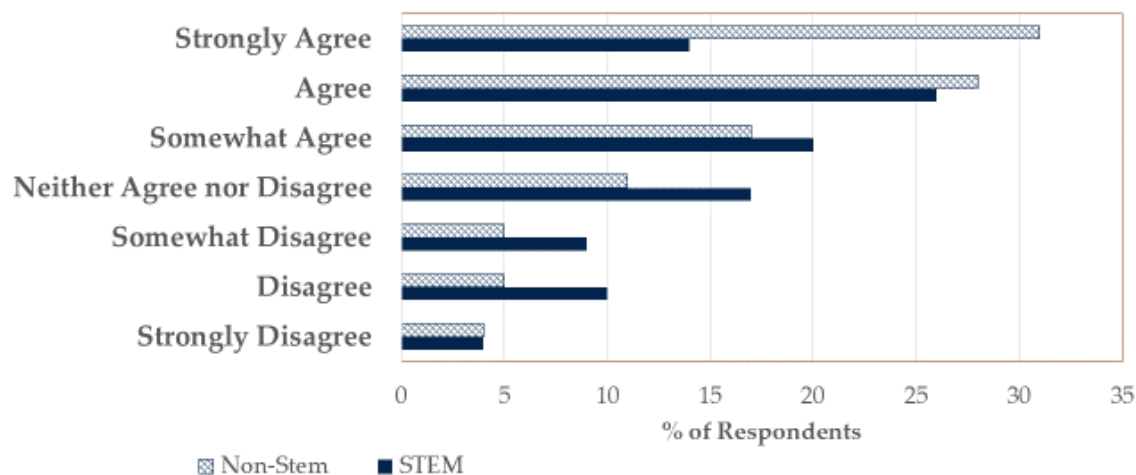
In addition, use of source types shifted as students transitioned from the coursework stage of their programs to the research stage (i.e., either master's paper/capstone project or doctoral dissertation). For STEM students, "regular" use of study guides and online tutorials and education resources was lower while "regular" use of scholarly journals was higher and even surpassed use by non-STEM students (89% STEM; 82% non-STEM). Meanwhile, the gap between "regular" use of print books (29% STEM; 50% non-STEM) and historical documents (7% STEM; 22% non-STEM) was wider between the two groups.

One type of source in which the differences between STEM and non-STEM students was not great was use of data or datasets. At the coursework stage, 34% of STEM students reported "regular" use of data as compared to 33% of non-STEM students. At the research stage of graduate work, there was only a slightly wider margin of difference with respect to "regular" use of data (47% STEM; 42% non-STEM). A deeper dive into the survey results revealed a significant gap between humanities students' use of data (28% at the research stage) and STEM students; however, regular use of data by social science students was very similar (49% at the research stage) to that of STEM students (see figure 2).

Research Practices and Perceptions

Both STEM and non-STEM graduate students anticipate that "research and analysis skills" will be "very useful" or "extremely useful" in helping them to secure their desired job or career (83% STEM; 80% non-STEM). A majority in both groups also "agree" or "strongly agree" that their instructors help them to develop the research skills needed to find and use academic sources of information (62% STEM; 59% non-STEM). A somewhat lower percentage of students in both groups indicate that library staff play a key role in this area. Among STEM students, this difference in perception is more pronounced. Just over 38% of STEM students, compared to 45% of non-STEM students, "agreed" or "strongly agreed" that library staff helped them develop research skills (see figure 3). Graduate students in the humanities, by contrast, were considerably more likely to see library staff as partners in research and, in fact, considered them to be of close-to-equal importance with their instructors in this regard. Over 58% of humanities students "agreed" or "strongly agreed" that library staff helped with research skills compared to 63% who "agreed" or "strongly agreed" that their instructors helped. Collaborating with faculty on original research projects provides graduate students with opportunities to be mentored by faculty, and a majority of both STEM and non-STEM graduate students regard it as "important" or "very important" to have this experience before they graduate. STEM students assigned greater importance to this than non-STEM students (67% STEM; 52% non-STEM).

A greater percentage of STEM students also found it to be "important" or "highly important" to be employed or receive college credit as a research assistant (51% STEM; 30% non-STEM). STEM students were also more likely to have had these experiences. Over 61% of STEM students reported collaborating with faculty on original research (compared to 40% of non-STEM students), and over 45% of STEM students were employed or received credit as a research assistant (compared with just over 22% of non-STEM students). Given the culture of collaborative research in the STEM fields, it is perhaps not surprising that STEM students view their instructors as key contributors to their development as researchers.

Figure 2

How often do you use each of the following types of sources of information in your research projects?

Figure 3

My instructors help me develop the research skills to find and use academic sources of information

Campus librarians or library staff help me develop the research skills to find and use academic sources of information
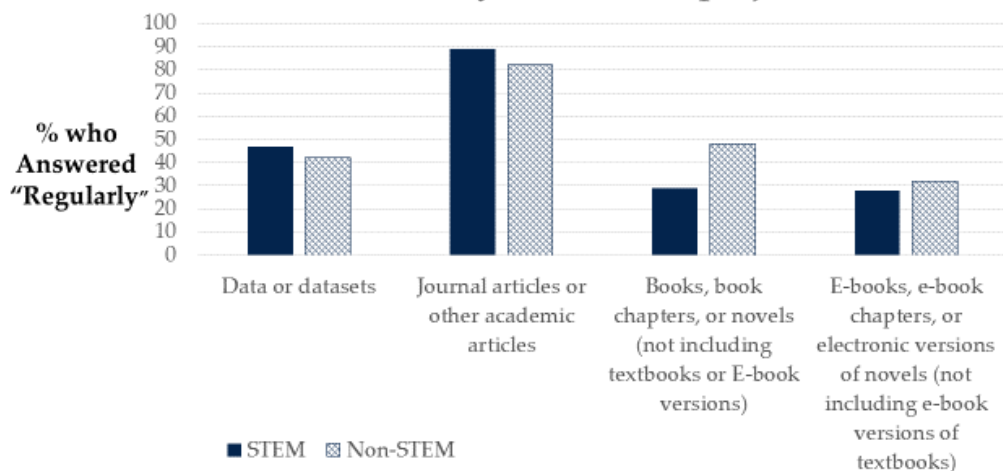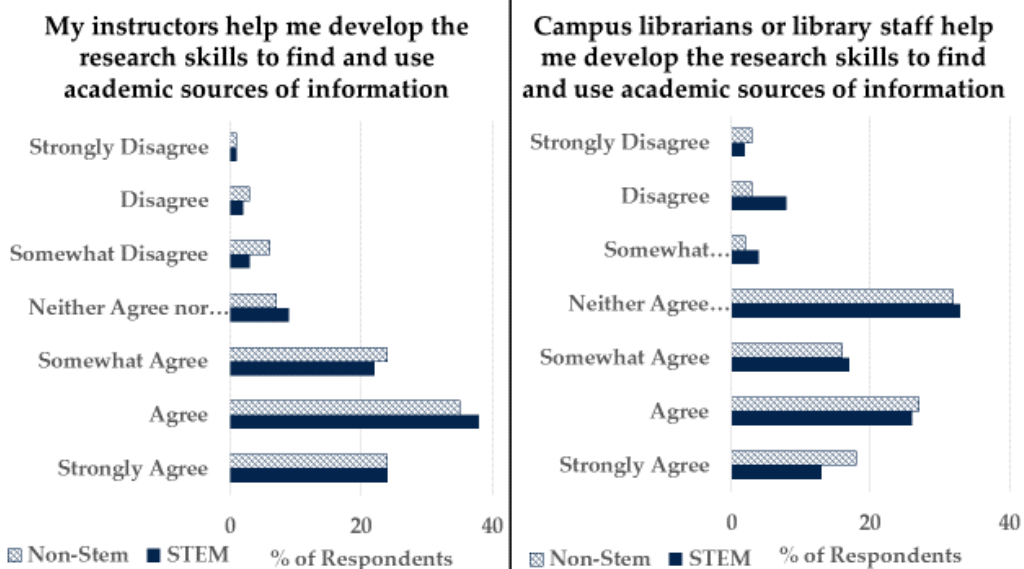
Conducting scholarly research calls for a variety of different research skills. More than eight in ten graduate students, both STEM and non-STEM, rated "locating academic sources of information," "using information ethically (i.e., understanding the concept of intellectual property, copyright issues, and/or legal and ethical standards for the conduct of research)," "writing according to academic or discipline-specific standards," and "forming evidence-based conclusions" as "important" or "highly important" research skills. They also

rated a number of other research skills as important. Over two-thirds of graduate students, both STEM and non-STEM, consider "evaluating academic sources of information," "synthesizing or incorporating academic information into research projects," "situating research projects within the existing academic literature," "framing or developing original research questions," and "analyzing data, media, images, or other primary source materials" to be "important" or "highly important" research skills. Of somewhat lesser importance to both STEM and non-STEM students were skills related to "writing and submitting grant applications or other funding proposals" and "managing data, media, images or other primary source materials." In general, STEM and non-STEM students were very close in their ratings of the above research skills with the exception of grant writing skills, which STEM students were more likely to rate as "important" or "very important" (61% STEM; 54% non-STEM) (see figure 4).

Figure 4

How important or unimportant is it to you to acquire each of the following research skills as a result of your experience at this college or university?
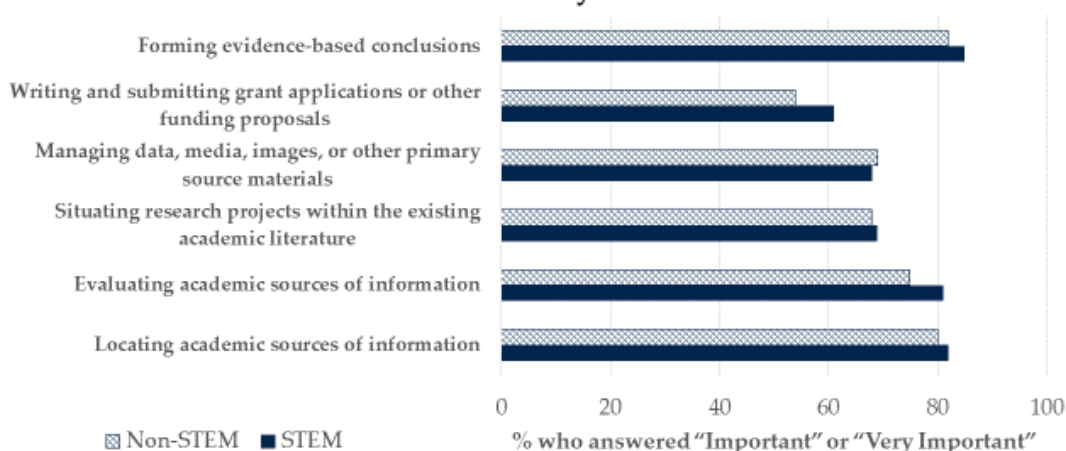
Auburn's local version of the survey also includes a module consisting of questions answered only by STEM students. While this question set does not allow for comparisons with non-STEM students, it does provide context for STEM students' responses about the skills needed to engage in research activity in their disciplines, including many of the skills listed above. For example, 57% of STEM students (n=381) responded that they worked in a lab or research group. This subgroup of STEM students answered questions pertaining to their roles in the lab which included "managing, organizing, updating, or analyzing data or datasets" (63% PhD; 58% master's/professional); "keeping up to date with the academic literature on behalf of the lab or research group" (49% PhD; 33% master's/professional); "managing, organizing, or updating documents on behalf of the lab or research group" (42% PhD; 26% master's/professional); and "writing grants or funding proposals" (24% PhD; 13% master's/professional) (see figure 5).

Figure 5

Within your current lab or research group, which of the following describes your role(s) in the lab or research group? Please select all that apply: (STEM students only)
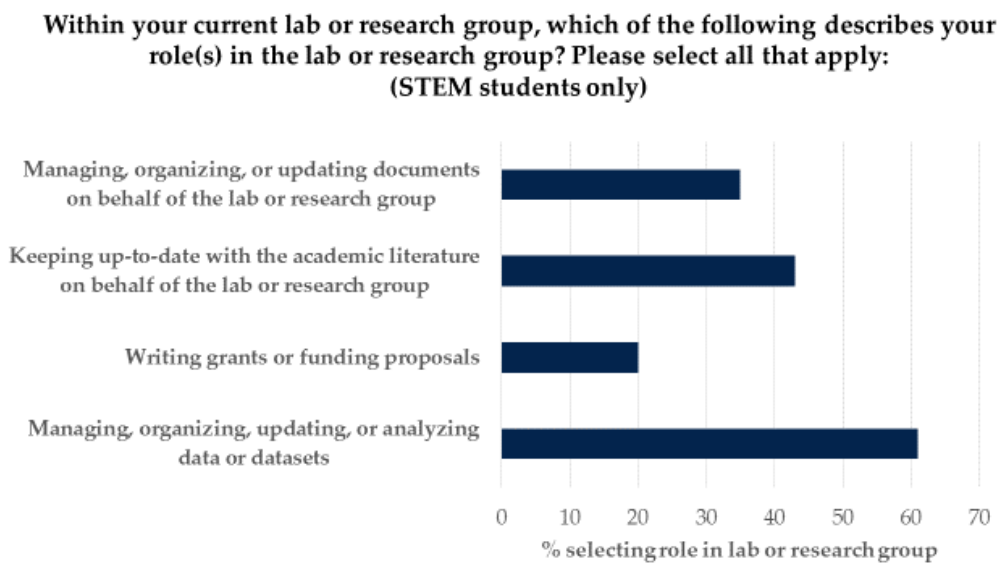
Additional questions probed STEM students' perceptions regarding other skills required to do "cutting edge" work in their chosen job or career. PhD STEM students, in particular, assigned very high levels of usefulness ("extremely useful" or "very useful") to: "proficiency in one or more programming languages" (65% PhD; 43% master's/professional); "proficiency in specialized software programs or applications" (76% PhD; 59% master's/professional); "proficiency in statistics or applied statistics fields" (79% PhD; 54% master's/professional); and "proficiency in data science methodologies" (78% PhD; 58% master's/professional).

Graduate Student Perceptions of the Library's Role

The library role valued most by both STEM and non-STEM graduate students was that "the library pays for resources that I need for my coursework or research projects." This provision of resources was seen as "very useful" or "extremely useful" by nine out of ten STEM (91%) and non-STEM students (91%). STEM and non-STEM students also held generally-similar views about the assistance provided by librarians/library staff with "managing citations of books, articles, data, images, or websites" (63% STEM; 68% non-STEM), "using information ethically" (61% STEM; 65% non-STEM), and "assistance or guidance with managing data or datasets" (53% STEM; 58% non-STEM).

STEM and non-STEM students differed to a greater extent in their perceptions of the usefulness of the library as the place that "stores, organizes, and keeps track of books, articles, data, images, or other resources," with more non-STEM (83%) than STEM (76%) students viewing that role as "very useful" or "extremely useful." Approximately three-fourths of non-STEM students view it as "very useful" or "extremely useful" that "the library helps students develop research skills" (73%) and that "librarians or library staff provide assistance or guidance in finding sources" (76%). In contrast, closer to two-thirds of STEM students respond "very useful" or "extremely useful" to these questions (61% and 67% respectively). Similar degrees of difference exist between the perceptions of STEM and non-STEM students with regard to the usefulness of librarians/library staff providing "help for learning about technological, digital, or online tools" (62% STEM; 71% non-STEM) and "support in learning and using online search engines or databases" (66% STEM; 74% non-STEM) (see figure 6).

Figure 6

How useful is it to you personally that your campus library provides each of the services listed below?

% who answered "Extremely Useful" or "Very Useful"
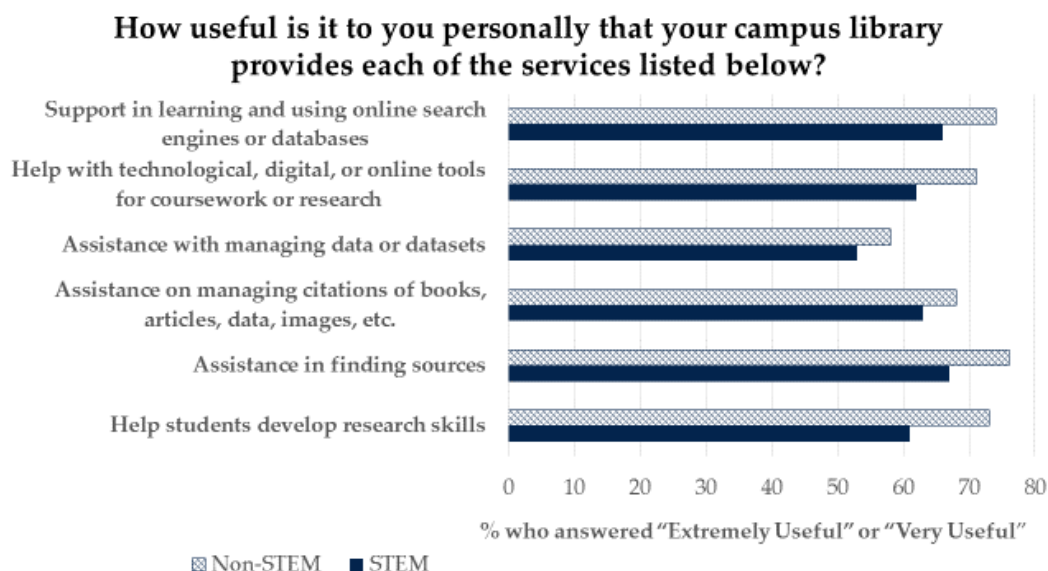
☒ Non-STEM   ■ STEM

The fact that 39% of non-STEM students reported having "been directed by a faculty advisor, instructor, or professor to consult with a subject librarian," compared to 28% of STEM students, may contribute to these differing perceptions about librarians' roles (see figure 7).

Figure 7

Have you ever been directed by a faculty advisor, instructor, or professor to consult with a subject librarian or departmental library liaison at this college or university?

■ STEM   ☒ Non-STEM
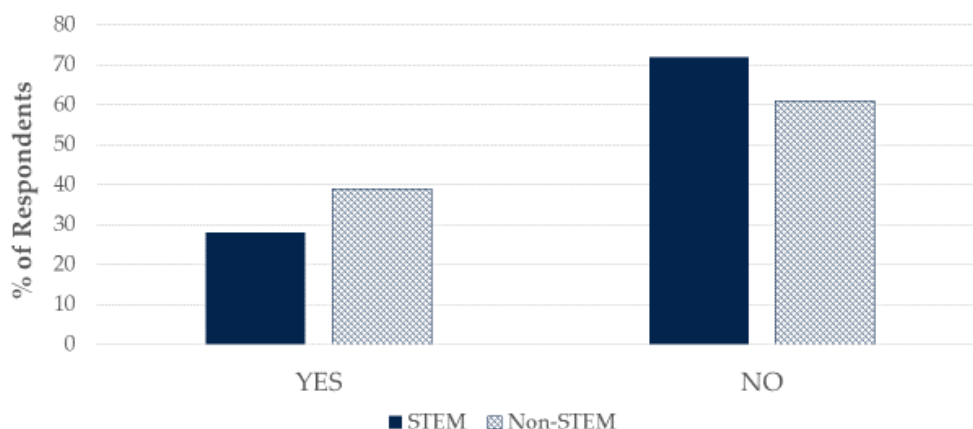
Attendance at library instruction classes may also factor into students' perceptions. Although more than three-fourths of all students reported attending "a library information session, class, or section that was focused on finding sources of information for your major, field, or program of study," the percentage was slightly higher for non-STEM students (75% STEM; 80% non-STEM). Moreover, while STEM students were more likely than non-STEM students to have "attended a library information session, class, or section that was taught during an orientation" (55% STEM; 44% non-STEM), non-STEM students were more likely to have "attended a library information session, class, or section that was taught by a librarian in a campus library building" (54% STEM; 65% non-STEM). It may be that course-integrated library instruction, provided at point of need, has a more positive impact on students' perceptions than instruction provided

during information-packed orientations. Instruction that takes place in the library building itself may also serve to reinforce the perception of librarians as offering research support.

Custom Liaison Services: Next Steps

In addition to advanced, discipline-specific knowledge, graduate students in both STEM and non-STEM fields indicated that acquiring research skills was a key goal of their graduate education. Both groups place a premium on a broad range of research competencies that include not only the ability to find reliable sources of information but also other skills deployed throughout the research cycle, such as situating research projects within the existing academic literature, managing citations, using information ethically, managing data, and writing grant proposals. Variations between STEM and non-STEM students with respect to the perceived importance of these general research skills were not great. More noteworthy were the different perceptions STEM and non-STEM students had about the role that librarians played, or could play, in helping students to develop research skills. As the abovementioned responses indicate, STEM students were between 8 and 12% less likely than their non-STEM counterparts to view librarians as "very useful" or "extremely useful" in helping students to develop research skills, find sources, and learn how to use online search engines or databases. They were also 7% less likely than non-STEM students to "agree" or "strongly agree" that librarians had helped them to develop research skills.

Given these disparities, STEM students are prime candidates for targeted outreach. The collaborative research culture that exists in the sciences between students and instructors suggests that a promising avenue of approach may be to enlist the aid of STEM faculty. A STEM faculty member's referral is likely to carry considerable weight with his or her students, and the survey data indicates considerable room for improvement in this area. While the STEM module of the survey provides basic information about the research activities of STEM students, follow-up studies would help to fill in more detail about the context in which disciplinary research occurs. This, in turn, would help to bring the specific information needs of STEM students into sharper focus. For example, it would be helpful to know how STEM students understand research skills such as "using information ethically" or "evaluating academic sources of information." General research skills such as these are likely to have disciplinary dimensions that library instructors should attempt to address.

Additional research into disciplinary differences in information usage and discovery patterns would also help to inform library liaison work. As reported, less than half of STEM students (41%) "agreed" or "strongly agreed" that the library was "a starting point" for their research, compared to 59% of non-STEM students. How are STEM students locating the scholarly journal content that 89% are "regularly" using at the research stage of their programs? How heavily are students relying upon Google Scholar or scholarly networking sites such as ResearchGate when conducting research? Anecdotal evidence from Google Scholar workshops held on Auburn's campus suggest that graduate students are often uncertain about the scope of the scholarly literature they are searching and frustrated when they find themselves unable to limit to discipline-specific content—both issues that could be addressed by the library's subject databases.

Conclusion

As is so often the case with user surveys, responses to the Ithaka S+R Graduate and Professional Student Survey have generated additional research questions. Survey findings have also highlighted areas in which targeted liaison efforts could be of particular benefit to both STEM and non-STEM graduate students. AUL faculty plan to use the survey data to help better position themselves in graduate students' academic and research workflows. Focusing on resources and services that have the greatest impact on these user groups' practices and expectations will help to elevate the library's profile as both partner in research and information content provider.

Notes

1. STEM demographics are based on the US Immigration and Customs Enforcement (ICE) definition of STEM fields, https://nces.ed.gov/pubs2011/2011226.pdf, last modified April 2011, which is typically used by the Auburn University Office of Institutional Research, https://auburn.edu/administration/ir, accessed January 15, 2019.
2. Ithaka S+R is a non-profit organization that provides assistance with research and evaluation for higher education, libraries, and museums. Information about the Ithaka S+R faculty and student surveys is available at: https://sr.ithaka.org/our-work/surveys, accessed January 15, 2019.

Appendix A
Question/Answers Related to Patterns of Information Use and Discovery

Questions	Answers	STEM		Non-STEM		Total	
		Number	Percentage	Number	Percentage	Number	Percentage
How easy or difficult do you find it to access information and resources that you need for your coursework or research projects?	Very Difficult	1	0.30%	0	0.00%	1	0.17%
	Difficult	8	2.42%	8	3.28%	16	2.79%
	Somewhat Difficult	46	13.94%	30	12.30%	76	13.24%
	Neither Easy nor Difficult	42	12.73%	25	10.25%	67	11.67%
	Somewhat Easy	97	29.39%	69	28.28%	166	28.92%
	Easy	102	30.91%	75	30.74%	177	30.84%
	Very Easy	34	10.30%	37	15.16%	71	12.37%
	TOTAL	**330**	**100.00%**	**244**	**100.00%**	**574**	**100.00%**
How easy or difficult do you find it to access information and resources that you need to prepare or study for your PhD or other qualifying exams	Very Difficult	0	0.00%	2	2.90%	2	1.12%
	Difficult	2	1.83%	1	1.45%	3	1.69%
	Somewhat Difficult	9	8.26%	6	8.70%	15	8.43%
	Neither Easy nor Difficult	18	16.51%	8	11.59%	26	14.61%
	Somewhat Easy	27	24.77%	15	21.74%	42	23.60%
	Easy	47	43.12%	27	39.13%	74	41.57%
	Very Easy	6	5.50%	10	14.49%	16	8.99%
	TOTAL	109	100.00%	69	100.00%	178	100.00%

Questions	Answers	STEM		Non-STEM		Total	
The library serves as a starting point for locating information, resources, or citations that I use for my coursework or research projects.	Strongly Disagree	24	3.60%	18	4.27%	42	3.86%
	Disagree	63	9.45%	19	4.50%	82	7.53%
	Somewhat Disagree	60	9.00%	20	4.74%	80	7.35%
	Neither Agree nor Disagree	116	17.39%	45	10.66%	161	14.78%
	Somewhat Agree	133	19.94%	71	16.82%	204	18.73%
	Agree	176	26.39%	120	28.44%	296	27.18%
	Strongly Agree	95	14.24%	129	30.57%	224	20.57%
	TOTAL	667	100.00%	422	100.00%	1089	100.00%
In the courses you are currently taking, how often do you use each of the following types of sour...— Online video tutorials (such as videos available on Khan Academy, Lynda.com, YouTube, etc.)	Never	61	19.93%	37	26.43%	98	21.97%
	Rarely	77	25.16%	29	20.71%	106	23.77%
	Sometimes	103	33.66%	43	30.71%	146	32.74%
	Regularly	65	21.24%	31	22.14%	96	21.52%
	TOTAL	306	100.00%	140	100.00%	446	100.00%
In the courses you are currently taking, how often do you use each of the following types of	Never	41	12.35%	30	12.24%	71	12.31%
	Rarely	60	18.07%	51	20.82%	111	19.24%
	Sometimes	94	28.31%	78	31.84%	172	29.81%
	Regularly	137	41.27%	86	35.10%	223	38.65%

Questions	Answers	STEM		Non-STEM		Total	
sources—Online educational resources that are not videos (such as Wikipedia, study guides, etc.)	TOTAL	332	100.00%	245	100.00%	577	100.00%
In the courses you are currently taking, how often do you use each of the following types of sources—Books, book chapters, or novels (not including textbooks or e-book versions)	Never	90	27.19%	27	11.07%	117	20.35%
	Rarely	50	15.11%	34	13.93%	84	14.61%
	Sometimes	85	25.68%	67	27.46%	152	26.43%
	Regularly	106	32.02%	116	47.54%	222	38.61%
	TOTAL	331	100.00%	244	100.00%	575	100.00%
In the courses you are currently taking, how often do you use each of the following types of sources—Journal articles or other academic articles	Never	17	5.14%	5	2.05%	22	3.83%
	Rarely	37	11.18%	18	7.38%	55	9.57%
	Sometimes	88	26.59%	39	15.98%	127	22.09%
	Regularly	189	57.10%	182	74.59%	371	64.52%
	TOTAL	331	100.00%	244	100.00%	575	100.00%
In the courses you are currently taking, how often do you use each of	Never	217	65.76%	123	50.20%	340	59.13%
	Rarely	51	15.45%	62	25.31%	113	19.65%
	Sometimes	39	11.82%	35	14.29%	74	12.87%

Questions	Answers	STEM		Non-STEM		Total	
the following types of sources— Collection(s) of historical documents or records (such as rare books, handwritten letters or diaries, artifacts, etc.)	Regularly	23	6.97%	25	10.20%	48	8.35%
	TOTAL	330	100.00%	245	100.00%	575	100.00%
In the courses you are currently taking, how often do you use each of the following types of sources— e-books, e-book chapters, or electronic versions of novels (not including textbooks)	Never	106	32.12%	57	23.27%	163	28.35%
	Rarely	61	18.48%	45	18.37%	106	18.43%
	Sometimes	80	24.24%	72	29.39%	152	26.43%
	Regularly	83	25.15%	71	28.98%	154	26.78%
	Total	330	100.00%	245	100.00%	575	100.00%
In the courses you are currently taking, how often do you use each of the following types of sources— Electronic or e-book versions of textbooks or textbook chapters	Never	40	12.20%	35	14.34%	75	13.11%
	Rarely	62	18.90%	47	19.26%	109	19.06%
	Sometimes	104	31.71%	72	29.51%	176	30.77%
	Regularly	122	37.20%	90	36.89%	212	37.06%
	Total	328	100.00%	244	100.00%	572	100.00%
How often do you use each	Never	34	11.11%	18	12.77%	52	11.63%

Questions	Answers	STEM		Non-STEM		Total	
of the following types of sources of information in your research projects—Online educational resources that are not videos (such as Wikipedia, study guides, etc.)	Rarely	81	26.47%	32	22.70%	113	25.28%
	Sometimes	98	32.03%	49	34.75%	147	32.89%
	Regularly	93	30.39%	42	29.79%	135	30.20%
	Total	306	100.00%	141	100.00%	447	100.00%
How often do you use each of the following types of sources of information in your research projects—Journal articles or other academic articles	Never	2	0.65%	1	0.71%	3	0.67%
	Rarely	5	1.63%	2	1.42%	7	1.56%
	Sometimes	27	8.79%	23	16.31%	50	11.16%
	Regularly	273	88.93%	115	81.56%	388	86.61%
	Total	307	100.00%	141	100.00%	448	100.00%
How often do you use each of the following types of sources of information in your	Never	48	15.58%	10	7.14%	58	12.95%
	Rarely	74	24.03%	16	11.43%	90	20.09%
	Sometimes	98	31.82%	44	31.43%	142	31.70%
	Regularly	88	28.57%	70	50.00%	158	35.27%

Questions	Answers	STEM		Non-STEM		Total	
research projects— Books, book chapters, or novels that are not textbooks (not including e-book versions)	Total	308	100.00%	140	100.00%	448	100.00%
How often do you use each of the following types of sources of information in your research projects— Collection(s) of historical documents or records (such as rare books, handwritten letters or diaries, artifacts, etc.)	Never	144	46.75%	39	28.06%	183	40.94%
	Rarely	102	33.12%	38	27.34%	140	31.32%
	Sometimes	40	12.99%	32	23.02%	72	16.11%
	Regularly	22	7.14%	30	21.58%	52	11.63%
	Total	308	100.00%	139	100.00%	447	100.00%
In the courses you are currently taking, how often do you use each of the following types of sources— Data or datasets	Never	48	14.55%	31	12.65%	79	13.74%
	Rarely	59	17.88%	52	21.22%	111	19.30%
	Sometimes	102	30.91%	81	33.06%	183	31.83%
	Regularly	121	36.67%	81	33.06%	202	35.13%
	Total	330	100.00%	245	100.00%	575	100.00%
How often do you use each of the following	Never	17	5.52%	8	5.76%	25	5.59%
	Rarely	45	14.61%	23	16.55%	68	15.21%

Questions	Answers	STEM		Non-STEM		Total	
types of sources of information in your research projects—Data or datasets	Sometimes	100	32.47%	49	35.25%	149	33.33%
	Regularly	146	47.40%	59	42.45%	205	45.86%
	Total	308	100.00%	13	100.00%	447	100.00%

Appendix B
Questions/Answers Related to Research Practices and Perceptions

Questions	Answers	STEM		Non-STEM		Total	
		Number	%	Number	%	Number	%
How useful do you think each of the following factors will be in helping you get your desired job or career? — The research and analysis skills that I acquired or expect to acquire at this college or university	Not at all Useful	7	1.05%	6	1.42%	13	1.19%
	Not too Useful	21	3.14%	20	4.73%	41	3.76%
	Somewhat Useful	84	12.57%	57	13.48%	141	12.92%
	Very Useful	240	35.93%	166	39.24%	406	37.21%
	Extremely Useful	316	47.31%	174	41.13%	490	44.91%
	Total	668	100.00%	423	100.00%	1091	100.00%
My instructors help me develop the research skills to find and use academic sources of information for my coursework or research projects.	Strongly Disagree	3	0.93%	2	0.83%	5	0.89%
	Disagree	7	2.18%	7	2.89%	14	2.49%
	Somewhat Disagree	11	3.43%	15	6.20%	26	4.62%
	Neither Agree nor Disagree	30	9.35%	17	7.02%	47	8.35%
	Somewhat Agree	70	21.81%	58	23.97%	128	22.74%
	Agree	122	38.01%	84	34.71%	206	36.59%
	Strongly Agree	78	24.30%	59	24.38%	137	24.33%
	Total	321	100.00%	242	100.00%	563	100.00%
Campus librarians or library staff	Strongly Disagree	16	2.40%	12	2.86%	28	2.58%

Questions	Answers	STEM		Non-STEM		Total	
help me develop the research skills to find and use academic sources of information for my coursework or research projects	Disagree	38	5.70%	12	2.86%	50	4.60%
	Somewhat Disagree	28	4.20%	7	1.67%	35	3.22%
	Neither Agree nor Disagree	218	32.68%	133	31.74%	351	32.32%
	Somewhat Agree	111	16.64%	65	15.51%	176	16.21%
	Agree	172	25.79%	115	27.45%	287	26.43%
	Strongly Agree	84	12.59%	75	17.90%	159	14.64%
	Total	667	100.00%	419	100.00%	1086	100.00%
How important or unimportant is it to you to do each of the following before you graduate from this university—Collaborate on an original research project with one or more faculty advisors, instructors, or professors	Very Unimportant	51	7.67%	39	9.31%	90	8.30%
	Unimportant	21	3.16%	40	9.55%	61	5.63%
	Somewhat Unimportant	18	2.71%	12	2.86%	30	2.77%
	Neither Important nor Unimportant	65	9.77%	50	11.93%	115	10.61%
	Somewhat Important	64	9.62%	62	14.80%	126	11.62%
	Important	147	22.11%	77	18.38%	224	20.66%
	Very Important	299	44.96%	139	33.17%	438	40.41%
How important or unimportant is it to you to do each of the following before you graduate from	Very Unimportant	76	11.46%	62	14.73%	138	12.73%
	Unimportant	46	6.94%	62	14.73%	108	9.96%
	Somewhat Unimportant	26	3.92%	27	6.41%	53	4.89%

Questions	Answers	STEM		Non-STEM		Total	
this university— Be employed or receive college or university credit as a research assistant	Neither Important nor Unimportant	100	15.08%	85	20.19%	185	17.07%
	Somewhat Important	80	12.07%	59	14.01%	139	12.82%
	Important	131	19.76%	51	12.11%	182	16.79%
	Very Important	204	30.77%	75	17.81%	279	25.74%
	Total	663	100.00%	421	100.00%	1084	100.00%
Some students conduct or contribute to original academic research for course credit and/or for publication. At this university, have you ever— Collaborated on an original research project with one or more faculty advisors, instructors, or professors	Yes	411	61.99%	168	39.72%	579	53.31%
	No	252	38.01%	255	60.28%	507	46.69%
	Total	663	100.00%	423	100.00%	1086	100.00%
Some students conduct or contribute to original	Yes	299	45.03%	93	22.04%	392	36.10%
	No	365	54.97%	329	77.96%	694	63.90%

Questions	Answers	STEM		Non-STEM		Total	
academic research for course credit and/or for publication. At this university, have you ever— Been employed or received college or university credit as a research assistant	Total	664	100.00%	422	100.00%	1086	100.00%
How important or unimportant is it to you to acquire each of the following research skills as a result of your experience at this university— Locating academic sources of information	Very Unimportant	9	1.35%	4	0.95%	13	1.20%
	Unimportant	6	0.90%	6	1.43%	12	1.11%
	Somewhat Unimportant	4	0.60%	7	1.67%	11	1.01%
	Neither Important nor Unimportant	31	4.66%	17	4.05%	48	4.42%
	Somewhat Important	69	10.38%	50	11.90%	119	10.97%
	Important	212	31.88%	109	25.95%	321	29.59%
	Very Important	334	50.23%	227	54.05%	561	51.71%
	Total	665	100.00%	420	100.00%	1085	100.00%
How important or unimportant is it to you to acquire each of the following research skills as a result of	Very Unimportant	11	1.65%	9	2.14%	20	1.84%
	Unimportant	5	0.75%	5	1.19%	10	0.92%
	Somewhat Unimportant	9	1.35%	8	1.90%	17	1.57%

Questions	Answers	STEM		Non-STEM		Total	
your experience at this university—Using information ethically (i.e., understanding the concept of intellectual property, copyright issues, and/or legal and ethical standards for the conduct of academic research)	Neither Important nor Unimportant	22	3.31%	16	3.80%	38	3.50%
	Somewhat Important	70	10.53%	42	9.98%	112	10.31%
	Important	198	29.77%	110	26.13%	308	28.36%
	Very Important	350	52.63%	231	54.87%	581	53.50%
	Total	665	100.00%	421	100.00%	1086	100.00%
How important or unimportant is it to you to acquire each of the following research skills as a result of your experience at this university—Writing according to academic or discipline-specific standards	Very Unimportant	12	1.80%	10	2.38%	22	2.02%
	Unimportant	9	1.35%	7	1.66%	16	1.47%
	Somewhat Unimportant	12	1.80%	4	0.95%	16	1.47%
	Neither Important nor Unimportant	25	3.75%	20	4.75%	45	4.14%
	Somewhat Important	68	10.19%	43	10.21%	111	10.20%
	Important	197	29.54%	114	27.08%	311	28.58%
	Very Important	344	51.57%	223	52.97%	567	52.11%
	Total	667	100.00%	421	100.00%	1088	100.00%
How important or unimportant is it to you to acquire each of	Very Unimportant	10	1.50%	11	2.63%	21	1.94%
	Unimportant	4	0.60%	4	0.96%	8	0.74%

Questions	Answers	STEM		Non-STEM		Total	
the following research skills as a result of your experience at this university—Forming evidence-based conclusions	Somewhat Unimportant	3	0.45%	5	1.20%	8	0.74%
	Neither Important nor Unimportant	22	3.30%	18	4.31%	40	3.69%
	Somewhat Important	61	9.16%	38	9.09%	99	9.13%
	Important	173	25.98%	123	29.43%	296	27.31%
	Very Important	393	59.01%	219	52.39%	612	56.46%
	Total	666	100.00%	418	100.00%	1084	100.00%
How important or unimportant is it to you to acquire each of the following research skills as a result of your experience at this university—Evaluating academic sources of information	Very Unimportant	10	1.51%	7	1.67%	17	1.57%
	Unimportant	4	0.60%	8	1.90%	12	1.11%
	Somewhat Unimportant	5	0.75%	8	1.90%	13	1.20%
	Neither Important nor Unimportant	27	4.07%	26	6.19%	53	4.89%
	Somewhat Important	82	12.37%	55	13.10%	137	12.65%
	Important	228	34.39%	124	29.52%	352	32.50%
	Very Important	307	46.30%	192	45.71%	499	46.08%
	Total	663	100.00%	420	100.00%	1083	100.00%
How important or unimportant is it to you to acquire each of	Very Unimportant	24	3.61%	15	3.58%	39	3.60%
	Unimportant	13	1.95%	9	2.15%	22	2.03%

Questions	Answers	STEM		Non-STEM		Total	
the following research skills as a result of your experience at this university—Synthesizing or incorporating academic information into research projects	Somewhat Unimportant	7	1.05%	6	1.43%	13	1.20%
	Neither Important nor Unimportant	42	6.32%	21	5.01%	63	5.81%
	Somewhat Important	86	12.93%	39	9.31%	125	11.53%
	Important	201	30.23%	123	29.36%	324	29.89%
	Very Important	292	43.91%	206	49.16%	498	45.94%
	Total	665	100.00%	419	100.00%	1084	100.00%
How important or unimportant is it to you to acquire each of the following research skills as a result of your experience at this university—Situating research projects within the existing academic literature	Very Unimportant	19	2.85%	21	5.00%	40	3.68%
	Unimportant	22	3.30%	13	3.10%	35	3.22%
	Somewhat Unimportant	10	1.50%	8	1.90%	18	1.66%
	Neither Important nor Unimportant	58	8.70%	45	10.71%	103	9.48%
	Somewhat Important	101	15.14%	46	10.95%	147	13.52%
	Important	215	32.23%	103	24.52%	318	29.25%
	Very Important	242	36.28%	184	43.81%	426	39.19%
	Total	667	100.00%	420	100.00%	1087	100.00%
How important or unimportant is it to you to acquire each of the following research skills as a result of	Very Unimportant	20	3.02%	18	4.30%	38	3.51%
	Unimportant	16	2.41%	13	3.10%	29	2.68%
	Somewhat Unimportant	18	2.71%	8	1.91%	26	2.40%

Questions	Answers	STEM		Non-STEM		Total	
your experience at this university—Framing or developing original research questions	Neither Important nor Unimportant	44	6.64%	23	5.49%	67	6.19%
	Somewhat Important	89	13.42%	53	12.65%	142	13.12%
	Important	179	27.00%	106	25.30%	285	26.34%
	Very Important	297	44.80%	198	47.26%	495	45.75%
	Total	663	100.00%	419	100.00%	1082	100.00%
How important or unimportant is it to you to acquire each of the following research skills as a result of your experience at this university—Analyzing data, media, images, or other primary source materials	Very Unimportant	10	1.50%	9	2.15%	19	1.75%
	Unimportant	8	1.20%	10	2.39%	18	1.66%
	Somewhat Unimportant	10	1.50%	10	2.39%	20	1.85%
	Neither Important nor Unimportant	31	4.66%	26	6.21%	57	5.26%
	Somewhat Important	79	11.88%	42	10.02%	121	11.16%
	Important	194	29.17%	119	28.40%	313	28.87%
	Very Important	333	50.08%	203	48.45%	536	49.45%
	Total	665	100.00%	419	100.00%	1084	100.00%
How important or unimportant is it to you to acquire each of the following research skills as a result of	Very Unimportant	18	2.71%	21	5.01%	39	3.60%
	Unimportant	17	2.56%	17	4.06%	34	3.14%
	Somewhat Unimportant	29	4.37%	19	4.53%	48	4.43%

Questions	Answers	STEM		Non-STEM		Total	
your experience at this university—Preserving data, media, images, or other primary source materials for the long-term	Neither Important nor Unimportant	76	11.45%	52	12.41%	128	11.82%
	Somewhat Important	118	17.77%	74	17.66%	192	17.73%
	Important	178	26.81%	101	24.11%	279	25.76%
	Very Important	228	34.34%	135	32.22%	363	33.52%
	Total	664	100.00%	419	100.00%	1083	100.00%
How important or unimportant is it to you to acquire each of the following research skills as a result of your experience at this university—Writing and submitting grant applications or other funding proposals	Very Unimportant	30	4.50%	26	6.19%	56	5.15%
	Unimportant	26	3.90%	17	4.05%	43	3.96%
	Somewhat Unimportant	22	3.30%	17	4.05%	39	3.59%
	Neither Important nor Unimportant	70	10.49%	58	13.81%	128	11.78%
	Somewhat Important	109	16.34%	76	18.10%	185	17.02%
	Important	155	23.24%	93	22.14%	248	22.82%
	Very Important	255	38.23%	133	31.67%	388	35.69%
	Total	667	100.00%	420	100.00%	1087	100.00%

Appendix C
Questions/Answers Related to Graduate Student Perceptions of the Library's Role

Questions	Answers	STEM		Non-STEM		TOTAL	
		Number	%	Number	%	Number	%
The library pays for resources that I need for my coursework or research projects, from academic journals to books to electronic databases	Not Useful at all	6	0.90%	5	1.19%	11	1.01%
	Not too Useful	7	1.05%	6	1.43%	13	1.20%
	Somewhat Useful	48	7.20%	28	6.68%	76	7.00%
	Very Useful	175	26.24%	111	26.49%	286	26.34%
	Extremely Useful	431	64.62%	269	64.20%	700	64.46%
	Total	667	100.00%	419	100.00%	1086	100.00%
Librarians or library staff provide assistance or guidance on managing citations of books, articles, data, images, or websites for coursework or research projects (such as for a bibliography, works cited, or index section)	Not Useful at all	15	2.26%	12	2.86%	27	2.49%
	Not too Useful	71	10.68%	24	5.73%	95	8.76%
	Somewhat Useful	159	23.91%	100	23.87%	259	23.89%
	Very Useful	267	40.15%	153	36.52%	420	38.75%
	Extremely Useful	153	23.01%	130	31.03%	283	26.11%
	Total	665	100.00%	419	100.00%	1084	100.00%
Librarians or library staff provide assistance or guidance on using information ethically (such as to avoid plagiarism)	Not Useful at all	21	3.18%	16	3.81%	37	3.42%
	Not too Useful	68	10.29%	28	6.67%	96	8.88%
	Somewhat Useful	168	25.42%	102	24.29%	270	24.98%

Questions	Answers	STEM		Non-STEM		TOTAL	
	Very Useful	239	36.16%	149	35.48%	388	35.89%
	Extremely Useful	165	24.96%	125	29.76%	290	26.83%
	Total	661	100.00%	420	100.00%	1081	100.00%
Librarians or library staff provide assistance or guidance with managing data or datasets	Not Useful at all	30	4.52%	27	6.52%	57	5.29%
	Not too Useful	82	12.35%	37	8.94%	119	11.04%
	Somewhat Useful	198	29.82%	111	26.81%	309	28.66%
	Very Useful	234	35.24%	143	34.54%	377	34.97%
	Extremely Useful	120	18.07%	96	23.19%	216	20.04%
	Total	664	100.00%	414	100.00%	1078	100.00%
The library stores, organizes, and keeps track of books, articles, data, images, or other resources	Not Useful at all	10	1.50%	6	1.43%	16	1.47%
	Not too Useful	24	3.59%	14	3.33%	38	3.49%
	Somewhat Useful	126	18.86%	48	11.40%	174	15.98%
	Very Useful	266	39.82%	152	36.10%	418	38.38%
	Extremely Useful	242	36.23%	201	47.74%	443	40.68%
	Total	668	100.00%	421	100.00%	1089	100.00%
The library helps students develop research skills	Not Useful at all	13	1.94%	8	1.92%	21	1.94%
	Not too Useful	52	7.77%	28	6.73%	80	7.37%

Questions	Answers	STEM		Non-STEM		TOTAL	
	Somewhat Useful	197	29.45%	77	18.51%	274	25.25%
	Very Useful	212	31.69%	161	38.70%	373	34.38%
	Extremely Useful	195	29.15%	142	34.13%	337	31.06%
	Total	669	100.00%	416	100.00%	1085	100.00%
Librarians or library staff provide assistance or guidance in finding sources for coursework or research projects (such as books, articles, databases, websites, etc.)	Not Useful at all	10	1.50%	7	1.67%	17	1.57%
	Not too Useful	54	8.10%	23	5.49%	77	7.09%
	Somewhat Useful	157	23.54%	72	17.18%	229	21.09%
	Very Useful	271	40.63%	167	39.86%	438	40.33%
	Extremely Useful	175	26.24%	150	35.80%	325	29.93%
	Total	667	100.00%	419	100.00%	1086	100.00%
Librarians or library staff provide help for learning about technological, digital, or online tools for coursework or research	Not Useful at all	17	2.56%	12	2.88%	29	2.68%
	Not too Useful	67	10.08%	23	5.53%	90	8.33%
	Somewhat Useful	170	25.56%	87	20.91%	257	23.77%
	Very Useful	266	40.00%	176	42.31%	442	40.89%
	Extremely	145	21.80%	118	28.37%	263	24.33%
	Total	665	100.00%	416	100.00%	1081	100.00%
Librarians or library staff provide support in	Not Useful at all	18	2.72%	12	2.89%	30	2.79%

Questions	Answers	STEM		Non-STEM		TOTAL	
learning and using online search engines or databases	Not too Useful	56	8.47%	18	4.34%	74	6.88%
	Somewhat Useful	154	23.30%	77	18.55%	231	21.47%
	Very Useful	252	38.12%	167	40.24%	419	38.94%
	Extremely Useful	181	27.38%	141	33.98%	322	29.93%
	Total	661	100.00%	415	100.00%	1076	100.00%
Have you ever been directed by a faculty advisor, instructor, or professor to consult with a subject librarian or departmental library liaison at this college or university (i.e., a librarian who specializes in your major, field, or program of study?)	Yes	184	27.88%	164	39.05%	348	32.22%
	No	476	72.12%	256	60.95%	732	67.78%
	Total	660	100.00%	420	100.00%	1080	100.00%
Have you attended a library information session, class, or section that was—Focused on finding sources of information for your major, field, or program of study?	Yes	281	74.73%	233	79.79%	514	76.95%
	No	95	25.27%	59	20.21%	154	23.05%
	Total	376	100.00%	292	100.00%	668	100.00%
Have you attended a library	Yes	206	54.93%	129	44.18%	335	50.22%

Questions	Answers	STEM		Non-STEM		TOTAL	
information session, class, or section that was—Taught during an orientation?	No	169	45.07%	163	55.82%	332	49.78%
	Total	375	100.00%	292	100.00%	667	100.00%
Have you attended a library information session, class, or section that was—Taught by a librarian in a campus library building?	Yes	203	53.99%	191	64.97%	394	58.81%
	No	173	46.01%	103	35.03%	276	41.19%
	Total	376	100.00%	294	100.00%	670	100.00%

Library Impact with International Rankings—One Library's Continuous Journey to Figure it Out

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ABSTRACT:

Over the past year, a major initiative has occurred at Case Western Reserve University (CWRU) to help determine why the international ranking of the university keeps declining year after year. In the summer of 2017, a task force was formed by the university president and was charged with determining the cause of the decline and learn how to improve the rankings moving forward. The task force determined that all three major rankers (Times Higher Education, QS, and Shanghi (also known as ARWU)), use citation data and academic reputation as components within the scoring, so the library was asked to complete an initial analysis of the bibliometric data to identify issues that may impact the ranking. Thus began the process of data mining inside the two tools that the big three rankers relied on for their citation data: Web of Science (WoS), from Clarivate Analytics, and Scopus, from Elsevier. After completing a deep dive analysis to identify errors, the assessment librarian made changes necessary to clean up the records. By sheer tenacity, the library became one of the leading departments on this initiative, using data mining tools to correct many mistakes within the abstract/citation databases, clearly communicating with vendors and international ranking organizations on issues involving the bibliometrics, putting into place procedures and processes to improve accuracy of bibliometric data for the university, and working with faculty to try and improve their international reputations.

INTRODUCTION:

Case Western Reserve University is a medium-sized high impact research university located in Cleveland, Ohio, with origins dating back to 1826. The university was federated in 1967 in a collaboration between Western Reserve University and the Case School of Applied Science. Currently, CWRU has over 10,000 students and over 50% are enrolled as professional graduate students, which leads to great possibilities for research. The new Case Western Reserve University (CWRU) "immediately became a leading institution for academics and research,"[1] recognized nationally and internationally. Due to this exemplary reputation, it has been essential to assess the direction of the university, through strategic planning and developing initiatives, to remain a leading university across the country and around the world. The university's 2013–2018 strategic plan aimed "to be recognized internationally as an institution that imagines and influences the future," and the strategic plan counted international engagement as one of the core values along with making strides to "deepen and expand the university's international engagement over the next five years."[2] As part of this pledge, the university opened the Center for International Affairs to ensure that CWRU was moving in an upward direction. Even with these initiatives in place, over the past few years CWRU has been losing ground in their international rankings. If left unchecked, a drop in rankings can directly and indirectly impact the university's partnerships, student and faculty recruitment and retention, research opportunities, as well as funding and overall institutional reputation. Upon seeing the rankings in 2018 from the major ranking agencies, the university realized that steps needed to be taken to reverse the downward trajectory that was occurring. The university librarian and the vice-president of international affairs began working together to move the university forward with a strategic process on improving the rankings. This included determining how the library could help change the trajectory. This paper will introduce readers to the top international ranking agencies that institutions should recognize and the overall process KSL took when introduced to research assessment and define the bibliometric processes and procedures that were developed over the past year while working on this project.

RANKING AGENCY BACKGROUND:

If you search the internet for "college and university rankings,"[3] a list of different ranking agencies appear in the results; however, it is difficult to differentiate and determine which ones are the most important to your

university. While it is not the best way to learn about rankings, it will direct you to the names of the ranking agencies and the corresponding websites. Fortunately, CWRU hired an international rankings consultant who indicated there are three agencies that most countries and international universities look to for reputation. They are known as the "Big Three": Times Higher Education (THE) World Rankings, QS World Rankings, and Academic Ranking of World Universities (ARWU), also known as Shanghai Rankings. The reason why these are so notable is because they are a few of the longest-running ranking agencies. They are looked to for guidance by universities throughout the world to determine with which school their students, researchers, and educators should engage and collaborate. Or by students, for which schools their government will help fund in aid to allow their attendance. This is a topic that will not be covered in this paper; however, it is important to note certain international countries will not fund students who wish to attend schools that fall below a certain ranking within the list.

Each ranking agency is slightly different and their methodology is not perfect for bibliometric data. Ranking variables differ between each agency: the number of institutions ranked, citation and author impact, total output by the university, subject and performance areas, method of counting, and how data is calculated and normalized are just a few examples. It is important to note, each ranking agency uses a different supplier of the citation data, either Clarivate Analytics or Elsevier. The suppliers review different subject and performance areas and have their own methodology on normalization and results. Many may question why universities or schools examine or believe this information, due to the differences listed above. However, the ranking agencies, especially the ones listed below, still give researchers, collaborators, and prospective students direction in their pursuits.

- **Times Higher Education (THE) World Rankings**: THE has been ranking institutions and supplying data to prospective students for about 50 years. They currently review more than 1,250 universities as of 2019, and currently have thirteen performance indicators grouped into five major areas: teaching (the learning environment); research (volume, income and reputation); citations (research influence); international outlook (staff, students and research); and industry income (knowledge transfer).[4] For KSL, the main area of importance is citations, which counts for 30% of the total indicator score. The citations are supplied by Elsevier and the range is six years of citation count. For 2019, Elsevier examined "67.9 million citations to 14.1 million journal articles, article reviews, conference proceedings, books and book chapters published over five years. The data includes more than 25,000 academic journals indexed by Elsevier's Scopus database and all indexed publications between 2013 and 2017. Citations to these publications made in the six years from 2013 to 2018 are also collected."[5]
- **QS World Rankings**: Currently, QS includes 1,000 universities from 85 countries and is reviewing six metrics: Academic Reputation, Employer Reputation, Faculty/Student Ratio, Citations per faculty, International Faculty Ratio, International Student Ratio.[6] QS obtains the bibliometric data from Elsevier.
- **Academic Ranking of World Universities (ARWU), also known as Shanghai Rankings,** was "first published in June 2003 by the Center for World-Class Universities (CWCU)."[7] ARWU has different categories: "six objective indicators to rank world universities, including the number of alumni and staff winning Nobel Prizes and Fields Medals, number of highly cited researchers selected by Clarivate Analytics, number of articles published in journals of Nature and Science, number of articles indexed in Science Citation Index-Expanded and Social Sciences Citation Index, and per capita performance of a university."[8] ARWU is the only ranker considered one of the "Big Three" that uses Web of Science (WoS) in their analysis. More than 1,200 universities are ranked by ARWU every year and the best 500 are published.

The next few agencies are also ones to watch due to the indicators that are taken into consideration with their use of bibliometric data. These are not as highly cited by countries to make decisions but still used for understanding how institutions are viewed by other countries and institutions around the world.

- **National Taiwan University (NTU) Ranking** reviews about 800 universities and uses WoS as the bibliometric source. "Data used to assess the performances of the universities was drawn from ISI's ESI and Web of Science Core Collection (WoS), which includes SCI and SSCI, and Journal Citation Reports (JCR)."[9]
- **Center for Science and Technology Studies (CWTS) Leiden Ranking** is one of the only rankers that is strictly bibliometric in nature and also uses WoS for the base data. "The CWTS Leiden Ranking 2018 includes 938 universities worldwide. These universities have been selected based on their number of WoS indexed publications in the period 2013–2016."[10]
- **US News & World Report Education Best Global Universities Rankings** is made up of 1,250 universities in 75 countries and are ranked based on 13 indicators, which include the following: global research reputation, regional research reputation, publications, books, conferences, normalized citation impact, total citations, number of publications among the 10 percent most cited, percentage of total publications among the 10 percent most cited, international collaboration, percentage of total publications with international collaboration, number of highly cited papers among the top 1 percent most cited in their respective field, and percentage of total publications that are among the top 1 percent most highly cited papers.[11] US News also uses WoS to make up the bibliometric dataset, but they also use Clarivate Analytic InCites to create the pool of institutions they will review. "To create the pool of 1,372, US News first included the top 250 universities in the results of Clarivate Analytics' global reputation survey, described further below. Next, US News added 1,368 institutions that had met the minimum threshold of 1,500 papers published in the 2012–2016 time frame. The last step was to remove duplicates and institutions that are not schools to reach the final 2018 ranking pool of 1,372 institutions."[12]

PROJECT TIMELINE:

Starting in fall 2017, the university librarian asked the KSL assessment librarian to identify ways of improving the university's international rankings. The assessment librarian looked into the main ranking agencies and completed a review of the indicators from the big three rankers to see where the library could assist. It was discovered that bibliometric data was included in 15 to 30% of the overall indicators and it could be said that bibliometrics make up the foundation of most indicators due to academic reputation, faculty output, collaboration, and citation impact. These areas laid the groundwork to begin the project with the top areas of focus on reviewing institution variations followed by reviewing faculty and their affiliations.

KSL had been doing analysis with WoS and InCites since late 2015, using the tool for collection assessment and library peer comparison. This would be the first time these tools were used to assess the university and review the backend data that created the CWRU data set. It was important to learn how the university was represented since the institution had past names. Looking at all institutional variations for CWRU including all professional schools, institutes, research labs, and previous school names were reviewed and accounted for during this project. It becomes a daunting task but determining the steps a librarian would potentially take helps.

Step 1: Institutional Name Variation Clean Up also known as so much data

The first area tackled was institutional name variation and affiliations associated with the university, and to discover if those affiliations were separate entities or university variations. This is important because some institutions must consider if each professional school would or should receive its own affiliation entry in WoS and Scopus *and* be its own entity. For example, some institutions may want to analyze their professional schools separately to help gauge the different aspects necessary for accreditation, collaboration, or assessment. Note: all work was completed using WoS and their analytic tool InCites for the first few phases of this process because the campus did not have access to Scopus or SciVal at the time.

Figure 1 WoS Naming Variations

The path CWRU took was related to how WoS was already set up and only focused on the overarching main affiliation/variation. There is a separate "hospital" variation but, due to the limited information in that profile, the assessment librarian only focused on the main university variation. The librarian did ensure that anything listed under "hospital" was added to the main version already listed in WoS. This meant that no matter how an author documented their affiliation for Case Western Reserve University, WoS would associate the author with CWRU.

Making this decision simplified the process for the librarian as we learned of new variations. Since CWRU is a medium-sized school with only about 10,000 students and 3,000 faculty, the "one campus" approach was the best option. The librarian did recognize there might be questions regarding the "one campus" approach since all departments and schools were now under the general Case Western Reserve University name and, if a department head was searching for faculty in their respective school, they could not do it in one click. It would take additional time but the department head would be able to search for their respective faculty through publication sets pulled from WoS. InCites allows publication datasets to be loaded into the analysis tool which can also be an option in analyzing specific areas of the institution. Plus, this leverages the library's ability to complete research assessment for the school as a whole and better partner with the departments, faculty members, and administrators. If an institution does not want to have the "one campus" approach, then it will be up to that school to request the addition of variations and affiliations as well as maintaining lists of those variations.

Once the basic organization was decided, the librarian was able to move to the next step: determining what institutional variations were in WoS. The librarian accessed the "Organization-Enhanced" dataset in WoS and pulled a list of 215 variations, which the librarian considered to be a good-sized list; it was assumed that this list would not need many more variations. The librarian was very, very mistaken.

The next part of the cleanup process was to contact the three professional library directors who support the health science schools, school of social work, and the school of law, to determine how many variations they were aware of for each of their schools. The assessment librarian provided them the list that was accessed through WoS to help them see a baseline of what was already discovered. The directors provided another 200 variations (the majority were from the health science areas). It was immediately evident that all of the schools indicated their research labs, institutes, use of office numbers, buildings, and different iterations of CWRU, as well as combinations of CWRU with second affiliations, in different ways that were not accounted for in the original dataset. The assessment librarian now had a list of over 400 variations of CWRU and needed to add them to WoS; this became an almost-six-month service request to Clarivate Analytics Support to make changes to the "Organizational-Enhanced" field and have all of the new variations added to the system. These requests were submitted at the time WoS moved from Thomson Reuters to Clarivate Analytics, which caused a massive delay in the completion of the service request. Due to the delay, much of the data generated from WoS was inaccurate and incomplete in order to meet the international ranking agency submissions deadlines.

The next part of the cleanup was the most time-consuming: it involved pulling the top researchers in the university from each school and department and going through the articles that listed CWRU as their affiliation. This was a way to start compiling other random university variations for each of the schools and

departments. At KSL, the librarian had two student workers to help support this effort and was able to add 100 additional variations.

During this time KSL started a trial of Elsevier's Scopus platform to use in the variation data cleanup as well, and began the same analysis using that tool. It was helpful to see the differences between the two systems and helped support the cleanup effort using both tools.

The assessment librarian performed data cleanup in Scopus and WoS for all the institutional variations and compared the lists being created and was able to make sure the two lists were identical. To date, CWRU has over 650 institutional variations in Scopus and WoS. These lists have been shared with the three major international rankers to ensure when data is pulled into their systems, everything matches to the best of the library's ability.

By using a project management outline in Excel, the library is now on a cycle to ensure all new variations and affiliations are updated accordingly, prior to any submission to international ranking agencies.

Step 2: Author Clean Up Also Known as Author Name Descrambling

Once the institutional naming variation process was under control, the next focus was on the author naming variations.

First, the librarian contacted the Office of Institutional Research (IR) to learn all of the faculty names. This proved difficult because CWRU has a large cohort of researchers and clinicians based within the hospitals. The librarian determined it would be best to start with the faculty that are 100% paid by the university. This means these faculty were either board-appointed, tenure-tracked, or located on the main campus and were counted by IR as a full time employee (FTE) in IPEDS. This reduced the list from over 6,000 names to a manageable 1,500+ names. This decision was made to attempt to start small and then expand as the process developed. The smaller list contained faculty that most likely had a primary affiliation with CWRU and not another institution.

Starting with the schools supported by KSL (College of Arts and Science (CAS), School of Engineering (ENG), and the School of Management (WSOM)), the librarian began reviewing two parts of the author's profile in Scopus and WoS: how the university was listed in the indexed item and how the faculty's name was listed. The librarian reviewed each name and any corresponding curriculum vitae found on the CWRU website to make adjustments to the profiles. This was a very time-consuming process with a lot of data to review. In order to reduce the risk of errors, the assessment librarian made the decision to assign one senior student worker to assist with the task of submitting corrections to WoS or Scopus to merge or adjust a faculty member's profile.

For WoS or InCites (where the analyzing was first completed), the only change that was made to a faculty member's profile was if the university was incorrectly attributed. For example, a correction was submitted to a technical support team for an entry that listed CWRU's location as "Cleveland, Sweden".   Author errors were also corrected as they were found, ensuring names were accurate. InCites does not allow major changes to author profiles, including combining different name versions like "JR Smith," "John Robert Smith," "J Smith," and so on. This might be frustrating as corrections are being made. However, it also removes incorrect combinations of different names that Scopus has in their system. There is a feature that allows the naming versions to be combined together (called "pinning") to see the aggregate author information in one spot. One thing to note about WoS is that it takes time to receive the corrections with an average of six to ten weeks; however, they appear to be getting faster in their turnaround to process support requests.

On the other hand Scopus can complete an update in as little as two weeks, but the quick turnaround for requests and updates can sometimes cause headaches. In Scopus, anyone can request to make changes to the author profile. This is very convenient when cleaning small errors, such as spelling and merging naming

differences for authors. Two problems emerge with this open capability to correct errors, though. One is when faculty work and publish for multiple organizations. Technically, the author is connected to each institution and, because profiles can be updated by anyone, users will find that highly-cited faculty with multiple teaching assignments will move from one school to another, even if the faculty member published under one's own institution. The second comes when two faculty members in the same institution have the same name (or appear to have the same name, i.e., "John R Smith" or "John A Smith"). Some profiles will have the initials while others will not, and if they work in the same department, it becomes critical not to merge the two profiles without ensuring the information is accurate. One error KSL discovered consisted of a faculty member being attributed to another's profile and it took weeks to determine what publications belonged to which faculty member before sending the information to Scopus for correction. This is why it is so important to limit how many people work on this in the early stages of the project. It helps reduce errors and allows for the ability to document processes and issues that will ultimately benefit the future stages of the project.

Once the first round of cleanup was completed, the assessment librarian turned to the Research Service Librarians (RSLs) to ask for their support during the second round of cleanup. This allowed for additional help and, due to their connections with the faculty, they would be able to do a more detailed review of faculty profiles.

Step 3: Collaboration Also Known As Asking for Help

In early 2018, the assessment librarian completed the basic cleanup of 1,500+ faculty names provided by IR for the 2017–18 academic year. Now it was time to ask for help from other staff familiar with faculty to see what additional cleanup efforts were needed.

Discussions began with the Research Services team leader to request that all RSLs review their department lists and work with their individual faculty to determine if the information listed in WoS and Scopus was accurate. During these meetings with their faculty, RSLs would also help create ORCID iDs, if needed.

The team leader whole-heartedly agreed with the process outlined and the project launched by the end of the 2018 spring semester. However, the timing was tricky. Some faculty were leaving on break and all were busy with the end of the semester approaching, RSLs had some time constraints, and other major library initiatives were occurring, but it was decided that, since this would be an ongoing process, it would launch and continue as a summer project. The assessment librarian began working with the RSLs to instruct on the use of WoS/InCites and Scopus/SciVal so they could teach their faculty and assist with improving faculty profiles. It was interesting to learn this exercise also helped the RSLs that have previously published realize that they, too, needed to clean up their profiles and get an ORCID iD to manage their publications and works. They were able to use themselves as examples when speaking with the faculty about the importance of updating their faculty profiles in the two systems.

The number one question faculty asked was, "Why? Why should I do this? This seems like more work," or, "I already put this information on my CV, or in another portal like Google Scholar." Another message we received was, "It's just a way for the university to track what I do and I don't want to do that." These were hurdles the RSLs were equipped to handle through the communication pieces the assessment librarian put together.

Below are a few talking points the assessment librarian provided the RSLs to explain the importance of the project to their faculty, no matter which stage they are in their career and no matter their thoughts on the process.

- This is to ensure you are properly recognized for all of the work that you do instead of someone else that just happens to have your name.
- You will be searchable by others that are doing the same or similar work as you, so it is important to have accurate information in your profile. Someone may be searching in WoS/InCites or

Scopus/SciVal for collaborators with established careers and, if they come across your name with incorrect data (i.e., you only have five publications attributed to your name), it may seem like you are only at the beginning of your career. They may move past you in their search for a more experienced collaborator, resulting in a missed opportunity for research that is important to your tenure and promotion.

- It is a great way to keep track of how many citations and other metrics you have and use that to help with promotion and tenure. If publications are not correctly attributed to you, your impact is limited.

- We want to make sure we empathize with their issues on developing an ORCID iD profile. Yes, developing an ORCID profile when someone has a few hundred publications is a bit of a challenge, but it will help faculty because an accurate profile means their respective h-index or citation impact will also be exact and show their true impact in their academic field. Plus, there are also APIs built into ORCID to help make the process easier and will automatically import citations from a variety of indices.

- In the screenshot below from Scopus, you can see the multiple versions of the name John Smith. Without review by the librarian or faculty member, the works can easily be attributed to another university they previously worked for. Additionally, Scopus or WoS may index the publication incorrectly under the wrong Smith (remind them that computer algorithms are not perfect). It is also important to note that errors can occur down on the journal, article, and the author level. A spelling error can occur at any level of publishing and it is important to note that getting the errors corrected takes time and multiple people, but mainly it is the faculty member's responsibility to ensure that their profile is accurate. The library and indices can only do so much before it is up to the researcher.

Figure 2 Example of Different Author Naming Variations

In spring 2018, KSL began marketing education opportunities to the faculty, encouraging them to register for ORCID iD profiles as well as cleaning up their profiles in both Scopus and WoS. The library also had Elsevier come on two occasions to assist researchers, faculty, staff, and students on how to use Scopus and SciVal for their specific needs. It was very successful and our groups went away with a new understanding of how to use the tools, as well as the benefits of improving their profiles, research, and collaboration. Note that all training is free and, to encourage participation, KSL supplied light refreshments and Elsevier provided a Kindle to one attendee for the two training sessions.

Over the past several months, the RSLs have actively spoken with their departments and KSL has successfully updated almost all of the faculty for the schools directly supported by KSL. Another benefit has been the development of department hierarchies for the schools. These are created in SciVal and have all faculty with at least two publications indexed by Scopus. These hierarchies are then shared with the necessary parties, including department chairs, research deans, and librarians. These individuals are then able to complete analysis on their departments and make adjustments to include prospective candidates in the hiring process or ask any other pertinent questions they might have for their area.

As you can see in the screenshot below, over the past five years, the biomedical engineering department has increased in their scholarly output but decreased in the amount of researchers. This information can help department chairs or deans when looking at candidates to fill one of the open positions in their department or determine which areas of research their faculty are focusing in and help their faculty members look at new collaboration opportunities.

Figure 3 SciVal Department Overview
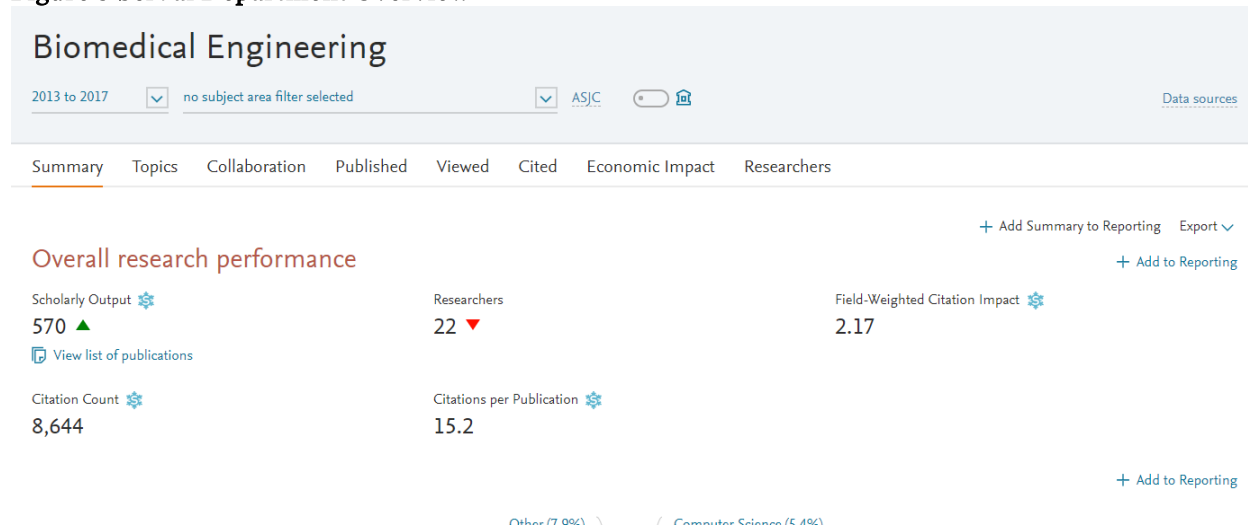
Sharing this information with the departments and schools helped demonstrate the importance of the project, which resulted in more buy-in from the leadership of the departments and schools. This process will be ongoing as the faculty list changes each academic year and requires updates annually.

CURRENT RESULTS:

The international ranking project began in late 2017 and, after a year of learning as much as possible about international rankings and ranking agencies, making updates to the institution variations, correcting and updating author profiles, scrambling to meet deadlines, and creating new processes and procedures, the Kelvin Smith Library team saw if all of their hard work and effort came to fruition as the results of the new rankings were published in 2018.

When the new rankings for the reporting year started coming out by mid-2018, the assessment librarian was thrilled to see that all of the hard work and late nights paid off. There was concrete proof in the numbers that

the library contributed to the increase in the university's rankings, especially in the Leiden Rankings, since that is specifically bibliometric.

The chart below shows some success in the first year of CWRU's targeted effort to improve their rankings. It also shows that not all rankings have gone up and some have actually decreased. This is to be expected from time to time if the methodology has changed by the ranking agency or if the university is not performing well in a specific area.

	2012	2013	2014	2015	2016	2017	2018	2019
ARWU	99	99	101	116	111	124	123	-
QS	145	164	175	189	215	202	213	186
THE	93	104	88	116	133	126	158	132
NTU	88	103	116	117	117	116	124	-
Leiden	101	101	74	109	133	143	57	-
US News Global Rankings	_	_	_	137	142	131	146	152

One area the university is struggling with in regards to international rankings has been collaboration and connectivity between CWRU authors and international authors. This can cause a ripple effect and impact the rankings. KSL was able to show leadership using InCites and SciVal that the university predominately works more locally and nationally than with international counterparts. The example below shows the SciVal and Scopus data of international collaboration and the total co-authored papers from 2013 through 2017, as indexed by the Scopus dataset.

Region totals	Collaborating Institutions	Co-authored publications
Worldwide	3307	14547
Africa	122	420
Asia Pacific	800	2349
Europe	1166	2893
Middle East	177	573
North America	912	12321
South America	130	500

Filter Summary:
Dataset: SciVal
Schema: Scopus

Time Period: [2013, 2017]
Collaborations with Organizations: [Case Western Reserve University]

2018 AND BEYOND:

The university created a team of individuals to help improve the rankings, so it was not only KSL's efforts but also the entire university coming together to support this initiative. For 2018, KSL has two representatives that serve on the steering committee and as part of the working group, which includes the university librarian and the assessment librarian. The library is able to share their knowledge and expertise in the process as well as make recommendations. This was especially important during the development of the working group recommendations to the steering committee regarding the strategic recommendations to keep moving the initiative forward. The assessment librarian was able to press that bibliometric work and cleanup cannot be done without WoS and Scopus and the university needs to contribute to the purchasing of the tools to be successful. The university is in the process of finalizing a complete international ranking strategic plan as well as a budget that will include financing at least one of the tools to help support bibliometrics.

For the library initiatives regarding international rankings, KSL is now diving deeper into the data and looking at new areas to support the university. New reporting is now occurring, which includes delving into the research and subject areas to analyze accuracy. Review where faculty are publishing and the impact factor of the journals, including where CWRU's faculty collaborators are located, will help determine if there is a place for international collaboration in the future. Evaluation of the faculty doing work across a range of disciplines can also help determine what the international rankers are looking at and which data points to pay attention to during the next cycle. KSL hopes these projects and others will help administration in the pursuit to improve international rankings in the coming years.

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Endnotes

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Communicating Library Impact through the Assessment Website

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Introduction

Academic library assessment activities are designed to facilitate planning, improve programs and services, and demonstrate library impact on student academic success and faculty research productivity. One effective way to share assessment processes and outcomes is through scholarly publications in library and information sciences. However, presenting assessment activities on the library website is another essential way to share this impact activity with a wider audience, and especially with institutional and higher education stakeholders. With that in mind, how do academic libraries effectively communicate on their website their impact on the research and learning enterprise to their stakeholders? In accordance with ACRL's recommendations for demonstrating value and impact, what are best practices for demonstrating impact through the website, a far-reaching platform which gives libraries a unique opportunity for broadly communicating their alignment with institutional goals?

Stony Brook University is designing a mini-site as part of the overall libraries' web presence to share our assessment activities, findings, and statistics with our university community. Our goal is to create a web presence that demonstrates library impact on academic success in a way that is understandable to external stakeholders and to do so in a visually compelling way. As part of this project, a thorough review was conducted of the [Association of American Universities](#) (AAU)[1] member institutions' library webpages to locate and study their assessment information to serve as a comparison. This examination revealed a lack of a library assessment presence on the majority of library websites. Where there was assessment information, some of it was difficult to follow because of library-centric presentation and lingo, and issues with organization, navigation, volume, scope, and types of materials presented. Using ACRL's *Academic Library Impact: Improving Practice and Essential Areas to Research* (*Library Impact*)[2] and ACRL's *The Value of Academic Libraries: A Comprehensive Research Review and Report* (*VAL Report*)[3] as a framework, the authors discussed the findings, deliberations, and recommendations for best practices in design, visual impact, and communication of assessment goals and processes with appropriate institutional contexts on a website.

Assessment Trends and Priorities

Demonstrating value has been an urgent priority for academic libraries. One of the most essential ways that libraries can do this is by aligning their work with their institutional missions. To that end, ACRL has identified specific areas of institutional missions that academic libraries can and do impact and should explore to further increase their value: student enrollment, retention, graduation rates; student success, achievement, learning, experience, engagement; faculty research productivity, grant proposals, grant funding, teaching; and institutional reputation and prestige. These research agenda areas should be used to shape or revise library missions, visions, and strategic directions in collections, services, and programming to ensure that academic libraries contribute maximum value to institutional outcomes.[4]

It follows that ACRL's agenda areas also help inform and shape library assessment planning and activities insofar as these assessment activities help libraries demonstrate their impact on institutional missions. Assessment helps libraries to be transparent and accountable, foster a culture of continuous evidence-based improvement and learning, and embrace change so they remain as a "centerpiece of their institutions."[5] Libraries have traditionally measured (and presented) internal library processes (input/output, service quality, user satisfaction). As these traditional measures "no longer resonate with many higher education stakeholders,"[6] there is a need to shift the paradigm of assessment to one that demonstrates the library's impact on learning and research outcomes. In this new paradigm, libraries must see themselves as an integral, active part of the learning and research enterprise of higher education, not just information repositories and physical spaces; librarians must focus on information skills, not just information access; and

they must think like educators and research partners, not just service providers. The *VAL Report* shows that it is imperative that libraries improve their articulation of value to external stakeholders since they do not exist for themselves, but rather to advance institutional missions. In other words, academic libraries must reframe *what* they assess so they can demonstrate *how* they advance the mission of their institutions.

Building on the *VAL Report*'s recommendations on targeted areas for program improvements and more effective communication of the library's contributions to institutional missions, and with input from key stakeholders, ACRL issued an update with priority research and action areas in its 2017 *Impact Report*:

- Communicate the library's contributions to the institution
- Match library assessment to institution's mission
- Include library data in institutional data collection
- Quantify the library's impact on student success
- Enhance teaching and learning
- Collaborate with educational stakeholders[7]

Communicating the library's impact to the institution requires libraries to present the library's contributions using terminology that is easily understandable by the institutional/higher education stakeholders, raise awareness of the library's participation in missional areas to those outside of the library, actively participate in campus and interdepartmental efforts, cultivate informal communication opportunities, and leverage the library's unique position of serving all students and majors. **Matching library assessment** to the institution's mission requires libraries to work with campus partners and departments to collaborate on common issues and goals, work with teaching and learning support services as well as faculty and students to build a culture of assessment, and align assessment activities to the institution's strategic directions. **Including library data** in institutional data collection requires libraries to have their data included in the systematic data collection processes and analyses of the institution to better connect the library with research, teaching, learning, and student success. Impact on student success has become the most significant way for institutions to demonstrate their value to their stakeholders, and libraries can **quantify their impact** in this area with data and assessment of library resources, programs, spaces, library instruction for student success, and other data points. Libraries must show the ways they contribute to critical thinking, student learning and engagement, and use spaces, collections, and programs to **enhance learning and engagement**. And **libraries must collaborate** with other partners and units on campus and at other institutions to improve student learning and success.

The *Impact Report* stressed that the first priority area—communicating the library's contribution to the institution—was indeed the most important, and that the other five areas support this priority area in more specific ways.[8] Indeed, a library that is adequately achieving the other five priority areas, but is not communicating it effectively, through the website or otherwise, may still fail to demonstrate its value to its stakeholders. Lewin and Passonneau noted that "[i]nstitutions will not place high value on libraries if stakeholders cannot discern the positive impact library activities have on scholarship and teaching activities."[9] Moreover, at least half of the ten "next steps" identified in the newly published white paper, *Library Integration in Institutional Learning Analytics*,[10] involve communicating value or prioritizing user stories or impact narratives to further facilitate greater library integration with institutional data and analysis of student learning and success.

Given these guidelines, how can libraries utilize their websites to effectively communicate their value and impact? One way is to change their frame of reference away from the library to prioritize the perspective of the institution and other external stakeholders by presenting information that resonates with higher education goals. For example, we must consider what administrators may want to know when they visit our website:

- What is the librarians' role in "high impact educational practices" such as first-year seminars, writing-intensive courses, undergraduate research, and capstone courses?
- How does the library's outreach and programming contribute to faculty and student engagement and cultivating an informed citizenry?
- How are liaison and/or first-year experience librarians interacting with first-year students to contribute to student retention?
- How is the library contributing to student recruitment, graduation rates?

Faculty and students will want to know:

- How much research time does the library save (reference transactions, research guides, database access) for my paper, research, or grant proposal?
- How is the library instruction contributing to student learning objectives?
- What general education requirements does the library help students meet?

Moreover, employers are looking for transferable skills in students:

- How does library instruction teach and reinforce critical thinking, analytical skills, problem-solving, locating, evaluating, and ethically using information from multiple sources?

Libraries can use these and other prompts from the *VAL* and *Impact Reports* to help reframe how they communicate the impact of their work in terms of student success and faculty productivity, rather than the traditional input/output framework.

Therefore, effectively communicating the library's value and impact on its website requires that the information and material:

- are outcomes-based, mission-focused;
- clearly resonate with institutional mission;
- align with other institutional reporting;
- communicate value and impact through evidence-based assessment practices, methods, and metrics;
- are easily understandable and appreciated by external stakeholders;
- are presented in the language of higher education;
- are open and accessible, not restricted by staff logins;
- explain the data, charts, and other metrics for what they show—do not make the reader have to do the work of making meaning of impact; and
- focus on the results of assessment (what will we do with it, how have we used it to improve library impact and value to institutional mission?), not on the assessment process itself.

So, being very intentional about framing *what* libraries communicate on their websites about their value and impact in the language of higher education is crucial. *How* they visually present this narrative through their website is just as important.

Cognitive Load Theory and Visual Elements

When learning new information, our working memory has a limited capacity in what it can process at one time. Research has found the average person can hold seven plus or minus two pieces of information in working memory at any one time.[11] When there is too much information to process beyond what an individual's working memory can handle, they can experience a cognitive overload.[12] "Cognitive load theory seeks to reduce or manage the working memory load, or cognitive load, in order to assist learners in developing meaningful learning experiences."[13]

According to Sweller,[14] cognitive load can be broken down into intrinsic and extraneous components and is said to be additive in nature. Intrinsic cognitive load is the nature of the material being presented on the website. If the new information has many elements that must be processed or learned together such as interpreting Tableau data and charts, it is said to have a high element interactivity. This requires more working memory resources than learning unrelated single elements that do not interact together. Intrinsic cognitive load is usually fixed and can only be reduced by changing the nature of the learning task or by the act of learning itself. Sweller describes extraneous cognitive load as the way in which material is presented. When there is too much extraneous information (e.g., detailed reference transactions by hours), learners are using working memory for things other than learning and an unnecessary high cognitive load can result. This can be reduced by changing the way information is presented to the learner.[15]

As we focus on communicating library assessment, it is important for the designer/presenter to keep in mind working memory, the nature of the material being presented, and the way in which it is presented. Stephanie Evergreen reminds us that, "If our hard work is to draw attention, make an impact, and convince others to take action, then communication can no longer be presented in the weak style of the status quo."[16] Schweppe and Rummer state that "a central recommendation for the design of multimedia learning materials is to take into account the limited capacity of working memory."[17] To reduce extraneous cognitive load, libraries can focus on the following visual elements to support efficient and effective processing of library information by external stakeholders. A summary is also provided in Table 1.

Dual Coding is presenting information using verbal and non-verbal codes or with words and pictures. This helps the viewer process and retain information more effectively.[18] As Evergreen writes, "graphic elements can reduce the overload by doing some of the thinking for the reader."[19] When the presenter uses meaningful words and appropriate images together, they are organizing and emphasizing information for the reader, freeing up working memory and helping them process and understand the presented information. Where appropriate, library assessment information should incorporate graphic elements or symbols to help facilitate meaning.
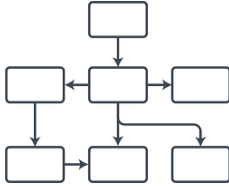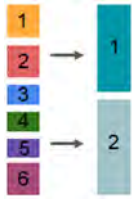
Organization of Material is organizing material in a way that is easy for the reader to understand to support retention. We naturally want to put things into categories. As a library, we want to present information so that external readers do not have to use working memory to organize the assessment information themselves. Reference icons are a good example of organizing information in a meaningful way. Evergreen describes reference icons "provide the reader with a mental organizational structure."[20] Judgmental icons are another example which "quickly communicate our interpretation of our research findings."[21] Reference and judgmental icons can also contain dual coding using verbal and non-verbal cues.[22]

Removing extraneous information that will hinder or reduce understanding in the presentation of assessment information is important. If there is too much information presented that is not absolutely needed to easily interpret findings and results, the reader is likely to experience cognitive overload and give up reviewing the information presented: we risk losing our audience.

Chunking is grouping single pieces of information into groups and is a technique for keeping information in working memory and eventually long-term memory.[23] Phone numbers are a great example of chunking. Our brains view phone numbers as three grouped units of information instead of ten individual numbers. This technique helps to free up working memory so an individual can process more information at one time. Grouping related assessment items helps readers process and retain the information better.[24]

Drawing Attention is emphasizing to the viewer what we want them to know. We want to draw the viewer to the information that we deem most important or that has the most significance. Making this information stand out helps us communicate what value and impact they have over other information on the page.

Table 1: Visual Elements to Help Reduce Extraneous Cognitive Load

Visual Element	Example	Explanation
Dual coding	Library Book	Combining verbal and nonverbal elements; using words with pictures
Organization of material	Organize Content	Providing a clear framework and organization of elements that is orderly and easy to understand and follow. It is important to keep in mind an external audience. Reference and judgmental icons are good examples and can include dual coding.
Remove extraneous information	Remove extraneous info	Remove any information that is not essential to processing and understanding the information you are presenting. This will free up working memory to process the intrinsic nature of the material.
Chunking information		Grouping single pieces of information into groups. This frees up working memory to allow you to hold and process more information at one time.
Draw attention	*Draw Attention*	Drawing attention and emphasizing important information with visual cues such as color

Making assessment activities meaningful to higher education stakeholders would facilitate academic communities' understanding of libraries' relevance, value, and impact on the research process and teaching and learning enterprise.[25] Libraries need to be proactive in mapping their contributions to institutional success. We should take full advantage of the website's broad reach to effectively communicate this alignment by consistently focusing on the external audience, strategic use of design principles, impact narratives/storytelling, and other methods that resonate with the institutional stakeholders. We should also draw upon cognitive science and design theories to guide us in the way we present this information. This

study explores best practices in library assessment web presence that not only presented assessment content in ways that resonated with higher education goals (student learning and success, faculty productivity, and institutional prestige and reputation), but also used design elements that maximized the communication potential of a website presentation.

Methodology

In planning for a mini-site on assessment activities, Stony Brook University Libraries researched other library assessment websites. A quick Google search was completed and a few institutions' webpages were reviewed. The variation and lack of information found prompted us to do a more systematic review to discover best practices in what should be communicated through a library assessment webpage and the most effective ways to do so. The sample chosen for this review consisted of 61 (out of 62) AAU institutions, of which Stony Brook University is a member. SBU was excluded from the review because we did not have a website to compare. The three research questions that guided our qualitative inquiry are:

1. Do AAU member institutions have a webpage for library assessment information?

2. What library assessment information can be accessed on library websites of AAU member institutions?

3. For institutions that have a substantial library assessment webpage:

    a. Is the information comprehensive?

    b. Does it explicitly state a focus on academic library value and impact?

    c. Is the information presented in a visually appealing way?

All 61 AAU member websites were initially searched for library assessment information in the summer of 2018 by two library professionals. We cross-checked and calibrated our independent findings with one another in fall 2018 to reach a consensus on the criteria and categorizations. For each institution, we used the following protocol:

Search Protocol

1. Google "Institution Name" + "Library Assessment"

2. If no information found:

    a. Go to institution's library website and review main library page to locate any assessment info

    b. If site search available on main library page, search "assessment"

    c. Review main library page "About Us" section

Institutions were grouped into the following three categories:

1. No library assessment web presence easily discoverable

2. Some library assessment information present but not substantial

3. Substantial library assessment information located on webpage/webpage

A criteria checklist grew out of this initial search and analysis and mapped to the recommendations in the *VAL* and *Impact Reports*. We then completed a more thorough review of a smaller subset of 13 institutions we considered to have "substantial" library assessment information (see Research Question 2 discussion for definition of "substantial"). For these 13 institutions, we investigated whether the websites were comprehensive, whether they explicitly stated a focus on value/impact of the academic library, and whether the information was presented in a visually appealing way (using cognitive load theory and design thinking concepts). A sample of this checklist is provided in the appendix. We defined "comprehensive" as including the following elements:

- Library value/impact explicitly stated
- Library mission statement
- Library strategic plan
- Information current
- Contact information present
- Survey assessments
- Information literacy/Instruction assessment
- Benchmarking data
- User focus—internal/external audiences
- Supporting faculty research productivity
- Contributing to retention/graduation/academic success measures
- Results of assessment projects outlined and how they inform improvements

Findings
Research Question 1
Do AAU member institutions have a webpage for library assessment information?

All 61 member institutions of the AAU (excluding Stony Brook) were searched for library assessment webpages. Through this initial search, we found that 9 institutions did not have a library assessment web presence;[26] 39 had some, though not substantial, assessment information; and 13 had a substantial library assessment webpage or web presence.

Web Presence	# of Institutions
No library assessment webpage presence	9
Some assessment information but not substantial	39
Substantial library assessment webpage	13
Total institutions reviewed	61

Research Question 2
What library assessment information can be accessed on library webpages of AAU member institutions?

109

Through our search and analysis, we found the following to be included on many of the library assessment webpages. This included mission statements/guiding principles, patron surveys (internal and standardized), annual reports, statistics reported to library and higher education associations, benchmarking data, and information literacy/instruction assessment.

Research Question 3

For institutions that have a substantial library assessment webpage:

a. *Is the information comprehensive?*

b. *Does it explicitly state a focus on academic library value/impact?*

c. *Is the information presented in a visually appealing way?*

We continued to review 13 institutions that we found to have a substantial library assessment presence using the criteria checklist we developed. Based on our definition of comprehensive (as stated above), we found only three institutions met this criterion. Four institutions explicitly stated a focus on academic library value/impact somewhere on their pages. Finally, we found that only two institutions presented their information in a visually appealing way.

Quality and presentation of web presence	# of Institutions
Substantial library assessment webpages	13
Comprehensive assessment information	3
Explicit statements of focus on academic library value/impact	4
Information presented in a visually appealing way	2

The two institutions that demonstrated exemplary webpages for communicating library assessment information are the University of Washington and Iowa State University.

University of Washington

The main page of the University of Washington library assessment website, www.lib.washington.edu/assessment, lists four icons that direct the reader to different parts of the assessment page.[27] These icons use dual coding—combining words and pictures—which easily communicates and organizes content. This also simplifies navigation of the site, removing extraneous information which helps to not overwhelm the viewer. However, these icons are only present on the landing page. If these icons were used throughout the assessment webpage and on their fact sheet, it would further help the viewer to more easily identify and navigate the content.

Figure 1. Dual coding example from the University of Washington Libraries assessment website
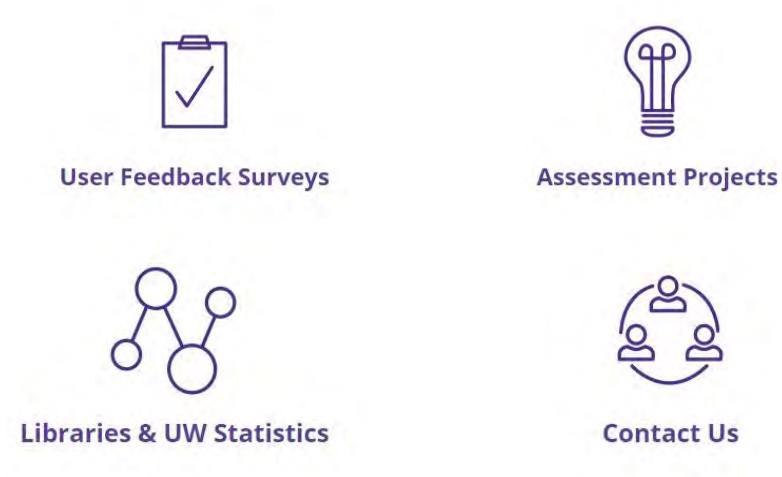
Assessment projects are current and well-outlined, with explanations and links. More common in our review of websites was just a list of links. University of Washington's assessment reports emphasize not only the results of the assessment projects but how these results are used and inform changes and improvements. The links to the strategic plan help the viewer connect assessment projects to the library and institutional goals. There are also links to institutional data collection which show how the library fits within overall institutional assessment.

Contact information is easily accessible, though we found access to the overall page to be difficult. There does not seem to be a way to link to the assessment page from the main library webpage. Their use of the data visualization tool, Tableau, is effective. They include links to statistics with charts and graphs, but they also assume a higher level of library knowledge than might be appropriate for external readers. The assessment information on many of their pages can be overwhelming for a novice or external viewer to manage and understand.

Iowa State University

Iowa State University's library assessment webpage, https://assess.lib.iastate.edu, is easily discoverable and is included under the About Us section of the library's main webpage.[28] Iowa State University Library is engaging in current comprehensive assessment including surveys, benchmarking data, and information literacy assessment. The website demonstrates a culture of assessment and explicitly states a focus on value and impact. Here is an example from their 2016 Library Student and Postdoc User Survey report describing their survey goal: "To measure the user perceptions of undergraduate students, graduate students, and postdoctoral scholars of the value, impact, and service quality of the services provided by Iowa State University Library."[29]

When accessing the main page, the viewer is first introduced to Iowa State University Library's strategy map. This color-coded map breaks down their assessment plan into different perspectives (service, financial, learning, and internal) and is tied to the university's mission on academic excellence. This is a great example of chunking and organizing content effectively. However, these perspectives could have been used throughout the webpage to help the viewer more easily navigate and locate assessment projects based on these different perspectives. The navigation headings on the website (The Plan, Stories, Metrics, Surveys, and Reports) are not intuitive and sometimes reflect an internal perspective rather than presenting information for an external audience.

Figure 2. Example of effective chunking and organization of content from the Iowa State University Library assessment website.
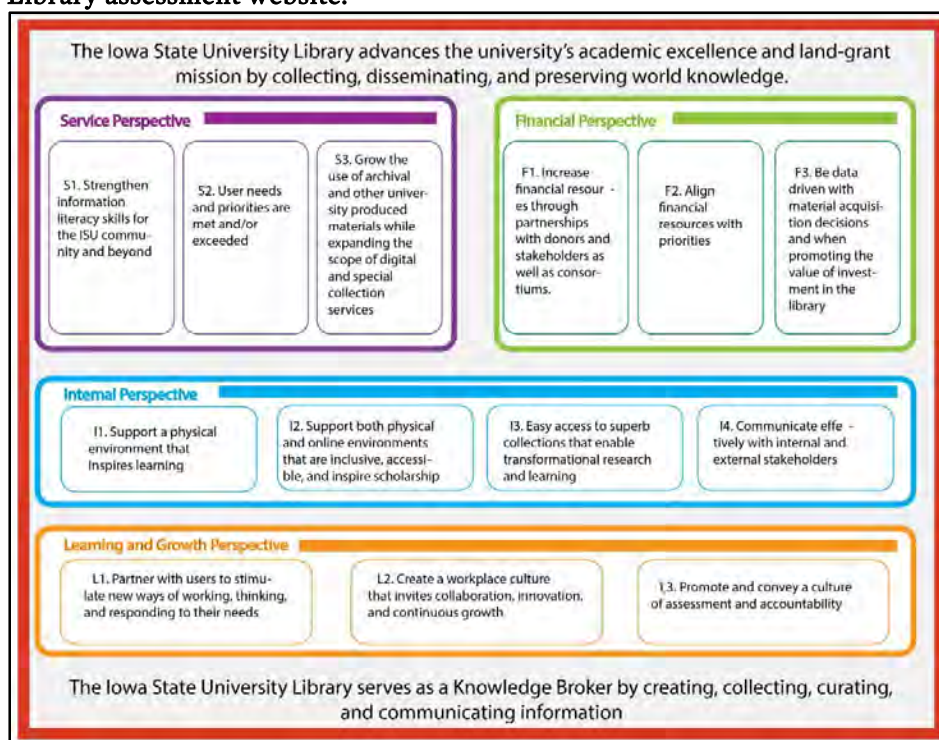
Their use of Tableau assumes some level of knowledge from the viewer but extraneous information has been removed, visuals are appealing, it is not too technical, and the information is concise. The Tableau charts and graphs are interactive so the viewer can engage with the data. In some Tableau charts, they also include a short narrative (or Tableau Story Points) that guides the viewer to interpreting the data. As they stated, "People tend to understand and remember concepts through stories. And they can tell a story with data, just as they can tell a story with text or with film. Tableau Story Points are narratives with data."[30]

Iowa State University's Library assessment website demonstrates effective use of judgmental icons in their reports. They use a system of color-coded arrows that quickly communicates to the viewer if they have met, exceeded, or not (yet) met their expectations of goals. This helps to keep the information organized, removes extraneous information, and clearly communicate through the use of graphic icons.

Figure 3. Example of effective use of judgmental icons from the Iowa State University Library assessment website.

Limitations

While we found that nine institutions did not have a library assessment web presence, we recognize that they may have a library assessment webpage, just not discoverable based on our search parameters. We also acknowledge that our sample of AAU institutions is a relatively small sample of academic libraries nationwide. We did not review these websites for ADA compliance. We also understand that the lack of a library assessment webpage does not necessarily mean that the institutions do not have a comprehensive and well-structured culture of assessment in their library; it simply means they are not communicating this well through a webpage.

Recommendations for further research include:

- doing a deeper dive in how libraries can use benchmarking data to communicate value, improve and enhance teaching and learning, and communicate with external stakeholders through a website;
- determining whether or how well library strategic plans and assessment activities align with an institution's mission; and
- looking at other samples, such as ARL libraries, other types of academic libraries (community college, 4-year, etc.), or exemplary websites of other types of libraries (public, school, special) for best practices.

Conclusion

ACRL identified the two most essential areas for research and practice regarding library impact—aligning the library with institutional effectiveness and communicating that alignment in ways that resonate with

higher education stakeholders. Assessment websites can and should show how the library contributes to student success and faculty research productivity, enhances teaching and learning outcomes, and aligns with the vision and mission of the parent institution. In applying ACRL's criteria to AAU member library assessment websites, we found that the majority of the sample either had no assessment information or inadequately communicated their alignment and impact in higher education terms. While libraries already might be doing excellent assessment work, if they are not communicating these activities effectively on their websites and through impactful narratives, they will not be recognized for the value they bring to their institutions. What this means is that there is great room for improvement for all libraries to better communicate their institutional effectiveness through the web portal.

Notes

1. "Our Members," Association of American Universities, https://www.aau.edu/who-we-are/our-members.
2. Association of College and Research Libraries, *Academic Library Impact: Improving Practice and Essential Areas to Research*, prepared by Lynn Silipigni Connaway, William Harvey, Vanessa Kitzie, and Stephanie Mikitish (Chicago: Association of College and Research Libraries, 2017), http://www.ala.org/acrl/sites/ala.org.acrl/files/content/publications/whitepapers/academiclib.pdf.
3. Association of College and Research Libraries, *Value of Academic Libraries: A Comprehensive Research Review and Report*, prepared by Megan Oakleaf (Chicago: Association of College and Research Libraries, 2010), http://www.ala.org/acrl/sites/ala.org.acrl/files/content/issues/value/val_report.pdf.
4. ACRL, Value of Academic Libraries, 42.
5. ACRL, Value of Academic Libraries, 42.
6. ACRL, Value of Academic Libraries, 42.
7. ACRL, Library Impact.
8. ACRL, Library Impact, 46.
9. Heather S. Lewin and Sarah M. Passonneau, "An Analysis of Academic Research Libraries Assessment Data: A Look at Profesional Models and Benchmarking Data," *The Journal of Academic Librarianship* 38, no. 2 (2012): 91.
10. Institute of Museum and Library Services, "Library Integration in Institutional Learning Analytics," prepared by Megan Oakleaf, November 15, 2018, https://library.educause.edu/~/media/files/library/2018/11/liila.pdf, 7.
11. George A. Miller "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity For Processing Information," *The Psychology Review* 63, no. 2 (1956): 81–97.
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13. Jennifer J. Little, "Cognitive Load Theory and Library Research Guides," *Internet Reference Services Quarterly* 15, no. 1 (2010): 53–54.
14. John Sweller, "Element Interactivity and Intrinsic, Extraneous and Germane Cognitive Load," *Educational Psychology Review* 22, no. 2 (2010): 123–138.
15. Sweller, "Element Interactivity." For a more in-depth review of cognitive load theory see *Cognitive Load Theory* by John Sweller, Paul Ayres and Slava Kalyuga.
16. Stephanie D. Evergreen, *Presenting Data Effectively: Communicating Your Findings for Maximum Impact* (Los Angeles: Sage Publications, 2014), 9.
17. Schweppe and Rummer, 286. Judith Schweppe and Ralf Rummer, "Attention, Working Memory, and Long-Term Memory in Multimedia Learning: An Integrated Perspective Based on Process Models of Working Memory," *Educational Psychology Review* 26, no. 2 (2014): 285–306.

18. For a more in-depth review of dual coding theory, see *Mind and Its Evolution: A Dual Coding Theoretical Approach* by Allan Paivio.
19. Evergreen, *Presenting Data Effectively*, 12.
20. Evergreen, *Presenting Data Effectively*, 36.
21. Evergreen, *Presenting Data Effectively*, 39.
22. For more information about reference and judgmental icons, see *Presenting Data Effectively* by Evergreen.
23. Miller, "The Magical Number Seven."
24. Miller, "The Magical Number Seven."
25. Lewin and Passonneau, "An Analysis," 85–86.
26. While we did not find a library assessment web presence for nine institutions, we recognize that they might exist; they were simply not discoverable based on our search parameters.
27. "Assessment," University of Washington Libraries, accessed June 12, 2018, http://www.lib.washington.edu/assessment/.
28. "Library Assessment," Iowa State University Library, accessed June 12, 2018, https://assess.lib.iastate.edu/.
29. "2016 Library Student and Postdoc User Survey Report," Iowa State University Library, accessed September 18, 2018.
30. "Library Tableau Stories," Iowa State University Library, accessed September 18, 2018, https://assess.lib.iastate.edu/stories.

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Appendix: Assessment Website Criteria Checklist

Date: _____

University/College: _____

Reviewer: _____

Criteria—Website Review	Yes	No	Comments
Is there a focus on library value/impact explicitly mentioned? (1, 4, 5)			
Is there a clearly stated library mission statement? (1, 2)			
Is there a library strategic plan present? (1, 2)			
Are annual reports made available? (1, 4)			
Information literacy/Instruction assessment available (1, 4, 5) • If yes, are learning objectives clearly outlined? • If yes, what kind of assessments used?			
Is there benchmarking data available? (ACRL, ARL, SAILS other associations) (1, 5) If yes, • Collections • Outreach • Library Spaces • Instruction			
Survey assessments available (1, 4) (i.e., Ithaka S&R, Libqual) • If yes, what kind of assessments used?			
Is there any mention of how libraries are connected to/contributing to retention, graduation, academic success measures? (1, 3, 4)			
Is there assessment information on supporting faculty research productivity? (1, 6)			
Are results of assessment projects outlined? How does this information inform improvements? (1, 5)			
Is information reported current? (1) What years are reported?			
Is contact information clearly outlined? (1)			

Criteria—Website Review	Comments
Where is the assessment website/webpage located? (1) How do you navigate to the page?	
What is the main user focus of the website/webpage? (1) How prevalent is library jargon?	Internal library External library Students Faculty Administration Community
Design Principles Dual Coding Organization Extraneous information Chunking Drawing attention	
Notes:	

Quantifying the Value of the Academic Library

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Abstract

To determine which engagement factors contribute to student success at a large, public, research university in the southeast, the university library—along with representatives from Academic Affairs, Student Affairs, and other academic and support units across campus—have agreed to collaborate on the alignment and analysis of student data and to contribute their data to a repository that will enable longitudinal study. The study indicates that library, co-curricular, and extracurricular activities have a significant and positive impact on student success in terms of GPA and months to graduation. The model developed for this study is one that is easily transferable to other organizations.

Introduction

Student engagement and success are critical, with more than 40% of individuals seeking a four-year degree dropping out within six years.[1] Tinto's *social integration theory* posits that students need integration into formal and informal academic and social systems of the university to be successful.[2] Engagement strengthens students' academic intentions, goals, and institutional commitment, thereby increasing the likelihood of graduation. While universities are implementing high impact practices to engage and retain students, myriad other factors may be at play.[3] Through the lens of *social integration theory*, formal integration may also include (1) library engagement, (2) use of student support services, and (3) participation in co- and extracurricular activities.

To determine which engagement factors contribute to student success at a large, public, research university in the southeast, the university library—along with representatives from Academic Affairs, Student Affairs, and other academic and support units across campus—have agreed to collaborate on the alignment and analysis of student data and to contribute their data to a repository that will enable longitudinal study. The joint project will not only allow the library to quantify its impact on student success, but also help university leaders identify other critical areas of student engagement.

As such, the objectives for this study are threefold and align closely with key priority areas identified in the Association of College & Research Libraries' (ACRL) *Academic Library Impact Report*, which calls for librarians and information professionals to conduct research that will demonstrate library contributions to student learning and success.[4] The first objective of the study, which aligns with ACRL Priority 3, is to include library data in institutional data collection. The second objective, to quantify the library's impact on student success, aligns with ACRL Priority 4. The third objective, which follows logically from the first two, is to create a transferable model for aligning and assessing university metrics. To meet these objectives, the university library at the University of North Carolina at Charlotte (UNC Charlotte) is leading an initiative to assess student engagement and its impact on student success by forming partnerships with the university's Office of Institutional Research, the Division of Academic Affairs, the Division of Student Affairs, and other university support service units to gather and align student engagement and success data.

UNC Charlotte is an urban, research institution with the Carnegie Classification Doctoral Universities: Higher Research Activity. With an enrollment of nearly 30,000 FTE (24,000 undergraduates), UNC Charlotte has the third largest undergraduate enrollment among the 17 institutions of the University of North Carolina System (fall 2018). The university accepts 66% of applicants while incoming classes are 55% new freshmen and 45% transfers. The persistence rate is 80% for the first to the second year. The university emphasizes student participation in research with faculty and in internships in the Charlotte community. Nearly 80% of students participate in internships and other research activities.

Literature Review

Throughout the library and information studies literature, findings from a variety of studies have shown that library usage is positively correlated with academic success.[5] In a study investigating library usage patterns and academic achievement of students enrolled in nearly 200 courses at a single university, findings suggested that students who "read" more, measured in terms of borrowing books and accessing electronic resources, achieved better grades.[6] Likewise, findings from a study of 8,701 library records and GPA revealed statistically significant, positive correlations between GPA and checkouts of library materials.[7]

Other study findings indicated that participation in library instruction is significantly related to students' GPA.[8] For example, a statistically-significant increase in GPA among graduating students who were enrolled in classes that participated in at least one library instruction session (n=1,265) was demonstrated over students who were enrolled in classes that were not exposed to library instruction (n=115).[9] Similarly, in a large-scale study of 42,624 students across 12 universities for the academic year 2014–2015, findings suggested that the first-year GPA for students whose courses included information literacy instruction was significantly higher than the GPA of students enrolled in courses which did not include such instruction.[10]

More recently, Soria, Fransen, and Nackerud conducted a series of studies in which they examined the relationships between student academic achievement (GPA, degree completion, retention, and student learning outcomes) and library usage, particularly among first-year students, as documented through a variety of variables (e.g., online databases access, electronic book usage, electronic journal logins, library website logins, material borrows, interlibrary loan borrows, library workstation logins, and engagement with library staff through instruction sessions or reference interactions) along with pre-college metrics (e.g., high school GPA, SAT/ACT scores) and demographic factors (e.g., gender, international student, race, first-generation college student, Pell grant, college of enrollment, first year seminar, campus housing, SAT/ACT scores, incoming college credits, and participation in a student academic success program).[11] The findings from these studies revealed statistically significant regression models that predicted a variety of dependent variables, including students' academic engagement, academic skills, engagement in scholarship, GPA, continued enrollment or graduation, and learning outcomes.[12] In particular, the results from two of these studies suggested that four types of library services were positively and significantly associated with students' cumulative GPA: database logins, book loans/renewals, electronic journal logins, and use of library workstations.[13] The model used for Soria, Fransen, and Nackerud's 2013 and 2014 studies was particularly helpful in designing the current study.[14] Extending these studies further, the present study also includes student engagement variables from other academic support units across the university, high impact practice data captured from the university's participation in the National Survey of Student Engagement (NSSE, 2014, 2016, 2018), and student affairs' engagement data to include participation in sports clubs and Greek social organizations.

The study addresses three research questions.

1. How can libraries connect their data with student outcomes?

2. What effects do libraries have on success outcomes for different types of students?

3. How can libraries supplement the data collected by other university departments to document student engagement and success?

Methodology

A two-phase, mixed model was designed to include three data collection strategies across two phases. In Phase I, researchers conducted interviews and meetings with university stakeholders to gather insights for Phase II activities. In Phase II, researchers accessed and aligned datasets and conducted statistical analyses (e.g., ANOVA, Regression) to identify significant factors between student engagement and success. The independent variables were aligned and integrated with the dependent variables to form a transferable model for longitudinal data analysis.

Phase I

Phase I began with a single brainstorming meeting in February 2018 with the key institutional research and assessment personnel (specialists) on campus to discuss the justifications for and viability of the project. The researchers and specialists discussed how we could align data (independent variables) on individual students from many different campus entities and even more systems and connect them to the dependent variables held in the student information system (Banner). Attendees included the library dean, library head of assessment, executive director of the Office of Assessment & Accreditation, assistant provost for institutional research, director of research compliance, associate vice chancellor for student affairs for research and systems, and divisional director of student affairs for research and assessment. The library participants were surprised that a few of the individuals had never met before we brought them together. A few months later, they are working together cohesively on a variety of campus projects. During the initial meeting, the group created a list of potential partners, established the goals for the project, identified the dependent variables of interest, and agreed on the initial data alignment and de-identification process for the pilot.

The library agreed to lead the project. The library recommended as potential partners the academic support services offered in or near the library building: Writing Resources Center, University Speaking Center, University Career Center, and University Center for Academic Excellence (tutoring, supplemental instruction, and affiliated services). We selected these partners as they are "academic support" or co-curricular services, mostly formal activities that were already collecting student identifying information during interactions. We wanted to include the most recent results from the National Survey of Student Engagement (2018) and as many Student Affairs metrics as were available in a compatible format (Greek Life and Sports participation).

The partners would extract data on interactions and participation by student identifier (student ID number or email prefix) from their respective system(s). The library's head of assessment would gather the data from the partners once they agreed to sign on to the project with one representative from each partner being added to the IRB Protocol. She would align the incoming datasets and deliver them to the assistant provost for Institutional Research, who would perform the crosswalk from the independent variables to the available dependent variables.

We wanted to connect with as many student demographic measures and indicators of student success (dependent variables) as possible (see Appendix A), but used semester and cumulative GPA and months to graduation in the initial data analysis. The assistant provost for institutional research then removed the identifiers and returned the dataset to the library's head of assessment who agreed to run the analyses for the partners.

After the initial brainstorming conversation with the statistical experts, the library conducted individual meetings with the representatives of each of the targeted partners. In each meeting, we explained the project, discussed the data the partner collected, discussed how to extract it from the system(s) used by the partner, discussed how to format it for delivery to the head of assessment, and worked to gain buy-in. Overall, getting buy-in was easy, though we had many conversations about how to protect student privacy, the benefits of the project to each partner, and how the data would be used in the aggregate. The Writing Resources Center took the most effort to persuade perhaps because they do not work with datasets, statistical tests, and analyses on a regular basis.

The partners asked a variety of questions during the interviews with the partners and provided the following responses.

Question #1: How do we know that the student's personal information will be protected?
Your representative who has been approved through the IRB protocol will gather email usernames or student ID numbers in your software system(s) along with the independent variables during the regular conduct of your services. On a regular basis (typically the end of the semester or academic year), the representative will extract reports and/or spreadsheets and send them to the assistant provost for

institutional research. He will load the data into the Student Information System and run aggregated reports upon request and typically for end-of-semester or -year reporting or for specific research projects.

Question #2: Who will have access to the PII?
The Personally Identifiable Information (PII) of students (typically email username and/or student ID number) will be resident in the partner's system(s), but only available to the representative who is listed on the IRB. The partner is responsible for maintaining confidentiality of the information contained in the partner's system(s) according to campus security protocols. The assistant provost for institutional research receives data loads from each partner, makes the connections to the Student Information System, and runs the desired reports. He returns the aggregated, de-identified reports. Partners in the project will only have access to PII they interacted with as stored within their own systems and will otherwise see only de-identified data and aggregated reports.

Question #3: Who will make the crosswalks?
The assistant provost for institutional research creates the connections from the datasets from each partner to a selected hook in the Student Information System. Only that individual knows what hook (a different identifier than the email username or student ID number provided by the partners) is used to link the records from each partner to the SIS data.

Question #4: What information do I have to provide, in what form, and to whom?
The partner will need to present retrospective, current, and future datasets at agreed-upon dates to the assistant provost for institutional research. The dataset, typically an Excel spreadsheet extracted from the partner's software system(s), should include a column with the email username or student ID number followed by columns for each of the independent variables collected. The specific variables should be discussed in a meeting with the library's head of assessment and the assistant provost for institutional research. Additional variables can be added later.

Question #5: How will I get reports?
The partner sets up a schedule in advance of what reports should be generated and when with the assistant provost for institutional research. The partner may work with the assistant provost for institutional research to produce reports from the partner's dataset that are not part of the current research project. A graduate assistant may be needed to produce reports if the assistant provost for institutional research is too busy.

Once it looked like we had sufficient partners to make the project viable, the Office of Research Compliance helped the researchers write the IRB application form and ensure everything related to the study and protection of student data was in place. With IRB approval, the researchers asked each partner to have the primary representative sign on to the IRB.

Phase II
In this first iteration of the project, engagement and success data has been compiled and aligned from all initial partners (see Appendix A) to include academic years 2012–2013 through 2017–2018, though there are some inconsistencies in the data contributed, as some partners did not have full datasets dating back to 2012. Overall, data from the library, the University Career Center, and the University Center for Academic Excellence was most complete, as these offices provided data for all six years of interest. The University Speaking Center provided data for the 2016–2017 and 2017–2018 academic years while the Writing Resources Center data included the 2013–2014 to 2017–2018 period. Greek organization and sports teams'/clubs' memberships were included for the two most recent academic years. NSSE data was compiled, consolidated, and included in the study for 2014, 2016, and 2018. At this point, there are over 70,000 individual student records and 375 variables included in the study. The partners plan to include new data for each semester moving forward.

The sample of data analyzed for the current study consists of student records from undergraduate students who matriculated into the university in summer or fall 2012. The sample was selected to generate a dataset

that could answer questions related to students' engagement with the university throughout a six-year graduation window and to allow for predictions of months-to-graduation, first-year GPA (beginning of fall 2013), and cumulative GPA (beginning of fall 2018). In all, there were 4,967 viable records for analysis that met these parameters. Of these, 2,995 students were initially admitted to the university as new freshmen and 1,947 were admitted as new transfer students. From this sample, 70% (n=3,487) of the students graduated within a six-year window. A full set of frequency data related to the students' pre-college and demographic variables are outlined in Appendix B.

Regression and Analysis of Variance (ANOVA) tests were used to predict three measures of student success as defined for this study: GPA after first year of study, cumulative GPA, and months to graduation. Significance thresholds were limited to ($p < .05$). Stepwise multiple regression analysis was used as it allowed the researchers to explore the data for relationships when there was uncertainty as to whether relationships did, in fact, exist.[15] One-way ANOVAs, a statistical test used to compare mean scores within and between groups, were calculated only for those samples meeting a sample size of at least 30, depending upon the number of groups being analyzed. Group size thresholds were established using G*Power 3 using an a priori power analysis.[16] In addition, Levene's test for homogeneity of variance was conducted for all ANOVA tests. Assumptions of homogeneity of variance (Levene's test, p > .05) were met for all groups unless otherwise noted. In cases in which assumptions of homogeneity of variance were violated, Welch's adjusted ANOVA test, a more robust test that is particularly useful with unequal sample sizes, was used in place of the traditional ANOVA F test. For all significant ANOVAs that included more than two categories for a demographic variable, Fisher's Least Significant Difference (LSD) comparisons were conducted to assess where group differences occur. In cases in which assumptions of homogeneity of variance were violated and a Welch's ANOVA test was calculated instead of the traditional ANOVA F test, a Games-Howell post hoc test was conducted in place of Fisher's LSD. For all significant ANOVAs, descriptive statistics, which outline means and standard deviations, are outlined in Appendix C.

Results
Analysis of Variance

ANOVA tests were run for all categorical variables to see if there were significant and noteworthy differences among groups related to first-year GPA, cumulative GPA, and months to graduation. These tests were conducted in the aggregate for the entire 2012–2013 sample for students who matriculated as new freshmen and for students who matriculated as new transfers. There were myriad significant ANOVAs (see Appendix D) related to cumulative GPA and months to graduation. ANOVA results relating to first-year GPA are not included, as sample sizes were too small for reliable analysis. Effect sizes, measured using eta squared (η_P^2), largely fell into the negligible (<.01) to small (.01–.04) range, with a few bordering on medium (>.04).

Particularly noteworthy among the ANOVAs are findings that suggest that cumulative GPA differs significantly in the aggregate depending on the total number of engagements with university co-curricular and extra-curricular services included in this study (Welch's $F_{(5,1446.07)}$=112.79, p<.001, η_p^2= .01). Similar findings were revealed when the test was run for students who matriculated as new freshmen (Welch's $F_{(5,912.146)}$=20.4, p<.001, η_p^2= .04). Post-hoc analysis revealed that students who engaged with the participating units in this study fewer than 10 times earned significantly lower GPAs than all others (Appendix D, Table 1). When broken down by particular partner, significantly higher cumulative GPAs were indicated for students who engaged more frequently with the University Career Center (Welch's $F_{(3,371.65)}$=112.79, p<.001, η_p^2= .03), the University Center for Academic Excellence (Welch's $F_{(4,688.07)}$=8.12, p<.001, η_p^2= .01), and the library (Welch's $F_{(4,2238.6)}$=13.5, p<.001, η_p^2= .01), both in the aggregate and for students who matriculated as new freshmen (See Appendix D, Table 1 for freshman and post-hoc results). Finally, analysis by particular library activity—participation in library instruction (Welch's $F_{(2,2568.85)}$=28.47, p<.001, η_p^2= .01), reservations placed for library study rooms (Welch's $F_{(3,1573.1)}$=49.53, p<.001, η_p^2= .03), and library book checkouts (Welch's $F_{(2,1045.67)}$=39.89, p<.001, η_p^2= .01)—showed significant and noteworthy findings, both in the aggregate and for students who matriculated as new freshmen (see Appendix D, Table 1 for freshman and post-hoc results). ANOVA results also revealed that cumulative GPA differed significantly depending upon the number of high impact practices a student participated in, as reported on the NSSE, both for the aggregate ($F_{(2,195.39)}$=140.932,

p<.001, η_p^2= .025) and for students who matriculated as new freshmen ($F_{(2,113.709)}$=117.167, p<.001, η_p^2= .035). For students who matriculated as new transfer students, the significant ANOVA with the largest effect size related to cumulative GPA was for visits to the University Center of Academic Excellence ($F_{(4,199.99)}$=14.84, p<.001, η_p^2= .03).

ANOVA tests were also conducted for all categorical independent variables (Appendix A) to assess for group differences related to months to graduation. The only meaningful ANOVA related to months to graduation was for participation in high impact practices (HIPs) for students who matriculated as new freshmen (Welch's $F_{(2,131.11)}$=33.26, p<.001, η_p^2= .01). Post-hoc analysis revealed that students who participated in one or more HIPs graduated in significantly fewer months than those who did not participate in an HIP (see Appendix D, Table 2).

Stepwise Regression

Stepwise Regression tests revealed numerous, statistically-significant models that predicted first-year GPA (Appendix E, Table 1), cumulative GPA (Appendix E, Table 2), and months to graduation (Appendix E, Table 3), not only for the aggregate, but also for students who matriculated either as freshmen or transfer students. For each of the dependent variables, separate regression analyses were run to include:

1. Total of all engagements across partners;

2. Total engagements X partner;

3. Total engagements X specific partner activities;

4. All specific partner activities, and

    a. Pre-college factors (weighted high school GPA, incoming transfer for AP credits, SAT/ACT scores, Pell grant award);

    b. Demographic variables (e.g., gender);

    c. Greek organization and sports clubs/team participation;

    d. High impact practices (internships, study abroad, learning community, research with faculty, culminating senior experience, etc.);

1. Total library engagements;

2. Engagements in specific library activities (e.g., study room reservations, library instruction, computer logins, book checkouts, etc.);

3. Engagements in specific library activities; *and*

    a. Pre-college factors (see Item 4);

    b. Demographic variables (e.g., gender);

    c. Greek organization and sports club/team participation;

    d. High impact practices (internships, study abroad, learning community, research with faculty, culminating senior experience, etc.).

Of these 64 regression tests, 62 were statistically significant (p < .05). The two models that were not statistically significant were related to the transfer student subset.

First-Year GPA
Overall, the models which only included university partner data (not pre-college or demographic factors), though statistically significant, predicted, at most, 3.3% of the variance in first-year GPA. Adding in pre-college and demographic variables resulted in noticeably higher ability to predict variances in GPA. All statistically-significant regression models related to first-year GPA are outlined in Appendix E, Table 1. Overall, the model that included specific partner activities along with pre-college and demographic factors for the aggregate set was the strongest ($F_{(6,3412)}$=127.225, p<.001) and explained 18.3% of the variance in first-year GPA. This model suggests that library computer usage along with attendance at career fairs, career advising, and UCAE supplemental instruction sessions are associated with higher GPAs. The regression equation for this model was:

Predicted 1st Year GPA = 1.003 + .466(Weighted HS GPA) + 137(Gender (1=Male; 2=Female)) + .098(2012–2013 Career Fairs) + .047(2012–2013 Career Advising) + .003(2012–2013 Library Computer Logins) + .013(2012–2013 UCAE Supplemental Instruction)

Cumulative GPA
Similar to the models predicting first-year GPA, models which included pre-college and demographic factors had greater ability to explain variance in cumulative GPA. However, it should be noted that a statistically-significant model using only partner engagement data (no pre-college or demographic factors) was able to explain 9.6% of the variance in cumulative GPA for the new freshman subset ($F_{(8,2986)}$=39.83, p<.001). (See Appendix E, Table 2 for other significant models relating to cumulative GPA). This model suggests that engagement with specific services in the University Career Center, the library, the University Center for Academic Excellence, the Writing Resources Center, and high impact practices is positively associated with cumulative GPA. The regression equation for this model was:

Predicted cumulative GPA = 2.757 + .056(Career Fairs) + .092(Career Workshops) + .036(Library Instruction) + .007(Library Book Checkouts) + .002(Library Study Room Reservations) + .012(UCAE—Supplemental Instruction) + .139(Total HIPs) + .035(Writing Center Consultations)

When pre-college and other demographic factors are added into a model along with specific library activities, the model explains even more of the variance in cumulative GPA (18.3%) for students who matriculated as freshmen ($F_{(9,2959)}$=73.842, p<.001). The regression model to predict cumulative GPA for the new freshman matriculant subset was:

Predicted cumulative GPA = 1.545 + .172(Weighted HS GPA) + .026(Standardized SAT/ACT) + .108(Total HIPs) + .004 (Library Book Checkouts) + .037(Library Instruction) + +.01 (UCAE—Supplemental Instruction) + .041(Career Fairs) +.019(Career Advising)

This model suggests that library book checkouts, participation in library and UCAE instruction sessions, attendance at career fairs, and participation in career advising are positively associated with cumulative GPA.

Months to Graduation
Similar to the other measures of success for this study, all models run to predict months to graduation were statistically significant (see Appendix E, Table 3), with the ability to explain the variance in the months to graduation ranging from 1.3% to 42% depending upon the types of factors included. The most noteworthy of the models is for the aggregate subset with factors including specific partner activities along with pre-college and demographic factors ($F_{(4,3485)}$=626.28, p<.001). This model explained 42% of the variance in months to graduation. The regression equation for this model for transfer students was:

Predicted months to graduation = 58.362 - 0.267(Incoming Credits) - 1.837(Gender (1=Male; 2=Female) - 0.685(Total HIPs) - 1.645(Sports Club Membership).

This model suggests that the number of incoming credits and participation in high impact practices along with a sports organization may help to decrease the months to graduation.

Discussion

The findings from the study suggest that engagement with various university resources, including the library, has a statistically-significant impact on student success across multiple analysis techniques. In addition to quantifying the library's role in student success, study findings revealed other significant, key areas of engagement for students, including those associated with the University Career Center, the University Center for Academic Excellence, the Writing Resources Center, and the University Speaking Center. These categories of engagements, along with participation in Greek organizations, sports clubs and teams, and high impact practices, all lend support to Tinto's theory of social integration, which suggests that academic, co-curricular, and extracurricular engagements all help to increase the chances of student success and the likelihood of graduation.[17]

Aligning co-curricular and extracurricular student engagement metrics with measures of student success can provide powerful insights to universities as they seek ways to promote deep, rich learning while increasing student retention and graduation rates. Creating a central data repository with the right structure and rapid updates would increase the ability to understand and predict student behavior. The repository should include not only measures of engagement and student success, but also pre-college and demographic variables, as the disaggregation of data is necessary to understand particular categories of student subsets. While the analysis for this study involved disaggregating data according to original admission status (freshman or transfer), it is only a first step in understanding our university population. The model developed for this study, which involved inviting other university constituents to the table to form partnerships, share ideas, make mutually-beneficial decisions, outline responsibilities, work together to identify key metrics, and collaborate to align and analyze these data is one that is easily transferable to other organizations. The power of the model will intensify as new partners are identified and brought into the study.

Study Limitations

Although every attempt was made to conduct a thorough and comprehensive exploration of the co-curricular and extracurricular factors relating to undergraduate students' engagement and success, the study was subject to numerous limitations. These limitations relate primarily to the dataset, which had many missing or inconsistent variables that had to be ignored or imputed. Transitioning from the full dataset to the portion with the most complete and reliable data actually improved our ability to explain variations in the data, despite the smaller number of records. Moving forward, the current partners now have a clearer understanding of the categories of data they need to collect and methods for doing so that will make future alignment and analysis much easier and more complete.

Through this analysis, the researchers realized the advantage of recruiting additional partners, particularly those departments or units responsible for directly managing the high impact practices across the university, including those that arrange programs for study abroad, undergraduate research, learning communities, internships, and more. The most significant limitation to the study was relying upon self-report data from the NSSE surveys related to high impact practices since completion of NSSE is voluntary and subject to significant inaccuracies inherent in self-reporting.

Conclusions

The study indicates that library, co-curricular, and extracurricular activities have a significant and positive impact on student success in terms of GPA and months to graduation. Future studies will emphasize integrating data from additional partners, more consistently gathering activity metrics, and testing other demographic and pre-college factors. With a greater variety and accuracy of data, we hope to achieve deeper

understanding of the impact of the library and other aspects of student life on student success and graduation.

The study represents one of the first efforts documented in the library and information studies literature in which the library has taken the lead on developing a transferable model for aligning and assessing university student activity and success metrics in order to quantify the value of the academic library. Too often, we are not aware of what other units across our campuses are doing in support of our mutual goal to promote student learning, success, and graduation. By building relationships and collaborating in the development of an institutional repository of student engagement and success data, campus units may find themselves less focused on competing for valuable campus resources and more focused on working together for the future success of our students.

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Library & University Engagement & Success Over Time 2012-2013 to 2017-2018

Library

Primary Keys
- 800#
- UserId

Engagement Metrics
- Study Hall Check-In (Greek)
- Library Instruction
- Study Room Reservations
- After Hours Access
- Computer Logins in Library
- # Checkouts
  - Books
  - Laptops
  - Other Items
- Special Collections Access

Student Affairs

Primary Key
- 800#

Engagement Metrics
- NSSE Data (2014 & 2016 Seniors)
  - HIP Engage (Q 11 & 12)
  - Intern/Field Exp
  - Study Abroad
  - Culm Sr Exp
  - Lrng Comm
  - Svc Learning
  - Res w/ Fac
- Club Membership (#/yr)
- Greek Life (Yes/No)
- Sports Clubs (#/yr)
- Recreational Activities (#/yr)
- On/Off Campus Housing

University Speaking Center

Primary Keys
- Names & Majors

Engagement Metrics
- Individual consultations
- Workshop attendance
- Classroom presentations

Writing Resources Center

Primary Key
- 800#

Engagement Metrics
- Individual consultations
- Workshop attendance

University Center for Academic Excellence

Primary Key
- 800#

Engagement Metrics
- Workshop Attendance
- Seminars
- Mentoring
- Classroom Presentations
- Tutoring Visits
- Supplemental Instruction Attendance

University Career Center

Primary Key
- 800#

Engagement Metrics
- Career Fair
- Workshops
- Class Presentations
- Individual consultations

Academic Affairs - Banner

Primary Key: 800#

Demographic Variables: Gender, Age, Major, College, Year in School, On-Campus v Off-Campus Housing, Original Admit Status, First Generation

Dependent Variables:

Per Academic Year (2012-13 through 2017-18) - GPA, Year to Year Retention, Graduation, Time to Graduation

Appendix B

Participant Demographics: Summer & Fall 2012 Undergraduate Student Matriculants

Demographic	Aggregate n (%)	Entered as Freshman n (%)	Entered as Transfer n (%)
Original Admit Status	4967 (100)	2995 (60.2)	1947 (39.2)
Gender			
Male	2594 (52.2)	1553 (51.9)	1034 (53.1)
Female	2373 (47.8)	1442 (48.1)	913 (46.9)
High School GPA (Weighted)			
1–2.50	73 (1.5)	1 (0.0)	68 (3.5)
2.51–3.00	268 (5.4)	129 (4.3)	131 (6.7)
3.01–3.50	974 (19.6)	802 (26.8)	170 (8.7)
3.51–4.00	1236 (25.4)	1115 (37.2)	147 (7.6)
4.01+	848 (17.1)	766 (25.6)	82 (4.2)
HS Standardized Test Score (SAT/ACT) Standardized to ACT (Max Pts Poss. 36)			
5–15	1538 (31.0)	343 (11.5)	1186 (60.9)
16–20	865 (17.4)	506 (16.9)	350 (18.0)
21–25	1948 (39.9)	1677 (56.0)	302 (15.5)
26+	580 (11.7)	469 (15.7)	109 (5.6)
Incoming Credits (Transfer, AP, etc.)			
0	1693 (34.1)	1680 (56.1)	11 (0.6)
1–9	784 (15.8)	772 (25.8)	12 (0.6)
10–24	473 (9.5)	338 (11.3)	130 (6.7)
25–39	584 (11.8)	92 (3.1)	484 (24.9)
40–59	566 (11.4)	49 (1.6)	512 (26.3)
60+	867 (17.5)	64 (2.1)	789 (41.0)
Months to Graduation			
9–19	32 (0.9)	--	32 (2.2)
20–35	799 (22.9)	48 (2.3)	747 (52.4)
36–48	1450 (41.5)	1025 (50.1)	419 (29.4)
49–60	973 (27.9)	791 (38.7)	176 (12.3)

Demographic	Aggregate n (%)	Entered as Freshman n (%)	Entered as Transfer n (%)
61+	236 (6.8)	181 (8.9)	52 (3.6)
Pell Recipient			
Yes	2514 (50.6)	1365 (45.6)	1138 (58.4)
No	2453 (49.4)	1630 (54.4)	809 (41.6)
Sports Club or Team			
Yes	171 (3.4)	137 (4.6)	33 (1.7)
No	4796 (96.6)	2858 (95.4)	1914 (98.3)
Greek Organization Membership			
Yes	449 (9.0)	403 (13.5)	45 (2.3)
No	4518 (91.0)	2592 (86.5)	1902 (97.7)
Completed 1 or More Internships (NSSE)			
Yes	165 (3.3)	127 (4.2)	35 (1.8)
No	4802 (96.6)	2868 (95.7)	1912 (98.2)
Learning Community Participant (NSSE)			
Yes	88 (1.8)	72 (2.4)	14 (0.7)
No	4879 (98.2)	2923 (97.6)	1933 (99.3)
Conducted Research w/ Faculty (NSSE)			
Yes	74 (1.5)	55 (1.8)	18 (0.9)
No	4893 (98.5)	2940 (98.2)	1929 (99.1)
Participated in a Study Abroad (NSSE)			
Yes	44 (0.9)	32 (1.1)	11 (0.6)
No	4923 (99.1)	2963 (98.9)	1936 (99.4)
Completed Culm. Senior Exper. (NSSE)			
Yes	162 (3.3)	126 (4.2)	36 (1.8)
No	4805 (96.7)	2869 (98.8)	1911 (98.2)

Appendix C

Table 1: Cumulative GPA (Fall 2018)—Descriptive Statistics for Variables with Significant ANOVAs

Grouping Variable	Aggregate			Entered as Freshman			Entered as Transfer		
	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev
Aggregate	4967	2.91	.65	2996	2.93	.63	1947	2.88	.67
Total Engagements Overall									
1–9	1417	2.80	.75	747	2.71	.75	663	2.89	.74
10–24	1310	2.93	.64	809	2.97	.60	496	2.86	.68
25–49	1048	2.93	.61	686	2.98	.58	356	2.84	.64
50–74	463	3.02	.56	294	3.06	.55	168	2.95	.56
75–99	263	2.95	55	168	3.03	.51	93	2.80	.60
100+	466	3.00	.53	292	3.04	.52	171	2.94	.55
Career Center Totals									
0	2214	279	.72	1218	2.78	.71	987	2.81	.74
1–4	2236	2.97	.59	1432	2.99	.57	793	2.93	.62
5–10	435	3.13	.49	290	3.20	.45	141	3.03	.52
11+	82	3.09	.41	55	3.17	3.6	26	2.96	.46
Univ Ctr for Acad Excellence									
0	1524	2.96	.69	621	2.88	.68	897	3.00	.69
1–4	2179	2.86	.64	1501	2.90	.64	668	2.77	.64
5–10	706	2.93	.57	504	3.00	.54	196	2.78	.61
11–25	448	2.87	.67	293	2.96	.66	153	2.72	.66
26+ s	110	2.09	.56	76	3.20	.55	33	2.83	.49
Writing Center									
0	4583	2.89	66	2768	2.90	.64	1794	2.86	.68
1	228	3.06	.52	140	3.13	.49	85	2.95	.54
2+	156	3.21	.49	87	3.32	.42	68	3.06	.54
High Impact Practices									
0 HIPs	4703	2.88	.65	2811	2.90	.63	1868	2.86	.67
1–2 HIPs	129	3.20	.48	75	3.28	.42	54	3.09	.54

Grouping Variable	Aggregate			Entered as Freshman			Entered as Transfer		
	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev
3–6 HIPs	135	3.45	.41	109	3.46	.41	25	3.43	.38
Sports Club Membership									
Yes	171	2.91	.53	137	2.96	.53	33	2.70	.49
No	4796	2.91	.65	2858	2.92	.64	1914	2.88	.67
Greek Life Membership									
Yes	449	3.08	.43	403	3.10	.42	45	2.91	.45
No	4518	2.89	.67	2592	2.90	.66	1902	2.87	.68
Library Total Engagements									
0–2	843	2.76	.78	439	2.63	.79	400	2.90	.76
3–9	1110	2.88	.66	660	2.89	.65	446	2.87	.68
10–24	1145	2.93	.64	712	2.99	.59	427	2.84	.69
25–74	1255	2.97	.57	803	3.02	.55	445	2.88	.60
75+	614	2.98	.55	382	3.03	.52	229	2.91	.59
Library Study Room Reservations									
0 Reserv	2645	2.81	.70	1448	2.80	.69	1183	2.84	.71
1–5 Reserv	1201	2.97	.57	776	3.00	.56	421	2.93	.60
6–15 Reserv	612	3.01	.57	410	3.08	.53	199	2.87	.63
16+ Reserv	509	3.11	.52	361	3.12	.53	144	3.07	.52
Library Book Checkouts									
0	3755	2.87	.67	2175	2.87	.65	1567	2.86	.69
1–2	473	2.96	.58	315	3.00	.58	152	2.86	.56
3+	739	3.07	.55	505	3.11	.54	228	2.99	.57
Library Instruction									
0 Classes	2521	2.85	.69	1236	2.88	.69	1274	2.82	.69
1 Class	1486	2.93	.61	1025	2.90	.61	455	2.99	.60
2+ Classes	960	3.02	.58	734	3.04	.55	218	2.98	.65

Grouping Variable	Aggregate			Entered as Freshman			Entered as Transfer		
	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev
Library Computers—Total Logins									
0 Logins	724	2.88	.76	395	2.76	.78	326	3.01	.71
1–10 Login	2165	2.92	.66	1360	2.94	.64	794	2.87	.69
11–30 Logins	1120	2.89	.61	692	2.95	.57	422	2.80	.68
31+ Logins	958	2.93	.57	548	2.98	.56	405	2.86	.58
Libary EZ Proxy									
0 Logins	4540	2.89	.66	2709	2.92	.64	1809	2.86	.66
1–5 Logins	239	2.98	.56	169	2.94	.56	69	3.07	.56
6+ Logins	188	3.10	.55	117	3.06	.55	69	3.20	.52
Library Laptop Checkouts									
0 Checkouts	4110	2.91	.67	2416	2.92	.66	1678	2.88	.69
1 Checkout	297	2.96	.55	196	2.97	.56	99	2.94	.54
2+ Checkouts	560	2.88	.53	383	2.94	.51	170	2.77	.54
Library After Hours Access									
0 Swipes	4487	2.91	.66	2615	2.93	.65	1850	2.88	.68
1 Swipe	198	2.92	.50	154	2.99	.47	43	2.66	.52
2+ Swipes	282	2.87	.52	226	2.88	.50	54	2.82	.59

Table 2: Months to Graduation—Descriptive Statistics for Variables with Significant ANOVAs

Grouping Variable	Aggregate			Entered as Freshman			Entered as Transfer		
	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev
Aggregate	3940	45.41	1167	2045	50.99	7.43	1426	37.38	11.98
Total Engagements Overall									
1–9	786	41.37	11.90	339	49.48	.731	442	35.16	11.03
10–24	941	45.23	11.47	574	50.53	6.91	363	36.79	12.20
25–49	787	46.59	11.19	518	50.93	7.77	263	37.95	11.85
50–74	383	46.74	10.89	238	51.01	6.84	145	39.73	12.56
75–99	211	48.07	10.91	137	52.43	7.27	72	39.57	11.71
100+	382	48.91	11.53	239	53.39	8.00	141	41.25	12.61
Career Center Totals									
0	1279	43.53	12.27	628	50.56	7.88	645	36.67	11.95
1–4	1739	46.26	11.30	1100	51.13	7.1	629	3767	11.91
5–10	394	47.04	10.84	263	51.17	6.97	128	38.51	12.27
11+	78	48.91	9.36	54	51.66	6.33	24	47.72	11.96
Univ Ctr for Acad Excellence									
0	1072	40.49	13.26	385	50.76	8.63	681	34.67	11.86
1–4	1496	46.99	10.51	1012	50.87	7.22	476	38.65	11.52
5–10	527	48.32	9.26	386	51.03	6.68	137	40.69	11.22
11–25	310	48.67	9.56	201	51.25	6.97	108	43.71	11.54
26+	85	49.63	10.43	61	52.77	8.53	24	41.65	10.71
Writing Center									
0	3139	45.32	11.77	1837	51.08	7.46	1286	37.05	11.88
1	203	46.79	10.82	125	50.27	7.64	76	41.26	12.86
2+	148	45.31	10.63	83	49.67	6.13	64	39.35	12.13
High Impact Practices									
0 HIPs	3243	45.43	11.84	1870	51.23	7.55	1355	37.39	11.99
1–2 HIPs	119	44.96	10.36	70	49.27	6.29	49	38.81	11.90

Grouping Variable	Aggregate			Entered as Freshman			Entered as Transfer		
	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev
3–6 HIPs	128	45.30	8.06	105	47.62	4.28	22	33.87	11.62
Sports Club Membership									
Yes	141	50.19	9.52	114	52.04	8.52	26	42.16	9.79
No	3349	45.21	11.71	1931	50.91	7.35	1400	37.29	12.01
Greek Life Membership									
Yes	421	50.13	6.89	378	50.72	6.09	43	44.94	10.52
No	3069	44.76	12.04	1667	51.03	7.70	1383	37.15	11.95
Library Total Engagements									
0–2	428	41.40	11.62	170	49.59	6.46	256	35.97	10.71
3–9	723	43.98	11.73	401	50.08	6.96	318	36.31	12.06
10–24	850	45.38	11.36	529	50.41	7.07	317	36.94	12.17
25–74	991	46.59	11.28	633	51.19	7.48	351	38.16	12.06
75+	498	48.62	11.68	312	53.40	7.92	184	40.45	12.53
Library Study Room Reservations									
0 Reserv	1605	43.91	12.23	769	50.98	7.94	801	36.86	11.69
1–5 Reserv	939	46.27	11.36	597	50.99	6.91	338	37.86	12.75
6–15 Reserv	512	46.35	11.00	344	50.64	7.17	165	37.14	11.87
16+ Reserv	434	47.99	10.15	308	51.30	7.30	122	39.82	11.66
Library Book Checkouts									
0	2465	44.07	12.01	1354	50.66	7.23	1102	35.94	11.80
1–2	395	48.85	9.72	262	51.84	7.60	128	42.93	10.69
3+	630	48.47	10.21	429	51.44	7.86	196	41.88	11.70
Library Instruction									
0 Classes	1626	43.42	12.23	747	50.53	7.42	873	37.37	12.28
1 Class	1060	46.30	11.46	692	51.30	7.39	363	36.74	11.81
2+ Classes	804	48.25	9.94	606	51.15	7.47	190	38.66	10.84

Grouping Variable	Aggregate			Entered as Freshman			Entered as Transfer		
	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev
Library Computers—Total									
0 Logins	443	42.86	11.60	206	49.21	7.13	235	37.33	11.96
1–10 Logins	1477	45.23	11.33	903	50.49	7.04	566	36.81	11.79
11–30 Logins	826	46.09	11.74	516	51.40	7.68	305	36.94	11.77
31+ Logins	744	46.53	12.07	420	52.35	7.78	320	38.83	12.47
Libary EZ Proxy									
0 Logins	3195	44.64	11.12	1845	50.26	6.73	1333	36.83	11.31
1–5 Logins	161	54.10	12.73	116	56.83	9.59	45	47.08	16.71
6+ Logins	134	53.33	15.40	84	58.66	10.23	48	43.52	18.20
Library Laptop Checkouts									
0 Checkouts	2785	44.41	11.98	1566	50.65	7.38	1206	36.28	11.94
1 Checkout	246	48.21	9.34	160	51.11	7.61	85	42.77	9.96
2+ Checkouts	459	49.98	9.33	319	52.51	7.38	135	43.81	10.59
Library After Hours Access									
0 Swipes	3091	44.47	11.71	1725	50.48	7.29	1350	36.76	11.80
1 Swipe	165	50.43	8.63	131	51.40	7.33	33	46.10	11.54
2+ Swipes	234	54.31	7.74	189	55.23	7.40	43	50.15	7.88

Appendix D

Table 1: Cumulative GPA (Fall 2018)—Analysis of Variance—Significant Results

Independent Variables	F	df	Sig. (p)	Effect (η_P^2)	Post Hoc Sig Results*
Aggregate					
Total Engagements Overall	112.79**	5, 1446.07	< .001	.01	10–24 > 1–9*** 25–49 > 1–9 50–74 > 1–9 75–99 > 1–9 110+ > 1–9
Career Center Total	64.49**	3, 371.65	<.001	.03	1–4 > 0*** 5–9 > 0 5–9 > 1–4 10+ > 0 10+ > 1–4
Univ Center for Acad Ex	8.12**	4, 688.07	<.001	.01	0 > 1–4*** 5–10 > 1–4 26+ > 1–4 26+ > 11–25
Writing Center	39.39**	2, 278.02	< .001	.01	1 > 0*** 2+ > 0 2+ > 1
High Impact Practices	140.932**	2, 195.39	<.001	.025	1–2 > 0*** 3–6 > 0 3–6 > 1–2
Greek Life Membership	71.27**	1, 684.87	<.001	.01	N/A
Library Total Engagements	13.50**	4, 2238.60	<.001	.01	3–9 > 0–2 *** 10–24 > 0–2 25–74 > 0–2 75+ > 0–2 25–74 > 3–9 75+ > 3–9
Library Study Room Reserv	49.53**	3, 1573.10	<.001	.03	1–5 > 0*** 6–15 > 0 16+ > 0 16+ > 1–5 16+ > 6–15
Library Book Checkouts	39.89**	2, 1045.67	<.001	.01	1–2 > 0*** 3+ > 0 3+ > 1–2
Library Instruction	28.47**	2, 2568.85	<.001	.01	1 > 0*** 2+ > 0 2+ > 1
Library EZ Proxy	14.52**	2, 313.94	<.001	.004	6+ > 0***

Independent Variables	F	df	Sig. (p)	Effect (η_p^2)	Post Hoc Sig Results*
Entered as New Freshman					
Total Engagements Overall	20.4**	5, 912.146	<.001	.04	10–24 > 1–9*** 25–49 > 1–9 50–74 > 1–9 75–99 > 1–9 100+ > 1–9
Career Center Total	59.25**	3, 253.16	<.001	.05	1–4 > 0*** 5–9 > 0 5–9 > 1–4 10+ > 0 10+ > 1–4
Univ Center for Acad Ex	7.78**	4, 449.23	<.001	.01	5–10 > 0*** 5–10 > 1–4 26+ > 0 26+ > 1–4 26+ > 5–10 26+ > 11–25
Writing Center	50.74**	2, 162.9	<.001	.02	1 > 0*** 2+ > 0 2+ > 1
High Impact Practices	117.167**	2, 133.709	<.001	.035	1–2 > 0*** 3–6 > 0 3–6 > 1–2
Greek Life Membership	66.65**	1, 747.97	<.001	.01	N/A
Library Total Engagements	25.40**	4, 1309.5	<.001	.04	3–9 > 0–2*** 10–24 > 0–2 25–74 > 0–2 75+ > 0–2 10–24 > 3–9 25–74 > 3–9 75+ > 3–9
Library Study Room Reserv	46.55**	3, 1102.4	<.001	.04	1–5 > 0*** 6–15 > 0 16+ > 0 16+ > 1–5
Library Book Checkouts	38.28**	2, 718.4	<.001	.02	1–2 > 0*** 3+ > 0 3+ > 1–2
Library Instruction	18.04**	2, 1844.3	< .001	.01	2+ > 0*** 2+ > 1
Library Computer Logins	8.10**	3, 1178.24	<.001	.01	1–10 > 0*** 11–30 > 0 31+ > 0

Independent Variables	F	df	Sig. (p)	Effect (η_p^2)	Post Hoc Sig Results*
Entered as New Transfer					
Career Center Total	9.29**	3, 113.01	<.001	.01	1–4 > 0*** 5–9 > 0
Univ Center for Academic Excellence	14.84**	4, 199.99	<.001	.03	0 > 1–4*** 0 > 5–10 0 > 11–25
Writing Center	5.17**	2, 112.17	< .001	.004	1 > 0*** 2+ > 0
High Impact Practices	29.83**, ****	2, 47.72	<.001	.01	1–2 > 0*** 3–6 > 0 3–6 > 1–2
Sports Club Membership	4.49**	1, 34.12	.041	.001	N/A
Library Book Checkouts	5.17**	2, 317.14	.006	.004	3+ > 0***
Library Study Room Reserv	8.57**	3, 456.29	<.001	.01	16+ > 0*** 16+ > 1–5 16+ > 6–15
Library Instruction	14.60	2,1944.00	<.001	.02	1 > 0 2+ > 0
Library Computer Logins	6.05**	3, 900.94	< .001	.01	0 > 1–10*** 0 > 11–30 0 > 31+
Library EZ Proxy	11.82	2, 1944.00	<.001	.01	1–5 > 0 6+ > 0
Library Laptop Checkouts	4.23**	2, 201.97	.016	.003	2+ > 0*** 2+ > 1
Library After Hours Access	3.86**	2, 67.26	.026	.003	0 > 1***

*p<.05, **Welch's ANOVA, ***Games-Howell Post Hoc Analysis, **** Some groups < 30 thus results may not be reliable.

Table 2: Months to Graduation—Analysis of Variance—Significant Results

Independent Variables	F	df	Sig. (p)	Effect (η_p^2)	Post Hoc Sig Results*
Aggregate					
Total Engagements Overall	30.46**	5, 1122.34	<.001	.04	10–24 > 1–9*** 25–49 > 1–9 50–74 > 1–9 75–99 > 1–9 100+ > 1–9 75–99 > 10–24 100+ > 10–24 100+ > 25–49
Career Center Total	19.67**	3, 343.51	<.001	.02	1–4 > 0*** 5–9 > 0 10+ > 0
Univ Center for Acad Ex	65.99**	4, 505.36	<.001	.08	1–4 > 0*** 5–10 > 0 5–10 > 1–4 11–25 > 0 11–25 > 1–4 26+ > 0
Sports Club Membership	36.13**	1, 158.39	<.001	01	N/A
Greek Life Membership	180.24**	1, 825.80	<.001	.02	N/A
Library Total Engagements	27.51**	4, 1499.92	<.001	.03	3–9 > 0–2*** 10–24 > 0–2 25–74 > 0–2 25–74 > 3–9 75+ > 0–2 75+ > 3–9 75+ > 10–24
Library Study Room Reserv	20.12**	3, 1318.00	<.001	.02	1–5 > 0*** 6–15 > 0 16+ > 0 16+ > 1–5
Library Book Checkouts	66.15**	2, 939.66	<.001	.031	1–2 > 0*** 3+ > 0
Library Instruction	56.08**	2, 2058.70	<.001	.03	1 > 0*** 2+ > 0 2+ > 1
Library Computer Logins	10.43	3, 1408.9	<.001	.01	1–10 > 0 11–30 > 0 30+ > 0 30+ > 1–10
Library EZ Proxy	61.90**	2, 204.85	<.001	.05	1–5 > 0***

Independent Variables	F	df	Sig. (p)	Effect (η_p^2)	Post Hoc Sig Results*
					6+ > 0
Library Laptop Checkouts	72.81**	2, 561.93	<.001	.03	1 > 0*** 2+ > 0 2+ > 1
Library After Hours Access	181.83**	2, 317.15	<.001	.05	1 > 0*** 2+ > 0 2+ > 1
Entered as New Freshman					
Total Engagements Overall	9.43	5, 2039.00	<.001	.02	10–24 > 1–9 25–49 > 1–9 50–74 > 1–9 75–99 > 1–9 100+ > 1–9 75–99 > 10–24 75–99 > 25–49 100+ > 25–49 100+ > 25–74
High Impact Practices	33.26**	2, 131.11	<.001	.01	0 > 1–2*** 0 > 3–6
Library Total Engagements	11.32**	4, 744.22	<.001	.02	75+ > 0–2*** 75+ > 3–9 75+ > 10–24 75+ > 25–74
Library Book Checkouts	3.79	2, 2042.00	.023	.004	1–2 > 0
Library Computer Logins	10.64**	3, 720.93	<.001	.02	11–30 > 0*** 30+ > 0 30+ > 1–10
Library EZ Proxy	52.64**	2, 134.74	<.001	.09	1–5 > 0*** 6+ > 0
Library Laptop Checkouts	8.45	2, 462.43	<.001	.01	2+ > 0 2+ > 1
Library After Hours Access	36.28	2, 2014.00	<.001	.03	2+ > 0 2+ > 1
Entered as New Transfer					
Total Engagements Overall	7.90**	5, 295.35	<.001	.03	25–49 > 1–9*** 50–74 > 1–9 75–99 > 1–9 100+ > 1–9 100+ > 10–24

Independent Variables	F	df	Sig. (p)	Effect (η_p^2)	Post Hoc Sig Results*
Career Center Total	2.86	3, 1422.00	.036	.006	10+ > 0 10+ > 1–4
Univ Center for Academic Excellence	22.20	4, 1421.00	<.001	.06	1–4 > 0 5–10 > 0 11–25 > 0 11–25 > 1–4 11–25 > 5–10 26+ > 0
Sports Club Membership	4.23**, ****	1, 1424.00	.04	.003	N/A
Greek Life Membership	17.84	1, 1424.00	<.001	.01	N/A
Writing Center	5.36	2, 765.35	.005	.000	1 > 0
Library Total Engagements	4.93**	4, 654.05	.001	.01	75+ > 0–2*** 75+ > 3–9 75+ > 10–24
Library Book Checkouts	37.33	2, 1423.00	<.001	.05	1–2 > 0 3+ > 0
Library EZ Proxy	11.25**	2, 62.37	<.001	.03	1–5 > 0*** 6+ > 0
Library Laptop Checkouts	41.82**	2, 167.43	<.001	.05	1 > 0*** 2+ > 0
Library After Hours Access	65.79**	2, 52.67	<.001	.05	1 > 0*** 2+ > 0

*p<.05

**Welch's ANOVA

***Games-Howell Post Hoc Analysis

**** One or more groups < 30 thus results may not be reliable.

Appendix E

Table 1: First Year GPA—Significant Regression Models*

Independent Variables (2012–2013)	Aggregate (B)	Entered as Freshman (B)	Entered as Transfers (B)
Total of All Engagements			
Constant	2.939	2.975	--
Total Engagements	.002 R^2=.001 $F_{(1,4963)}$=7.162 p = .007	.004 R^2=.009 $F_{(1,2991)}$=25.71 p < .001	-- -- -- Not significant
Total Engagements x Partner			
Constant	2.931	2.961	2.846
Career Center	.063	.088	.041
Library	-- R^2=.007 $F_{(1,4963)}$=33.894 p < .001	.003 R^2=.019 $F_{(2,2990)}$=28.729 p < .001	-- R^2=.003 $F_{(1,1945)}$=6.342 p < .012
Total Engagements x Activity			
Constant	2.898	2.944	2.841
Career Center	.094	.144	--
Fairs	.044	.059	.061
Advising	.054	--	.124
Library	--	.003	--
Instruction	.005	--	.007
Computer Logins	.019	.024	--
Study Room Reserv	R^2=.018	R^2=.034	R^2=.009
Univ Ctr for Acad. Excel.	$F_{(5,4959)}$=18.038	$F_{(4,2988)}$=9.445	$F_{(3,1943)}$=5.981
Supplemental Instruc.	p < .001	p < .001	p < .001
Demographic Variables & All Partner Activities			
Constant	1.003	1.035	1.297
HS GPA (Weighted)	.466	.512	.395
Non UNCC Credits	--	--	.004

Independent Variables (2012–2013)	Aggregate (B)	Entered as Freshman (B)	Entered as Transfers (B)
Gender (1=Male; 2=Female)	.137	--	--
Career Center Fairs	.098	.123	--
Advising	.047	.051	--
Library Computer Logins	.003	.004	--
Univ Ctr for Acad. Excel. Supplemental Instruc.	.013 R^2=.183 $F_{(6,3412)}$=127.225 $p < .001$	.015 R^2=.175 $F_{(5,2801)}$=118.676 $p < .001$	-- R^2=.143 $F_{(2,594)}$=49.411 $p < .001$
Total Library Engagements			
Constant	2.943	2.986	--
Total Library Engagements	.002 R^2=.001 $F_{(1,4963)}$=6.289 $p = .012$	.004 R^2=.007 $F_{(1,2991)}$=20.647 $p < .001$	-- -- -- Not significant
Specific Library Activities			
Constant	2.937	2.988	2.846
Library Study Room Reserv	.006	.004	.007
Library Instruction	.050	--	.120
Library Computer Logins	-- R^2=.004 $F_{(2,4926)}$=9.396 $p < .001$	.004 R^2=.007 $F_{(2,2990)}$=10.44 $p < .001$	-- R^2=.006 $F_{(2,1944)}$=5.754 $p =.003$
Demographic Variables & Specific Library Activities			
Constant	.994	.862	1.297
HS GPA (Weighted)	.477	.506	.395
Non UNCC Credits	--	.155	.004
Gender (1=Male; 2=Female)	.139	--	--
Library Study Room Reserv	--	.004	--

Independent Variables (2012–2013)	Aggregate (B)	Entered as Freshman (B)	Entered as Transfers (B)
Library Computer Logins	.004 $R^2 = .172$ $F_{(3,3415)} = 237.223$ $p < .001$	.004 $R^2 = .176$ $F_{(4,2802)} = 149.488$ $p < .001$	-- $R^2 = .143$ $F_{(2,596)} = 49.411$ $p < .001$

*Significance level $p < .05$. Stepwise Regression used to determine which variables make a significant and positive contribution to improving GPA. Analyses were rerun using only positive factors.

Table 2: Cumulative GPA (Fall 2018)—Significant Regression Models*

Independent Variables	Aggregate (B)	Entered as Freshman (B)	Entered as Transfers (B)
Total of All Engagements			
Constant	2.878	2.879	--
Total Engagements	.001 $R^2 = .004$ $F_{(1,4965)} = 19.82$ $p < .001$	.001 $R^2 = .01$ $F_{(1,2993)} = 29.44$ $p < .001$	-- -- -- Not significant
Total Engagements x Partner			
Constant	2.826	2.830	2.820
Career Center	.033	.035	.027
Writing Center	.028	.040	.022
Total HIPs	.146 $R^2 = .048$ $F_{(3,4963)} = 82.68$ $p < .001$	.145 $R^2 = .066$ $F_{(3,2991)} = 70.72$ $p < .001$	.152 $R^2 = .024$ $F_{(3,1943)} = 15.96$ $p < .001$
Total Engagements x Activity			
Constant	2.763	2.757	2.770
Career Center Fairs	.044	.056	.033
Workshops	.077	.092	.031
Advising	.015	--	--
Class Presentations	--	--	--
Library Instruction	.038	.036	.051
Book Checkouts	.006	.007	.004
EZ Proxy	.007	--	.013
Study Room Reservations	.002	.002	.002

Independent Variables	Aggregate (B)	Entered as Freshman (B)	Entered as Transfers (B)
Univ Ctr for Acad. Excel. Supplemental Instruc	.010	.012	--
Writing Center Consultations	.023	.035	--
Total HIPs	.137 R^2 =.071 $F_{(10,4956)}$=38.08 $p < .001$	.139 R^2 =.096 $F_{(8,2986)}$=39.83 $p < .001$	.145 R^2 =.043 $F_{(7,1939)}$=12.43 $p < .001$
Demographic Variables & All Partner Activities			
Constant	1.474	1.545	1.333
HS GPA (Weighted)	.175	.172	.215
Non UNCC Credits	.002	--	--
Gender (1=Male; 2=Female)	--	--	--
SAT/ACT (Standardized)	.026	.026	.031
HIPs	.104	.108	--
Career Center Fairs	.038	.041	--
Workshops	--	--	--
Advising	.017	.019	.042
Class Presentations	.049	--	--
Library Instruction	.040	.037	--
Book Checkouts	.004	.004	--
Study Room Reservations	.002	--	--
Univ Ctr for Acad. Excel. Supplemental Instruc	.009	.010	--
Writing Center Consultations	.054 R^2 =.191 $F_{(12,2956)}$=58.143 $p < .001$	.056 R^2 =.183 $F_{(9,2959)}$=73.842 $p < .001$	-- R^2 =.140 $F_{(3,2512)}$=137.966 $p < .001$
Total Library Engagements			
Constant	2.844	2.891	--
Total Library Engagements	.001 R^2 =.003 $F_{(1,4965)}$=15.2 $p < .001$	.001 R^2 =.007 $F_{(1,2993)}$=21.2 $p < .001$	-- -- -- Not significant
Specific Library Activities			

Independent Variables	Aggregate (B)	Entered as Freshman (B)	Entered as Transfers (B)
Constant	2.836	2.847	2.821
Library Instruction	.042	.038	.048
Library Book Checkouts	.006	.008	.004
Library Study Room Reserv	.003	.003	.003
Library EZ Proxy	.008 R^2=.026 $F_{(4,4962)}$=36.61 $p < .001$	-- R^2=.028 $F_{(3,2991)}$=29.15 $p < .001$	.012 R^2=.022 $F_{(4,1942)}$=11.13 $p < .001$
Demographic Variables & Specific Library Activities			
Constant	.761	.482	1.161
Weighted HS GPA	.399	.445	.312
SAT/ACT (Standardized)	.019	.023	.021
Non-UNCC Credits	.002	--	.004
Internships	.128	.142	--
Library Book Checkouts	.005	.006	--
Library Instruction	.041	.047	--
Library Study Room Reserv	.003	.003	--
Library EZ Proxy	.005 R^2=.186 $F_{(8,2960)}$=84.333 $p < .001$	-- R^2=.195 $F_{(6,2509)}$=101.098 $p < .001$	-- R^2=.163 $F_{(4,434)}$=28.234 $p < .001$

*Significance level $p < .05$. Stepwise Regression used to determine which variables make a significant and positive contribution to improving GPA. Analyses were rerun using only positive factors.

Table 3: Months to Graduation—Significant Regression Models*

Independent Variables	Aggregate (B)	Entered as Freshman (B)	Entered as Transfers (B)
Total Engagements x Partner			
Constant	65.652	51.208	62.206
Greek Membership	-5.424	--	-7.768
Sports Team or Club	-5.129	--	-4.806
Total HIPs	-- R^2=.03 $F_{(2,2487)}$=53.83 $p < .001$	-.925 R^2=.013 $F_{(1,2043)}$=25.85 $p < .001$	-- R^2=.015 $F_{(2,1423)}$=11.02 $p < .001$
Total Engagements x Activity			
Constant	65.652	51.208	52.731
Sports Team or Club	-5.129	--	--
Greek Organization	-5.424	--	-7.793
Total HIPs	-- R^2=.03 $F_{(2,3487)}$=53.83 $p < .001$	-.925 R^2=.013 $F_{(1,2043)}$=25.85 $p < .001$	-- R^2=.012 $F_{(1,1424)}$=17.84 $p < .001$
Demographic Variables & All Specific Partner Activities			
Constant	58.362	60.550	51.205
Non-UNCC Credits	-.267	-.146	-.259
Gender (1=Male; 2=Female)	-1.837	-1.965	--
Total HIPs	-.685	-.815	--
Sports Clubs/Teams	-1.645	--	--
Weighted HS GPA	-- R^2=.42 $F_{(4,3485)}$=626.28 $p < .001$	-1.426 R^2=.107 $F_{(4,1910)}$=57.33 $p < .001$	-- R^2=.183 $F_{(1,1424)}$=318.36 $p < .001$
Demographic Variables & Specific Library Activities			
Constant	62.088	62.045	75.900
Non-UNCC Credits	-2.877	-1.399	-4.984
Gender (1=Male; 2=Female)	-2.156	-1.937	-2.246
Total HIPs	-.708	-.770	--
Sports Clubs/Teams	-1.487	--	--

Independent Variables	Aggregate (B)	Entered as Freshman (B)	Entered as Transfers (B)
Weighted HS GPA	--	-1.422	--
Greek Organization	-- $R^2 = .242$ $F_{(4,2349)}=187.3$ $p < .001$	-- $R^2 = .091$ $F_{(4,1910)}=47.6$ $p < .001$	-4.775 $R^2 = .231$ $F_{(3,425)}=42.5$ $p < .001$

*Significance level $p < .05$. Stepwise Regression used for initial analysis to determine variables that make a significant contribution to reducing Months-to-Graduation. Analyses were rerun using these factors.

Textbook Affordability Options: Assessing E-book Purchase Models for Value and Impact

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Introduction: The Growing Momentum of Textbook Affordability Efforts

Textbook affordability (TA) is gaining momentum in academia. University libraries are well positioned to leverage their online books acquisitions to initiate and support TA efforts. However, library e-books are acquired with a variety of purchase models on different platforms with differing digital rights management (DRM) restrictions, simultaneous user (SU) limits, and user interfaces. Currently, libraries make best guesses about best practices for e-book acquisitions for books that might be used as textbooks. This paper describes efforts by the University of Central Florida (UCF) Libraries' acquisitions department to establish quantitative and qualitative data to inform library e-book acquisitions in support of TA efforts.

For years, the standard policy in the UCF acquisitions department prohibited buying textbooks. UCF has over 68,000 students, 101 bachelor's, 88 master's, and 29 research doctorates.[1] Our budget cannot sustain the cost of purchasing print or single-use online textbooks in quantities to support demand. We determined that we could better support teaching and learning missions by putting limited funds towards non-textbook material. However, several factors prompted us to reconsider our textbook policy.

First, our e-book collection has grown to considerable size and contains many titles suitable for use as textbooks with unlimited simultaneous users. Second, UCF is large, with approximately 68,000 students enrolled, and is very active in online learning, with 38% of the credit hours coming from online courses. Because they can support online and distributed use, and multiple simultaneous use, e-books have the potential to be a good fit for supporting TA. Finally, Section 1004.085 of the Florida Statutes[2] and Rule 6A-14.092[3] both pushed colleges and universities to make college more affordable to their students, and specifically included language about textbook affordability. These mandates were, of course, unfunded, so the library had to be strategic and creative about supporting TA efforts.

Previous Textbook Affordability and E-book Projects

The interest in textbook affordability spanned many library departments, inspiring projects and collaborations in many units, including Public Services, Scholarly Communications, the Center for Distributed Learning, and Acquisitions. The focus for Acquisitions has been on using library-acquired books to reduce textbook expenses for students.

In 2016, we were granted access to the bookstore's list of assigned textbooks for the first time. We identified assigned titles that were already owned as e-books with favorable digital rights models (DRM). "Favorable," in this case, meant unlimited simultaneous usage (SU) or nonlinear lending, and the ability to download either the entire book, or chapters. We calculated a potential savings to students by multiplying the bookstore's list price per book with the enrollment for the course using the textbook and multiplying the result by three—an estimate of the number of semesters the book would be used. The total potential savings exceeded $800,000 over three semesters. We calculated a return on investment (ROI) by dividing the total potential savings by the sum of the library's spend on the identified books.

Figure 1. Acquisitions TA projects timeline

The results of the initial project were very encouraging but flawed. The potential savings calculation presumed that every enrolled student opted to use the library's online version of the book, and that they would have otherwise purchased the book at full price, and that the book would be assigned with the same level of enrollment for three semesters. We had no data on whether the faculty or the students knew about the library's e-book (though usage data for many of the identified books was significantly higher than the average).

In 2017, we collaborated with Taylor & Francis (T&F) in a TA effort. The library had recently joined a consortia-wide evidenced based acquisitions (EBA) plan for T&F and had also proactively identified and purchased T&F e-books that matched assigned textbooks. The T&F e-books came with perpetual ownership, unlimited usage, and full book downloads. T&F offered to monitor incoming textbook inquiries from UCF faculty, to check whether the book was either already owned or could be acquired as an e-book by UCF. If the e-book was not yet owned, UCF purchased a copy of the identified textbook. T&F sent custom emails to the inquiring faculty to encourage them to use the library-purchased version, complete with an image of the book cover, a link which incorporated the UCF library EZproxy, and instructions on how to post the link into our Learning Management System (LMS).

Faculty were asked to fill out a survey about their use of the e-book and to share a survey with their students. The effort proved to be much more labor intensive than anticipated. Many of the faculty-supplied emails were not UCF email addresses, and the supplied course information sometimes did not align with currently offered courses. The process was far more labor intensive and time consuming than anticipated and did not result in the faculty engagement nor ROI that we had hoped for.

UCF Libraries is involved in many other TA and open education resources (OER) efforts and collaborations in addition to the two e-book projects described above. For example, the UCF Libraries was awarded a grant to supply print textbooks for selected courses via print reserves in 2018. The projects relating to print and OER benefit students and address textbook affordability in significant ways but fall outside of the scope of this paper.

Research Questions: E-book Acquisitions Models for Supporting Textbook Affordability

We learned several things from the prior projects described above and uncovered many new questions. Particularly relevant to e-book acquisitions, we needed to find out which of our many options for acquiring e-books could support use as a course textbook. We wanted data to address some very practical questions related to our purchase and e-book DRM models:

- Are DRM-free and unlimited user models worth an extra cost?
- Should we prefer publisher-hosted versus aggregator-hosted e-books?
- What is the tipping point for nonlinear being a viable model for online courses?
- Which subjects yield the best ROI or usage?

UCF's E-book Purchase Models

The library has acquired e-books in a wide variety of methods. We have participated in several consortial e-book purchases over the years, with different parameters for number of copies available, shared and unshared copy pools, and various DRM models. We have purchased several e-book collections from aggregators, including several of the Solinet NetLibrary Shared Collections which date back to the early days of e-book collections. We continually purchase publisher collections, such as Springer e-books and Oxford Scholarship Online. Some of the collections are purchased consistently, year after year. Others have gaps and skipped years. We participated in several DDA (demand-driven acquisitions) and EBA (evidence-based acquisitions) programs, both on our own and as part of a consortia. Of course, we also purchase many e-books title-by-title as firm order requests from our subject librarians.

Usage Limits and DRM Models

Just as we have many business and purchasing arrangements, the library's e-book collection incorporates a variety of usage limits and DRM models. For the project, we distinguished three main usage/DRM models:

Unlimited Users (UU): There is no limitation on the number of simultaneous users (SU) for these titles, and no limitation on the number of times users can access these titles. This is the perfect model for textbooks, even if the title is not completely DRM-free. Typically, titles on publisher platforms (such as Taylor & Francis, Springer, etc.) will be unlimited and DRM-free, which means that students can download a PDF copy of the entire book. Unlimited titles on aggregators, like ProQuest Ebook Central and EBSCO, may or may not be DRM free, so there may be limitations on the number of pages a user can print or download.

Nonlinear/Concurrent: ProQuest uses the term "nonlinear" and EBSCO uses the term "concurrent," but they mean essentially the same thing. One of these e-books will have a limited number of uses per year, and the uses typically refresh on the anniversary of purchase. A typical nonlinear e-book will have 325 uses per year, though some will have 200. The number of uses remaining is not viewable from the user side. It is important to note that a nonlinear use is defined differently from a COUNTER use. In ProQuest, a nonlinear use is not assessed unless the e-book has been read for longer than five minutes, or content has been downloaded or printed. Anything below five minutes is counted as a "free view." UCF did not have any EBSCO concurrent e-books assigned as textbooks, but we did have several nonlinear e-books used as texts. In most cases, the nonlinear model was sufficient for these courses. However, it is important to monitor usage and be willing to purchase another copy or upgrade to unlimited if the uses get low.

Limited User Copies: Many e-books are not available as unlimited or nonlinear. Instead, these e-books may state a specific number of simultaneous users, such as one, three, six, or any other number. There is no limit on the number of times this book can be used, but it can only be used by that number of people at the same time. UCF has many titles with a specific number of users listed, and many of those came from consortial deals. Oftentimes a vendor acquires another platform and will migrate a package over (say, NetLibrary moving to EBSCO) that was purchased by a consortia or other group. Consortial deals, particularly legacy deals made in the early days of e-books, often stipulated that the group purchase a specific number of "copies" that translated into a number of SUs, either as a shared pool or with one SU designated per participating library. As a result of our consortia participation, we have thousands of titles that have one

user, six users, twelve users, or some other number. For example, we have many e-books that say "12 copies" that are a result of a consortial DDA in MyiLibrary. Though these e-books are now in ProQuest, the original terms of the group deal were that each time an e-book was triggered for purchase by the group, a copy was purchased for each library. So, though UCF technically only owns one single-user copy, we have access to all 12 copies purchased by the consortia. This can obviously be confusing and getting locked out of an e-book can be frustrating for users. All students in a course frequently need to access the e-book in the same time frame when they have assignments due, so our starting assumption is that the limited-users model is not suitable for textbooks.

Table 1: Summary of E-book Platforms and DRM/Usage Models at UCF

Platform	DDA	EBS	Title / Firm	1 to 6-SU	Non-linear	12 Copies	UU
ACLS							✓☐
Cambridge		✓☐	✓☐				✓☐
EBSCO			✓☐	✓☐	✓☐		✓☐
Elsevier			✓☐				✓☐
Oxford							✓☐
ProQuest	✓☐		✓☐	✓☐	✓☐	✓☐	✓☐
SPIE							✓☐
Springer							✓☐
T&F		✓☐					✓☐
Wiley			✓☐				✓☐

Methodology: Data Gathering, Cleanup, Matching

Our project required us to gather data from disparate sources. We obtained course data, including enrollment, sections, and faculty names, from the university's Institutional Knowledge Management (IKM) unit. Acquisitions records and GOBI provided e-book titles, purchase price (if available), collections and packages, host platforms, purchase model, and the DRM for each e-book. Usage data came from COUNTER BR1 and BR2 reports for the fall 2018 semester from August 1st through October 31st, and additional usage details came from special non-COUNTER reports provided by the administrative modules for e-book aggregator platforms, such as the ProQuest Ebook Central usage reports.

Finally, and crucially, we needed the list of fall 2018 textbooks. The textbook list provides vital information, including titles, ISBNs, course numbers, enrollment, and faculty names. The data is compiled and controlled by the campus bookstore. Historically, the bookstore has treated the textbook list as proprietary and secret and has not shared the information with the library. Since 2016, the library has gained limited access to parts of the list.

Matching the textbook list against our holdings was done by searching the library catalog, title by title, and recording the online versions listed in the results. Likewise, finding the purchase, SUs, and DRM information per book involved checking title by title in GOBI or other purchase records. These two steps were performed by a colleague in UCF's Center for Distributed Learning.

The data sets we gathered were created by different units for different purposes, and, for our purposes, had many problems, such as malformed ISBNs, ISBNs for different editions or formats for the title, or missing ISBNs entirely. Some of the titles for the books were incomplete, while others had extraneous notes tacked on the end. A variety of capitalization and punctuation schemes were applied, even within the same data sets. Acquisition data, such as price and specific circumstances of the purchase, was inconsistently available. Many of these e-books were purchased in large collections with no per-title pricing on the invoice. Others were part of consortia-wide deals, with a pool of shared titles purchased at a discount. Even COUNTER 4 usage reports were problematic because some of the host platforms provide chapter level usage data (BR2— Number of Successful Section Requests by Month and Title), while others provide book level data (BR1— Number of Successful Title Requests by Month and Title). Very few platforms provide both COUNTER BR1 and BR2 statistics, making comparisons impossible in some cases.

Finally, we opted to scope the project by only including platforms that provide titles that would be considered "books" in the modern sense of the word, and by eliminating courses with fewer than 5 students from our list, in the likelihood that those classes had been cancelled. The resulting data would, we hope, better reflect normal UCF textbook and e-book norms and so provide a better basis for analysis and conclusions.

Digging into the Data
Textbooks per Platform

After cleaning the data, we used Excel functions and manual verification to match elements across the different sources and began looking for trends. Checking the library catalog for the titles on the bookstore's list for fall 2018 textbooks identified 96 e-books in the library's collection that matched the assigned textbooks in 93 courses with five or more students enrolled. The identified e-books were hosted on ten platforms, providing a representative cross section of options including aggregator and publisher platforms, subject collection, DDA, firm orders purchases, unlimited users, nonlinear users, short-term loans, and limited user copies ranging from 1 to 12.

Table 2: Courses and Enrollment Counts per Platform

Platform	Courses	E-books	Course Enrollment	Potential Student Spend
ACLS	4	4	205	$5,298
Cambridge	3	3	72	$2,755
EBSCO	23	24	931	$59,458
Elsevier	1	1	48	$2,296
ProQuest EBL	42	43	2182	$4,366
ProQuest ebrary	1	1	12	$99,675
SPIE	1	1	20	$1,680
Springer	11	11	199	$896
T&F	6	7	272	$20,932
Wiley	1	1	28	$17,840
Total	93	96	3969	$215,196

We were surprised that most of the matched textbooks were on an aggregator platform, with 43 hosted on ProQuest and 23 on EBSCO. We had predicted that the books on platforms would match the most assigned textbooks because they are more likely to have unlimited users and because of their reputation of publishing scholarly content aligned with UCF's programs.

Table 3: E-books in UCF's Collection versus Textbooks Matched per Platform

Platform	% of Total E-books	% of Textbooks
ACLS	2.37%	4.17%
Cambridge	0.02%	3.13%
EBSCO	33.18%	25.00%
Elsevier	0.09%	1.04%
Oxford	5.78%	0.00%
ProQuest	15.40%	45.83%%
SPIE	0.15%	1.04%
Springer	42.60%	11.46%
T&F	0.21%	7.29%
Wiley	0.21%	1.04%

Of the platforms that provide what we think of as a modern, scholarly book, ProQuest, EBSCO, and Springer host the most titles, at 15%, 33%, and 43% respectively. Even though ProQuest only hosts 15% of UCF's e-books on the platforms in our study, it hosts 45% of the identified textbooks.

Clearly, the number of titles on the platform does not directly translate into the percentage of matched textbooks. The method of e-book selection may be an important factor. Most of our ProQuest e-books were acquired via DDA or firm order, with either nonlinear or unlimited usage. They tend to be recent and, because they were selected title-by-title by students, faculty, and librarians, likely to be very relevant to UCF's programs of study, which may explain why ProQuest titles matched the most textbooks. Further investigation is needed to determine if the pattern continues and whether DDA and firm order books more often match textbooks on other platforms.

Chart 1: Textbooks per DRM per Platform
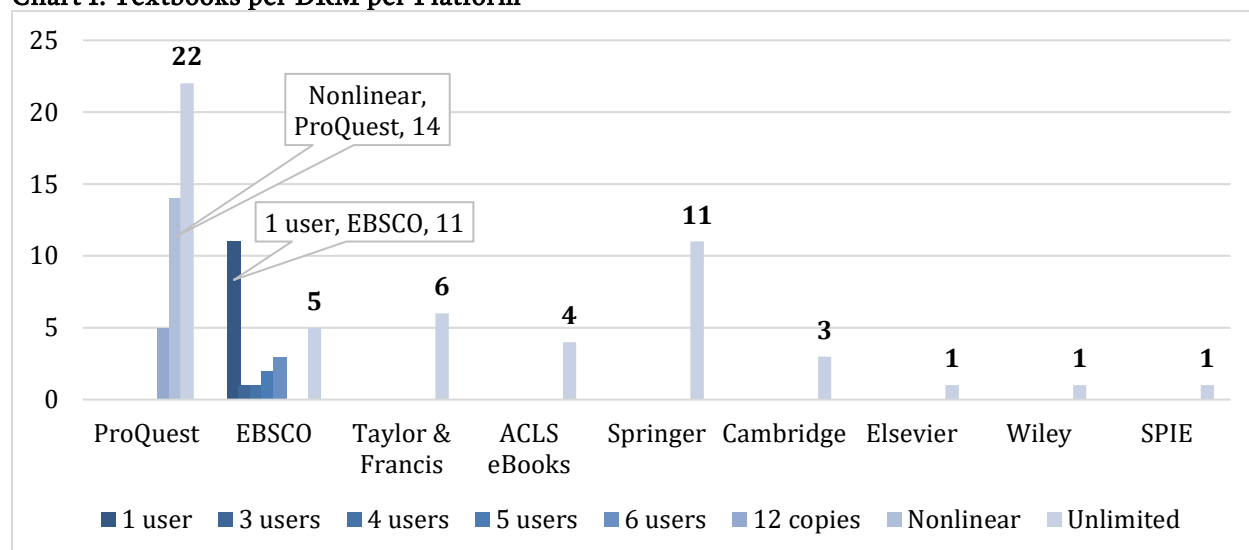
Comparatively, while EBSCO hosts nearly twice as many e-books as ProQuest, they were overwhelmingly acquired as part of the legacy NetLibrary Shared Collections. Most of the collection is more than 10 years old, the individual titles were not specifically selected, and most permit only one SU. The more recent EBSCO additions have been made through firm orders, and librarians may select whichever SU model they think is appropriate. The size of the EBSCO collection, combined with the mixture of publication dates and SU models may explain why EBSCO books matched at a higher rate than most platforms, but at a lower percentage than we might have guessed based on the collection size.

For publisher platforms, UCF purchases subject collections, with only a smattering of firm orders. All the books have unlimited SUs. Springer is notable as our longest-running and largest publisher-hosted collection. We have purchased most English-language Springer e-books from 2005 to present, making it our largest single provider of modern e-books and we have encouraged faculty to consider using the titles as e-books. Springer e-books make up a whopping 42% of UCF's e-books on the platforms listed in Table 3. Eleven percent of the identified textbooks were Springer e-books—higher than the other publisher packages, but not in proportion to the size of the collection.

COUNTER Usage per Platform

We predicted that students would discover and use the library's online copy of the assigned textbooks—after all, "Does the library have my textbook?" is the most common question asked at the reference desk during the first two weeks of the semester. All other factors being equal, we would expect usage per textbook would correlate closely with course enrollment. Of course, the factors are not equal, and the usage patterns turned out to be far from straightforward.

Neither the number of identified textbooks per platform, nor enrollments in the courses, predicted usage. For example, the ACLS textbooks for four courses with 205 students had no usage during fall 2018. EBSCO matched twenty-three courses with 931 students enrolled, but only one of the books was used, with a paltry 15 section uses reported on BR2. The forty-three textbooks on ProQuest, on the other hand, were used over 47,000 times during the semester.

Table 3: Courses, Enrollment, and Usage per Platform

Platform	Courses	Enrollment	BR1	BR2	% BR1 Use	% BR2 Use
ACLS	4	205	-	-	0%	0%

Platform	Courses	Enrollment	BR1	BR2	% BR1 Use	% BR2 Use
Cambridge	3	72	-	8	0%	0%
EBSCO	23	931	-	15	0%	0%
Elsevier	1	48	-	315	0%	1%
ProQuest EBL	42	2182	362	47,010	58%	95%
ProQuest ebrary	1	12	-	11	0%	0%
SPIE	1	20	5	-	1%	0%
Springer	11	199	1	1,856	0%	4%
T&F	6	272	253	51	41%	0%
Wiley	1	28	-	-	0%	0%
Total	93	3969	621	49,266	100%	100%

The BR1 and BR2 usage patterns were quite different, which bears some explanation. BR1 usage reports how often an entire book is used (displayed or downloaded). BR2 reports how often a section (i.e., a chapter) of a book is used. Most platforms support, or emphasize, chapter use, while a few emphasize downloading the entire book. When a student reads a book on a platform that emphasizes chapter-level use, a BR2 usage count is generated for each chapter the student accesses, every time they access it. If the student accesses the same book on a platform that emphasizes downloading the entire book, and the student uses their already-downloaded copy for the entire semester, the BR1 report will count only one use of the title. As a result, BR2 reports tend to have much higher totals than BR1.

The UU books on ProQuest generated the most usage. However, the nonlinear and 12-SU e-books had significant usage, too. The one EBSCO book with 15 BR2 uses had 6-SU. All the remaining BR2 use was UU on the publisher platforms.

Chart 2: BR2 Usage per DRM Model per Platform
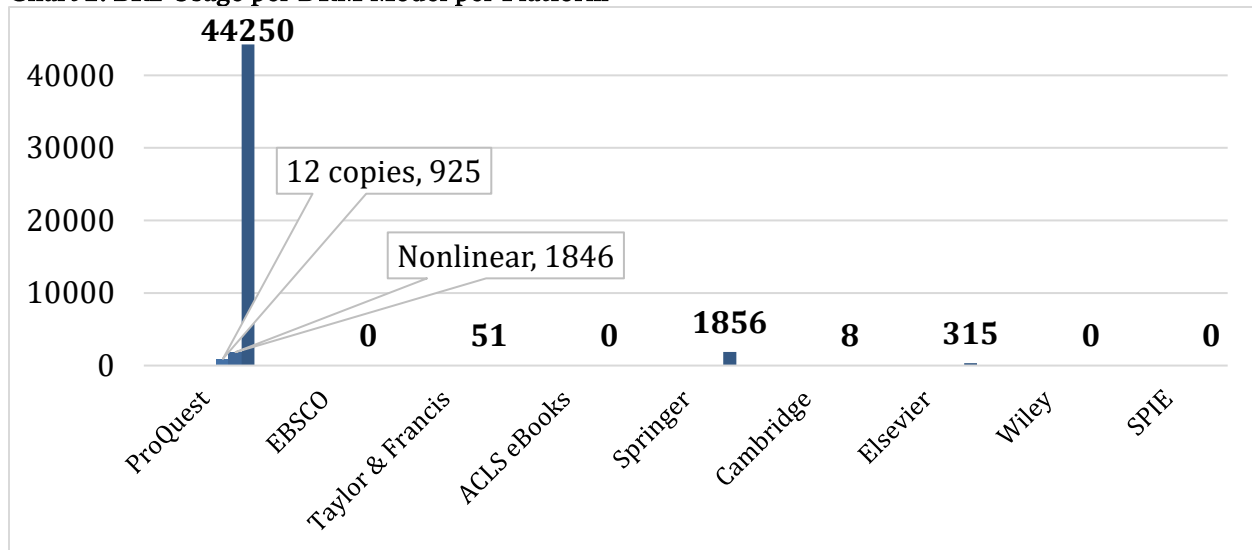
Only Taylor & Francis and ProQuest provided BR1 reports. ProQuest, once again, had the most usage. We also saw a significant use on Taylor & Francis.

Chart 3: BR1 Usage per DRM Model per Platform
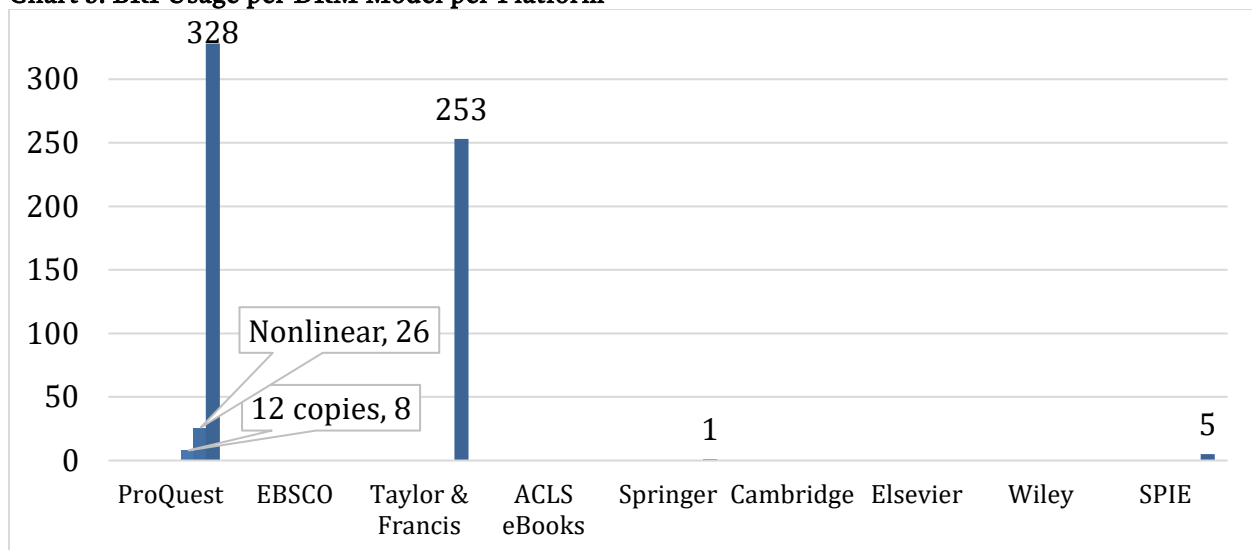
Usage per Student

Dividing the total use of the textbooks on a platform by the number of enrolled students in the associated courses gives a use per enrolled student ratio. The ratio does not let us know whether the students in the specific courses we identified were the people using the book, but a higher use per student ratio does indicate that the enrolled students could feasibly drive the usage. According to fall 2018 BR2 data, ProQuest's hosted textbooks were used, on average, 21 times per student. Springer and Elsevier also had use per enrolled student ratios that imply that every enrolled student *might* have used the library's online copy of the textbook.

Chart 4: Average BR2 Usage per Enrolled Student
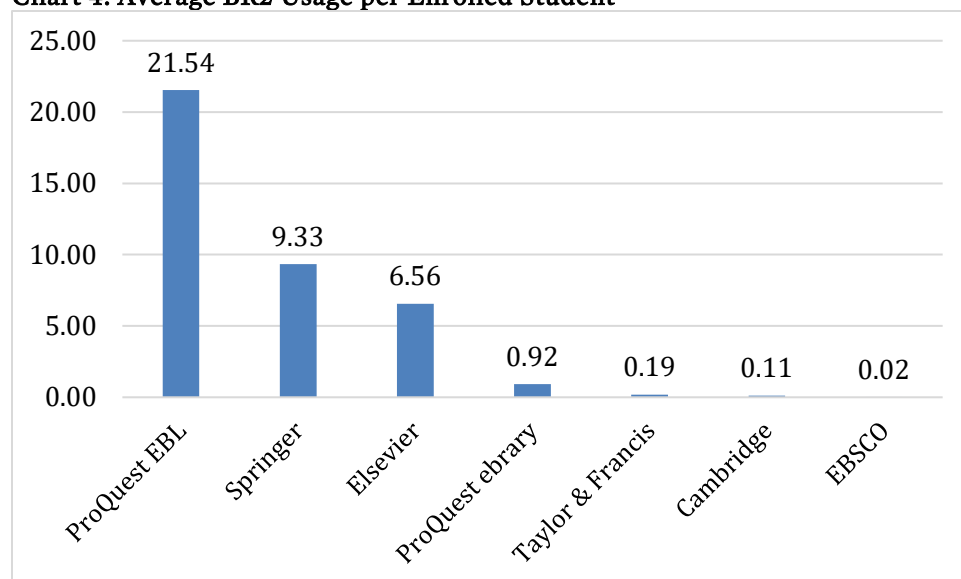
Use on ACLS, Cambridge, EBSCO, SPIE, and Wiley was low enough to imply that the enrolled students did not attempt to use the online book. Perhaps students did not know about the library's online copy, or knew about the copy, but found it unacceptable for some reason, such as an unfriendly user interface, discouragement by faculty, or need for offline access. We have no data to strengthen or debunk our speculations.

BR1 data shows Taylor & Francis-hosted textbooks were used approximately one time per student enrolled in the corresponding courses.

Chart 2: Average BR1 Usage per Enrolled Student
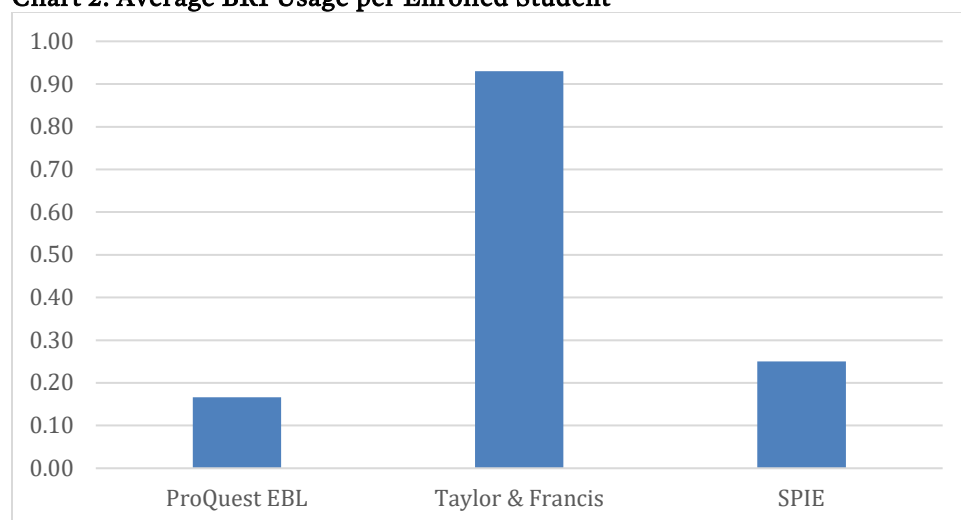
Nonlinear Textbook Case Study

To determine the tipping point for nonlinear e-books as textbooks, we examined the use of a specific nonlinear title by a course with enrollment large enough to cause usage to exceed the usage allotment. "Nonlinear" is a ProQuest model wherein the library gets a fixed number of uses, typically 325, for a title per year. The uses can all be simultaneous, so several students can access chapters and assigned readings at once. The usage pool refreshes on the anniversary of the purchase of the e-book. If the usage-pool is used up, then

access to the book is blocked for the remainder of the year, or, if the book is still available for nonlinear purchase, the library can pay for additional "copies," essentially doubling the number of allowed uses per year.

UCF purchased the book ***The Design of Everyday Things*** by Don Norman on the ProQuest platform with the nonlinear model with 325 uses per year. The title is the assigned textbook for Fundamentals of Interactive Design, a course taught in the fall and spring semesters, with enrollment ranging from 249 to 446 students a semester. Usage of the library's nonlinear copy of the title has been strong every semester the course is taught. During the spring 2018 semester, the nonlinear limit of 325 was reached. The usage pool refreshed in the summer, so there were enough remaining for the fall semester, but we predict that we will run out again during spring 2019.

Table 5: Usage and Enrollment Comparison per Semester

Semester	Usage	Enrollment
Fall 2018	129	390
Summer 2018	0	0
Spring 2018	263	249
Fall 2017	45	446
Summer 2017	1	0
Spring 2017	215	345

Interestingly, usage of the title has been strongest during spring semesters, even though enrollment has been higher in the fall. We are not sure what is causing the spring usage bump. Different faculty members teach the course each semester. Perhaps some of the faculty promote the e-book, while others do not, or some may emphasize reading assignments more than others.

The rest of the nonlinear textbooks, however, have not been as heavily used. Of the thirteen nonlinear textbooks we identified, only four had ten or more nonlinear uses. Note that nonlinear uses are not the same as COUNTER usage. A nonlinear use is assessed when an e-book is used for longer than five minutes at a time, or if the reader has saved a PDF or printed from the book. COUNTER usage is tallied for any access of the full text of the book, no matter how short. Many of the titles had robust COUNTER usage for the fall 2018 semester, even though a small number of nonlinear loans were counted, leaving a large pool of nonlinear uses available.

Table 6: Usage, Loans, and Enrollment for Nonlinear Textbooks

Title	BR2 Fall 2018	NL Renewal Date	NL Loans Left	Loans used	Upgrade Cost	Fall 2018 Enrolled
Abandoned in the Heartland	174	Sep 19	321	4	$0	8
Black sexual politics	77	Jun 19	325	0	$26	25
Business model generation	105	Dec 18	315	10	$26	181
Directing for animation	0	May 19	324	1	n/a	8

Title	BR2 Fall 2018	NL Renewal Date	NL Loans Left	Loans used	Upgrade Cost	Fall 2018 Enrolled
Examination of orthopedic & athletic injuries	646	Mar 19	295	30	$48	40
Fundamental mechanics of fluids	265	Jan 19	296	29	$88	42
Holy legionary youth	3	Dec 19	324	1	$110	12
Information architecture	105	Aug 19	325	0	n/a	56
Jonas' introduction to the U.S. health care system	0	Apr 19	325	0	$129	10
Quality and safety in nursing	0	Dec 18	325	0	n/a	6
Social work practice with groups, communities, and organizations	7	Feb 19	195	5	$18	67
Statistics for health care management and administration working with Excel	349	Mar 19	83	117	$28	11
Unholy war	10	Jun 19	323	2	$8	43

There are many variables with nonlinear textbooks, but overall, we were surprised to see how many nonlinear loans remained at the end of the semester. Much of the COUNTER usage was counted as "free views" in ProQuest's system, meaning that a lot of textbook usage seems to be quick views to look something up.

Concluding Thoughts

A few findings and trends stood out in our data and analysis. UCF's overall e-book usage is trending upward, as is the number of e-books in the collection. Use of the e-books for all e-books and for textbooks, with usage heaviest during fall semesters. Chapter-level usage, reported in COUNTER BR2 data, is robust for all UCF e-books. BR1 usage is relatively lower.

The number of e-books that matched fall 2018 textbooks is relatively small considering the number of e-books in UCF's collection and the number of courses offered. That said, if the approximately 3,900 students in the courses opted to use the library e-book, the potential savings to students is over $215,000 for the semester.

As we expected, unlimited uses books were most often matched to assigned textbooks and had the highest usage. However, UU books on publisher platforms had uneven usage and many publisher platforms had no use of the textbooks whatsoever. Use of T&F e-books was low, due in part to the platform's preference for full book downloads. In addition, we discovered that T&F had stopped recognizing our proxy sometime in November, preventing all use of their e-books from off-campus. The problem lasted for at least one week, perhaps longer, and may have had major impact on our usage statistics. However, given that we specifically sought out and purchased T&F textbooks in a prior project and identified several titles that were marketed to faculty, we predicted high use for all the matched T&F e-books, and it did not materialize. Clearly, DRM-free and unlimited users are a plus, but do not ensure that the library's copy of a textbook will be found and used.

In addition to unlimited use, nonlinear proved to be a viable approach, but requires acquisitions employees to monitor the loans, and periodically check to ensure that they can either upgrade or purchase a second copy if required. From this project, it appears that the other DRM models do not work well for textbooks. None of the UCF library's one to six user titles had any usage. The e-books were either dismissed as a poor option, were not discovered by faculty and students, or there were barriers to finding and using these titles.

The most surprising finding was the exceptionally strong showing of ProQuest-hosted textbooks. The biggest difference between ProQuest, EBSCO, and the many publisher platforms is the method we used to acquire most of the books. ProQuest is the platform for our largest and longest-running DDA deal. Additional studies are warranted to determine if the DDA model is truly a good approach to support TA, and how it can be best leveraged. Several additional factors likely come into play, such as the course level and program, cost of the textbook, and preferences of the faculty and students. Further investigation is needed to determine influence of the factors and establish patterns.

Unknowns and Further Exploration

We do not yet know how many faculty members knew about the library's copies of the textbooks or promoted the e-books to their students. We do not know if students found them on their own, through library outreach efforts, or if most students were not aware that the library had an online copy of their textbook at all. For students that did know about the library's e-book, we do not know whether they felt the e-book version was adequate, or if they were frustrated by DRM restrictions or the usability of platforms.

In fact, we do not know if the usage was generated by the students enrolled in the identified courses. It could be that the usage is driven by only a handful of students in each course and by other UCF students.

We plan to continue our investigation and gather more information, particularly relating to student interest or adoption of library e-books. We have prepared a very quick two-question survey that we will target to classes with assigned textbooks that have library e-book counterparts. The survey will ask students to rate their satisfaction with the library version and the bookstore version of the textbook. The results will let us determine how many students used the library e-book and how many obtained a copy from the bookstore. The new data will enable us to estimate student spend on selected textbooks and the relationship between students using the library text and COUNTER usage for that e-book. The planned survey is currently awaiting IRB approval. We anticipate sending it out late in spring and follow up with another paper or presentation in 2020.

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The Continuing Adventures of Library Learning Analytics: Exploring the Relationship between Library Skills Training and Student Success

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Introduction

The Open University (OU) is the UK's largest academic institution dedicated to distance learning, with over 173,000 students. Established by Royal Charter in 1969, in the fifty years since, we have evolved from providing a correspondence-based education to be the leader in online distance education. Our mission is to be open to people, places, methods, and ideas. Core to this is our provision of education without prerequisites; most of our undergraduate courses have no formal entry requirements. Our award-winning distance learning has seen over 2 million students receive an education otherwise denied to them at campus-based universities.

Learning analytics is a key organisational strategic driver at The Open University and we are known as a leader in this research field internationally. Library services within the university provide students and staff with access to an extensive online collection of library resources, digital and information literacy skills training, and 24/7 support. This paper is a continuation of our research into library learning analytics. Previously published research has identified a positive relationship between library collection access and student success,[1] but what about our skills training provision? This research explores the relationship between student attendance at library online training sessions and student attainment.

When the university library was first established, the service was predominantly provided for the academic staff based at the Milton Keynes campus. A collection of print texts and journals were established to support the academic writing for the curriculum delivery. Students were unable to access the library; the curriculum was designed to include all of the reference sources they would need within a core study text. As the provision of online information grew at the turn of the millennium, the library strategy evolved to improve access to resources for students wherever they were studying. In support of this, the library also established an information literacy unit whose aims included incorporating information literacy skills into the curriculum.[2] Today 70% of our 600,000 books and 100% of our journals are available electronically, and users of the service are supported by an extensive information literacy programme and a 24/7 helpdesk.

Information Literacy at the Open University

The information literacy unit at the library was the driving force behind the university strategy to embed information literacy skills into the curriculum. They devised our information literacy framework, which was subsequently revised to become the Digital Information Literacy (DIL) framework still used today.[3] Initially, DIL skills materials were embedded into the curriculum primarily through online learning activities incorporated into the module materials on the virtual learning environment. When the university introduced an online system for live tutorials, the library sought to use this technology to expand its DIL offer. After a successful pilot, coupled with the organisational strategy to improve online tutorial delivery, the library formed a new live engagement team in 2015.Their remit includes training classes of students on information seeking, evaluating, and referencing via our online platform. Since the launch of the team, approximately 20% of qualifications have added the library sessions to their group tuition strategies. Typically, these "targeted" sessions are introductory, enabling students to gain skills that will support them throughout their studies. In some cases, the sessions are designed to inform a specific assignment the students need to do, for example a literature review.

Alongside the targeted live engagement sessions, the team also regularly delivers a suite of tutorials available for any student to attend. Commonly known as the "generic" sessions these are advertised on the library website where students from any subject discipline can gain DIL skills. In line with our student expectations,

these sessions are typically delivered in the evenings and at weekends. Students will log into an online room from their homes at a prearranged time and date where they will receive live training from the librarian alongside their peer students. Students can engage with the online class through text chat, two-way audio, and video. For both the embedded and generic tutorials, recordings of the sessions are made available for students who are unable to attend the live session or for those who want to re-watch the session after the event.

Learning Analytics at the Open University

Learning analytics is a key organisational strategic driver at the OU and we are known as a leader in this research field internationally.[4] In 2014, we worked in partnership with the student association to develop and agree on an Ethical Use of Student Data for Learning Analytics Policy.[5] In line with the wider organisational strategy, the library embarked upon research into library learning analytics in 2015, initially focussing on the relationship between library use and student performance or retention.[6] Following a platform provider change in 2017 to Adobe Connect, data on student attendance at online tutorials, and any subsequent views of sessions after the event, have been collected as part of the institutional learning analytics strategy. The availability of this data prompted the research team to investigate the relationship between attendance at the training sessions and student performance or retention.

The drivers for this research are to identify if the online library training sessions are providing an impact on student success in line with key institutional strategic drivers. If they are having a positive effect, the information will be used to advocate the service with key stakeholders with an aim to increase resource for the service; with faculty to ensure students from all disciplines are able to benefit; and with students to encourage participation. If they are not having a positive impact on student success, future research will be conducted into the reasons why, with adjustments made to the training with the ultimate aim of improving student success.

Literature Review

Early work in the area of library learning analytics emerged from the University of Huddersfield's Library Impact Data Project,[7] where the researchers identified correlation between library content access and student attainment. This research went on to spawn further studies at eight UK university libraries, all with similar results.[8] It also echoed similar research being conducted in Australia[9] and the USA at the time.[10] These studies focussed primarily on the relationship between student access of library content and their attainment scores, for example Grade Point Average (GPA) or degree classification. Similar research was conducted at The Open University with comparable findings.[11]

A few studies have been conducted replicating these methodologies with information literacy instruction attendance. At an individual student level, Wong and Cmor investigated the effect of library tuition on the student attainment score throughout the duration of their qualification.[12] The number of sessions students attended varied due to course design. All first-year students must attend a compulsory orientation session, with some students benefitting from five different sessions whilst studying for their degree. Overall, a positive relationship between workshop attendance and GPA was identified in only a quarter of the students in the sample group. The authors found that the more sessions that they offered, the greater the positive relationship on student attainment; however, the overall results indicated that, for most attendees, there was no positive relationship. In 2012, Bowles-Terry conducted a mixed method review of the impact of information literacy tuition.[13] Their approach included focus groups with graduating seniors and an analysis of the GPA scores for students who had and had not received library tuition. The quantitative analysis of this study focussed on data at a class-level with some assumptions made on whether individual students had attended the session. The findings concluded that there was a positive correlation between librarian instruction and GPA when offered in later (upper) years of study as opposed to first (freshman) years. The research design differed from Wong and Cmor; however the findings could potentially be similar, with limited positive correlation between those who only completed the compulsory orientation session in their first year.[14]

At a multi-institutional level, the Greater Western Library Alliance study into student learning outcomes is investigating the relationship between library instruction, student retention, and student success.[15] They are also researching the impact of learning design with session characteristics being included in the analysis. The initial findings have compared the first-year students who received library instruction interactions compared to the first-year students who did not.[16] The GPA, retention rates, and academic outcome measures of over 42,000 students from 12 universities have been analysed, making this the largest study in the field identified. The study concludes that library instruction has a positive relationship; retention rates and GPA scores are higher for students who benefitted from the tuition. The study is continuing, aiming to eventually report on the impact on four-year and six-year graduation rates.

Approach
Study Design
This study has been designed to investigate the relationship between students who participate in the library-provided training sessions during the academic year 2017–18 and their attainment at the end of the module of study. Attainment data—defined as fail, pass or pass with distinction—and assessment scores have been used within the study. Attainment scores of students who chose to attend live, and those who watched the session later, have been compared with students who did not participate. It should be noted, however, that many factors will impact on student success alongside the library training session.

The research has been conducted in accordance with the institutional Ethical Use of Student Data for Learning Analytics Policy.[17] No new data was collected as part of this activity; the study was confined to analysing data that was already in existence. The analysis of data will be used to shape future services to improve them for students.

At the OU, students study for a degree in a series of modules. For undergraduate degrees, modules are designated as levels 1, 2, and 3. These broadly equate to years one to three of a standard UK three-year degree. An initial small-scale pilot was undertaken to look at the data for one level 3 module to show the viability of undertaking this analysis. This pilot suggested that students who engaged with the training were getting assignment scores on average six percentage points higher than students who did not attend the training. This implied that there would be some value in carrying out a more complete analysis.

The approach that has been taken is to investigate three distinct types of library training sessions. Firstly, the generic training sessions, which were run regularly during 2017–18 covering five different topics, an overview of which can be seen in the appendix. The second group were the targeted sessions; eighteen of these sessions were analysed as part of this study. The third group of sessions are library training sessions that were arranged to support specific assignments within a module; seven of these sessions are included in the study. This last group of sessions offered the potential to investigate whether there were any differences at the individual assignment level.

With each training session, it is possible for a student to attend the session live or to view the recording, or to do both, or to do neither. This offered the possibility of making comparisons between the different types of engagement and their relationship with student success. For example, are students who attend the live sessions more successful than those who view the recordings?

Study Methodology
The methodology taken for this study was to extract the identities of the students from the Adobe Connect platform for each session they attended or recording they viewed. Data on student results was extracted from the institutional data warehouse and matched with the student identity. Access to this data was restricted to one researcher in the team before being anonymised.

For the generic sessions and those targeted at specific modules, the final module result (a grade—pass with distinction, pass, or fail), the overall assessment score (a percentage), and the overall examination score (a

percentage) were used. For the third type of session, the individual assessment score for the assignment immediately after the date of the library training session was used.

For the first two types of session, two different analyses were undertaken, firstly to look at the percentage of students gaining the highest grade of result, a distinction, and secondly to look at the average assessment scores. In each case, a comparison was made between the pattern of students who attended the live session only or viewed the recording only against those who did neither. It was felt that this would give a good picture of the relationship with student success. The approach of using the percentage of students gaining a distinction offered a good way to allow comparisons to be made across the different types of sessions rather than trying to show the breakdown of all the possible results.

Findings
Analysis of the Generic Library Training Sessions

Just under 2,000 undergraduate students attended live or viewed the recorded generic sessions. An initial analysis of the data for all the sessions quickly identified that there was a pattern of higher attainment for students who attended the live sessions. As you can see from Table 1 below, 12% more students who attended at least one of the live sessions but no recorded sessions gained a distinction compared with students who did not engage with any live or recorded sessions (A compared to C). Students viewing at least one recorded session were also more likely to gain a distinction result compared with those who did not engage (B compared to C). The percentage of students failing was also lower for those engaging with a live session (A compared to C), but this was not the case for students who viewed at least one recording (B compared to C). The results from students who attended both a live session and a recording of a live session were also reviewed as part of this research. The number of people who had engaged with both the live and recorded sessions was not high enough to warrant presentation in this paper.

Table 1. Percentage of students gaining a specific result by level of engagement with generic training session.

Result/percentage	Students who attended any live generic session but no recorded session (n=809) (A)	Students who viewed any recorded generic session but no live session (n=1,000) (B)	Students who did not engaged with any live or recorded sessions (n=80,357) (C)
Distinction	31.15%	25.50%	19.50%
Pass	66.87%	69.40%	75.84%
Fail	1.98%	5.10%	4.66%
Total	100%	100%	100%

To compare the different sessions, the percentage of students gaining a distinction was used as the measure of attainment and a method was devised to compare them against a baseline.

The first step was to split the data into 11 sub-groups. For each of the five generic sessions, there were two sub-groups—students who attended the session live but not the recording, and those viewing the recording but not the live session—to give a total of 10 sub-groups. The eleventh sub-group was made up of students who did not engage with any live or recorded session—this was used as the baseline.

The next step was to calculate the percentage of students in each sub-group who gained a distinction. For example, 29% of students who attended the live referencing session gained a distinction and 35% of students attending the introduction session went on to gain a distinction at the end of their module.

The final step was to compare the percentage for each of the ten sub-groups against the baseline (the percentage of students who did not engage at all who gained a distinction). Sorting these in order gives the graph shown in Figure 1.

Figure 1. Difference in percentage of students gaining a distinction between students engaging or not engaging with the different general library training sessions.
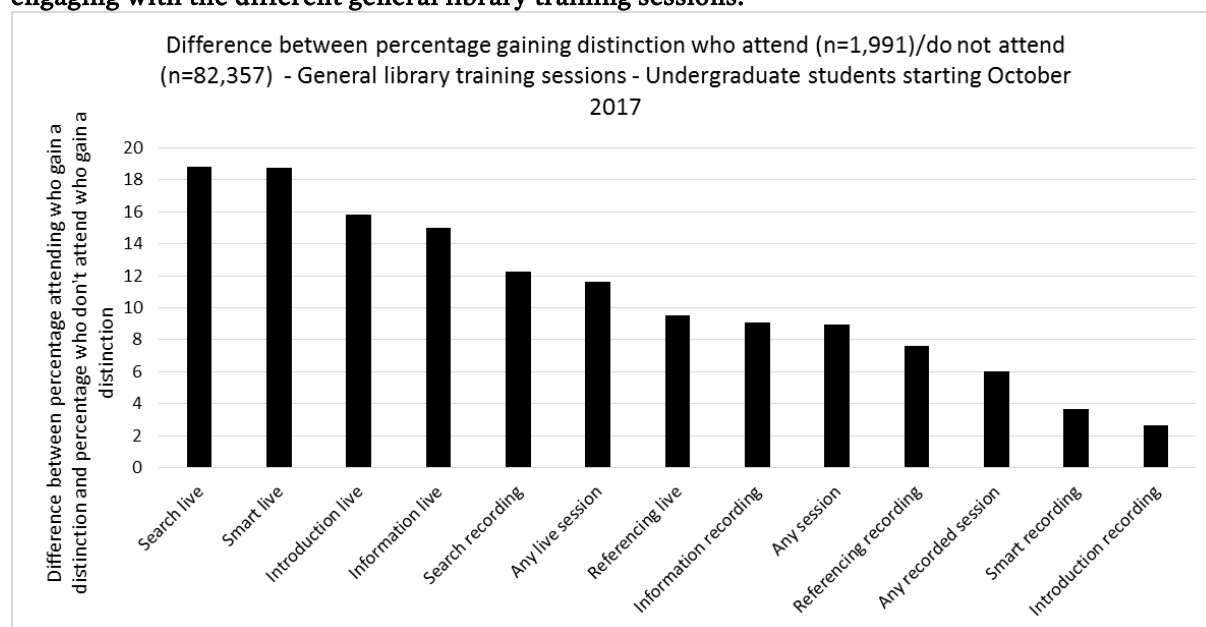
The analysis found some interesting features. Students attending the live session are more successful as a group than the students viewing the recording in all cases. The session with one of the highest increases in the percentage of students gaining a distinction—"Smarter searching live"—also had one of the lowest differences for the recording. There were quite large differences between the live and recorded sessions in some cases. The referencing session, a topic we know from feedback covers a particular pain-point for students, did not seem to be associated with higher student attainment. One hypothesis for this is that there are some differences in referencing practices across the institution, resulting in students receiving conflicting advice from different sources. The library is currently working with faculty colleagues to try to overcome this challenge.

The second approach used was to take the average assessment score for students who attended the live session only (i.e., attended the live session but did not view the recording) and deduct the average score for students who did not engage with either the live or recorded sessions. This gave a value for the difference between the two averages. Two assessment values are available—a continuous assessment score derived from the individual assignment scores within the module and an overall examination score—so the exercise was repeated for both scores. The two differences were added together and divided by two to give an average score for the live session. The same calculation was then carried out for students who only viewed the recordings, compared again with students who did not engage at all. An illustration of the calculation is shown in Table 2.

Table 2. Illustration of the calculation used to determine a value for the increase/decrease in attainment.

Module: Level 3	Average score for students attending live (A)	Average score for students not attending live or viewing recording (B)	Difference (A-B)
Average continuous assessment score	76.05	70.82	5.23 (C)
Average examination score	73.60	67.31	6.29 (D)
Calculation	(C+D)/2 = (5.23+6.29)/2 = 5.76		

This analysis gave a score for each of the five live sessions and five recorded sessions and provided a way of comparing the sessions. Sorted by order of value, the highest difference to the left gives the pattern in Fig. 2.

Figure 2. Difference in assessment scores between students attending/viewing or not attending/viewing the library training sessions for each session.
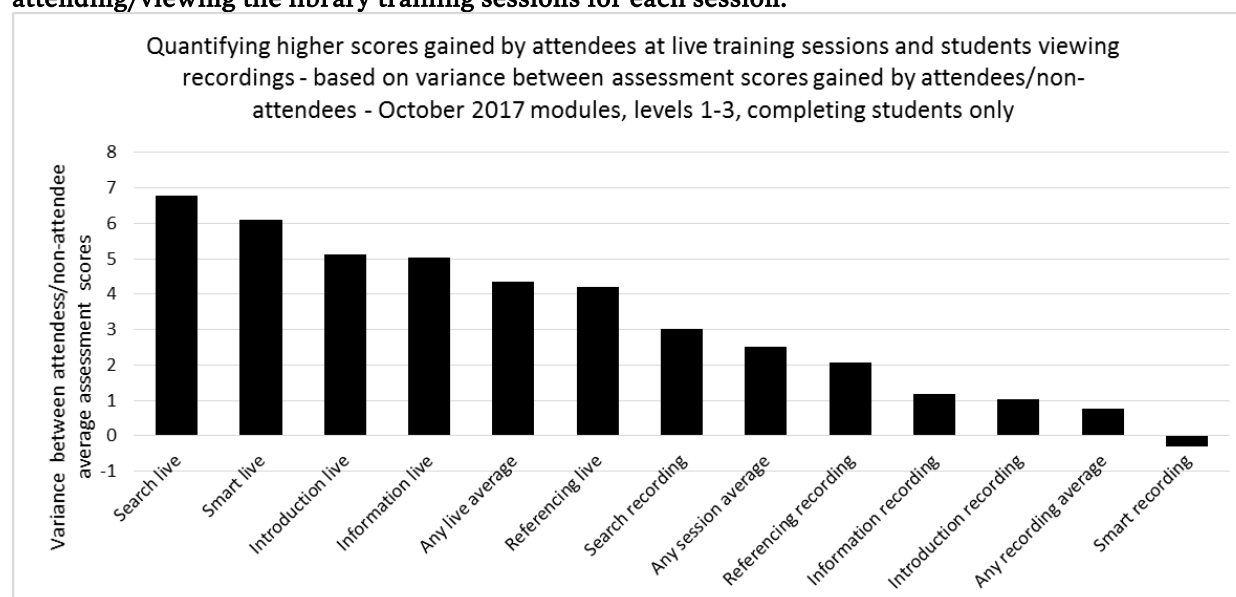
This second approach shows a very similar pattern to the first approach. Again, we see the live sessions seeing more engagement by students who do well in terms of results. We also see that some of the recorded sessions see only a small increase and, in one case—the recording of the "Smarter searching session"—students viewing the recording are those who do less well.

Library training sessions targeted at specific modules

Eighteen library training sessions were delivered for specific modules that started in October 2017. The majority of these (13) were delivered for level 3 undergraduate modules, with two each for undergraduate levels 1 and 2 and one for a postgraduate module. Carrying out a similar analysis to that used for the generic sessions showed that, for the live sessions, twelve modules saw a higher percentage of attendees gaining a distinction. In the recorded sessions, there was the same picture, although these were not the same modules in each case (Fig. 3).

Figure 3. Percentage of live and recorded library training sessions targeted at modules that see an increased number of students who engage achieve a distinction in their end of module result.

Are students attending the module targeted sessions more likely to gain a distinction than those who don't? Eighteen October 2017 start modules with library training sessions

Percentage of modules where more students who engaged gain a distinction (positve) or less students gain a distinction (negative)

■ Positive □ Negative
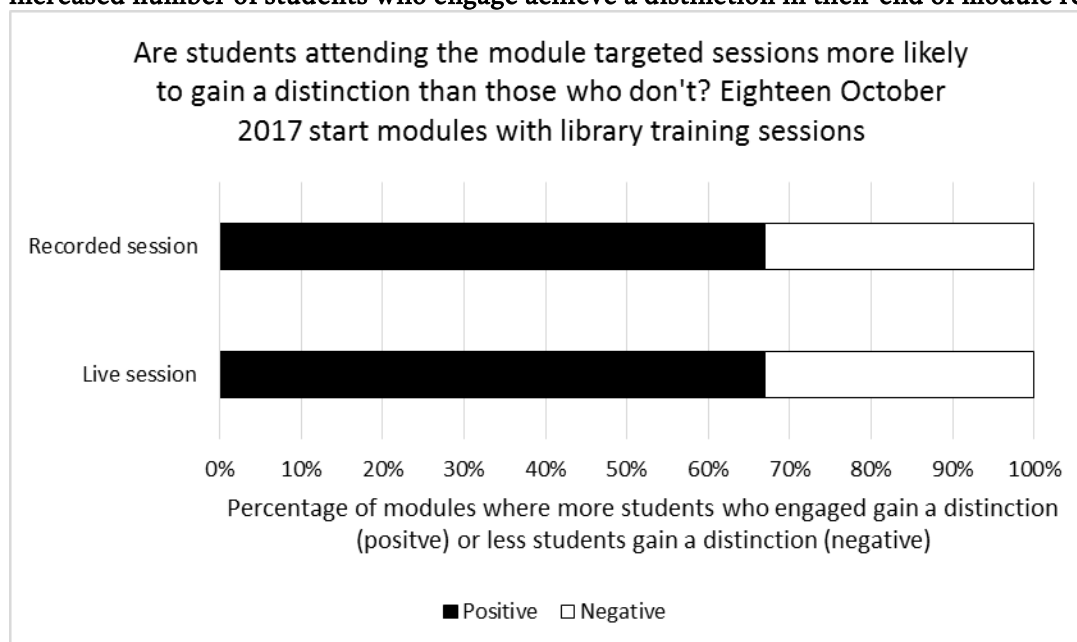
Analysing the assessment scores gave a slightly different picture, with all the live sessions showing an increase in assessment scores and with all but two of the modules showing an increase for the recorded sessions (Fig. 4).

Figure 4. Percentage of modules where students who engage have higher assessment scores.

Are students attending the session more likely to have higher assessment scores? Eighteen October 2017 start modules with library training sessions

Percentage of modules where students engaging with the library training sessions have higher average scores (Positive) and those where they have lower average scores (Negative)

■ Positive □ Negative
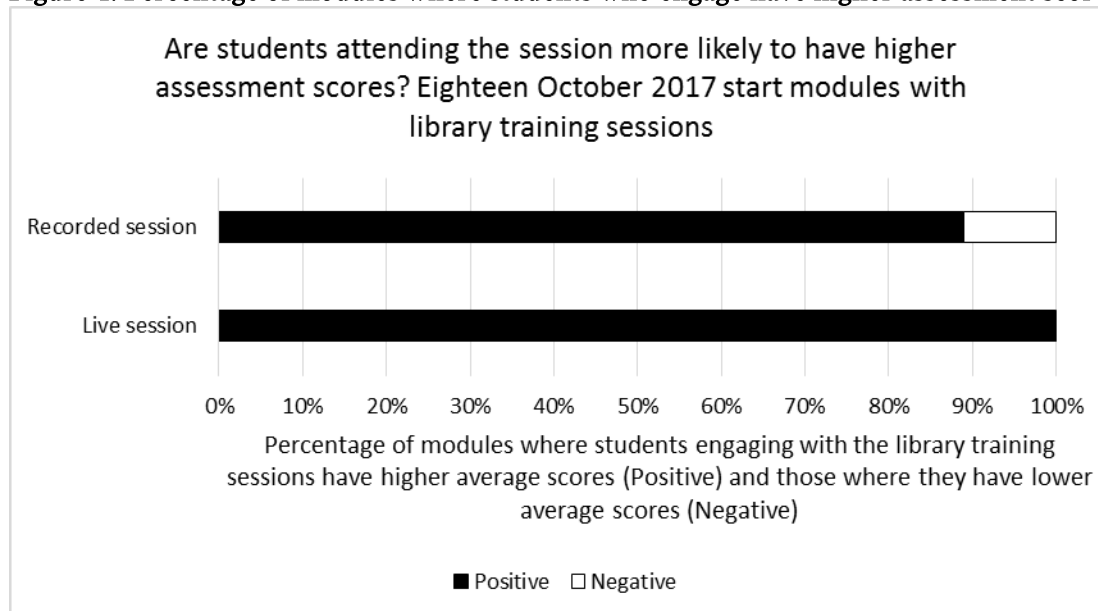
Library Training Sessions Targeted at Specific Assignments

Seven sessions targeted at specific assignments were also analysed. Six of the modules were level 3 undergraduate modules with one level 1 module. The topics covered in the sessions varied but all the level 3 sessions were on topics associated with finding material for their assignment. The level 1 session was on digital literacy. Just over 3,000 students studied these modules, 277 (9%) attended live sessions only, 221

(7%) viewed the recording only (before the date the assignment was due), 54 (2%) did both, and 2,637 (82%) did neither.

The approach taken to analyse this data was different, as the assignment score for the specific targeted assignment was used, rather than the final module result. The average assignment scores for students attending the live session only was taken and compared with the students who neither attended the live session nor viewed the recording. A similar calculation was carried out for students who only viewed the recording, again comparing with students who did neither. Finally, the students who did neither were compared with students who engaged with either of the sessions. As you can see from Table 3 below, in most cases there is a positive difference between the assignment scores for those who engaged compared with students who did not engage at all. Only one module showed a negative value (i.e., where non-attendees did better for one of the recorded sessions).

Table 3. Difference in assignment scores between attendees/viewers and non-attendees/viewers for seven modules where library training sessions were delivered to support specific assignments.

Module	Difference between average assignment score for students who attend live session only and students not attending the live or recorded session	Difference between average assignment score for students who view recording only and students who don't view it or attend the live session.	Difference between average assignment score for students who do not engage compared with students who engaged with either the live or recorded session.
Arts level 3	5.48	3.27	-4.46
Arts level 3	5.41	-1.97	-1.44
Social Sciences level 3	8.22	2.72	-5.99
Social Sciences level 3	7.66	4.95	-6.05
Childhood level 3	4.50	5.73	-5.38
Childhood level 3	7.28	5.24	-6.14
Science level 1	7.81	3.06	-6.59

Again, this analysis shows a picture where students who engage with the live sessions seem to be gaining better results. In all cases the group of students who don't engage at all have a lower average score for the group than those who do engage.

Library Training Sessions and Student Completion

The dataset compiled for this study also allowed an analysis to be undertaken to investigate whether students who engaged with the library training sessions were more likely to complete their module. Analysing the data for the generic and module-targeted sessions identified some interesting themes. Of those who did not engage with any of these sessions, 71% of students completed their module. But 84% of those students who attended at least one of the live sessions completed their module and 87% of students who viewed at least one recording completed their module. If students attended at least one session (either a live or a recorded session), there was an 86% likelihood that they completed their module. As with the data on student attainment, it appears to be the case that students engaging with library training sessions are those

who are more likely to be successful (i.e., that there is higher retention in the group who engage with library training). What is particularly interesting about this finding is the suggestion that, whilst students attending the live modules seem to be gaining higher results than those who view the recording, the opposite seems to be the case when it comes to student retention.

Conclusions

Throughout the analysis, we see a picture where students engaging with library training sessions are those who are gaining higher results. This applies whether we look at the generic sessions, the module-targeted sessions, or the individual assignment targeted sessions. There is a general picture that students attending the live sessions are doing better than those viewing the recordings. Is this that these are better organised and motivated students, maybe with better study skills, or are they just more experienced at studying with the university? Do these students see that these sessions are to their advantage? With the module-targeted sessions being mainly level 3 modules, that implies that students should be experienced in study at the Open University.

One of the other features that comes out of the study is that there are quite distinct variances in student success between the different library training sessions and not just between the live and recorded sessions. It may be that some of the sessions are less well-aligned to improving overall student achievement but more aimed towards building study skills, but it is slightly surprising to see topics such as referencing, a known pain point for students and one they can lose marks for, being less associated with student success.

There is also some suggestion, particularly from the analysis of the module-specific sessions that even in modules that do not see a larger percentage of students engaging with the session gaining a distinction, there is still a pattern of higher assessment scores for those engaging with the training session.

When it comes to student retention, this study also seems to show that students engaging with library training sessions are more likely to be completing their module but that students viewing the recording are more likely to complete than students who attend the live session, which is the reverse of the case with student success.

Overall, the study tells us that students who engage with library training sessions are getting higher attainment scores and are more likely to complete their studies. Attendance at the live sessions is also more likely to be associated with higher attainment than viewing the recorded sessions. This initial study helps our understanding of the value and impact of these sessions and starts to shed some light on the relationship between library training sessions, student success, and student completion.

As with many studies, this piece of work raises as many questions as it answers. Are the students attending the sessions more successful and well-motivated? What contribution is the library training playing in student success, alongside other contributory factors such as tutors, support, and learning materials? How good a predictor of student success is attendance at these library sessions? Follow-on work could include a robust statistical analysis to understand if the differences reported here are significant and to uncover to what extent the training sessions themselves are responsible for those improved results.

Acknowledgements

Author Biographies
Selena Killick is the senior library manager responsible for Engagement & Insight at The Open University library. Her remit includes leading the evaluation of customer perceptions and expectations within library

services to inform service development. She has presented, published, and provided consultancy services on using assessment methods to improve library services.

Richard Nurse is senior library manager at The Open University library and leads the digital services and metadata team that manages library websites, library search tools, and metadata. Previous work includes projects on library data analysis and the development of a library recommender tool. He has published and presented on aspects of library data.

Helen Clough is a senior library manager at The Open University library and the library's key customer relationship manager for the faculty of wellbeing, education and language studies. Her remit includes leading the team of librarians who deliver live engagement activities via Adobe Connect and social media. She is a fellow of the Higher Education Academy and has presented and published on delivering online information literacy teaching to distance learners.

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Appendix
Overview of the five generic training sessions provided by The Open University Library and their learning outcomes

Introduction to Library Services

Presented as "Information" in Figures 1 and 2

Learning Outcomes:

- Be able to confidently navigate the library website
- Be able to access resources relevant to your study
- Be able to access help and support provided by the library

Using Library Search for your assignment

Presented as "Search" in Figures 1 and 2

Learning Outcomes:

- Know how to use Library Search to find particular items
- Know how to use Library Search to find items on a particular topic
- Know where to go for help and support

Smart searching with library databases

Presented as "Smart" in Figures 1 and 2

Learning Outcomes:

- Identify key search terms from your research topic and expand these using synonyms
- Understand how to use effective search techniques, such as Boolean searching, in building a search statement
- Understand the functionality offered by databases in filtering, saving and exporting your results

Picking the best information for your assignment

Presented as "Information" in Figures 1 and 2

Learning Outcomes:

- Be able to use a framework to assess the reliability of information
- Be able to assess the reliability of information
- Be able to assess the usefulness of information

The why and how of referencing

Presented as "Referencing" in Figures 1 and 2

Learning Outcomes:

- Know why referencing is important
- Know what to reference when writing your assignments
- Know how to construct references

Impact and Ethics: A Meta-Analysis of Library Impact Studies

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Abstract[1]
Following trends in higher education that emphasize quantitative analytical approaches to learn about educational outcomes, academic libraries are increasingly turning to "big data" methods in an attempt to demonstrate their impacts on student learning and demonstrate their value to the university's educational mission. By applying learning analytics techniques to library use and instructional data, libraries have especially focused on attempting to measure the impact of the library on student retention and achievement measures.[2]

This presentation has two purposes. The first purpose is to discuss the methodological issues which were detected while conducting a meta-analysis on library impact studies. The second purpose is to present findings from a meta-analysis conducted on studies that were published between 1 January 2008 and 30 April 2018.

There are currently debates within the learning analytics field about informed consent and transparency when undertaking these methodological approaches.[3] These debates exist because learning analytics studies require large datasets of personally identifiable information (PII) that could be inherently risky due to the potential for breaching the confidentiality and privacy rights of individuals and groups within the dataset. The methodological issues that were detected while conducting this meta-analysis fall within this this debate because these studies subject individuals in library datasets to the same risks outlined above.

This presentation will also explore the results of the statistical findings from this meta-analysis of learning analytics studies in libraries that examine the effects of library use on students' retention and GPA. Based on these results, we will delve back into the debate about privacy, transparency, learning analytics, and libraries. We will examine the issue through two lenses—a pragmatic lens, and an ethical lens. While we recognize the institutional importance of these types of studies as well as the environmental conditions that create pressure on libraries to participate in learning analytics initiatives, we will also question the beneficence of these studies from a research ethics point of view.

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Assessing a Graduate Commons in the Library: Graduate Students Need an Identified Third Space

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Introduction

The University of Calgary is a four-year doctoral institution. In 2016–2017, there were 5,672 full time graduate students attending University of Calgary.[1] While there are offices or work spaces in their departments for many graduate students, the space can vary greatly in terms of suitability, utility, access, and comfort. In fall 2016, in order to meet some of the need for space by graduate students, Libraries and Cultural Resources opened a newly renovated space, the Alan MacDonald Graduate Commons, a shared space intended to provide space for graduate students who are at the stage of intensive research and writing. Students registered late in the fall and were assigned swipe card access to the room to the end of April 2017. In order to determine the utility and effectiveness of the space and its features, students were surveyed in April 2017. Results showed that the students used the space to improve and enhance their learning, research and productivity output.

Background

The Taylor Family Digital Library (TFDL) at the University of Calgary (UofC) opened in 2011. It has become a hub on campus, attracting thousands of undergraduate students daily. The library features an assortment of student spaces over six floors, from group study rooms to study carrels, group conversation areas, workstations with PCs or Macs, and three floors of quiet study space with individual seating, table seating, and quiet classrooms with PCs available for use when not being used for instruction. While the library does attract some graduate students, there is not a large core of graduate students who come to the library to do their work. In a previous study, the author investigated use of informal learning spaces in the library. It was found that students have a variety of reasons for using the library and a variety of preferences when it comes to space, primarily determined by their learning goals of the day and their learning behaviour.[2] So it was with some curiosity that the author devised a survey of the graduate students who were using the Commons to determine not only likeability and utility of the space and its features, but also to determine the students' learning space preferences and behaviours and how this new space suited their needs.

Recognizing that there was a need for graduate student space, the library converted a reading room to a graduate-student-only space, using university infrastructure money. Consulting with the Faculty of Graduate Studies to identify the needs of graduate students, the library created a secure space with flexible furniture, lockers, and comfortable seating. Information about the new space was distributed directly to graduate students and students were prompted to apply. Eighty-two students were assigned swipe card access to the room. The number was limited because the level of use of the space was unknown. Students were assigned one of the 56 lockers on a first-come, first-serve basis. The room features 24 small, rectangular, wired, moveable tables; adjustable chairs; 28 wired study carrels with individual lighting; and two adjustable-height individual tables with attached lighting. Individual privacy dividers for the tables are available. One wall is southwest facing, with windows providing natural light. If the sun is too hot or bright, the students can adjust the two types of screens: light filtering or blackout to block the sun. There is also overhead lighting. Students have swipe card access to the room whenever the library is open (8:00 a.m.–11:00 p.m., Sunday– Friday; 10:00 a.m.–11:00 p.m., Saturday). Cold food and covered drinks are allowed in the room. No seats/spaces are reserved, all is a first-come, first-serve basis. Total cost for the renovation, including electrical upgrade and paint, was approximately $200,000 CAD.

Figure 1: Alan MacDonald Graduate Commons, University of Calgary, photo by David Brown

Figure 1 above shows the Commons with the windows to the right and lockers to the left. Carrels (in the forefront of the photo) are at the back of the room, and moveable tables with optional dividers in place are towards the front of the room. The door has swipe card access. Chairs are adjustable. This is a photo of the room without students.

In a recent survey of graduate services webpages in academic libraries in the United States, four of the five ARL libraries surveyed offer graduate study group space and all five offered graduate study individual space.[3] While this is a small sample, it is generally recognized that graduate students prefer to have their own space, separate from the undergraduates. Kinsley, et al., in their study of graduate students' needs for spaces for research and study, found, among other things, that graduate students prefer their own space that is flexible, private, quiet, and comfortable, with an opportunity for distraction such as a window with a view.[4] Students especially needed room to spread out and expressed a preference for laptops and large tables and access to electrical outlets. In an earlier study, Rempel, Hussong-Christian, and Mellinger identified graduate students' need for "spaces for them to be separate from undergraduates, comfortable and usable for extended time periods."[5] Recognizing the need to establish a space that suits graduate students, Libraries and Cultural Resources at the University of Calgary established a separate space for quiet, individual work that was flexible and comfortable.

Methodology

Students (N=82) who registered to use the Graduate Commons were asked via email to complete an online survey. The survey asked the students to identify which elements of the space they preferred, the nature of the work that they accomplish in the space, length of stay, frequency of visits, and preferred times and days of the week for their visits. They were also asked to rate the features of the space and indicate their preferred seating and their activities. Additionally, students had space to comment on their goals in using the space and

how the space compared to other graduate spaces on campus. In a study of undergraduate behaviours in library learning spaces at the TFDL, the author noted that there was a preference for certain types of spaces according to the learning goals of the student and the nature of their learning activities and goals.[6] While undergraduate learning and graduate learning have different foci and outcomes, this author was also interested in discovering if there were any similarities between the learning behaviours and space preferences of undergraduate students and graduate students. This was explored somewhat in the survey by asking students to indicate what they were doing in the space, where they sat, and why they chose to sit where they did. Students were sent an initial letter of notification, a follow-up invitation with a link and informed consent, one reminder, and a final notice with thanks. The survey was open for two weeks.

Results

Demographics

Of the 44 completed surveys (53.6 % response rate), 31 respondents were female, 12 were male, and 1 preferred not to say. Twenty-seven (61.4%) of the students were master's students and 17 were doctoral. Twenty students (45.5%) were in the arts, humanities, and social sciences (AHSS) and 24 (55.5%) were in the sciences, including engineering and health sciences. Of the 24 students in the sciences, 8 students were in various engineering departments, 4 students were in biosciences, 4 in chemistry. Of the 20 in AHSS, 3 were in English, 3 in history, and 3 in environmental design. The remainder were distributed throughout other disciplines.

Frequency of Use

Just over half of students (N=23) used the Commons two to four times per week. Ten indicated that they came to the Commons once a week or less, and 11 indicated a high frequency of over five times a week. There was a split between the number of visits in a day: 22 reported visiting twice a day and 18 reported coming just once a day. On average their stays were lengthy. Twenty-five students report staying four or more hours in a visit; 19 would stay one to three hours. Students were asked to indicate their preferred times. The most popular times were noon to four p.m. (N=32), followed by before noon (N=25), 4:00–8:00 p.m. (N=21), and 8:00 p.m.–11:00 p.m. (N=10) in preference. When asked to choose their preferred days of the week, there was almost an even split over each day Monday–Friday (range 37–40), with the weekends (Saturday–Sunday) preferred by only 20. In terms of preference pattern for days of the week, 17 students preferred Monday–Saturday and 13 preferred Monday–Sunday.

Reasons for Using the Commons

Students were asked to choose from a variety of reasons for using the Commons. While some (N=12) indicated that they did not have any space elsewhere on campus, the majority of responses indicated a preference for the library because of access to resources, assistance, and services if needed. The space itself was desirable because of its comfort, newness, quiet, and lack of distraction.

Where Do They Sit?

Students preferred to sit near the windows at a solitary table (N=30), with about half of the table users indicating that they would use an optional table divider for more privacy. Eleven students indicated a preference for the study carrels and seven indicated a preference for the adjustable height tables. Fifteen indicated a preference for sitting away from the door at the far end of the room.

When students were asked why they sit where they sit, it is clear that the choice of near the window is not only for the light, but for the view which provides either a distraction or an opportunity to avoid distraction. They also prefer to work at a solitary table so that they are not distracted, as well as having enough room to work and to focus. This need for enough space and to avoid distraction is an echo of similarly-expressed undergraduate needs during times of intense learning. Some of the comments also reflect directly what the undergraduates also expressed: they select the space to work because it feels right.[7]

Figure 2: Typical Commons Seating Distribution Preference

Figure 2 above shows students distributed in the Commons with 4 students in the room. Two students are each sitting alone at a table quite removed from each other, at the window and facing outwards. The third and fourth students are seated at carrels far from each other and both facing away either at the window or away from the door, facing the wall. They each have a defined space and also demonstrate a preference to work away from each other.

What Do They Do?

The students were asked to choose what they accomplish among a variety of tasks. The graduate students are a diligent group. Their goals are to read, study, write, and complete their assignments. They read predominantly articles (N=32), books, (N=23) and their notes (N=18). They are writing research papers (N=39) and research notes (N=21). They were more forthcoming in their comments about their specific priorities and activities.

What Do They Bring?

All students, with the exception of the one who kept a laptop in their locker, brought a laptop to the Commons. There are no PCs provided in the room. The laptop is the main device, even more so than cell phones (N=34) or other personal devices (N=11). They came prepared to work with print books, digital books, articles, and notes to read and brought something to eat. UofC is a commuter campus, and it is logical that they will all have a large bag or backpack as well as everything that they need for the day. Lockers were very much appreciated as they were directly accessible in the room and well-used to store personal items and checked out library materials.

Facility Rating

Students were asked to rank out of five (the highest) the various features of the Commons. Below in Figure 3 are the cumulative rankings for the main features of the space: chairs, tables, study carrels, lockers, lighting (natural, desk, overhead), power outlets, internet access (Wi-Fi), view, windows, dividers, colors, cleanliness, environment (HVAC). While the majority of features ranged in the 4–5 out of 5 ranking, indicating a high level of satisfaction, there were some areas of lower ranking. The least-favored elements of the room were cleanliness and temperature. The top-favored were the windows and the view. While cleanliness is an issue that can be resolved, temperature control is the real problem in this room. A floor fan has been added to the room to improve the HVAC.

Figure 3: Cumulative Graduate Commons Facilities Rankings
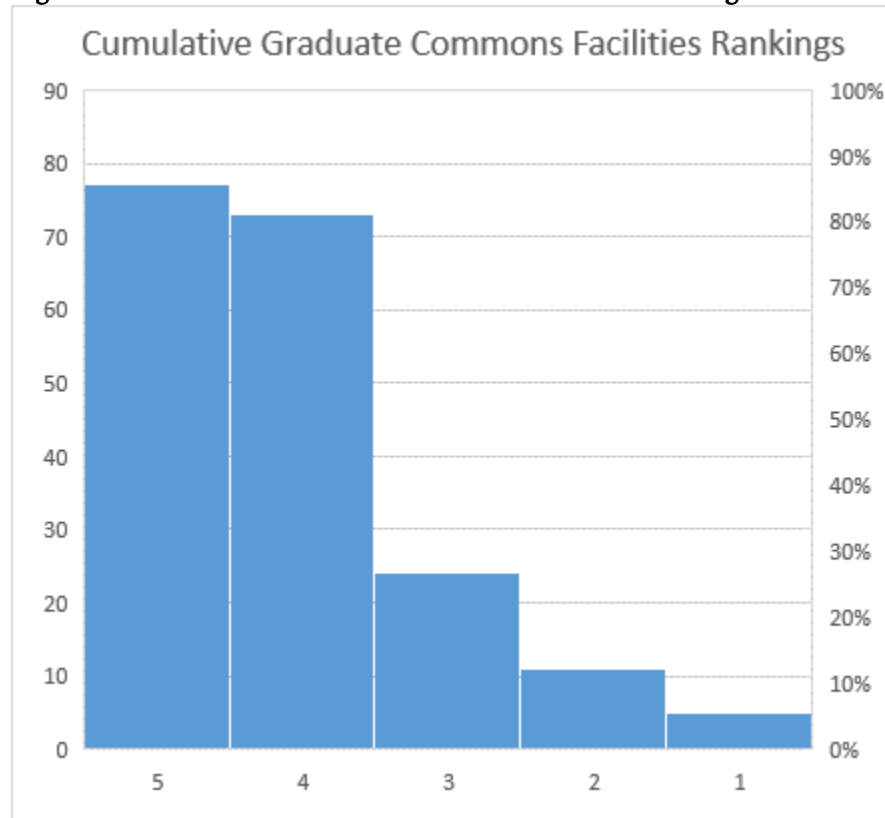
Summary of Comments
General Comments

For the most part, the comments from the students were positive and focused on the space as a place where they can get their work done. Overall, the positive affirmations referred to the space as a quiet space with words such as "amazing," "wonderful," and "love." Specific affirmative comments referred to the aspects of the room that appealed, such as windows, light, and view. Generally, their comments, such as "get my best work done," "get meaningful work done," "productive," and "essential work done," indicated that the space supported their activities. Additionally their affirmations also mentioned emotional affects such as "more relaxed" and "more focused." For those who had a negative comment or a comment focused on improvement, four factors stood out: heat (including air circulation, dry air, and cold); cleanliness; uncomfortable chairs (too small, hard to adjust); and noise disturbance (cell phone conversations as well as personal conversations).

Comments on Space

Students expressed a number of specific comments on the positive value to them of various features. The table below (Figure 4) ranks the comments highest to lowest. Most comments received were on the quiet atmosphere (23), the view (18), and the natural lighting (16). Students appreciated the guaranteed seating (16) and the fact that they could work distraction free, by themselves (13), and in a private space (12). They did appreciate the lockers and the secure nature of the space (10), thus allowing them to leave and come back to the room with their belongings still in place. The fact that the space was reserved for graduate students only (10) also allowed them to feel some ownership for the space and to make it their own (6). In general, then, they like to work in an intensive way in a space that feels supportive of their tasks and allows them to control their environment over a long period of time.

Figure 4: Number of comments on space

Feature	Number of comments
Quiet	23
View	18
Natural light	16
Guaranteed seating	16
Distraction/alone	13
Private	12
Secure/locker	10
Graduate students only	10
Ownership of space/flexible	6

Seating Choice

As with the previously studied undergraduate students, these graduate students tend to choose a space that meets their learning preferences. Given that this space has little variety, students do not have as much choice as elsewhere in the library. However, they did comment on their choice being dictated by such concerns as the need to be alone, either away from the sun or near a window; the need for as much space as possible; or the need to be aware of who is coming into the space. One student commented that the choice of seating was just natural. Students also commented on the need to feel relaxed, or that the space feels right. These comments reflect the comments that undergraduates had in a previous study about seeking a space that makes them feel comfortable (a mental state rather than a physical state) and open to learning.[8]

Activities

The students commented on their scholarly activities and their ability to be productive. They were very forthcoming on the nature of their scholarly work. Specifically, writing a dissertation or thesis was mentioned 16 times, while 31 students noted that they were working on their research while in the Commons. They were involved in writing such things as a thesis chapter, complete dissertations, literature reviews, conference papers and other presentations, master's theses, research proposals, in addition to writing and editing articles and books. They were involved in research and reading: reading notes, preparing for exams, advanced research, organization of research, reading papers, as well as specific research-related activities such as transcribing and data analysis. Students also used the space and time to catch up with other tasks: e.g., email, employer research, application letters, and their teaching assistant or research assistant

duties. They do indulge in some diversionary actions such as listening to music or podcasts or watching videos. It is clear that they are involved in many tasks during and throughout their time in the Commons. The following comment is reflective of the nature of their work: "...nice views helps me focus and be productive. I do most of my reading and research work here." It is clear that the graduate students who use the Commons are very actively involved in all aspects of their work.

Why the Library?

Students commented positively on the multifunctional aspect of being in the space: easy access to all study related amenities such as Wi-Fi, washrooms, library resources, printing, coffee, snacks, and water fountain. Primarily, students commented on their campus office being less than optimum, noisy, distracting, and too busy. One student commented on the fact that it is good to have options. Notably, while they were very clear on the type of work they accomplish, it is the level of productivity that is likely of more significance as illustrated by this comment: "I submitted three papers which was almost impossible in my own office."

Suggestions for Improvement

As noted previously, the top requests for improvement were for improved HVAC (ventilation and temperature control) and for more cleaning or the opportunity to clean the space themselves. There were suggestions on seating: better chairs, footrests under tables, taller chairs, easier to adjust, and more flexible table arrangement to offer an opportunity to not face across from someone else. There was a suggestion to add a rest area with soft seating for unwinding. Students requested more lockers and 24-hour access, as well as access over more than one term at a time. Some students would like to see an enforced quiet space with cell phones and conversation banned.

Observations

In their study of students' use of physical library space, Cha and Kim note that graduate students ranked the top five space attributes as noise, amount of space, crowdedness, comfort of furnishings, and cleanliness.[9] The same attributes are valued by the undergraduate students in the study as well. These results align with what the graduate students in the survey indicated, specifically in the need for improvements. They would like to have a clean, silent room, with more comfortable chairs and soft seating. In their positive comments, they value the space that they have and the ability to be away from distraction which is afforded to them by the view and the isolation of the room. While design focused on these attributes is essential, it is important to note that the purpose of the design in library learning spaces should be for learning.[10] If the design is appealing to the students and appears to enable them to meet their purpose, then they will use it to achieve their goals. It is apparent from the comments in the survey that the students feel that they are achieving their goals and that the space itself helps them do so. Students have benefited from the space by being more focused and therefore productive.

Further Actions by the Library

Since this survey, there have been some changes and enhancements. Registration limit has increased to 150 students. Post-doc students are now accepted in addition to graduate students. This increased registration number has not resulted in any over-crowding in the room. Hourly head counts of the room indicate that at most 10 students are using the room at any one time. There likely is more room for growth in terms of registration. Students now have access to the room over both fall and winter terms. A floor fan has been added to the room, but due to the nature of the HVAC in this LEED Gold building (hot water perimeter radiant heating and floor-installed fresh air diffusers), the ability to cool the room is limited. Antiseptic wipes are now in the room for the students to use.

Part of the purpose in providing space for graduate students is to attract more graduate students to the library and its services. In terms of services, programming is being offered in the room, and the latest feature is drop-in writing assistance offered twice a week by the Writing Support Centre. Signs are posted in the room notifying students of scheduled room events so that they can plan their work in the Commons accordingly.

Conclusion

By going beyond the simple feedback survey focused on likeability, this survey yields results which illuminate desirable features of a graduate space that support and enhance student learning. Most students in the survey preferred the unique features of the Commons versus the spaces available to them across campus. They could get their work done faster and with fewer disruptions in the library space. Additionally, results further understanding of the behaviours and activities of the graduate students and the value of identifiable spaces for graduate students. By applying a better understanding of student learning behaviours in the library and the value unique library space holds for students to space planning and design, libraries can be a vital learning space for all. This is a message that should be taken across campus.

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Seating Our Patrons: A Multi-Year Approach to Creating and Assessing User Space

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Introduction:

Like many academic libraries, Kimbel Library at Coastal Carolina University has a space problem. Use of the library building increases as the student population grows, while the physical facility has barely kept pace. Between 2009 and 2018, the student population grew 27%, from 8,100 to 10,300. In the same time period, the square footage of the library increased 38%, but the actual square footage only increased from 43,000 to 61,200 square feet. In an effort to increase seating and workspaces for students, over the past nine years library staff has been conducting the Kimbel Library Space Study, which uses assessment data to effect change in floor plans and seating options. This paper outlines the process through which a longitudinal study was developed that utilizes multiple assessment measures for continual improvement of library space. Over the course of the past decade, we have utilized external studies, LibQUAL+ surveys, and internal assessments to conduct ongoing assessment and a redesign of the existing and new library space in response to increasing use of the facility by students. The ongoing impact has been to maximize space use in the library given building size restrictions and a growing student population.

LibQUAL Survey One:

The genesis of the longitudinal study was the administration of the LibQUAL climate survey in the fall of 2009. This was the first time LibQUAL has been used to measure service satisfaction at Kimbel Library. Previous surveys had been developed and administered in-house, and, while inexpensive, had not yielded the type of information needed for planning. The 2009 survey was intended to be a benchmark study, anticipating the addition of a new library addition that was currently under design. While not originally envisioned as a space use study, the combination of quantitative data and qualitative comments relating to space issues and satisfaction were put to use in both building planning and enacting immediate change on the existing facility. In order to make use of the data in the comments; we coded all comments in an Excel spreadsheet by status of responder (faculty, undergraduate, graduate), discipline, tone of comment (positive, negative, neutral), and specific survey dimension question referenced. Comments were than sorted in a variety of ways to easily see which comments related to specific questions within each dimension, which ones were negative or positive, and which type of patron made the comment. This enabled us to differentiate between needs of undergraduates, graduate students, and faculty. Pairing qualitative comments with service quality dimensions enabled us to identify specific issues that might have contributed to the overall quantitative results and provide directions for improvements.

The LibQUAL comments provided reassurance and praise for what the library was doing well; they also revealed specific areas of concern, substantiating what staff believed to be true. There were many positive comments on the availability of CDs, DVDs, computers, and printers. In the middle of the survey administration, the library's hours expanded to 24/5, and initial reactions indicated that students loved the new schedule, liked the new relaxed food and drink policy, the decrease in restrictions on cell phone use, and, overall, found the library to be a great place to study. Many respondents, though, found it difficult to study in the existing library building because of high noise levels, overcrowding, limited number of study rooms, and cold temperatures. They found the facility to be dim and dingy and original furnishings from 1977 to be outdated.

The resulting data was shared with all departments who were encouraged to develop proactive responses, particularly to specific recurring issues identified through the comments. Over the next three years, seating options were increased on the first floor by removing stacks to create an open floor plan. The bound journals were relocated to the second floor, while reference and media materials were interfiled into the main stack

collection on the second floor. Government documents were weeded and the remaining materials were moved into the main stacks. Reducing the number of collection locations improved the search functionality of the library's webpage, increased students' ability to find resources in the building, and most importantly, freed up valuable floor space. The library shifted the focus of purchase considerations to include many more e-books as space in the second floor main stacks was limited. Removing shelving units from the first floor opened up space surrounding existing columns, which already had electrical outlets, allowing more individual computer workstations to be purchased and installed around the columns. Tables were removed from the designated silent study spaces on the second floor area and relocated to the open spaces on the first floor to accommodate more collaborative study. Like many other library buildings built in the same era, the 1977 structure continually struggles to keep pace with ever-increasing electrical needs. Dozens of six-foot flat power cords were purchased to provide electrical access to the tables. It seemed that the first floor noise levels increased with the addition of more large tables and the reduction in sound-absorbing print materials, so a basic noise suppression system was installed to provide white noise throughout the entire first and second floors of the library. New lighting was installed to improve visibility and reduce electrical costs.

LibQUAL comments were also shared with the architect and incorporated into the design process for the new Learning Commons space, along with focus groups based on issues raised by the survey. The need was very clear for space that would reduce overcrowding and noise levels in the existing facility. The new space should have an inviting, updated décor including a variety of flexible seating options and natural lighting. Comments supported the need for more computers, electrical outlets, dry erase boards, and study rooms. There was also strong interest in self-checkout machines. The new addition was to be connected to the existing 1977 structure, with a focus on providing computer workspaces and study rooms for collaborative work. The new facility opened in 2012 with 84 new desktops plus 24 instructional laptops, 9 study rooms each equipped with an EnoBoard as well as large screen monitors. Furnishings provided a variety of seating styles to accommodate the needs of individuals and collaborative groups. Twenty rolling white boards were available for students for use with studying or to create personal workspaces. Booths, padded benches, and soft seating near expansive windows provided relaxed, comfortable areas for studying, while large, technologically enhanced tables were more conducive to collaborative group work. Wall and floor outlets were abundant throughout the new Bryan Information Commons, exceeding current needs in hope of meeting future needs. An enhanced white noise system was installed in the new facility, which provided volume control specific to various sections to mask the sounds of collaborative study. Though the new addition did not contain any physical library materials, construction project funding was allocated to upgrade the library's EAS security system to an RFID system that would provide desensitizing capabilities. As part of the upgrade, the locking security gates at the exits were replaced by less obstructive gates that did not impede passage of patrons and were more visually appealing and less intrusive. To accommodate the new security system, the library's entire print and non-print collections were retagged and three self-checkout stations and a self-check-in book drop were installed in the original library building.

LIBQUAL Survey Two:

Due to the extensive changes made to library services, policies, and building space following the LibQUAL survey, the library received an internal assessment grant to fund a follow-up study in fall semester 2012 to assess the impact of the changes. The success of the 2009 survey in creating change was the impetus for conducting the second survey. The administration of the LibQUAL Lite survey was timed to coincide with the opening of the 16,800 square foot Bryan Information Commons. This was intentional, as the 1977 side of the building still had the same furniture and carpeting as it did when it opened, despite a minimal renovation that removed walls and created the first study and instruction rooms back in 2003. Unlike the existing Kimbel Library building, the new Bryan Information Commons contained only computer workstations, collaborative study Mediascapes, and study rooms; no stacks were allowed. The LibQUAL Lite survey would assess changes made to the 1977 building since the 2009 survey, provide information on changes still needed, and provide data on student satisfaction with the new building, in particular, the increased access to computers, seating, and study room space.

Replicating the comment analysis conducted with the 2009 LibQUAL study enabled us to compare results between the studies, despite using two different versions of LibQUAL. Again, we coded all comments in an Excel spreadsheet. We utilized the same dimension as the 2009 study, adding only whether the comment related to the Kimbel Library or Bryan Information Commons space.

While the new Bryan Information Commons was a hit with patrons, data mining the comments highlighted the specific areas of dissatisfaction, the majority of which centered on the aging furnishings and carpet on the Kimbel Library side. The flood of comments regarding the "dingy" appearance of the 1977 building in contrast to the new addition prompted the university administration to release funds to replace the carpeting for the first time since the building was opened and to approve a gradual repainting of all the walls in the Kimbel Library building the following year.

With the opening of the Bryan Information Commons, library hours went to 24/7. An administrative decision was made to close the Kimbel Library side—the one with group tables—at midnight and require all students to move to the new Bryan Information Commons. This was highly unpopular as headcounts at midnight exceeded seat space in BIC and groups already established at tables did not want to move to a space that lacked similar space. In addition, at certain hours on weekends, the Kimbel side was open and the Bryan Information Commons side was not. Student comments in LibQUAL were highly negative regarding this arrangement, which reinforced arguments that library staff had been making to treat the two buildings as one. Shortly after the comments were released to library staff, a new administrative decision was made to open the entire building as one, ensuring that all library space was available for student use 24 hours per day, 7 days per week.

Kimbel Library Space Use Study:

By 2014, building use was increasing, but we had new questions. How were the students actually using the spaces in the two buildings? Did the location of the limited outlets meet student needs? We had safety and accessibility concerns over the number and migration patterns of the electrical power strips previously purchased for the Kimbel Library building. Did we need fewer tables for group work or an increased number? Did the location of the tables matter? Visually, it was apparent that groups were using tables, but were the tables in the best location to facilitate group work and minimize noise distractions to other patrons? We had increased the number of large and small group study rooms. How were the study rooms actually being utilized? We had no way of counting room use as the provost at the time did not support using a reservation system and required that all study rooms were first come, first serve. The library was affectionately called "Club Kimbel" by the students, but was that all they were doing, socializing? Was the library a social gathering spot rather than a space for study and research in support of student achievement?

Lacking funding to conduct a third LibQUAL study and wanting to focus specifically on space use in the two buildings, a group of librarians and staff developed a space study using an ethnographic approach to address these internal concerns. An internal working group, the Library as Space Committee, had been established in 2013. This group was grappling with the lack of data while library administrators and staff had varying opinions on how and why space was being used by students and what changes would maximize space use. The space study was designed to provide data to support decision-making, based on the successful use of the LibQUAL survey data in prior years. A key consideration was that, in contrast to the LibQUAL surveys, this would be an observational study that would use library staff time but would not require any time commitment from students.

The committee read existing literature and held several meetings to define exactly what information was needed and how we might acquire it.[1] Basing the study on anthropological methods, we decided to do an observational study that would track where students were working and what behaviors they were engaged in. The building was divided into five zones and every seat and workspace was identified using a floor plan, tagged, and mapped to an Excel spreadsheet.[2] A list of patron behaviors was developed, with assigned codes to track activity taking place in each seat and workspace. Teams of librarians and staff surveyed the areas on a rotating schedule of days to ensure that the entire building was mapped at different times of day, including

the overnight hours. The findings supported staff suppositions regarding building use and also provided some surprises. Use of the building was slightly higher in the "old" Kimbel Library, 54 percent compared to 47 percent in the "new" Bryan Information Commons. Students studying alone accounted for 60 percent of use, students in groups 40 percent. The seats with highest use in all five zones were, not surprisingly, those with the easiest access to electrical power outlets. With regard to what students were doing in the library, only 16 percent were actively socializing; the remainder were engaged in a variety of behaviors related to study or research.

The study confirmed that the establishment of a customer service point on the fringe of the quiet study area was a poor fit. The volume of traffic and resulting noise was detrimental to effective student use of the quiet zone. The service point was removed and consolidated into existing service points in areas that tolerated noise. Students had defined the four floors of the library by their behavior and the expectation that the library staff would reinforce the desired noise levels. The first floors, with tables, computer workstations, and service points, are for group study and a very high level of noise is tolerated by students. The second floor of the original building is designated as silent study. Students expect the second floor of the Bryan Information Commons to have lower noise levels than the first two floors but do not expect silent study in that space.

To provide better access to electrical services, the large tables were redistributed on the first floor of Kimbel Library, the group study area, to be closer to power outlets. Tables without power were labeled as such and strategically located. Soft seating was redistributed based on the traffic flow pattern. Use of the newly arranged seating options increased use of all seats on this floor. In an ongoing effort, the university administration was lobbied for new chairs, in part to reduce the student-to-seat ratio. In 2009, with a population of 8,100 students, the library student seat ratio was 18:1; in 2018, with a student population just over 10,000, the seat ratio is now 11:1.

2018 Library Services Study:

In the fall of 2018, the "Kimbel Wants to Know" point-of-use study was launched. The focus of this study is to identify resources and services that the library can provide or improve upon. In designing this study, the authors wanted to gather responses to a wide range of questions related to the use of the building and services. A less time-intensive process was needed than using an external or observational study. While the space study yielded much useful data, the expense in staff and librarian labor was high. We decided to use comment sheets located by the service or space under review. The intention is to gather information based on real-time student use at the specific location. Weekly questions are posted and students respond by writing in or checking off options on large comment sheets. The advantage of this method is that, in the first week, we received 418 responses and 74 comments to our first question. It took us four weeks to get 668 viable LibQUAL Lite surveys in 2012. As we move forward, we will be looking to see if response rates continue at a high level or if the novelty of responding wears off over the course of the semester.

While this is a study in progress, questions will be asked about space use and we will be coding all comments to provide a comprehensive picture of unrealized needs and areas that can be improved on. Kimbel Library space is constantly in flux. We still do not "control" all the physical space in the library; several large rooms have been used as overflow adjunct faculty offices and study rooms are "borrowed" for a semester to house campus administrators while renovations are conducted on other buildings. We anticipate using the data from the new study to develop plans for accommodating new services and spaces (archives, Makerspace) and for accommodating the increasing number of students who want to use Kimbel Library and Bryan Information Commons as a hub of academic activity.

Summary:

We used quantitative measures (LibQUAL, seat use surveys, seat counts, building use counts) and qualitative measures (LibQUAL comments, survey comments) to create composite pictures of how students were actually using available space and what needs were being met or unmet. Each study was unique but built on the findings of the previous study. While the data acquired from LibQUAL was very valuable, the time and

money commitment was high. The in-house assessments are low cost, but still require time to administer and analyze the data. We have concerns that students are increasingly less-inclined to respond to time-intensive online studies and more apt to respond to shorter on-point questions.

A culture of assessment leading to change was built from the beginning. The sheer number of positive changes enacted as a result from the initial LibQUAL study meant that, with each study, library staff were eagerly awaiting the summary data in order to enact further changes that improved space and services.

We found that students had a variety of needs and were actively creating the spaces they wanted to be in. Our task is to ensure that the physical space is conducive to the expected use. Having a willingness to move furniture and furnishings was essential, as student needs are continually evolving. By prototyping spaces and studying the results, we effected change that promoted increased usage of space and furnishings. In addition to rearranging workspaces, removing tables from quiet areas and increasing them in noise zones, and rearranging furniture to maximize access to electrical outlets, we modified policies, such as dispensing with all food and drink policies. This contributed to an atmosphere that meets the needs and desires of our student population. When designing the library addition, furniture selection was based on versatility and the ability to promote formal and informal collaborative spaces. Throughout the nine-year cycle, we assessed existing space, created and implemented changes based on the data, and assessed the changes, developing new approaches to space use with each assessment cycle. The ultimate goal is to make the best use of available square footage while balancing needs of individual access with collaborative group work areas. Physical space restrictions do not have to restrict the ability to innovate and serve students. The final result is a library that accommodates students and makes the most effective use of the limited space available.

1. See Andrew Asher and Susan Miller, ***So You Want to do Anthropology in Your Library? : A Practical Guide to Ethnographic Research in Academic Libraries*** (Chicago: ERIAL Project, 2011); Margaret Brown-Sica, "Library Spaces for Urban, Diverse Commuter Students: A Participatory Action Research Project," ***College & Research Libraries*** 73, no. 3 (May 2012): 217–231; Michele Crump, "Assess to Cultivate Your Own Library," in ***Meeting the Needs of Student Users in Academic Libraries: Reaching Across the Great Divide***, eds. Michele Crump and LeiLani Freund (Oxford: Chandos Publishing, 2012), 69–88; Nancy Fried-Foster and Susan Gibbons, ***Studying Students: The Undergraduate Research Project at the University of Rochester*** (Chicago: ACRL, 2007).
2. Margaret Fain and Jennifer Hughes, "Gathering User Behaviors: Improving Library Space while Enhancing the Library's Profile," in ***Academic Libraries and the Academy: Strategies and Approaches to Demonstrate Your Value, Impact and Return on Investment,*** vol. 2***,*** eds. Marwin Britto and Kirsten Kinsley (Chicago: ACRL, 2018).

Headcounts on Steroids: A Lightweight Method for Evaluating Space and Furniture Use

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Abstract

The study identified patterns of space and furniture use to inform planning and vision for the busiest library on the University of Minnesota Twin Cities campus. Library staff manually gathered headcount and user behavior data in Walter Library during the fall 2017 and spring 2018 semesters. Data was gathered three times a day, three days per week, during three weeks throughout the semester. The data included counts of people by furniture type and was augmented with time and location data. These data were combined with total seat counts by furniture type, room, and floor and compared across time and space. The instrument was updated and refined to improve data collection. Library users' furniture preferences changed drastically from room to room. We found that spaces with furniture and atmosphere designed for collaborative work were very popular, as were spaces designed for quiet, individual study. Furniture supportive of individual study were underutilized in rooms and areas more conducive to group or parallel study and vice versa. We want flexible spaces and a nimble decision-making process but have limitations due to the constraints of our historic building. The study has encouraged creative, user-centered thinking. The methodology is lightweight enough to repeat the study each semester and at the same time produces actionable information that have informed major decisions and a vision for our library space as a whole. The datasets we generated answered big picture questions about library use and informed individual decisions about the placement and use of pieces of furniture. Most importantly, the study has challenged many of our assumptions about how people use the library's spaces.

Introduction

The University of Minnesota Libraries are, like many libraries, moving from a collection-centered approach to library spaces to re-envisioning the library as an informal learning space. To that end, the largest libraries on campus have recently seen a massive reduction of the size of the reference collections housed on site to make space for additional student work areas and collaboration space. Just as libraries do collection analysis to ensure they are providing the resources their users need, it is important to understand user needs and behaviors in informal learning spaces as a means of ensuring those spaces provide the environment required to help our patrons accomplish the work they came to do.

Developing an understanding of user interactions with library spaces has prompted a number of user-focused studies in the library literature. The simplest method used to obtain baseline information on human-environment interactions is a passive observational study.[1] Observational studies use a wide range of methods. They may include counts by room and furniture type or divide spaces into artificially defined zones.[2] Observational studies can employ the use of paper maps, mobile apps, or even GIS mapping software.[3]

Observational studies often use a mixed-methods approach to create a more complete picture of user activity and perceptions, incorporating surveys, photo diaries, mapping exercises, or whiteboard comments.[4] A mixed-methods approach can also provide qualitative information about what users want out of a space.[5] Libraries have used a variety of methods to design learning spaces and gather feedback from potential users, including observations, interviews, usability tests, environmental scans, ideal space design exercises, and focus groups.[6]

Environmental psychology is the field of study devoted to the exchanges and interactions between people and their surroundings. Many of the methods used in environmental psychology can be employed to gain an understanding of library space use. Additionally, findings in environmental psychology provide the

foundation for understanding the behaviors recorded in studies of library space. For instance, many observational studies of user behavior in library spaces show an occupancy rate of around 50%. This phenomenon has been documented by environmental psychology researchers and appears to be quite robust.[7]

Libraries sit at the intersection of learning theory, architecture, and placemaking. In addition to an awareness of environmental psychology, an understanding of the library as a cultural construct which brings a specific picture to mind is also useful when interpreting library space use data. Communal use of a space is the act of quietly being in a space with others while social use is the collaborative group work that produces some amount of noise and activity. While libraries are increasingly seeking ways to support social use, traditional study spaces are still highly desired.[8] It has been recognized that libraries often find themselves struggling to fill a social need at the expense of their traditionally communal nature.[9]

Walter Library is a library on the University of Minnesota Twin Cities campus that has undergone a significant transition from collection storehouse to student learning space and contains many spaces that support collaboration, communal use, and semiprivate work. Opened to the public in 1924, Walter Library is the oldest library on campus. The lobby and second floor have marble walls, beautiful ornate ceilings, marble columns, and frescoes above the doorways. The library houses the physical science and engineering collections, but much of the collections were moved to storage during a renovation completed in 2002. It has huge areas devoted to individual and group study space and is centrally located on campus, which contributes to the large numbers of students who use the library.

The ornate grandeur and historical status of these areas mean there are restrictions on what staff can and cannot do to modify the space. The major study areas on the second floor are huge rooms with vaulted ceilings. Two of these rooms contain heavy wooden tables that are hardwired into the floor and require a crane to move. Careful thought is required before asking to change things in Walter.

However, the space does require updates and thoughtful redesign. Over time, furniture was moved wherever there was space, not necessarily where students would find it valuable. Some spaces had been neglected because of the restrictions on moving the heaviest furniture or simply not knowing how to take the first step. There was not any data that helped to address these problems, guide decisions, or aid in determining priorities. Walter is large enough that it can provide both social and communal spaces desired by users, but striking a good balance had to be achieved by careful observation of the activity occurring in the spaces.

A data collection project was designed to gain a better understanding of how people are using the spaces and furniture in Walter Library so informed decisions could be made about the spaces and a more strategic and iterative approach to designing library spaces based on user needs could be taken.

Method

An observational method was used to establish an understanding of how the library spaces are used as a whole. We conducted headcounts organized by seating type, time, and area of the library to acquire more granular information than gate counts or room or nondescriptive headcounts could provide.

Counts were conducted during the fall 2017 and spring 2018 semesters along with a limited set of observations. Counts and observations were recorded 27 times throughout a semester: at 10:00 a.m., 3:00 p.m., and 8:00 p.m. on Tuesdays, Wednesdays, and Thursdays during the 5th, 9th, and 14th weeks of the semester. The building was divided into seven areas corresponding to a large room on the second floor or one of the lower levels. Each type of furniture in the building was identified and defined. Each group study room was identified. Special types of furniture and equipment were also defined to take more detailed observational data. These included:

1. Number of people sitting at computer stations and not using the library's computer (technology/equipment, behavior)

2. Location of groups (behavior)

3. Orientation of people using standing tables (behavior)

4. Location of upright monitors (technology/equipment)

5. Number of upright monitors in use (technology/equipment)

Data was entered into a spreadsheet using a Google Form. Staff also had the option of using a paper form, which was entered into the Google Form at a later time. The data collector recorded the time of day and the area they were counting. They counted the number of people sitting at each type of furniture in the area and recorded the numbers under the correct furniture type. If there was no one using a type of furniture in the space or if the type of furniture was not present in the space at all, they recorded a 0. The form prompted them for additional observations. Finally, the form for the area was submitted and a new form was started for the next area. The steps were repeated seven times until each public area was counted. Data collection for the whole building took 30 minutes or less.

The data were cleaned, filtered, and analyzed. Each row represented one count completed in one area of the building and included descriptive information about the time of day, day of the week, data collector, and a timestamp. Staff added descriptive mm/dd/yyyy information to make the data sort chronologically. All the headcount and observational data were recorded in columns listed as furniture types, group study rooms, and observational categories. A working copy of the data was created and a separate dataset containing the total number of seats in each space was used to correct for collector error. The researchers made educated inferences in cases where the data did not add up. For instance, if a data collector counted 3 users at "tables with 5–6 seats" in an area where there were no "tables with 5–6 seats" but there were "tables with 4 or fewer seats," it was assumed that a mistake or misinterpretation occurred and we adjusted the count to the correct category. However, if we noted that 9 users were counted in a study room that only seats 5, we left those data alone because they are more likely to represent accurate user behavior than a counting error. Once the data were clean, the headcount data and the dataset with the total number of seats by furniture type (a subset of which is in Table 1) were combined to calculate the number of unoccupied seats for each count. Frequency analysis was used to look at absolute numbers of users in each area and to calculate occupancy rates to compare usage across rooms and furniture types.

Tables 1 and 2: Total available seats

Library area	Seats
Great Hall (2nd floor)	62
Reference Room (2nd floor)	177
Quiet Study (2nd floor)	152
SMART Learning Commons (2nd floor)	78
Basement Level	52
Sub-Basement Level	41
Foundation Level	42
Total	**604**

Furniture type	Seats
Soft chairs	126
Long tables (7+ seats)	231
Medium tables (5–6 seats)	66
Small tables (4 seats or less)	86
Study carrels	34
Computer seats	38
Standing-height tables	18
"Brody" lounge chairs	5
Total	**604**

The instrument was updated and refined to improve data collection. The first iteration of the instrument used during the fall 2017 semester divided the library into nine smaller areas rather than seven. The instrument was changed in the spring 2018 semester since no useful data came from dividing the larger rooms and contributed to more complicated data cleaning. The first iteration also did not include a room containing the SMART Learning Commons, which is a shared space that hosts tutoring and media production. SMART was included in spring 2018 counts. Finally, the second iteration of the instrument in spring 2018 used improved definitions of the furniture types to add precision and reduce ambiguity. For example, the category "small tables" was changed to "tables with 4 or fewer seats."

Findings

The resulting data were well-organized and multifaceted. Despite being a relatively simple and quick collection method, the data were rich enough to identify both building-wide trends and room-level furniture use patterns.

The library has four floors with user spaces, but most seats in the library are located on the second floor (77%). There are eight major types of seating in Walter Library but the most common types of seating are at long, sturdy wooden tables found in the reference room and quiet study room (38%) and soft chairs throughout the building (21%).

The afternoon (3:00 p.m.) count is consistently the time of day when most seats in the library are occupied (Figures 1a and 1b). More seats are occupied at 3:00 p.m. on average than any other time. This is true for the building as a whole and for each section of the building, except for the basement in fall 2017.

Figure 1a: Average occupancy rates (fall 2017)
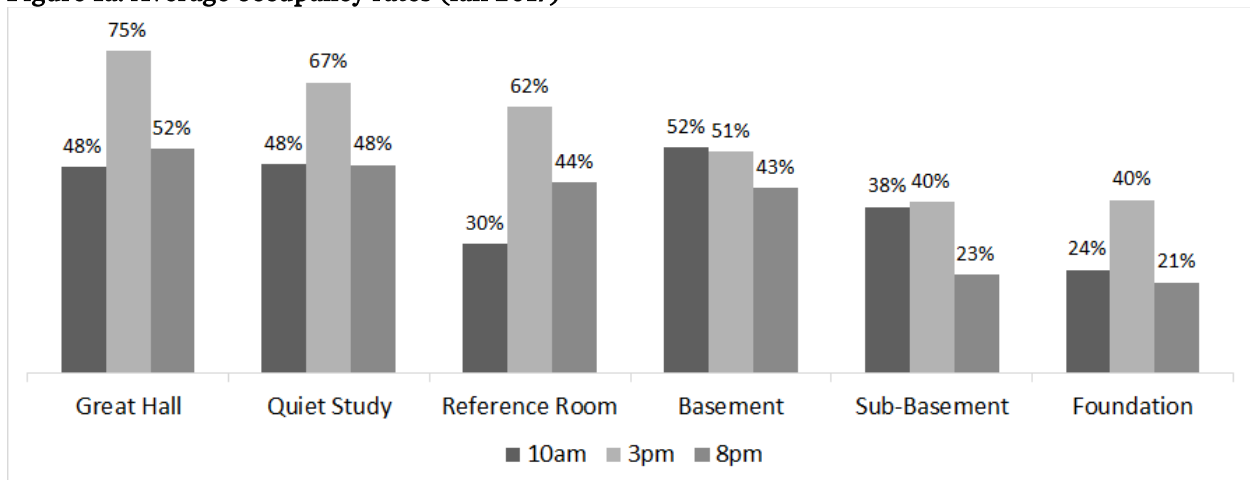
Figure 1b: Average occupancy rates (spring 2018)
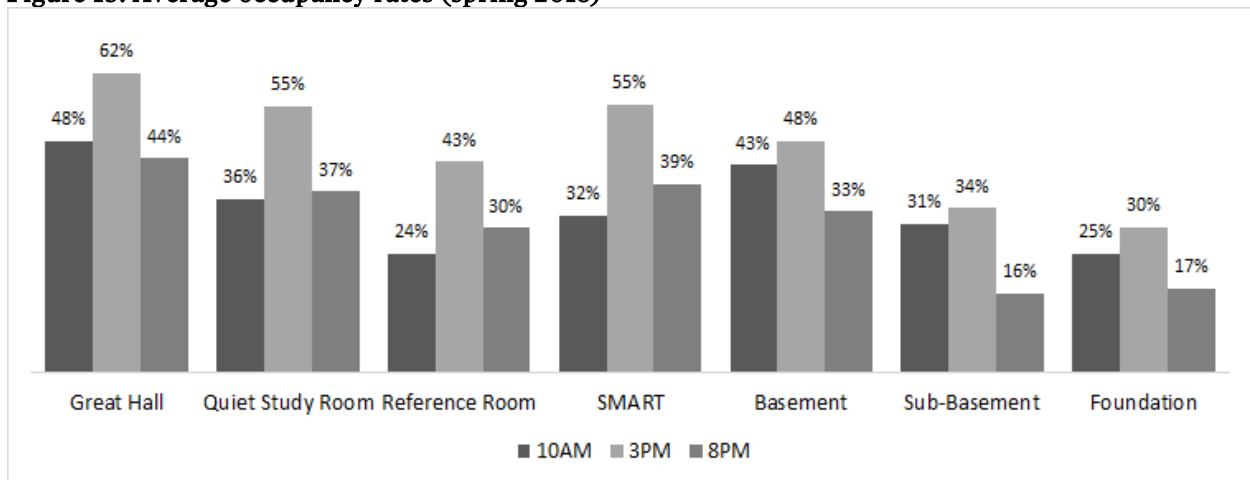
No area of the library was ever completely full at the time of the counts (Figures 2a and 2b). The highest percentage of occupied seats in any of our spaces was 84% in the Great Hall during one count in the fall 2017 semester. Even then, there were a few seats available.

Figure 2a: Max, min, and average occupancy rates (fall 2017)
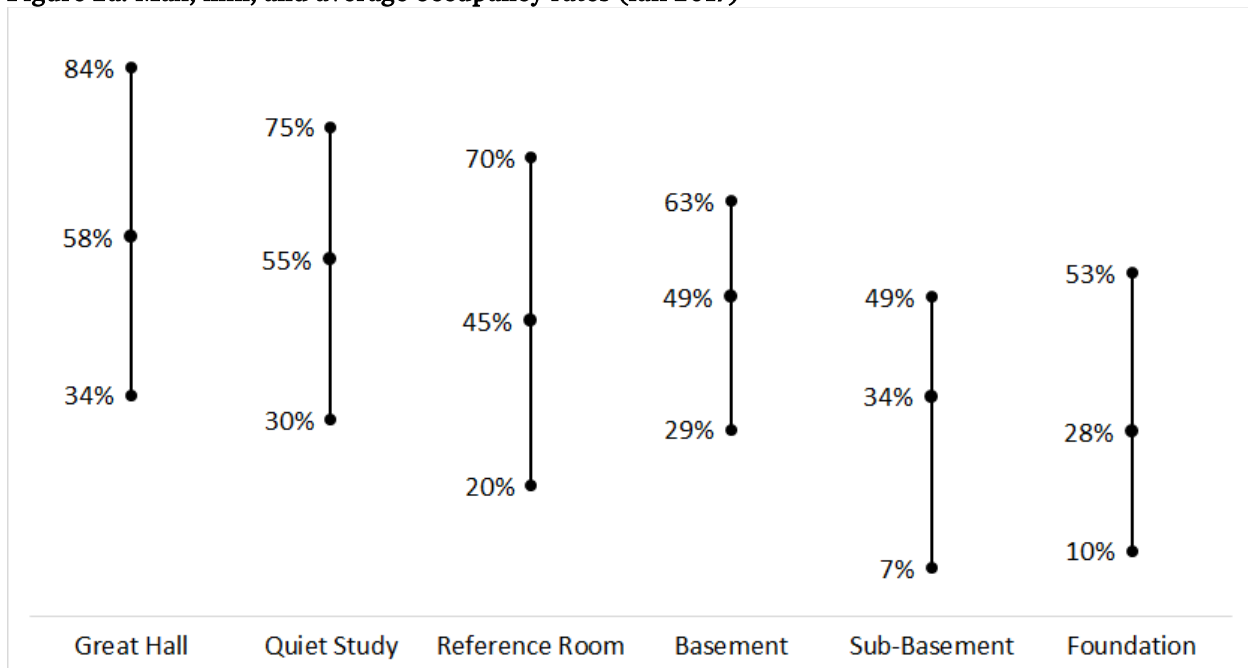
Figure 2b: Max, min, and average occupancy rates (spring 2018)
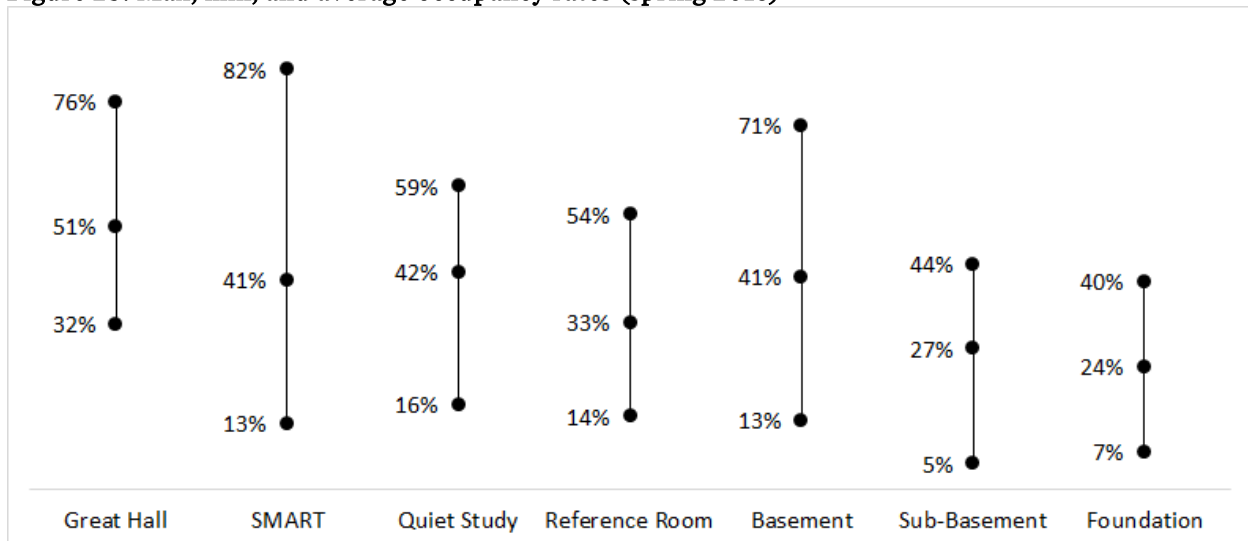
Extreme patterns of use were noted: furniture types in certain areas that were extremely heavily used or extremely underused. For example, the foundation level has several tables that seat 5–6 people each (Figure 3). These pieces of furniture were underutilized and were mostly empty for most of the counts.

Figure 3: Foundation-level tables (fall 2017 and spring 2018)

Legend: 5-6 SEAT TABLES occupied chairs | 5-6 SEAT TABLES empty chairs
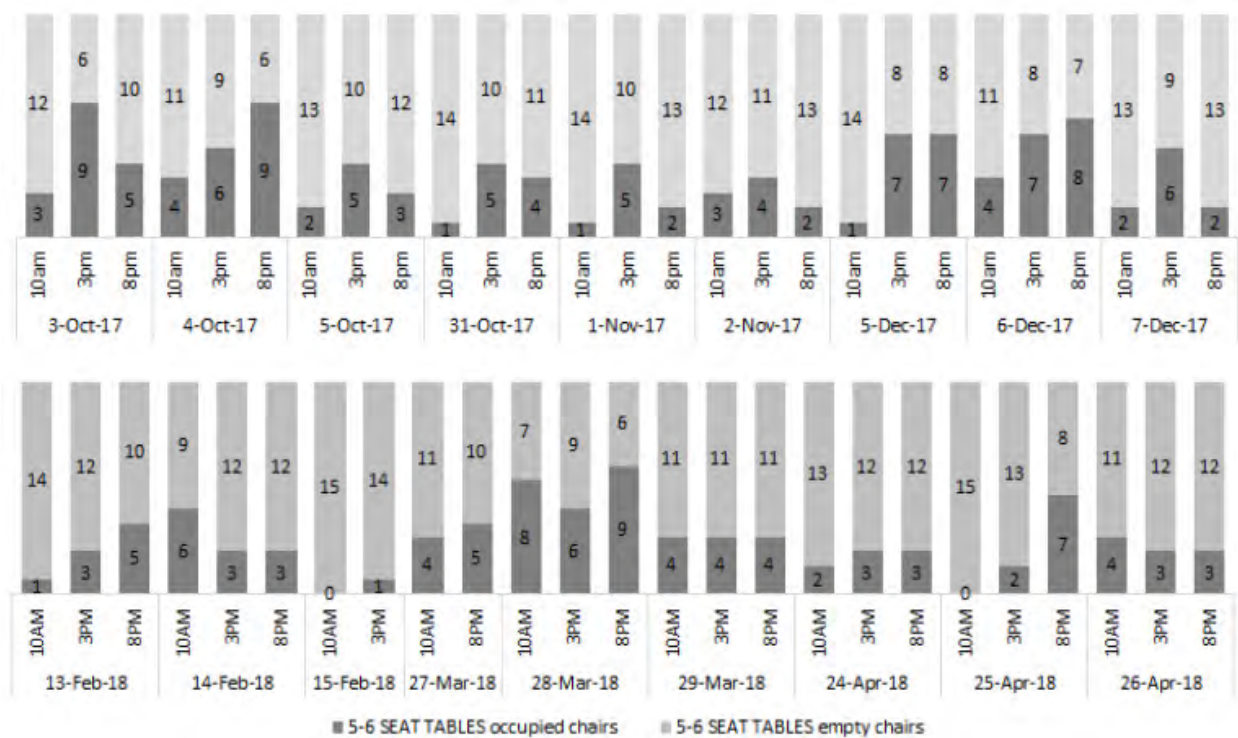
Another extreme use was a small group of soft chairs located in the quiet study room (Figure 4). The only time they were really heavily occupied was during the busiest afternoon counts when the other furniture in the room was crowded. However, in 85% of the counts in the fall semester, at least four or more chairs were empty.

Figure 4: Quiet study room soft chairs (fall 2017 and spring 2018)
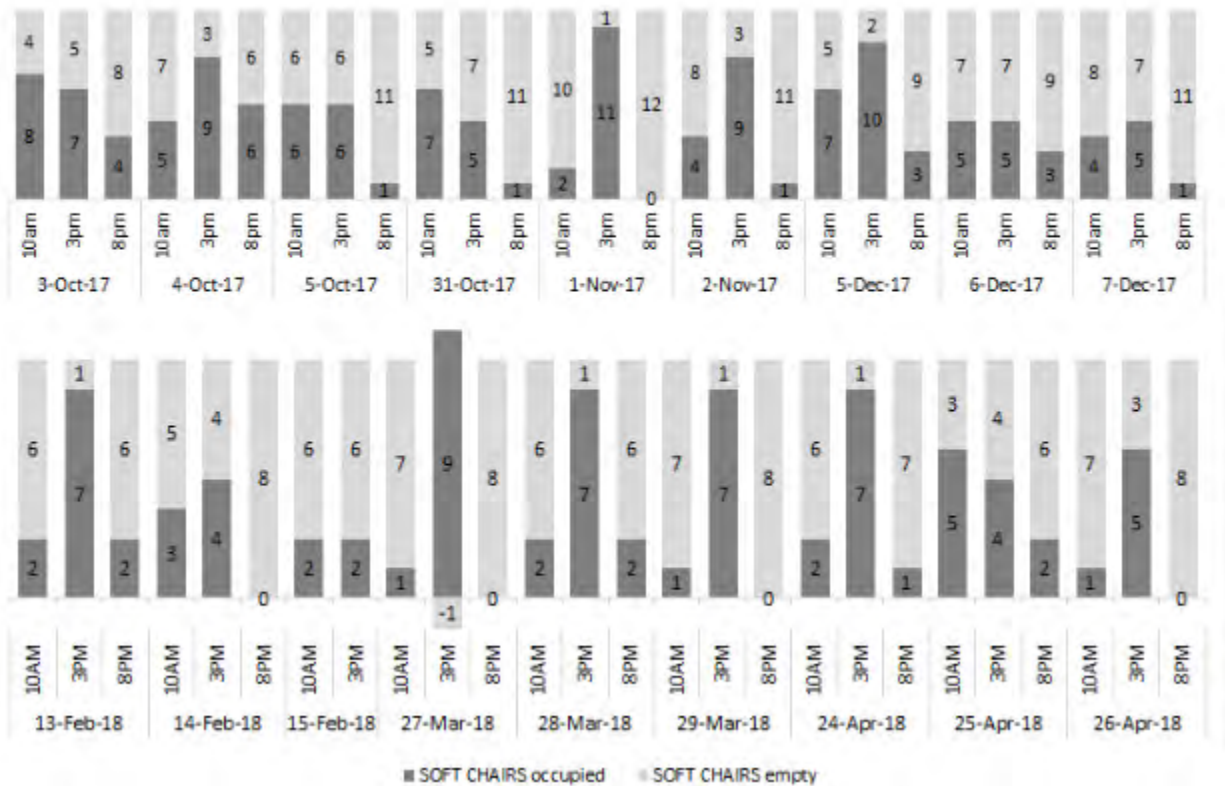
On the other end of the spectrum a cluster of individual study carrels in the quiet study room were heavily used regardless of time of day or time of the semester (Figure 5). Study carrels in other areas of the library were not as heavily used.

Figure 5: Quiet study room carrels (fall 2017 and spring 2018)
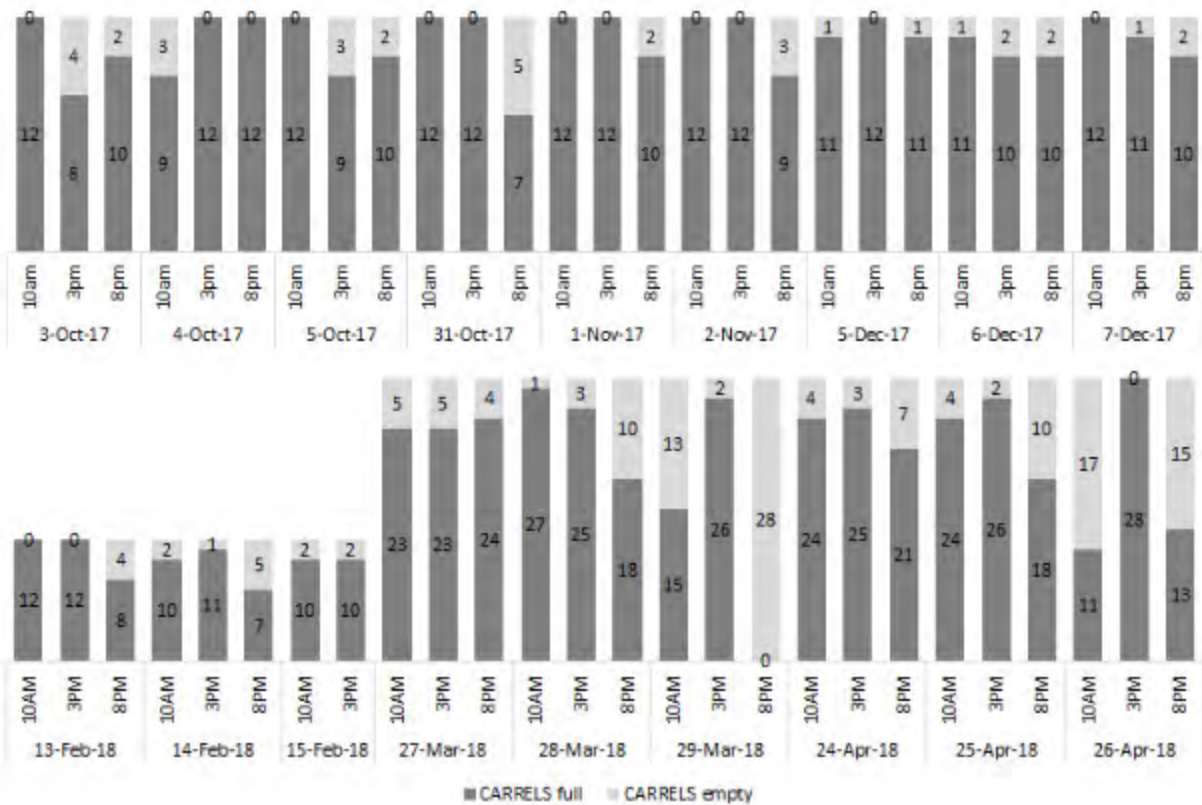
Groups of students were observed working throughout the building but they were often concentrated in the Great Hall. The Great Hall has 62 seats: 54 soft chairs and 8 seats at two small tables. Three or more groups were observed in 52% of the counts in the fall semester and 46% of the counts in the spring (Figure 6). Additional qualitative observational data showed that students pulled together clusters of soft chairs, grabbed mobile white boards, and made small collaborative spaces for themselves within the larger space of the Great Hall.

Figure 6: How often groups were counted in the Great Hall

Fall 2017

- 19%
- 52%
- 30%

■ 0 groups ■ 1-2 groups ■ 3+ groups

Spring 2018

- 15%
- 46%
- 39%

■ 0 groups ■ 1-2 groups ■ 3+ groups
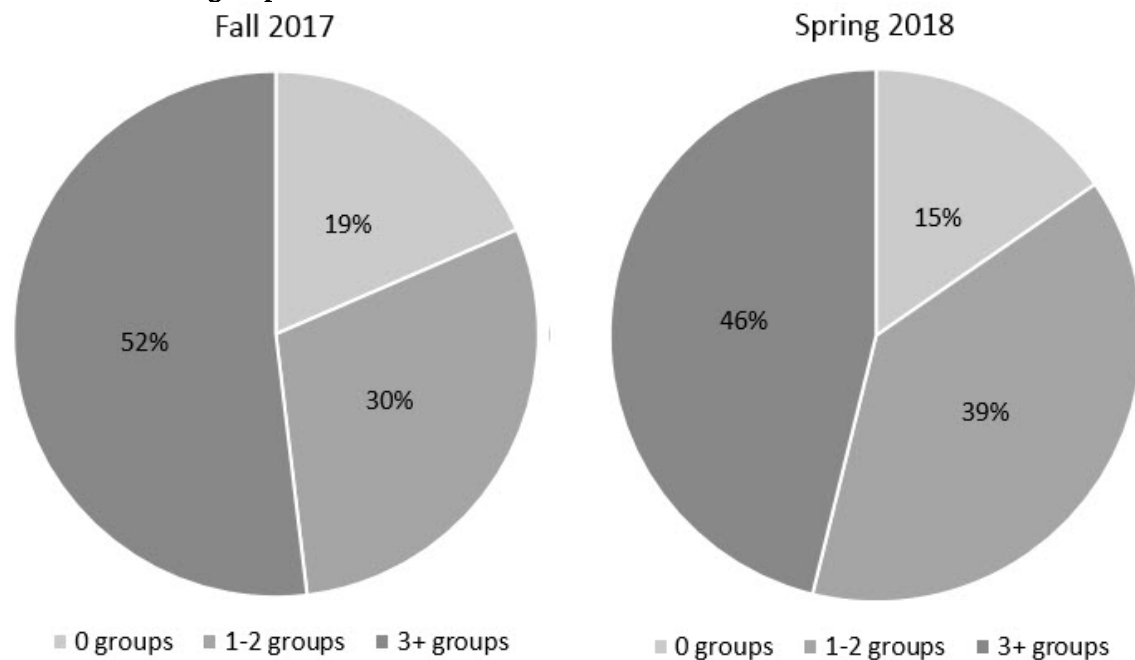
Implications

This lightweight space assessment method was created to provide detailed enough information to enable evidence-based decision-making, but not so complex or time-consuming that staff would not want to participate in data collection or feel ill-equipped to analyze or use the data. The descriptive headcounts are a simple form of space assessment that library staff can complete in under thirty minutes. The method produces data that a staff member with intermediate Excel skills can explore and transform into a story. The added metadata about furniture type, room, time, and group activity provides a balanced level of granularity to the data. The data can answer big picture questions about library use and inform individual decisions about the arrangement, location, and amount of furniture in a space.

Because the headcounts are flexible and lightweight, this study is repeated each semester. This routine allows us to gather large volumes of data and process them at a manageable rate. Since data is constantly being collected, incremental changes can be made to the instrument. Our collection methods have improved while retaining the ability to compare data across time.

Implementing this study has led to a shift toward creative, flexible, user-centered thinking. Walter Library has significant constraints on space design because of the historical status, large rooms, and heavy furniture that is expensive and difficult to move. With those constraints, it can be hard to imagine a simple first step to improve a space, much less a vision for the building. The headcount data has given us the freedom to focus on areas where small improvements can be made and subsequently assessed. Data focused on headcounts provides a sense of how users are interacting with the space, including what furniture they prefer or avoid. Decisions can then be made based on evidence and not assumption.

The field of environmental psychology can provide insight into some of the user behavior observed in the space. Studies have shown that people will seek out privacy and personal space and prefer to maximize the space between them and the next person unless they know one another.[10] These findings provide a compelling explanation for why average occupancy rates hover around 50% in many of our library spaces, particularly spaces like the reference room and quiet study room that feature large tables without the

defined personal space that soft chairs and study carrels offer. It also adds to understanding why users are so drawn to certain types of library furniture, particularly types that provide semiprivate personal space.

Some of the furniture-level information the data provided was so compelling that changes were immediately made to a space. Data was collected during both peak and off-peak times as recommended by Gullickson, et al. to provide a fuller picture of furniture use.[11] For instance, students who used the quiet study room space flocked to furniture that was designed for individual study but they did not use the available soft chairs except during the absolute busiest times of day, implying that soft seating in the quiet study room was not preferred and was likely being used because there was no other available seating. However, the soft chairs were used regularly for collaborative work in the Great Hall. As a result, the soft chair arrangement of seating was expanded to the reference room to discover whether students were willing to collaborate in a traditionally quiet space, taking the pressure off other crowded collaborative spaces in the library.

It was noted that tables in the foundation level were underused. Over the summer the tables were moved to the reference room on the second floor, while microform cabinets taking up valuable space in the reference room were moved down to the foundation.

This study put staff in touch with all the user spaces in the library and directly contributed to a shared vision for Walter's spaces. The counts provide several staff members and students with first-hand experience walking through the entirety of the library with the job of observing. Since the assessment does not take a lot of time, one person can do a count for the whole building on their own. The vision is a product of the combined stories the data tell us about what users value in our spaces with our individual observations and experiences conducting the headcount. An understanding of the library as a whole enables the imagining of how the library could evolve. The study highlighted the importance to our users of both communal study areas and collaborative social study areas. The vision articulates a desire to expand areas that serve each of these needs and turn underused and mixed-use spaces to spaces that fully support one type of studying.

The method we used limits our ability to understand why people are using certain furniture in our spaces or the reasons they prefer one area over another. Qualitative data from surveys, interviews, or focus groups would provide explanations and enable comparisons. To interpret the findings, information from the disciplines of environmental psychology, user experience, and learning theory have been helpful. While the methods are generalizable, the findings are very specific to our space. We are currently applying these methods to branch libraries in the same area of campus. In the future, we want to know how the library space compares to other study spaces on campus; what unmet needs our students have; and what our students and instructors expect of library spaces.

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Developing the Metrics to Assess the Library's Active Learning Spaces

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Abstract

Upon the opening of Purdue's new 179,000 square foot state-of-the-art Wilmeth Active Learning Center (WALC) facility, Purdue University Libraries (PUL) was interested in assessing space usage via observation to assist with the development of institutional metrics, as well as to ensure adequate staffing and services. Due to the size of the building and number of observations needed however, PUL team members determined that a more comprehensive data-collection tool was needed. The authors collaborated to design and build a mobile device-based, location-enabled system with reporting capabilities.

The data collection system was beta tested during the fall 2017 academic term. As part of this process, detailed training materials were provided to users to ensure data and technology consistency. Based on user feedback, the database and data collection interfaces were then modified to improve usability and data veracity. Results suggest the system is an effective tool for collecting library space usage information with minimal end-user training requirements. The system enables multiple staff members to collect consistent information in a reduced amount of time. Initial analyses have also helped to inform understanding of learning space usage statistics and the different learning activities occurring in the integrated areas, which will serve as a guideline for PUL's future service design.

Purdue's Wilmeth Active Learning Center (WALC)

Purdue University is a public land grant research institution located in West Lafayette, Indiana. Founded in 1869, the university currently has more than 41,000 students enrolled and offers over 200 undergraduate majors and 69 post-graduate programs.

In August of 2017, Purdue opened the Thomas S. and Harvey D. Wilmeth Active Learning Center. The WALC is a new concept in university buildings and was envisioned to fully integrate library space with active learning instructional spaces (Figure 1). The 179,000 square-foot facility houses seven different types of active learning teaching spaces for a total of 27 classrooms on three floors plus a lower level. The classrooms offer state-of-the-art digital tools for facilitating collaboration, communication, and distance learning.

Figure 1. The WALC layout

Surrounding the classrooms and interspersed throughout the building is Purdue University Libraries' Library of Engineering and Science (LOES). The library spaces include collection stacks with 30,000 volumes, study rooms, collaborative spaces, quiet study areas, and computer stations, as well as specialty computer labs and faculty offices. The library space is completely integrated with the classroom space, such that the collaborative library space is immediately adjacent to each of the classrooms. In addition, when classes are not being held, all of the classrooms are made available as additional study areas.

Realizing the Need for a Comprehensive Data-Collection System

The WALC's marriage of library space with classroom space evolved through a ten-year series of iterations of locating active learning classrooms in libraries.[1] Due to the active-learning nature of the curriculum, students were divided into small groups to work collectively to solve problems. When the earlier versions of these active learning classrooms were placed among library spaces, two compelling outcomes were observed.

First, students from these courses often arrived in the library before class began to meet in their smaller groups and then stayed late after class, again spilling into the library spaces to continue working on the assigned problems. Their instructors would also frequently join them, thus extending the learning period.

Several instructors even chose to hold their office hours in the library, where their students were already working, which appeared to result in more students taking advantage of office hours.

The second observation was that the juxtaposition of active learning classrooms with library spaces extended the use of the library. Typically, academic libraries are busy from 3:00 p.m. to 12:00 a.m., after most classes have been completed. Conversely, classrooms are busy from 7:00 a.m. to 3:00 p.m., as the majority of courses are scheduled during these hours. Holding active learning classes within the library spaces extended the "busy" hours from 7:00 a.m. through midnight, which effectively doubled use of the library spaces.

Because these observations were anecdotal, the decision was made when the WALC was constructed to closely monitor activity to determine if, in fact, the suspected increases in building usage and learning period were accurate. Purdue University Libraries' administration was also interested in assessing space usage via observation to assist with the development of institutional metrics, as well as to ensure adequate staffing and services. The WALC is staffed 24/7 during regular academic periods, so attendants were tasked with conducting observational head counts during their rounds.

At first, observations were recorded using paper and pencil, and the data were manually entered into an Excel spreadsheet at the end of each building attendant's shift. This quickly became problematic however, as it required both manual notation of each observation and the secondary step of data entry. Not only did this markedly inflate the amount of time needed to collect data, it provided repeated opportunities for data-entry errors to occur. In addition, during peak periods, staff were often distracted with other tasks, which raised concerns regarding missing and duplicate counts. Clearly, a more sophisticated method was needed.

Development of an In-House Solution

Similar to other academic institutions, Purdue University Libraries' (PUL) faculty and staff bring a wide variety of experience and expertise to the table. Thus, the development of a technical solution was quickly seen as an ideal opportunity for internal collaboration across specializations. PUL members joining the project were the director of assessment and the director of facilities (the assessment team), as well as a geographic information systems (GIS) analyst and an associate professor/GIS specialist (the GIS team).

Before committing to the enterprise, initial group discussions centered on whether more advanced options might already be available and if those options could be easily customized to meet required criteria. Two location-based library facility inventory tools were identified at this stage: Suma, developed by North Carolina State University Libraries,[2] and the web GIS platform developed at the University of Idaho Library.[3] A comparison study of the data collection requirements for our specific project was conducted against these systems, as was a review of all in-house resources toward supporting such a data collection system.

The user interface designed for Suma's mobile interface appeared intuitive enough to save significant staff training time, but it required a different technology stack than that currently existing within PUL. The map interface developed in the University of Idaho Library's system looked appealing because it provides a good reference for users as they move through a building, and its technology was also found to be compatible with PUL's existing infrastructure. However, because PUL anticipated expanded information collection related to different activities and preferred to save inventory data to a local database for further reporting and analysis, the GIS team determined that an in-house system would be PUL's best solution.

Concurrent with the GIS team's technical development of the system,[4] the assessment team began reaching out to a variety of stakeholders—such as PUL administrators, division heads, and WALC building managers—to identify key data points to be included. An important aspect of this step was to also uncover pending/wish list research projects so that any related data collection activities might be incorporated as well.

After a master list of variables was established, the assessment team worked to narrow down the field by clarifying variable definitions, consolidating highly similar data points, and eliminating those that would not

lend themselves well to observation. The final list was designed to determine: (1) how the library spaces were being used by students at different times each day; (2) which library services and technology were being used by students and how they were being used; and 3) the types of activities students were engaging in while at the WALC.

This revised list of variables and definitions was next shared with the GIS team for incorporation into the data collection system, as were detailed WALC floor plans provided by the director of facilities. The two teams soon began a series of regular meetings to list system requirements, review progress, and suggest changes and additional features. Certain stakeholders were also invited to participate in some of these discussions so as to garner input from their perspective, and many of their recommendations were adopted as well.

The system was deemed ready for use during the fall 2017 academic term, so it was decided that, due to time constraints, beta testing would be done as part of a planned five-day data-collection initiative in the WALC to gain insight into building usage. At the same time, WALC building attendants also began to regularly use the system to collect observation data during their midnight to 8:00 a.m. shifts. To facilitate these endeavors, a detailed manual was developed and participating staff were provided with end-user training.

While the system worked as designed and the results provided valuable insights, user feedback indicated that a number of important modifications to the data-collection tool were needed. Subsequent system enhancements included mechanisms to monitor data-submission activity and a session number for improved data analysis. It was also determined that some areas of the WALC, including the lower level and near stairways, were experiencing Wi-Fi connection gaps, which sometimes affected data submission. The importance of this finding was two-fold, as Wi-Fi access problems could also impact student-learning activities.

A second large-scale data-collection project was conducted during the spring 2018 term and subsequent staff feedback suggested that the recent updates made to the system greatly improved the end-user experience. The changes also alleviated concerns regarding missing or duplicate data.

Technical System Design

The GIS team at PUL manages a set of GIS servers, including ArcGIS Servers, enterprise geodatabases, and ArcGIS Portal. These resources, which had already been used by many research groups on campus in terms of sharing maps and managing data, made a customized solution feasible.

The data collection system includes four major components: a mobile interface for data collection; a GIS server for centralized map and data sharing; a geodatabase with maps and tables; and an engine for data aggregation and reporting (Figure 2). The mobile interface was developed using JavaScript and ArcGIS API, supported by the map services published from ArcGIS Server.[5]

Figure 2. The system components
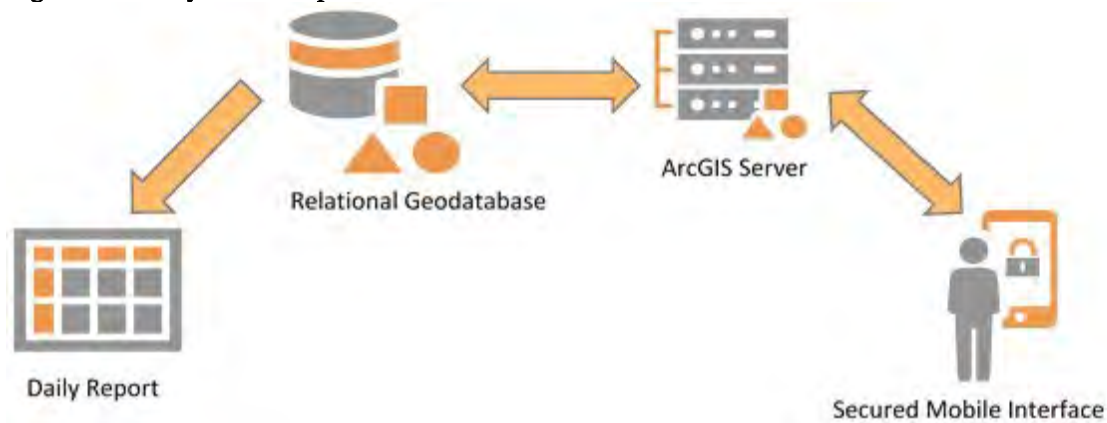
When developing the web interface, security and quality control were a major concern. The intent was that only authorized personnel would have access to the interface and be able to contribute data. At the same time, a record of who was contributing data was needed should substantially different observation estimates occur. This security feature was implemented using named users created for ArcGIS Portal. Password-protected user logins were established so that each observation would be associated with a specific user name, and observations could only be captured by the system via authorized users (Figure 3).

Figure 3. Secured login allows authorized personnel to input data.

To develop the map interface, the WALC's building floor plans were used as reference maps to help users navigate while collecting data. After the scanned floor plans were georeferenced, all pertinent space areas were digitized and saved as feature classes in the geodatabase. To further enhance the data-collection process, the three distinctive types of areas identified on the maps were highlighted using different colors on the interface (Figure 4): (1) space open 24 hours per day, (2) classrooms closed at 2:00 a.m. daily, and (3) classrooms closed at midnight. These feature classes were then published as feature services through ArcGIS Server.

Figure 4. The mobile data collection interface.

In the mobile data collection interface, the feature services were overlaid with the WALC's background floor plans. As shown in Figure 5, when a user clicks on any room or space from the feature map, this feature is highlighted and the data collection panel, or form, will appear. The user can then enter all observations for that room into the data collection form, as well as add free-text notes if needed. When entering numbers, the interface allows users to count by clicking the up/down arrows in each box, or to type in numbers directly. After all observations have been entered for a room, clicking the submit button transmits all input data, as well as the time/date stamp and user information, to the corresponding table in the geodatabase.

To avoid duplicated efforts when working as a team, a mechanism was designed to allow users to monitor each other's data collection activity. When observations for a room or space is submitted in a particular time period as determined by the session number, that space is then shaded on the map. Maps for all users collecting data during the same session number are synchronized and updated immediately as data are submitted. This mechanism can also help users track their data collection progress. When a user clicks on a shaded space, a pop-up message panel will provide details regarding the last submission for that space (Figure 5).

Figure 5. Mobile data collection interface: rooms are shaded if the information has been submitted

After designing the interface, it was determined that an efficient method would also be needed to communicate information to project members interested in reviewing results post-data-collection. Although all observations are saved to the geodatabase, generating a useful analysis of that information required additional software to connect to the geodatabase and an SQL query written to aggregate the data, as well as a good understanding of the database structure. To facilitate this process, a reporting feature was designed using the SQL Server Reporting Service from the database server to aggregate collected information and to generate scheduled reports. These reports are automatically saved to a designated folder on the departmental server at a prescribed time each morning, thus allowing results to be quickly and efficiently shared with the team.

Conclusions and Limitations

Findings to-date suggest the data-collection system is an effective tool for compiling library usage observations with minimal end-user training requirements. The system enables multiple staff members to collect consistent information in a reduced amount of time. Initial analyses have also helped to inform understanding of learning space usage statistics and the different learning activities occurring in the integrated areas, which will serve as a guideline for PUL's future service design.

As with any mobile application, this system is highly dependent on a strong wi-fi connection and a stable server environment. A data-submission failure could occur if observations are submitted in areas with weak or spotty Wi-Fi signals. Also, all server maintenance should be carefully scheduled around data collection activity to avoid connection interruptions.

Future Research

The PUL observation data collection system was initially designed for use in the WALC building, but the intent is to next expand the system to include all Purdue libraries. However, doing so will require changes to the mobile data collection interface to accommodate floorplans for different buildings, as well as to allow the user to choose a specific library. Future developments could also include making the system available as a library resource and extending its use to non-library locations as well.

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Participatory Data-Gathering and Community Building

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Introduction

The Library Environments department at the University of Michigan Library in Ann Arbor, Michigan, facilitates user- and data-driven research to inform projects meant to create safe, welcoming, and accessible library spaces. We also lead strategic space planning efforts to transform our buildings so that they better represent and support our expertise, tools, collections and the needs of our academic community.

Because the scale and distribution of our services, spaces, and collections spans nearly a dozen buildings or spaces across multiple campuses, our small team relies on a community-centered effort to achieve our work. This paper will describe our distributed team and consultation-based approaches to large-scale strategic data collection and assessment. We will describe how we built our network of partners within the library and provide examples of our programs and their impact to date.

Why This Work

University of Michigan Library hosts over 4.2 million users per year with 736,641 square feet of public, collections, and staff space, including two 24/7 locations. In 2015, the library began embarking on an organization-wide effort to shift the way we work across our administrative divisions, departments, and units to create value for our community. As part of this work, our organization is committed to building a culture of assessment, engaging in data-driven decision-making, and in embodying a set of service and space design principles that are user-focused. In order to achieve these commitments, the Library Environments department developed a series of programmatic and department-level goals to guide our efforts. By developing thoughtful and consistent approaches to evaluation and assessment that span our organization, we can hold ourselves accountable to our commitments and to these goals.

The library's Operations division (which oversees the management of our buildings and spaces, access services, campus partner outreach and engagement, and physical collections management) has created a set of data-focused goals with associated programmatic investments to support staff involvement in realizing our institutional commitments. Our division goals are to:

- Seek continuous improvement in customer service, communication, and intercultural competence based on our principles for good service by collaborating with our colleagues and embracing diverse work styles
- Continue to make our library spaces, services, and collections welcoming, accessible, and safe for our diverse library colleagues and our community of scholars
- Strive to stay forward-focused by managing staff resources, including developing documentation, budgets, schedules, and positions, in an intentional but versatile way based on data-driven decisions

Our Portfolio

Before our department existed, the library approached our space investments across our buildings and data-collection within our division from an opportunistic and often piecemeal approach. Data was not always used to inform decision-making and there were several different processes by which we made changes to our spaces, services, and collections.

In 2016, the Library Environments department was established to facilitate strategic directions and resource investment in our space design and planning efforts across our major library buildings housed on four campuses. The efforts led by the Library Environments department directly support our division- and

organization-wide goals and we strive to enable our colleagues to proactively participate in achieving these goals in their work based on the research we conduct and the data we gather.

We spread our impact by working in many directions, both within departments and units and at an organization-wide level. Within each portfolio area, we work on different programs and projects in a prioritized, collaborative way. Our portfolio covers the following sets of activities:

1. **Strategic Space Planning**—Our team collaborates with library departments and units regarding strategic design or renovation of library space and associated service development. Within space planning, we also help teams to better understand the workflows of their space to help determine how we redesign our public and staff spaces.

2. **Collections, Services, and Building Assessment**—We provide critical needs assessment by gathering, analyzing, and synthesizing data and generating reports, recommendations, or materials needed to facilitate decision-making.

3. **Wayfinding**—We conduct user research, foster communications, and develop appropriate signage standards across physical and digital library spaces to improve access to resources, services, and expertise.

4. **Communications and Process Improvement**—We collect, analyze, and communicate information to inform service, research, and policy development within the operations division.

Our team currently includes three full-time staff (department head, projects coordinator, research associate) and two student-staff positions. We each come from the information sciences discipline, but our expertise includes a variety of backgrounds and skills. All team members have experience and formal education in fields of human-computer interaction, particularly in conducting user experience research, in user-centered design, and in information architecture. Members have previous experience working in access services and circulation departments, in independent consulting to inform website design, and in conducting formal program evaluations. While we each have a primary responsibility for a portfolio area of our department, we work very collaboratively and strive to build on each other's individual strengths and expertise. We operate with an understanding of our functional roles but also take responsibility to lead individual projects based on our known expertise, capacity, and work style.

Our Approach

In our work, the specific projects our department works on change over time. What stays the same is our goals, our approach, and the values that drive our work. Our approach to collaboration intentionally considers the role and relationship of team members and what long-term goals there may be for the work at hand. While we do develop and deploy reports, communication plans, and space assessments to help inform decision-making, we strive to do so in a way that genuinely partners with colleagues and that is useful to both our organization and specific departments. For our work in evaluating our building use, service desk activities, and collections use, we have intentionally shifted the organization's approach to both our collecting and use strategies from an administrative-centered perspective to a user-centered perspective. We see this work as building community and capacity and engage in efforts to connect to managers, staff at-large, and through the creation of a "data stewards" team of staff who work in different departments across our division (see: Figure 1).

Figure 1: Slide from 2018 ARL assessment conference presentation illustrating community approach to data collection, analysis, and use.
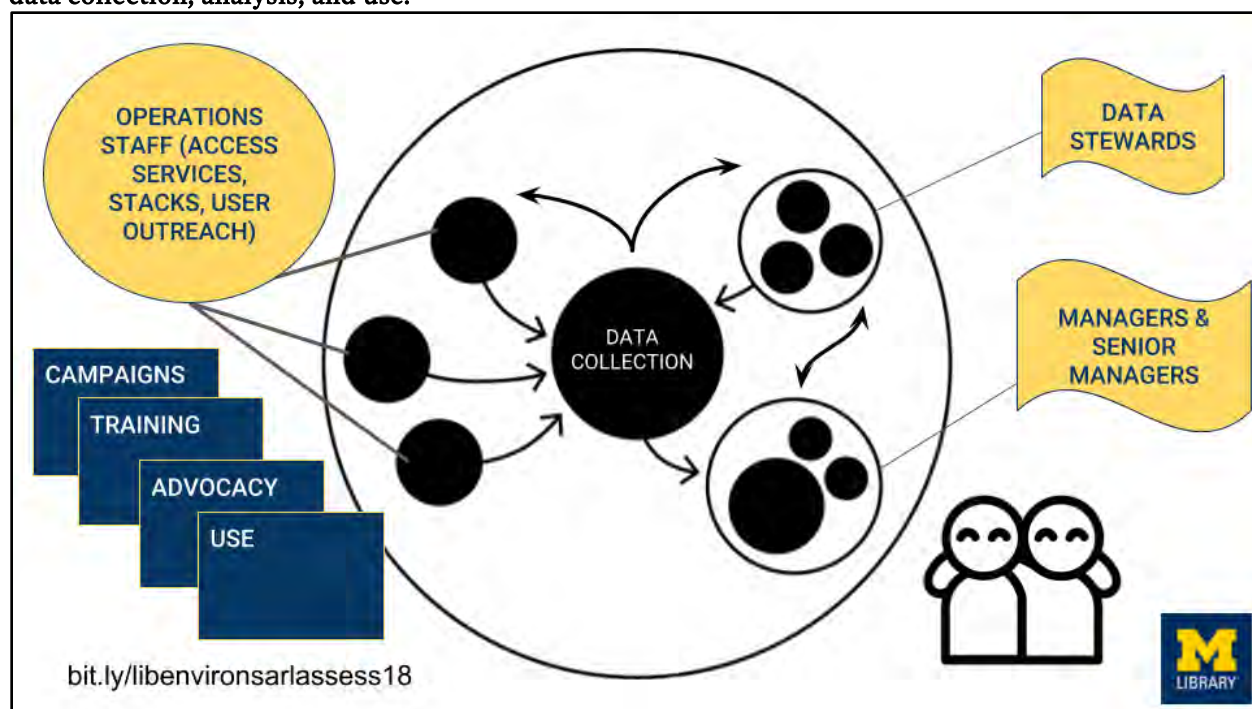
We intentionally develop guides, tools, and resources for our colleagues to use and we employ a "train the trainer" model in our work to build capacity for using applied methods and resources across the organization in different settings. Our work is intentionally framed around principles of service design and design thinking in alignment with library-wide strategic efforts and in partnership with other departments in our organization.

This approach enables us to:

- Increase the amount of data we can collect, how many times, in how many places
- Grow skills, knowledge, and time we can spend on data analysis
- Make intentional service change decisions based on data

We will review this process in the following sections, outlining the ways in which we have engaged our colleagues and the processes we have employed in using, understanding, and collecting data that helps us better understand our services, collections, and building use.

Collecting and Sharing Data that is Relevant and Useful

We started our operations data program with the goal of developing a sustainable data evaluation and reporting plan to facilitate strategic decision-making and resource allocation for the operations division. In the past, individual units or teams within operations have collected or used data for specific process-based purposes, but we did not have a culture of data use or sharing which allowed us to easily consult the data we had collected when making decisions. Collected data was stored in different locations and it was not always clear what was available, or how reliable it was. Our departments and divisions suffered from a lack of data literacy, making it hard for teams to use data to help answer questions, especially if it was pulled from and only available as large CSV files pulled from databases.

We first engaged senior managers (department heads) in the operations division, asking them to identify what they wanted to know about how patrons were using the library based on the services they provided or the resources they used or developed. From these conversations we identified three core research questions:

- What are people doing in our buildings?
- How are our collections moving across our libraries and shelving facilities?
- What is happening at our service desks?

These questions guide our collection strategies and how we compile reports. Because we worked with our primary stakeholders—our division's senior managers—to develop them, we know that they are relevant to the decisions that our managing colleagues make around the services the operations division provides.

Our department's challenge was to find a way to take ownership of our data without gatekeeping it. We wanted to manage the data we were collecting in a way that engaged the whole division in processes that built capacity and expertise, and made it clear what data we had, where it was, and how it could be used. We aimed to make the data accessible and readable by anyone within the organization by reformatting and structuring our spreadsheets and putting them on our staff intranet.

Routinely, we seek feedback from managers on the content and usefulness of the reports we are generating and the data we are collecting. This has helped us iterate and refine what and how we present information to our colleagues. For example, when we first started making reports we would show only the totals of activity we saw during a certain time period (see: Figure 2). Feedback about these reports helped us understand that we needed to provide markers for context to aid interpretation. This meant adding the room capacity as a comparison to total number of people in a room. We also began to offer visualizations that compare data across different time periods to show peak activity compared to a more average activity, giving more context to the numbers we provide (see: Figure 3).

Figure 2: This visualization does not provide any context around how many seats were available.
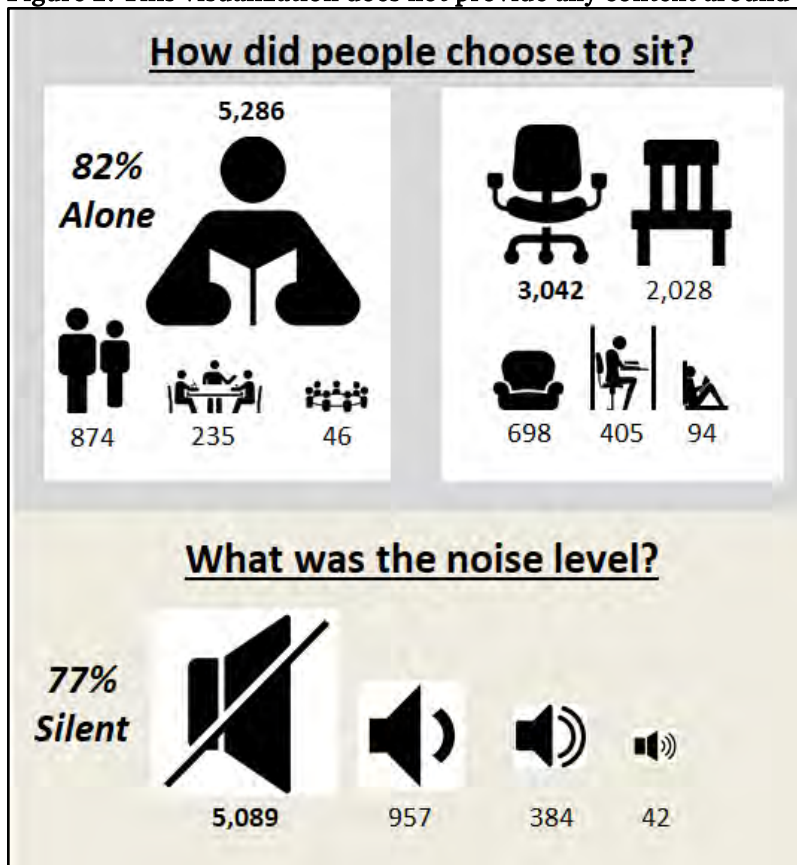
Figure 3: This visualization provides more detail about space capacity for contextual comparison.
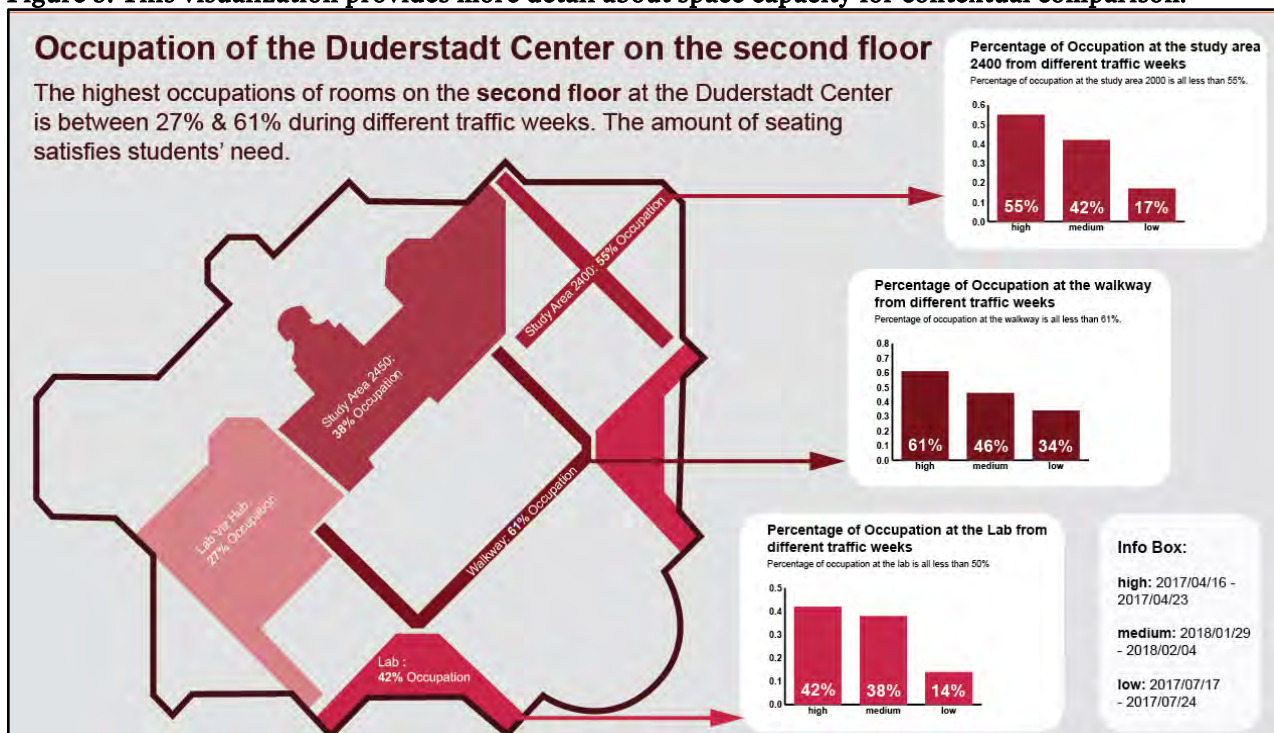
Reports with more context have been received by our colleagues and have sparked ideas from them about what kinds of additional information we can pull from our data sources to answer their questions. Continuing to talk to managers about what they need has also promoted buy-in and engagement for this effort.

What and How We Collect Our Data

Our co-created research questions also guide what sources we use to collect data. By combining multiple manual and automated data streams, we are able to see the use of our spaces, service points, and collections through different lenses (see: Figure 4). We can also compare some data points across our collection areas. For each stream, we have cultivated the type of information we collect, balancing the level of detail we can achieve with technology or staffing constraints.

Figure 4: This table lists our six main automated and manual data sources. Each source is collected with different frequencies and levels of granularity.

		Time			Patron			Materials		Location		Activity	
		Day	4 Hr block	Min	ID	Type	Count	Type	Specific item	Building	Room	Type	Specific goal
Manual	Desk Tracker	X	X	X			X	X		X	X	X	X
	Gate Count	X	X				X			X			
	SUMA	X	X				X	X		X	X	X	
Automated	Circulation	X	X	X	X	X	X		X	X			
	Hold Requests	X			X	X	X		X	X			
	Public Computer Use	X	X	X			X			X	X		

Our manual sources have required the most refinement and collaboration with staff who do the collecting and managers who schedule the data collection along with other responsibilities. For each one, we started with an initial tool and list of details we wanted to collect based on our guiding questions. We then piloted the process at one of our locations for a short period of time before refining the process based on feedback and then expanding more broadly to other locations and across different shifts.

Detailed Building Counts: Suma Initiatives

The process that has required the most coordination, testing, and refinement is what we call "Suma Initiatives." While we collect data like building counts, gate counts, and service point transactions on a daily basis, in order to answer the question, "What do people do in our buildings?" we needed to collect more detailed information. Suma Initiatives are week-long efforts to collect information about how our patrons are using our spaces. In designated spaces, counters use an iPad and the Suma Application (developed by North Carolina State University) to note whether people seem to be working individually or in groups, what kind of furniture they are using, and what they are actively focused on (whether it is books, personal technology, another person, library technology, or something else). This information helps us to better understand what our building looks like during different times of day, during different traffic weeks throughout the year, as well as how people are using our current configurations of resources. It also provides us with data we can review to determine priorities for additional, more resource-intensive studies, such as observations or focus groups.

This effort takes a lot of work. We are collecting data in six buildings, across 212 timeslots, in each of our three week-long initiatives a year. Fifty-seven students and full-time staff are involved across all operations departments. Some staff conduct just one count and others conduct up to 10 throughout the week. To make

sure we collect quality data, we need staff to have sufficient training on how we are using the Suma tool, and make sure that we are adequately staffed for both the counts and at our other service points or in other areas of responsibility during this time. Most importantly, staff need to be able to see how the data they are collecting is being used to help keep them motivated to collect the data accurately. They also need to understand broadly what we are trying to accomplish with this work to help them make judgements about how to record what they see.

Data that is Understandable and Timely

From the start of this effort, we wanted the data and the output to be available to all staff as they need it or would like to review it. The first way we tried to do this was by sharing raw spreadsheets of data or short, general reports. We soon learned that the level of detail we were sharing was both too much and too little, and that we needed a more flexible option. We imagined creating spreadsheets that were like a dashboard that could be manipulated and changed to give managers the information they needed. We had thousands and thousands of data points to analyze and organize and we needed more dedicated staff time to help do this, so we formed the data stewards team.

Data Stewards

Early in this process, our department formed the data stewards team to help us in three ways: to review the data we have collected for quality assurance, to help develop reports to share back to our colleagues, and to provide feedback related to our data collection efforts (what is working or not in terms of our department's education or communications efforts). Team members have varying experience working with data (collecting, organizing, and using to inform decisions), a professional or personal interest in enhancing their data analysis and visualization skills, and, importantly, they each come from different operations units or departments and work different shifts in different locations. Team representation includes the Access Services Department and the Physical Collections Management department (see Figure 5). Working together, the team has standardized collections processes across locations and developed new processes for transforming specific data types from raw CSVs into more useful collections of tables and graphs that communicate what the data means. Example projects have included creating a single point for entering gate counts, automating the calculations needed to get clear visitor numbers by location and time period, and working to transform our data collected at our information services desks into dynamic spreadsheets which allow service point managers to see what has been happening at the desks they supervise.

Figure 5: Data stewards represent different departments within Operations.
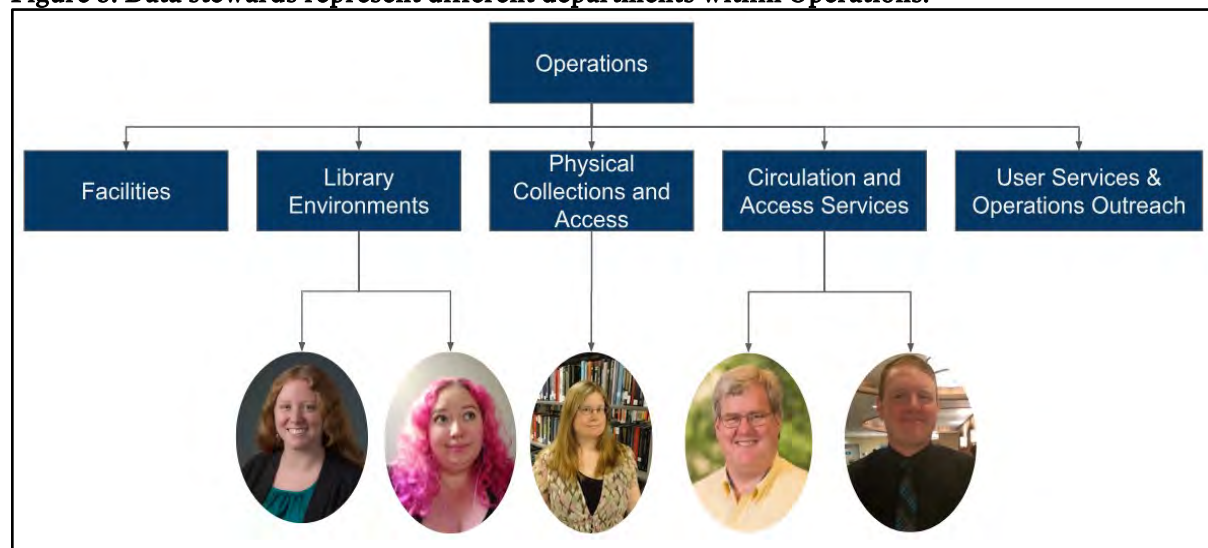
The team has built up our querying capabilities so that we can provide reports on demand in addition to our self-use spreadsheets. On-demand requests come from across the organization, from our executive council,

our associate university librarians, and from other department heads. We have also developed a semester report of use trends we plan to regularly share with both the division and the organization. In these ways, we are able to customize information for a manager who might want information to inform a project or service point while also being able to show longitudinal change in use over time for all of our services, spaces, and collections.

Lessons Learned

We have taken an iterative approach to establishing our data program. Our first year focused on envisioning and defining the program and the data we were gathering, including: identifying the research questions we wanted to begin answering, restructuring the ways in which we gathered the data, evaluating our data sources, and launching our first version of data collection with staff across our division. In our second year, we focused on reflecting and refining the process, including: developing reports to share out to staff-at-large, investing in our data stewards team, creating more training materials, and streamlining the data collection process for our staff.

In each cycle along the way, we have improved and built on our process. We now have two years' worth of data to draw from and compare to, something we did not have at all when we were starting this program from scratch. It was really hard to be transparent and build trust when we were just trying to figure out what we were doing and did not have anything to compare to. However, at the end of our second year, we can share trends, answer questions, and use the data to inform resource-based decisions.

Some applications of our data collection efforts have resulted in the following:

- Characterizing and describing how much square footage we have devoted to more collaborative and more individual study spaces and what that supply and demand looks like throughout the day and the week
- Adjusting service hours at specific locations based on traffic, interactions, and requests
- Using building data to communicate to campus partners and other library service providers about traffic expectations across the semesters in specific locations
- Identifying trends in directional questions to inform signage content, location, variety, and amount
- Using building count data to inform student staffing budget allocations and using transaction data to support library recommendations when collaborating with campus service providers at a shared campus information desk
- Understanding occupancy for a floor in one of our library buildings to plan for renovations and improvements

Understanding the Landscape

When our department first started, there was a lot of groundwork to lay. We were establishing a more comprehensive approach to all areas of our work and working from limited data collection efforts from the past. Reviewing previous data collection efforts and current practices and habits allowed us to better understand where we were starting from. Since data collection in Operations had previously been scattered across the division and it took time to identify what data there was, and how people were using it (or not). At first, many staff did not understand why we were doing this work or that this was not a one-time effort, but a programmatic activity that would be part of their regular workload. Many had participated in "data collection" but had never seen it used to inform decisions and so did not take our requests to collect data very seriously. We still struggle with getting staff to help us collect data regularly in some buildings across some shifts. It took time to communicate across various levels of the organization in meaningful ways and to understand what was working and what was not in terms of our communications and data collection strategy.

Establishing Norms by Modeling a Team Approach

How we do our work in our department is important to us. One way of spreading communication norms and different ways to work is by modeling that ourselves. This means organizing effective and timely meetings,

tracking work of teams, proactively seeking feedback, following up with results, updates, and information, and making reliable timelines. This builds our credibility as a team and as a department and also shows others how to get more done effectively in a team-based model. The data stewards team model included establishing new norms of communications, expected output, and investment. This cross-departmental team has been instrumental in the success of our data collection efforts, especially because they work in different settings and with different colleagues than our department and can serve as connectors between our department and colleagues collecting data for this effort. They help our department hold ourselves accountable to our intentions of transparency, participation, and creating a data gathering program that is useful, timely, and relevant to colleagues across the entire organization.

Growing Pains and Scaling Up

Our progression of work has accelerated with each cycle and iteration of effort but was a slow effort to start. This is especially true because our department is a newly conceived department and has a portfolio of four domains of work that can include several active projects within each area. This cyclical approach can feel very slow and ambiguous, especially for the dozens of full-time and student staff collecting the data and learning and relearning some of our data collection methods. However, the work we put in to balance time to create templates, documentation, drafts, and tests got us started down the path toward a strategic approach to this programmatic effort. Adding in a few quick wins along the way, including showcasing the data and recognizing individual contributions, helped our department and our division colleagues stay motivated. Now that we have established this work and can look back to how we communicated it, how often, and how well, we have been able to tighten our cycles of testing and implementation. This has resulted in more outward evidence of the impact we are making that have culminated in winter 2019 into our first quarterly report for our division. The data collection activities have also become a more normal and expected part of routine work for many staff across our departments.

We continue to face challenges of scale and in communicating our work to our colleagues. In our second year, we realized through a series of feedback sessions and discussions we needed to invest in a literacy campaign for our managers and our staff about how to engage with the spreadsheets and data reports we were sharing. This resulted in the "data literacy roadshow" (see Figure 6), a learning exercise our department staff created for managers and their supervisors with hands-on activities to help them understand what data was available and how it could be used. It was well received and created the basis for additional learning modules the data stewards team is helping to create for our staff and student staff that will be integrated into our general training programs.

Figure 6: An example slide from the Data Roadshow which taught staff how to use the data by focusing on hands-on activities answering questions using the data.

We still have some gaps in how staff understand this program and their role in it, but by showing both the results for our work and decisions from this work, we are illustrating the value of this effort and have received positive feedback from colleagues. Finally, while we are well established within the operations division and as partners in some strategic cross-divisional initiatives, there are many departments across the library that are not as well-aware of our department's work, scope, and who we are.

We are making intentional efforts to change this in our third year through advocacy, training, communications, and collaboration efforts. Our department is energized by our collective efforts in this work and the data is becoming more relevant and useful in strategic efforts. It is becoming more normalized for our division to ask for data reports and to give us feedback on what works and does not work in our programmatic efforts. We also learn a lot from our colleagues about how they work, what they value, their challenges, and how they impact the campus community we all serve. In this way, our department and our division is connected to our academic community in ways we otherwise would not be. We can better tell and understand the story of the University of Michigan Library, our collective role in it, and the impact we make in partnering with our community of scholars to create, share, and use knowledge to make changes in the world.

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Getting to Scale: Developing a Sustainable, Collaborative, Mixed-Method Approach to Space Assessment at the University of Washington Libraries

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Introduction

This paper details changes to the University of Washington Libraries' (UW) approach to space assessment piloted during 2016–2018. The authors discuss how they have been transforming the UW Libraries' approach to space assessment to focus on ongoing data gathering, use of mixed methods, and greater staff engagement to support the effective use of assessment results. In considering our goals for the pilot, and what we wanted to change about our previous approach to space assessment, we established a series of guiding questions:

- What does a scalable, sustainable, mixed-method approach to space assessment look like for a large, complex research library system such as the UW?
- How can we develop a programmatic approach to space assessment that enables us to understand and respond to user needs both in specific libraries and holistically across our system, and also ensure that we have data available to us for longer-term space planning?
- How might we engage libraries staff meaningfully in the assessment process in order improve our ability to take action on results?

There is a significant body of literature on library space assessment, some of which focuses on taking a programmatic, mixed-methods, and/or longitudinal approach to space assessment.[1] However, there are fewer studies focusing on undertaking this kind of programmatic assessment and data gathering at scale and holistically across multiple sites or a library system.[2] This paper aims to address this gap. Although this paper discusses a programmatic approach to space assessment in the context of a large research library system, the authors believe that the strategies, methods, and tools piloted in this project will be relevant to libraries of various types and sizes.

Context and challenges

The University of Washington is a large research institution and includes sixteen libraries across three campuses.[3] With a growing student population and the need to provide a variety of spaces to support collaborative and individual work, the UW Libraries system (and the university generally) is experiencing severe pressure on our physical spaces. Getting additional off-site storage for collections is a critical enabling factor in moving forward with any major library renovation or capital projects, but when this will happen is unclear. As a result, we are currently striving to maximize and improve the user spaces we have. However, we also need to continue to gather robust data about how spaces are currently being used so that we will be prepared to make informed decisions when we are able to make significant changes to spaces in the future.

One of the challenges to effective space assessment in such a large system is that it can be difficult to achieve a holistic, integrated approach to assessment and improvement, rather than one rooted in individual libraries. It is obviously important for individual libraries to understand the needs of their user communities and to answer questions about specific spaces (such as the libraries' Active Learning Classrooms, located in UW's Odegaard Undergraduate Library).[4] However, with many assessments happening in an ad hoc way at the local branch level, it has been difficult to "connect the dots" systemically in terms of the overall outcomes we are trying to achieve with the variety of spaces we provide and also determine which improvements are unique to a single library versus those that could be more efficiently scaled across multiple libraries. Such a large, distributed system creates opportunities to tailor spaces to a variety of user needs, but also presents the potential for unevenness of data collection or an unnecessary duplication of effort.

It can also be challenging to get traction on results because responsibility for different aspects of space are distributed throughout the organization; stakeholders include branch head librarians, facilities staff, and staff in a newly formed department overseeing access services and branch operations across multiple locations. While our past discussions of space survey results with library staff have always been met with general support, a lack of clarity about who was responsible for improvements, or how to make changes, prevented the results from being used to their full potential. This has meant that consistent feedback over time has not always been acted upon, and many staff have expressed skepticism about assessment activities because they do not always appear to lead to visible improvements.

In light of these challenges, the authors made a number of changes to the UW Libraries space assessment program during the 2016–2018 pilot. These changes focused on four key areas:

1. Developing a mixed-methods toolkit that could provide a more complete picture of space use and needs in specific spaces and that could be scaled across our system

2. Broadening and refocusing discussions with staff to surface shared questions and foster ongoing conversations about our users' space needs

3. Creating tailored reports and visualizations to draw together data from a variety of sources to encourage taking action on results

4. Taking a more collaborative approach to data analysis and emphasizing shared decision-making in order to help staff move from results to action

The following sections explore highlights from each of these areas, followed by a discussion of what the authors learned from the pilot and next steps for operationalizing this approach.

Developing a scalable mixed-method approach

The first change we made to our program was an attempt to develop a mixed-methods strategy that could be deployed across our system. The UW Libraries has a long-standing and highly successful space survey: the In Library Use Survey, which has run every three years since 2002.[5] This survey provides important data about who is using library spaces, what users are doing in the spaces, and how long they stay in a library during a specific visit. In the past, survey data has been used for improvement and advocacy, and we were scheduled to undertake another survey in 2018. The In Library Use Survey has been our primary method for gathering space data, in addition to various small scale, ad-hoc projects, often focused on a single space. While the survey provides useful quantitative and qualitative data (in the form of comments about desired improvements to spaces), conversations with staff at the start of the pilot pointed to questions that were not always answered using survey methodology. Staff questions focused, for example, on whether there was the right mix of collaborative and individual study space both in individual libraries and overall in the system, or if there were underutilized library areas that could be reconfigured to better meet user needs. It was clear that a range of methods was needed to explore these questions more fully, and the authors began to explore how a mixed-methods approach might be implemented system-wide.

To do this, the authors focused on developing space counts and observation protocols for selected spaces. The tool for space counts was a map of the space, which was then used as the basis for visualizing the data (see Figure 1). Counts were conducted during set sampling periods over an entire academic quarter (approximately 10 weeks) by assessment staff, as well as student employees who worked at particular libraries. The pilot began with two smaller spaces within one of our larger libraries to test these tools and explore whether our approach would be scalable across different spaces and sustainable over time. After this initial effort, the tools were refined and then used for increasingly larger and more complex spaces in different libraries. To date, this approach has been tested in six different spaces (four branch libraries of varying sizes, and two distinct spaces within our largest library building). While we have had to develop modifications for larger spaces (carefully targeting our selection of locations to observe in larger libraries, for

example), the authors have found that the count and observation protocols have been relatively easy to replicate across spaces of different types and sizes.

Figure 1.
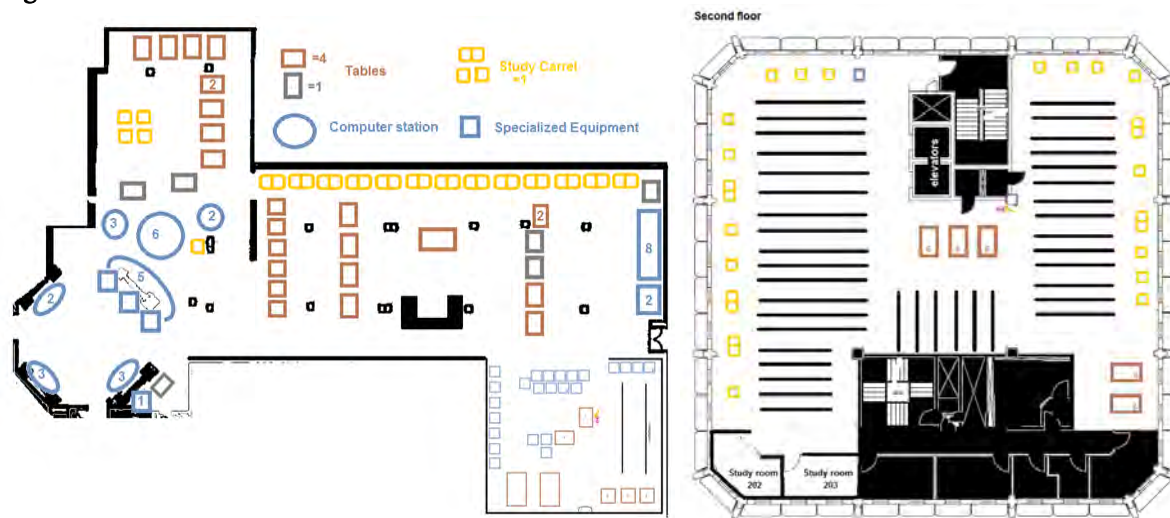
Two maps for space count data collection. Staff ticked off occupied spaces as they walked through the area and assessment staff entered the data in a digital form. Each location indicated on the map has a unique identifier that maps to additional context about the space, e.g., the capacity of the table or type of equipment.

In addition to space counts and observations, the authors also drew upon existing data such as circulation and reference statistics, computer logins, and gate counts. Gathering data using this mixed-methods approach has enabled us to triangulate results and build a more comprehensive picture of space use in different libraries, as well as across the system. This approach spoke directly to staff questions about how specific spaces were being used and provided immediately actionable data for improvements to furniture and seating configurations, as well as signage and placement of key equipment such as charging stations (or the removal of equipment that was not consistently being used).

This approach will also serve us well for longer-term space planning and improvements. Having a snapshot of current use from space counts, for example, will enable us to make better data-informed changes. This will reduce the chance of unintended consequences as we make incremental changes to spaces and respond to one set of needs without considering the whole picture of space use patterns (e.g., if we increase capacity for collaborative space in an underused area, but unintentionally create new space pressures or noise issues as result).

The result of this change to a mixed-methods approach is a set of tools that can be scaled up or down, depending on the size of the library and the particular questions being asked. Having this toolkit means we can now develop a routine schedule for assessments—rotating regularly through all our spaces as needed—so that we can engage in ongoing data gathering. As spaces change, we anticipate updating the data collection tools (such as the maps for space counts) to reflect the most recent configuration.

Focusing on questions and ongoing conversations with staff

The second area of change for our space assessment program involved surfacing common questions with staff about library spaces. At the start of the project pilot in 2016, and again in early 2018 when revising the latest In Library Use Survey, the authors held a series of discussion sessions with staff across the libraries. In the sessions, we asked staff to brainstorm questions about library spaces and user needs using two brief prompts:

- What questions do you have about library spaces (how spaces are being used, who is using them)?
  - These can include questions not only about the physical spaces themselves, but also questions about the services/resources/technologies provided in the spaces.
  - These can be about a specific library or the system as a whole.
- What kind of information about library use would be helpful for improvement? For advocacy/outreach?

As a result, the authors were able to identify a number of common questions across the system, and staff were able to see where their questions were shared. This has provided us with a bank of questions that we are now able to draw upon for more targeted projects either at a single library or across multiple libraries where questions are shared. We are collaboratively reviewing these questions with staff in 2018–19 to decide on which projects to prioritize based on resources and strategic importance.

It is our hope that creating this common set of questions will enable us to move from an ad-hoc approach to space assessment to one that is more collaborative, predictable, and programmatic. This does not preclude library staff from pursuing their own "pop up" assessment projects as needed (informal whiteboard assessments, for example), but it provides a more holistic picture of the questions about our spaces and users that we need to explore together in a more systematic way. In taking this more coordinated approach, we also hope to be better able to surface actionable results from different projects that can be applied to different spaces.

Fostering discussions focused on staff questions about spaces also enabled us to "close the loop" more effectively when reporting assessment results. We mapped results to original staff questions so colleagues could see where their questions were answered and where we might still need to do additional work. The questions that remain unanswered (or new ones arising out of the results) are then added to the bank of shared questions for possible future projects.

Tailored reports and visualizations

The third area we changed in our approach to space assessment involved how we communicate assessment data to colleagues in order to improve the use of results. Over the course of the pilot, we focused on creating tailored reports and visualizations that combined multiple data sources. These provide a more holistic picture of activity in specific spaces and across the libraries and highlight key messages from users. For example, in reporting the results of the mixed-method space assessment of our Engineering Library conducted in spring 2018, we included quantitative and qualitative data from observations, space counts, the 2018 In Library Use Survey, as well as other library data such as gate counts, circulation, computer logins, and questions asked at service points. Reports also draw upon comments from previous In Library Use surveys and other assessments to highlight where persistent issues still need to be addressed, thus creating a greater sense of urgency about long-standing trends and pain points for users.

The reports that provided a more comprehensive picture of space use were complemented by interactive Tableau dashboards created by one of the authors (the assessment and data visualization librarian); the dashboards are based on space counts and allow staff to explore space and furniture use in different ways: by type of seating or space (e.g., group study rooms, individual study carrels, multi-person tables), by floor of the library, by time of day/day of the week, and by occupancy rate in terms of the capacity for that particular type of space (see Figure 2).

Figure 2.

Two space assessment project dashboards in Tableau. Interacting with these dashboards, as shown in the lower right, highlights related information and allows exploration of space count data in additional depth.

While time-intensive to develop, these reports and dashboards now provide the templates we use for all space assessment reporting. Feedback from staff indicates that these have helped staff feel greater ownership of results. In addition, producing this package of results has also reduced the overall time we spend in answering questions about the data. The interactivity provided by the dashboards also allows staff to explore results as additional questions arise, and the dashboards provide some starting, baseline data that staff can use for ongoing decision-making and exploration.

Collaborative analysis, recommendations, decision-making

A final key change in helping us pilot a more collaborative and sustainable approach to space assessment involved increasing staff involvement in data analysis, decision-making, and communication with users. This change was designed to address the challenge staff often faced in translating results into action from prior space assessments such as the In Library Use Survey. In light of the significant amount of time and resources the UW Libraries invests in developing and implementing space assessments, the authors believed that a truly sustainable approach to our space assessment program needed to be built on a shared commitment to using and communicating results and subsequent improvements.

In order to help staff make decisions and translate results into concrete actions, we took a variety of approaches during this pilot period. First, we engaged staff in the process of making sense of the data. For mixed-methods space assessments in business, engineering, math, and selected spaces in our largest library (Suzzallo Allen), for example, we provided stakeholders for each project with a draft dashboard and preliminary report with a set of draft observations. Rather than simply presenting the results (in finished reports with recommendations), we engaged staff in conversation about what they saw in the data and whether our observations aligned with their interpretations of the data and their experience in the spaces. We posed questions about what the data meant and what possibilities they saw for action, including their recommendations. We then revised the reports and dashboards accordingly to capture the collective analysis and recommendations. We later returned to staff involved in these projects to see if additional data was needed, if any questions had arisen during the process of acting on data, and what improvements they had made.

Second, the authors held a series of larger group discussions with staff to explore data from the 2018 In Library Use Survey and to generate recommendations collaboratively. We focused these discussions explicitly on how to move from results to action. Our goal was to help staff practice moving from "what is this data saying?" to "what do we do with it?" In addition, we piloted working in partnership with staff members in different libraries to plan these staff sessions. In this approach, we provided some preliminary observations arising out of our survey data analysis, then met with a staff person from that library to identify what seemed actionable based on their experiences of working in the library. While we were able to provide our expertise in data analysis, they provided important context for the data and a clearer vision of those recommendations for improvements that would get wider buy-in from their colleagues. As a result, we were able to highlight the most important results for staff and spend more time talking about what to do with the data during these staff discussions.

Finally, we convened a temporary cross-departmental stakeholder group for our largest library to discuss results and decide who was going to take responsibility for next steps. As discussed previously, uncertainty about who was responsible for acting on results meant that clear (and, in some cases, easily actionable) results often did not lead to changes. Bringing together key stakeholders for the first time allowed everyone to develop a shared understanding of the data and an action plan for implementing changes.

Key takeaways

This 2016–18 pilot has been a time-intensive effort. While we are continuing to operationalize this new programmatic approach and reflecting on the outcomes of this work, we can offer some observations about what we have learned for those interested in undertaking this kind of programmatic, collaborative work at scale.

One of the most important takeaways from this pilot is the importance of starting small and scaling up; while the first mixed-methods project (as well as the reports and dashboards) took a significant amount of time to develop and implement, we were able to improve the methodology, tools, and processes before moving on to more complex spaces. Taking a gradually scaled approach has enabled us to see what works across different spaces in ways that are sustainable for us and our colleagues. With each subsequent iteration, we have been able to move more rapidly to implement data gathering, analysis, and reporting. In addition, developing a toolkit of tested methods that can be scaled up or down depending on the space and the particular questions being asked means that the methods are adaptable by staff who wish to engage in ongoing and more consistent data gathering in their own libraries.

While taking a mixed-method approach is standard for many space assessment projects, we learned that this is an approach that can be scalable and sustainable for a larger system. The up-front investment of time is significant both to develop the space count tools and observation protocols and to marshal additional relevant library data (such as past survey results, circulation, and computer login data). However, the authors believe this investment has been worthwhile: we now have a system established for gathering and reporting this data in an ongoing way. We found that including data we already collected for reporting

provided valuable context for the space data and helped legitimize some of our findings as longer-standing trends. Carrying data forward from previous assessment projects helped us highlight ongoing issues for users. As a result, we are engaged in more continuous space improvement for our students and faculty, and also have data available when opportunities arise for more substantial changes and when we need to respond to questions about how our spaces are being used (and the value those spaces provide).

However, using the space counts and observation tools across different libraries of varying sizes—and with staff groups who may have some, but not all, questions in common between their libraries—requires balancing flexibility and consistency, local questions and a system-wide view. In our earlier projects, the authors tended to define categories based on the library's specific needs. For example, one library was only interested in knowing *if* a study room was occupied, but another was concerned about the size of the groups in the rooms. Our initial data collection between the two was not consistent. Working toward greater consistency in these decisions will help us roll up results more effectively to a system-wide analysis, while maintaining the "on the ground" utility to library staff.

Lastly, collaborating with colleagues has been an important element in terms of a more holistic approach to addressing questions about library spaces and taking action on results. Generating a shared list of space-related questions has revealed where coordinated approaches might be taken, which in turn is helping us to establish a schedule for assessments, manage increasing demands on our time, and make ongoing assessment a more routine practice. Likewise, engaging in collaborative discussions focused on decision-making has been key in moving forward with results. However, as we continue this work, we need to explore more effective ways to have these discussions; in the absence of a libraries space committee, for example, the work of coordinating staff conversations across a large system often fell to us, which meant we spent less time engaged in assessment activities and more time facilitating discussions between departments that are sometimes in silos. While this was critical in taking action on assessment results, in the long term, a more coordinated process is needed so we can hand off results to staff more quickly to implement changes.

Next steps

There are a number of areas we have identified for next steps in our evolving space assessment program. In 2019–20, we hope to roll this approach out more widely to the largest library in the system. This will be our biggest challenge yet in understanding how to scale this mixed-methods approach.

We are also aiming to develop a more coordinated system for tracking improvements and communicating changes to our user communities. In such a large, decentralized library system, changes are often not communicated back to assessment staff, making it challenging to know when and how results are being used. Historically, assessment staff have returned to spaces and noted any changes themselves, but this has not always been consistent; as the pressure of undertaking the next assessment project was felt, following up on changes often fell lower on the list of priorities. The authors are now following up more systematically with staff on changes resulting from these assessment projects and tracking these changes; this will enable us to communicate these improvements more effectively to users.

We are also encouraging staff to communicate with users more routinely on issues arising out of assessment: the Assessment & Data Visualization Librarian has created a template that staff in a variety of locations can use to share with users what we heard and what we changed. This template is designed to make the process of closing the loop with users more sustainable for library staff. Just as importantly, we are also encouraging staff to communicate with users about why certain changes might not be possible right now, indicating that we have at least heard their feedback.

Most importantly, our longer-term goal for our space assessment program is to center equity and inclusion in consideration of both ongoing improvements and long-term space planning. One element of this is to partner with users more meaningfully in all aspects of the space assessment cycle, from formulating questions, deciding on methods, analyzing data, and shared decision-making. While past space assessments have involved students in design charrettes and focus groups, student involvement in the overall process

(particularly in shared data analysis and collaborative decision-making) has been limited. A second element involves gaining a better understanding of the ways in which our spaces may not be inclusive of the diverse communities we serve. Our space assessments up to this point reflect those who are already using our libraries, and there are students and faculty who may choose not to work in our spaces because their identities, communities, and ways of working may not be reflected there.[6] Gaining a better understanding of how we might make our spaces more inclusive for all our students and faculty and how they use available spaces outside the libraries will be a key goal for our space assessment program at the University of Washington Libraries.

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Endnotes

1. Gerke and Teeter, "Counting Heads"; Andrews, Wright, and Raskin, "Library learning spaces," 647–672; Shannon, "Driving the BUS."
2. May and Swabey, "Using and experiencing the academic library."
3. For the purposes of this paper, we are focusing on the libraries at the largest campus, in Seattle, WA. While we are considering how libraries at our Bothell and Tacoma campuses fit into this overall approach, these campuses have different contexts and local needs that are beyond the scope of this paper to discuss.
4. Fournier, Hornby, and Richards, "Active Learning in Odegaard Library."
5. Hiller and Belanger, "User surveys at the University of Washington Libraries."
6. Brook, Ellenwood, and Lazzaro, "In Pursuit of Antiracist Social Justice."

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Discovering Access: Uncovering the Connection between Office Spaces and the User Experience

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Introduction

Since the renovation of our library ten years ago, we have taken a user-centered approach to the improvement of our public spaces. As their needs have changed, we have taken every opportunity to listen to our users in order to create spaces and services that contribute to their success. But can we say the same about our approach to staff office spaces? In our Access Services department, the roles and responsibilities of staff have changed significantly over the past decade, and yet their office workspaces have stayed largely the same. Using many of the same user research methods we have used to study our patrons, we have spent the last year working closely with our staff, using their feedback to design an office environment that will help them be successful in their work. To our surprise, our findings revealed that many of the issues with the staff offices had a direct impact on our circulation desk and the quality of service being offered to our patrons, and what began as a behind-the-scenes effort has become a complete overhaul of our desk and service model. We will share our methods and findings, as well as our plans to renovate the circulation desk and move towards an integrated single service point.

Building the case for new offices

Before exploring our methods and results in more detail, it is important to understand the role of Access Services and support staff within our library and what prompted the need for new office space. Changes in the services provided by Access Services staff and the level of service expected by patrons have shifted dramatically in the past decade. Gone are the days when support staff positions were primarily focused on staffing a busy circulation desk. With technology-rich and collaborative spaces increasing within libraries and the creation of popular technology lending programs, the support for those spaces and services has been folded into the jobs of our Access Services staff.

In addition to having responsibilities that have expanded beyond the bounds of traditional Access Services work, as staff retire or leave the organization, departments have shrunk and Access Services staff are frequently asked to take on more responsibilities. Overall, the percentage of staff time that is allocated to work the circulation desk each day has dropped dramatically, and the majority of their time is spent focused on other, more specialized tasks: scanning materials for digital course reserves, providing support for specialized equipment, stacks management, AV/tech assistance for classrooms and conference rooms, interlibrary loan and document delivery, and even programming/coding. This is work that requires dedicated time and focus, and some measure of audio and visual privacy for concentration.

To illustrate just how significantly jobs in Access Services have changed, we have included examples of current staff job descriptions with those of staff from 10 years ago (Appendix A). Staff in our department currently have between 15 and 25% of their time allocated for circulation desk duties, with the majority of their time spent on other essential tasks. For example, one of our staff members spends about 50% of his time providing learning and technology support; 25% of his time providing multimedia instruction for patrons; and only 15% of his time assisting patrons at the circulation desk. Compare this to a more traditional job description from 10 years ago, when Access Services staff were dedicated to circulation desk functions for almost 50% of their time, and it is evident how much these positions have changed.

Having convinced library administration that Access Services jobs are not what they used to be, we were given the green light to propose a new office layout and an estimated budget. To inform this proposal and budget, we took an assessment approach similar to what we might do if we were renovating public spaces.

We did a thorough review of the staff and service space functions in Access Services that needed to be accommodated in any new design:

- Staff office space
- Reshelving area and book trucks
- Hold/reserves/interlibrary loan pick-up shelves
- Equipment and peripherals for loans
- Laptops (short- and long-term loans)
- Plotter printers and supplies
- Staff conference/meeting space
- Student employee space
- Multimedia consultation space
- Payments: fines/fees, printing, posters
- Dedicated staff and student workstations behind the service desk
- Pick-up area for shipping bins
- Staff printers and copier

When we began this assessment process, we believed we had a solid understanding of the issues facing Access Services staff. We knew that we needed additional office spaces, as some staff were being temporarily housed in the interlibrary loan office, away from the rest of the Access Services department. There had also been numerous requests from all staff for more private office spaces that would enable them to do their more focused, quiet work. We were also well aware that supervisors needed more privacy for meetings with staff. Similarly, the conference table where we often had department and small group meetings was frequently co-opted by our student staff, as they had nowhere to store their belongings or hang out before/after their shift. There was a very clear need both for staff meeting space as well as storage and break space for student employees.

Beyond the need for better staff offices and meeting spaces, several service areas were in desperate need of improved storage and accessibility. Our specialized equipment for loan, a service that has grown rapidly over the past five years, includes DSLR cameras, audio recorders, podcasting microphones, and more. This equipment was being stored precariously on existing bookshelves, and the charging stations for this technology was haphazardly rigged together with extension cords—a less than ideal set up. Finally, there were highly-circulating items such as course reserves that were located too far away from the circulation desk, and often created the illusion that there was no one available at the desk to assist patrons when, in fact, staff were frequently hunting down items back in the shelving area.

Design methods and results

Having taken a user-centered approach to the development of many of our public spaces, we decided to take a similar approach to assessing the needs of our staff. We used a mixed methods approach, developing and distributing a staff survey that asked 10 questions about the nature of their work (Appendix B). We followed the survey with in-depth interviews with staff to probe their answers, as well as a card sort activity that allowed staff to rank in order of preference the type of office environment they preferred. Finally, after receiving the initial designs from the interior designer, we had staff provide detailed feedback and suggestions, a step we repeated multiple times throughout the design process.

This process was very eye-opening, and after reviewing the surveys and interviews with staff, certain themes emerged that were consistent across all staff regarding office space.

Office size could be reduced but it was important to have a dedicated space. Many of our support staff had offices that were twice the size of the offices of many of our academic staff at roughly 200–250 square feet. While staff were willing to reduce the size of their space, it was still important to them to have their own dedicated space with walls. An open office environment, a growing trend in offices in many industries, was universally disliked. Though staff understood that, in an open office environment, there would still be an

opportunity for personalization of spaces, that did not instill enough of a sense of ownership and belonging in the same way that dedicated office spaces would.

More visual and acoustic privacy was needed. The circulation desk is a busy place and there are many distractions and expectations for staff who work the desk. Visual privacy is crucial to helping staff disconnect from the service point without the expectation that they would have to provide service when they were engaged in other tasks. Many of the staff told us that they often put on headphones and listened to music in order to tune out what was happening around them. Open cubicle and office environments bring with them distractions that do not always create the best environment for staff to do their work. In their article, "Challenges of Redesigning Staff Work Space," vanDuinkerken and MacDonald note, ""Crowding and the sense of loss of privacy contribute to job dissatisfaction because some employees begin to feel frustrated with their inability to focus on their job functions to complete assignments."[1]

All offices contained unused and unnecessary furniture. For better or for worse (mostly for worse), the Access Services area had become a place for all library staff to deposit items that they no longer needed. Because staff in Access Services also handle facilities and maintenance responsibilities, there is an expectation from other staff that they will know how to get rid of something that no one else knows how to get rid of: unused toner cartridges, broken chairs, and outdated laptops. Many of these items will be routed to their proper place for disposal but more often than not, they end up sitting unused in someone's office, taking up valuable space. By identifying items in their offices that were no longer needed, staff started to think about efficiency in their office space that they had not considered previously.

All staff are doing a mix of collaborative and focused, individual work each day. As mentioned previously, the staff in Access Services have seen their job descriptions change drastically in the last 5–10 years. There is a level of technical expertise expected of all staff, whether it is printing a poster, troubleshooting Wi-Fi connectivity issues, or showing patrons how to use the specialized equipment that we circulate. Staff are also frequently asked to join different library project teams or committees and are encouraged to work collaboratively to solve issues, so each staff member's daily schedule includes a mix of meetings, desk shifts, and focused/individual work.

Most staff need multiple work surfaces. As job responsibilities have become more multifaceted, the type of work space needed has changed. Just as our patrons need a variety of work spaces and surfaces, our staff do as well. Having different options in their offices is important, but we also wanted to explore the possibility of creating that variety in some shared "flex spaces" that all staff could use.

Natural light and/or quality of overhead lighting is important. Task lighting and natural light make an enormous difference in our ability to perform the work we need to do. The quality of light affects how much our eyes have to strain and focus, and poor lighting can lead to eye strain and headaches. Our overhead fluorescent office lights often flicker despite regularly changing out the bulbs, and the lighting is zoned, making it difficult to adjust the lighting for one office without affecting other areas nearby.

Much to our surprise—though given the shift in job responsibilities and expectations, perhaps it should not have been—staff were unable to separate their comments about their office environment from comments about the circulation desk. It was clear that, for an office redesign to function the way that staff would like, the desk needed to change as well, which we had not anticipated at the start of this project. We were able to identify consistent themes that emerged regarding the desk layout.

Line of sight to the circulation desk is a double-edged sword. As we continued to talk with staff about their survey responses, it was increasingly clear that the value placed on making sure that all staff had a direct line of sight to the front desk from their offices had created an expectation among staff that they were always on call. As we have given staff more responsibility and asked them to take on work that requires more focus, that expectation to always be available meant that staff felt like they could never do either portion of their job well. Not only were staff feeling like they could not focus on their individual work, but patrons had an unrealistic expectation of staff availability because they could easily see a staff member in his or her office

who was not getting up to help them at the desk. Our hope was to be able to create an office and desk environment that enabled staff to do the work they needed to do with the freedom from constant interruptions.

Shared workstations for shared tasks. There are many staff that share responsibility for a functional area—e.g., course reserves processing—so that we can provide patrons with resources in a timely manner every day of the week. Sharing some of these functions has proven to be problematic when the task is shared between two individual office spaces. Staff would feel uncomfortable intruding on someone else's space to continue the work that needed to be done. Moving the work back and forth between offices was inefficient and did not solve the awkwardness of intruding on each other's space.

Better storage solutions needed for equipment. With a growing equipment lending program, creating adequate storage for that equipment has become crucial. Even circulation desks built as recently as 10 or 15 years ago were not built to accommodate checking equipment out/in, charging devices, and maintaining equipment like projectors, digital cameras, laptops, etc. Designing a desk that would allow for all the processes needed for circulating equipment to be as seamless as possible was a high priority.

Better student employee space with storage. Our previous staff meeting space was a large conference table that was out in the open in a high traffic staff area. As one of the few open staff workspaces, the conference table became the spot for student employees to put their coats, bags, and whatever else they might be carrying with them. Holding a meeting at the conference table became quite labor intensive, having to remove all of the students' items to be able to even sit down. We needed a better storage solution for all of the students' belongings, not only to help ourselves when we needed to meet, but also to create a comfortable space for student employees that showed them how much we value them.

Improved supervisor station. The staff workstation, located between the circulation desk and the staff offices, was cramped and cluttered and did not have enough storage or workspace for items that needed to be processed. Staff would frequently use whatever other surfaces were nearby to store items that were being processed, giving the entire Access Services area a disorganized and disorderly appearance that was in full view of the public.

Easier and better access to high demand items was needed. In the previous desk configuration, students and staff working at the circulation desk had to do quite a bit of traveling to retrieve the high-demand circulating items such as course reserves from the shelving area behind the supervisor workstation. We wanted to move some of our more high-demand items closer to the front desk stations so that these items were more accessible to staff, which would allow us to provide faster service to patrons.

Finally, in our discussions with staff, there were themes that emerged that spanned both the desk and the office spaces.

There is enough space for both the staff and public service functions, but it was not being used efficiently. Most staff felt that the amount of square footage designated for staff offices and for the desk functions was more than adequate but that it was not being used as efficiently as possible. Our challenge was to think through procedures and workflows with a designer to develop a layout that allotted the appropriate amount of spaces to particular functions.

Implicit message with the current state of the desk/office space conveys clutter, chaos, disorder, and "awkward uncertainty" to our patrons. "As the frontline of library public services, circulation is a very visible unit, experiencing all the associated positive and negatives with high visibility. 'If the library had a cat, the litter box would be in circulation.'"[2] This sentiment is certainly one that came out during our interviews with staff about the public perception of Access Services. Perhaps one of the most interesting set of questions we asked staff during the interviews was about the message the current desk configuration and office set-up was conveying to our patrons compared to what message staff **wanted** it to convey. Staff felt that our current configuration was overwhelmingly sending a message of chaos and clutter to our patrons and

one that did not provide any clarity on what services are provided at the desk. Across the board, everyone wanted the desk and office space to be welcoming, helpful, efficient, and professional and felt that conveying that first impression would improve the customer transaction from the start.

Modularity and re-configurability of the desk. Our initial thoughts on this new desk reconfiguration was focused on not only making the current functions more efficient, but also allowing for greater flexibility so more functions could be added in the future, such as reference services. In recent years, there has been a "one-stop shopping" trend[3] for combining service points in academic libraries, and we knew it was a possibility that we could consider this service model in the future. Recognizing that spaces and services have changed on what seems like an annual basis, we wanted our desk to reflect the new normal for libraries: they are always changing. To do this meant that the desk needed to be modular so that it could be easily reconfigured as our needs and patron needs continue to change.

Without a grand budget, we also had to be cognizant of architectural factors that would limit our design decisions—primarily, the current footprint of the desk and offices, our inability to build floor-to-ceiling walls for staff offices, and what might fit nicely with the current furniture aesthetic in the rest of the building.

Combining service points

As mentioned earlier, the plan to design a modular, moveable service desk was to allow for flexibility in the future to incorporate additional services—namely reference—to be added to this service point. While we thought we would have more time after the installation of the new desk to work with staff to outline a model for creating a single service point, it was ultimately deemed that we should take the opportunity of the desk renovation to combine reference services with circulation and poster printing in time for the fall 2018 semester. This was obviously a much shorter timeline than we had anticipated and presented us with many challenges, not least of which was creating a sense of buy-in with frontline staff.

To complicate matters, the entire first floor was going to be re-carpeted at the same time that we would be installing new staff offices and a new desk and service model. We also experienced unusually high levels of staff turnover in our reference department and we unexpectedly found ourselves short-staffed right before the start of the fall semester. Needless to say, it was a juggling act both from a logistical and personnel perspective. We had a few weeks to modify plans for the desk, talk with reference and Access Services staff about the new service desk/model, and figure out a temporary plan for providing services to patrons during the renovation. Unfortunately, we had little time for developing a shared vision for what a single service point might look like, and what the roles and cross-training expectations would be for staff and student employees.

This is a difficult portion of the desk redesign to discuss because we are only now having the time to think through the staff expectations as thoroughly as we would have liked. One challenge we knew we would have to tackle early on is deciding what level of research support is reasonable to provide at a combined service point, and what needs to be referred to a librarian for a longer consultation. One challenge we did not initially anticipate was the fact that so much support was already happening at the circulation desk— everything from poster printing, holds/reserves/interlibrary loan pick-ups and policy communication, to multimedia consultations, AV help, equipment loans, and room reservation support. This has meant that circulation was a really difficult service to incorporate, and the cross-training of reference staff has proved to be quite challenging.

Present day

After many construction delays and logistical challenges over the summer, the new staff offices and service desk were installed in the middle of August 2018. Despite our frustrations with the short timeline, we have already seen many positive improvements. With better storage solutions throughout the space, the circulation desk area is tidier and more organized. The most highly-circulating items, such as computer and phone chargers, headphones, and course reserves are located much closer to the front desk workstations. The specialized equipment is now being stored in lockable storage cabinets that are much better-suited for

equipment storage. The lighter countertop and the lower height of the desk makes it much more approachable for our patrons. In a focus group session conducted to determine what students thought of our new desk, one student noted that the new desk "mimics the feel of the rest of the building now" and is "bright, open and approachable." In an effort to improve our commitment to diversity and inclusion, we adhered to universal design principles and chose a height and depth for the desk that makes it more accessible to patrons with disabilities. We made one section of the desk recessed from the patron side so that it is wheelchair accessible.

The staff offices have also proved to be a big improvement, with higher walls covered in sound absorbing material to provide greater audio privacy. Sliding glass doors allow staff to indicate to each other when they are doing focused work and help prevent frequent interruptions. The student employees have a comfortable new gathering area with soft seating, a group table and chairs, and shelves for storing personal items while they are on shift. The staff conference table, located further away from the student employee area, is now used for its intended purpose of facilitating staff meetings.

There is still much we would like to improve, including more clearly defined roles and responsibilities for reference staff. With little planning time for combining service points, there is a lot that is not working ideally. The location of the reference portion of the service desk is in a prime traffic flow spot on the first floor. While this has led to more interactions with students, the reference area has become the drop-off spot for equipment returns and other materials. Equipment loans have also proved to be challenging, as it takes time to find the patron's reservation in the system, and additional systems outside of the integrated management system used to keep operations functioning have been a training challenge.

Assessment

The work on the desk is far from over and we are committed to this being a continual process of evaluation and change. To that end, staff have provided a first round of feedback which has been sifted through for common themes/areas of overlap and a prioritized list of areas of effort was established, with work beginning on that in recent weeks. In addition to staff feedback, we are working with two staff members who have training and experience in user experience design who are observing interactions and workflows at the desk and providing a list of areas that they think are problematic. Finally, we plan to do further assessment with our patrons so that we can be sure that, from their perspective, there are not any gaps in service or frustrations with the new design.

Lessons learned

Throughout this process, it was very challenging to value both sets of users in this scenario—our staff **and** our patrons. Now that the focus of our work is shifting slightly to assessing whether the new service desk is meeting our patrons' needs, staff need to be reminded that the patron feedback is equally important in evaluating the success of our design. Sometimes the optimal user experience for our patrons does not align with the optimal user experience for staff. Designing a service or space that is mutually beneficial is difficult to navigate and requires an open mind and lot of patience.

Emotional management has been challenging and time-consuming. Soliciting staff input in the manner that we did has opened the feedback floodgates and, while we are thrilled with the level of engagement that it has ignited, the continued suggestions, ideas, and critiques have been a bit overwhelming. Moving forward, we need to find a balance between keeping staff engaged in the process so they feel a sense of ownership and are invested in the improvements, but also keep their expectations reasonable.

Lastly, the changing nature of Access Services work in general (but also in light of the new combined service point) has been a reminder that we should continue to examine our service philosophy to make sure that those customer service expectations are in line with both the work that needs to be done and the number of staff available to complete that work. We want to continue to provide excellent service to our patrons, while recognizing that the retail industry service model is not necessarily the most appropriate for the nature of library work.

Conclusion

This project made it clear to us that there was an obvious connection between the office environment and the user experience. When we design state-of-the-art study spaces and classrooms, what we are saying to our patrons is: we see the value in what you are doing, so we are going to create a space that allows you to do it well. This is an important message that should carry over to staff, but it often does not. Staff were feeling stressed about their ability to complete their work in an office environment that was not conducive for the kind of work they were doing, and they were telling us that it was impacting the quality of service at the desk. Not only was their individual work suffering, but the shared responsibilities that took place at the service desk were suffering from an outdated design.

We are intending this to be an ongoing design process, particularly since incorporating reference services into the help desk came very late in the design process. While we were able to make accommodations, the desk had not been designed with this service in mind so our assessment efforts will now be focused more on gathering feedback from students and staff, additional observations, and then modifications to the design or service as needed. User needs—both staff and patrons'—will continue to evolve and we want to make sure that our desk design is responsive to those needs.

Ultimately, it was important to create an office environment where staff felt like they could do their best work. By giving staff space that allows them to remove themselves from the busy desk and do the work they need to do, they will be more focused and attentive when helping our patrons. And by focusing on staff needs, listening to their issues, and incorporating their needs into the design, our hope is that we have communicated to them that they are valued by and provide value to the organization.

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Endnotes

1. vanDuinkerken and MacDonald, "Challenges of Redesigning," 151.
2. Schneiter, "Does Access Services Have a Future?" 213.
3. Crane and Pavy, "One-Stop Shopping," 29–45.

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Appendix A
Figure 1: Access Services Job Description from 2012

RESPONSIBILITIES/ESSENTIAL FUNCTIONS: List the position's assigned responsibilities and estimate percentage of annual time spent on each responsibility. Include only the essential functions that are fundamental and necessary to the position.	Approximate % of time, Annualized
Circulation Management a. Assume responsibility for the day to day management of circulation activity including scheduling, training, and reassignment of staff /student duties, monitoring fine collection and access to the collections; ensure that all software and hardware associated with the Circulation Desk is functioning properly. b. Set the service standard for the Unit and play a major role in setting, interpreting and consistently enforcing policy and determining operating procedures for the Unit. c. In tandem with the Night Supervisor, hire, train, and supervise all students who work at the Access Services desk. d. Coordinate training and follow up training programs for students and staff. e. Participate in the evaluation of full time staff who work at the Access Services desk. f. Anticipate trends and suggest new services and technologies to move circulation services forward. g. Assist with compiling documentation and training staff in the use of the Voyager circulation client. h. Interpret open ended complex queries from the public; must respond calmly, quickly and appropriately to a wide variety of unpredictable and often simultaneous demands/requests form the public. i. Maintain familiarity of interlibrary loan, Borrow Direct and reserve services. j. Maintain a current and thorough knowledge of the Voyager circulation client including the patron file. k. Perform monthly cleanups of Cornell University Collections reports. l. Assist the Head of Access Services with Voyager system administration, including the creation of patron records, circulation matrices and calendars. m. Provide backup to the Head of Access Services for administration of the Citrix Card Access system.	90%
Miscellaneous a. Work on special projects for the Head of Access Services b. Other duties as assigned.	10%
TOTAL	**100%**

ADDITIONAL COMMENTS: USE EXTRA PAGES IF NECESSARY.

Revised 7/03

Figure 2: Access Services Job Description from 2018

Responsibilities/Essential Functions: List the position's assigned responsibilities and estimate percentage of annual time spent on each responsibility. Include only the essential functions that are fundamental and necessary to the position.	Approximate % of time, Annualized
Learning & Technology support • Assess user and instructor technology needs and recommend appropriate hardware and software in support of teaching and learning at Mann Library • Provide frontline support for B30A, B30B, & Stone classroom, working with faculty and instructors to make sure necessary hardware and software are installed, and rooms are in good working order • Conceptualize, plan, support, and assist with AV upgrades • Interpret open-ended queries from the public; respond calmly, quickly and appropriately to a wide variety of unpredictable and often simultaneous demands/requests from the public • Provide AV and video support for events as needed • Assist in the development and design of educational training materials • Maintain a high level of technical working knowledge on multimedia equipment for training, maintenance and purchase needs • Develop and contribute to outreach efforts with special multimedia projects • Collaborate with public access computing (PAC) team members to provide excellent support and service to the Cornell Community • Coordinate software requests with the appropriate CUL, CALS, and CHE stakeholders for Mann Library's public access computers.	50%
Multimedia Workshop Assistance and Instruction • Provide assistance to patrons needing guidance using the library's multimedia technologies for the completion of class-related projects • Assist Emerging Literacies Librarian with design, implementation, and teaching of workshops and instruction sessions • Offer one-on-one consultations by appointment with patrons on the use of multimedia equipment and software	25%
User Services Operations	15%

Responsibilities/Essential Functions: List the position's assigned responsibilities and estimate percentage of annual time spent on each responsibility. Include only the essential functions that are fundamental and necessary to the position.	Approximate % of time, Annualized
• Assist with operation of the Circulation desk in Mann Library, including supervising student employees and working regularly scheduled shifts • Assist patrons with interlibrary loan, Borrow Direct, and reserve services • Interpret loan policies and procedures to library users and staff; resolve public services disputes • Help monitor effectiveness of policies and procedures and provide feedback when appropriate • Troubleshoot and report computer and computer peripheral problems • Address problems with printing, copying, and scanning; help patrons request refunds when appropriate • Assist with poster printing and troubleshoot plotter and printing issues • Help circulate and provide assistance for specialized multimedia equipment • Provide back-up evening/weekend coverage when needed • Ensure a high level of public services by enforcing and evaluating library procedures and policies • Monitor the condition of classroom and meeting room equipment, as well as public computers • Request and assist with troubleshooting and installation upgrades, and overseeing preventative maintenance procedures	
Miscellaneous • Serve on Library and appropriate Cornell campus committees • Other duties as assigned by the Head of Learning, Spaces, & Technology	10%

Appendix B
Access Services staff survey
Access Services Office Redesign

Thank you for taking this space assessment survey! The purpose of this survey is find out more about what type of space and furniture needs you have and how we can best address those needs in the upcoming Access Services office redesign. It should take between 5 and 10 minutes to complete. **Please submit your response by the end of the day on Friday, July 28.**

Q1 Your Name:

_____

Q2 What type of work are you doing in your office? Please be as detailed as possible.

_____

_____

_____

_____

_____

Q3 Which of your work duties require the most focus/concentration?

_____

_____

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_____

Q4 Does any of your work require privacy? If so, please explain.

_____

_____

_____

_____

_____

Q5 On average, how many hours per day do you spend in your office?

○ 0–1 (1)

○ 1–2 (2)

○ 3–5 (3)

○ 6+ (4)

Q6 On average, how many hours per day do you work on the circulation desk?

○ 0–1 (1)

○ 1–2 (2)

○ 3–5 (3)

○ 6+ (4)

Q7 Is there anything you've wanted to try/work on but space in your office was too limited? If so, please elaborate.

_____

_____

_____

_____

_____

Q8 It would be a game-changer for my work if…

_____

_____

_____

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_____

Q9 What works well about the current layout behind the circulation desk?

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_____

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_____

Q10 What could be improved about the layout behind the circulation desk?

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_____

_____

Q11 Any other comments or requests?

_____

_____

_____

_____

Library Design: How Many Seats Do We Need?

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Designing Experiences

What is the one question that comes up on nearly every library design project? How many seats do we need in our library? Libraries have evolved from solely places to access information into places to also connect, create, and collaborate. The balance of their space has shifted from primarily housing books to also providing ample seating for other programming. The balance shifts further as libraries incorporate fun learning activities, active learning classrooms, and academic services partners that transform into student success hubs. It shifts further still with the provision of distributed study space around campus in lobbies, lounges, and project spaces. Libraries are no longer the only game in town!

In this paper, we will outline a new methodology for ball-parking the number of seats libraries should provide.

By creating two new metrics of annual visits per student and annual visits per seat, institutions can use peer benchmarking data to create a weighted forecast that accounts for the utilization of seats.

A Tough Library Design Question: "How Many Seats?"

As complex as these library transformations are, they still leave libraries with a simple question: how many seats do we need in our library? As the purpose and use of libraries have evolved, answering this question became more complicated: standards have been rescinded, heuristics became outdated, and institutions are left with no good answer. For example:

- The Association of College and Research Libraries (ACRL) 1995 standard to accommodate seating for 25% of the student population has been rescinded.
- The Association for Learning Environments (A4LE) 2006 standard of seating for 12% of undergraduates, 30% of graduate students, and 5% of faculty is outdated.
- Benchmarking data from peers is often limited, inconsistent, and outdated; for instance, ARL collected space data only in 2012 and different institutions count seats differently. (For example, are general classroom seats included?)
- When available, peer data do not account for utilization or seat quality, such as the net square feet per seat or the proportion of seats at large tables that are unlikely to be used except for extreme peak periods when norms against sitting with strangers take a back seat.

Evolving to accommodate an expanded purpose and adapting to new uses despite a lack of planning standards is hard enough. But the rise of fully online education and programs that blend online and on-campus interaction further complicate the library design question of "how many seats?"
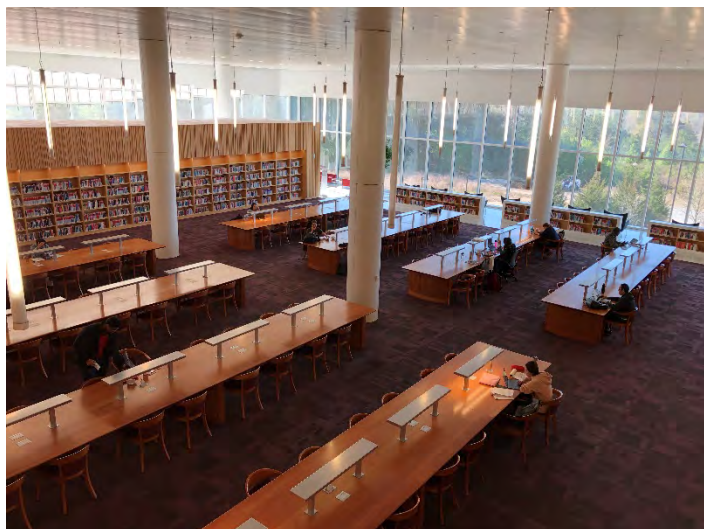
NC State University Hunt Library Reading Room

What are Institutions Doing to Know How Many Seats to Provide?

Faced with this challenge, some institutions simply try to maximize their seating by carefully reducing the space allocated to collections and increasing the space allocated for people, hoping that demand will equal supply. Others target a percentage of their population in a throwback to previous standards or based on a peer average, without taking into account the actual usage of their spaces. Others have no plan at all.

During the 2018 ARL Library Assessment Conference, we polled attendees on this question: "What is the best method to calculate the number of seats in your library?" Of the 63 responses, 67% said, "Collect evidence on how space is utilized," 8% each said, "Target a % of students" and "Just provide as many seats as you can," and 10% had other ideas. This indicated a desire to drive forecasts from real utilization data. The most coarse of these data is a library's gate count—the number of annual visits to the space—but this count can be heavily skewed from one library to the next; for instance, if the library contains a large number of general classrooms or if the library is a passage between other buildings with people passing through but not necessarily entering it.

UMass Amherst W.E.B. Du Bois Library Classroom

What's a Better Way to Answer the Seating Question?

So, how can institutions more simply, reliably, and accurately ballpark the amount of user seating they need? By coupling peer analysis of library utilization with their student population so that their forecast is determined not simply by population but by the predicted usage of space as well.

Using ARL data on gate count and population, we have developed a new methodology that uses the key metrics of "visit per seat" and "visit per student" in order to determine future seat needs.

1. By taking a future student population and dividing by the peer average of "visits per student," an institution can forecast their future gate count (being selective to use peers who have recently renovated and thus have a gate count that is more indicative of the future state).

2. By taking this future projected gate count and dividing it by the peer average of "visits per seat," institutions can then determine the future number of seats needed (and understand this as a percentage of their student population).

For example, imagine a growing campus looking to forecast the seats they will need in their libraries to accommodate 30,000 students in the future. First, select a group of relevant peer and aspirant institutions and calculate their average visits per student. An average of 65 visits/student would then predict 1.95M annual visits and then dividing that by a peer average of 600 annual visits per seat yields an estimated seat count of 3,250 seats.

Future Students	x	Visits/ Student	=	Future Visits	÷	Visits/ Seat	=	Future Seats Req'd

Example:

30,000 students	x	65 visits/ student	=	1,950,000 annual visits	÷	600 visits/ seat	=	3,250 seats (12% of pop.)

Library	Students FTE	Library Seats	% of Students	Gate Count	Visit / Seat	Visit / Student
Institution 1	27,558	2,044	7.4%	2,000,000	978	73
Institution 2	28,321	3,627	12.8%	2,398,544	661	85
Institution 3	63,813	9,280	14.5%	4,450,244	480	70
Institution 4	34,727	2,129	6.1%	1,618,672	760	47
Institution 5	32,255	3,975	12.3%	2,331,031	586	72
Institution 6	27,702	3,320	12.0%	2,266,076	683	82
Institution 7	25,034	3,010	12.0%	1,297,626	431	52
Institution 8	22,391	4,716	21.1%	2,105,527	446	94
Peer Average	32,391	4,013	12.3%	2,308,465	628	72
Forecasted Need	35,000	3,994	11.4%	2,509,305	628	72

Example using peer data to forecast needs

What Data Are Available and What Do They Tell Us?

To begin incorporating utilization data into future forecasts, we used the ARL 2012 survey of library seating and added student population at full-time equivalents (FTE) using data from the Integrated Postsecondary Education Data System (IPEDS) from the US Department of Education.

Of the ARL member libraries, 94 provided seat count and gate count data. We then added operating hours for these libraries that we gathered from their respective websites. To account for the impact of classroom seats (which were separately indicated in the ARL data), we prorated these seats by the assumed hours per week they would be available for library use when not in use for scheduled classes the other 45 hours per week; for instance, if the library was open all 168 hours in a week, a classroom seat would count as 0.73 seats (168−45 = 123/168 = 0.73).

From this analysis, we concluded:

1. There is no correlation (r = 0.04) between how many hours per week a library is open and how heavily it is used (in visits per seat).

2. There is a weak correlation (r = 0.36) between how many seats are provided in the library and how heavily the library is used (in visits per seat).

3. There is a moderate correlation (r = 0.51) between a library's annual budget per student (in dollars) and how heavily the library is used (in visits per seat).

Visits/Student vs. Operating Hours (r = 0.04)

Annual Visits per Student vs. Weekly Operating Hours

Operating Hours	
Median	118
Mean	123
Weighted Mean (by student FTE)	124
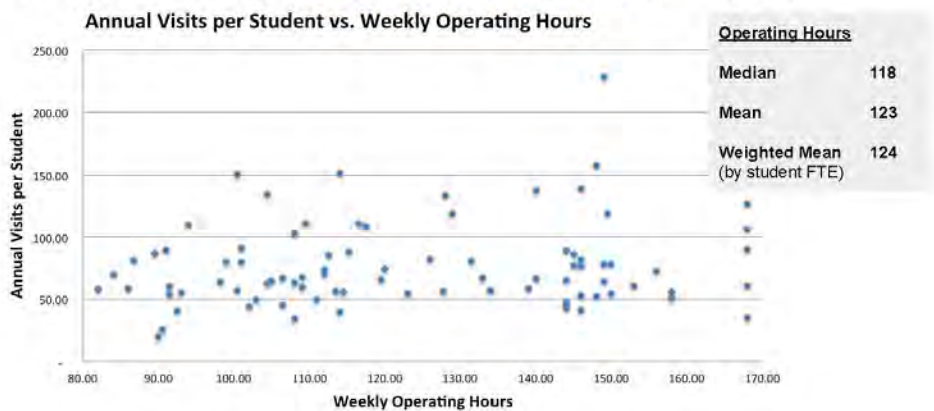
Visits/Student vs. Prorated Seats Provided (r = 0.36)

Annual Visits per Student vs. Adjusted Library Seating Percentage

Prorated Seats/Student	
Median	11.6%
Mean	13.7%
Weighted Mean (by student FTE)	12.4%
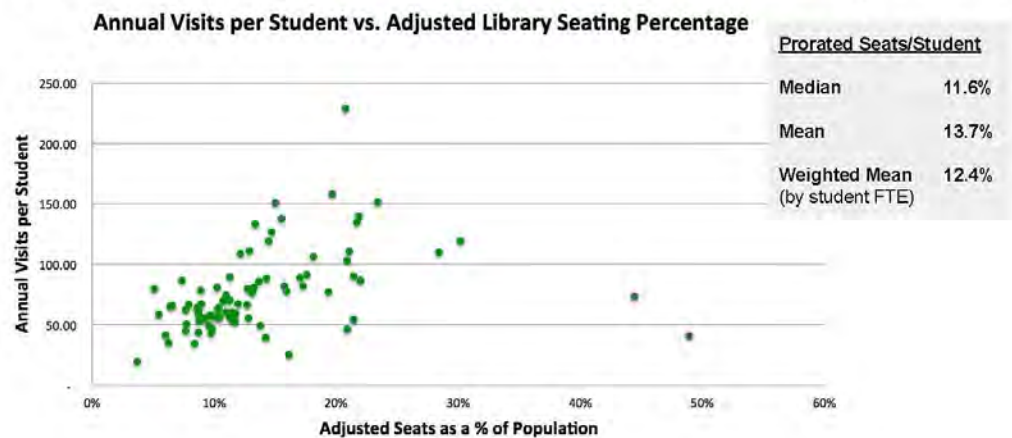
Visits/Student vs. Library Budget/Student (r = 0.51)

Annual Visits per Student vs. Library Expenditure/Student

Budget/Student	
Median	$901
Mean	$1114
Weighted Mean (by student FTE)	$990

Visit/Student	
Median	67
Mean	77
Weighted Mean (by student FTE)	74
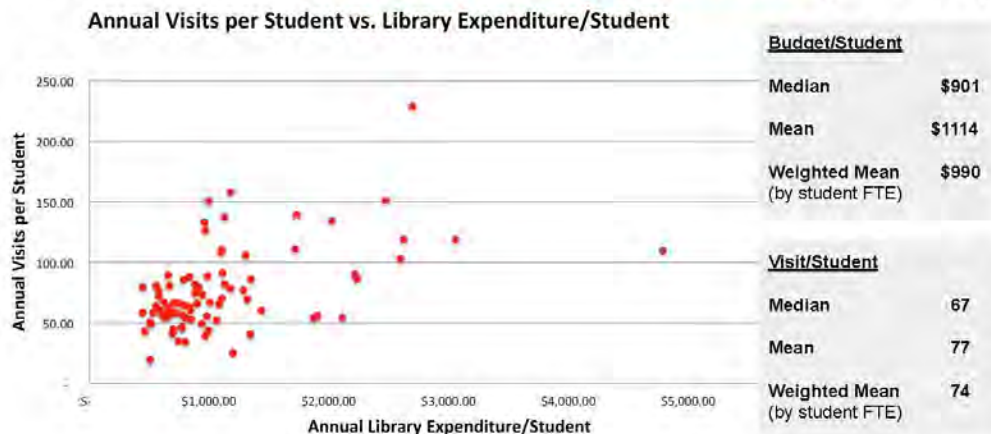
There are clearly many more factors one would need to consider, especially as the investment dollars relate to the utilization of the space. Are better-funded libraries providing better spaces with more comfort and a larger variety of spaces allowing for comfort, food, and other creative activities in a multiplicity of ways? Is there a positive feedback loop in these environments where more emphasis is placed on the library student experience? Are services more responsive to student needs, more flexible to accommodate different levels of need, and are staff empowered and encouraged to use policies for the benefit of the users rather than adhering to them with rigidity? Are their basic fundamental custodial services better funded so bathrooms are always clean, food behaviors better managed, and cleanliness fully served during all working hours?

What Might the Impact of Online Learning Be?

The rise of fully online education and programs that blend online and on-campus interaction further complicate the question of "how many seats?" beyond the challenge of outdated planning standards and piecemeal planning data. The latest report from the National Center for Education Statistics shows online education growing at about 6% a year, with 15% of students fully online, 18% combining online and on-campus courses, and 33% of students taking at least one course online. So, it is tempting to think this will decrease the need for library seating. Not so fast. At least in the foreseeable future, online learning will not diminish the need for library space. This is for two core reasons:

1. Even fully online programs are finding the need for people to meet in physical spaces. For instance, both for-profit and non-profit institutions are creating "micro-campuses" for students to meet, get services, and even attend a class. The online education company 2U created a partnership with WeWork for students to collaborate in their flexible office spaces. This all makes sense given that much of online education remains local: Babson's Survey Research Group found that, in 2016, about 56% of students who took only online courses lived in the same state as their institution, and among students at public universities, this is 84%.

2. The shift to learning that blends face-to-face with online interaction will drive more traffic to libraries. For online, one example of this blended learning paradigm is the "flipped classroom" in which students watch recorded lectures then work on projects together during class guided by their instructors. These students tend to watch the lectures in small groups while pausing, rewinding, and discussing as they go. These students also need places to work on their class projects. Libraries are well-suited to support these projects with flexible, bookable spaces, tools and technology, and staff support.

It is also worth noting that online learning often adds other types of library spaces beyond user seating. For instance, on most campuses, there is a "Center for Teaching and Learning" or a "Center for Excellence in Teaching and Learning" that offers services to faculty and graduate student instructors, such as instructional design, media production, and instructional technology support. These are often best located in the library as a mission-aligned partner and central campus resource, and require spaces for staff to work in, places for them to consult with faculty, places to create videos and graphics, and places for events that showcase work and enable faculty to inform and inspire each other.

Using Seating Forecasts for Better Library Design

Institutions can begin creating utilization-based seating forecasts right away using our analysis of the ARL dataset of 94 libraries with seat count and gate count data. However, while this is a starting point and has limitations because of the number of institutions in the dataset and the fact that it dates back to 2012, we imagine that the academic library community can move forward on two parallel paths:

1. Libraries can submit their campus-wide seating data to a public, open-access Google sheet that we have set up here: http://bit.ly/LibSEAT. This sheet will provide a dataset that can work for a broader set of institutions and rely upon more updated data. This sheet will have a network effect: the more people that contribute to it, the more useful it will become. Ultimately, this sheet could also become more granular; for instance, we could create a column for each library on a campus rather than using a coarse, campus-wide total.

2. Libraries can gather more granular utilization data to inform forecasts in a more accurate and detailed way than annual gate counts can. There are a number of promising technologies out there for measuring utilization. The SUMA tablet app developed by NC State provides a free and simple way for a human observer to count occupants and activities in a semi-automated way. The Vantage Space app allows users to pay a small fee, upload their floor plans, and then use a tablet app to have human observers touch spots on the plans to count occupancy at regular intervals, with the app automatically generating tables, graphs, and heat maps. Perhaps most promising, Occuspace has developed an app, piloted at UC San Diego, called "Waitz" that tracks space use in real-time and publishes these data in online dashboards that students can use to plan their visits and the institution can use to plan and operate their spaces.
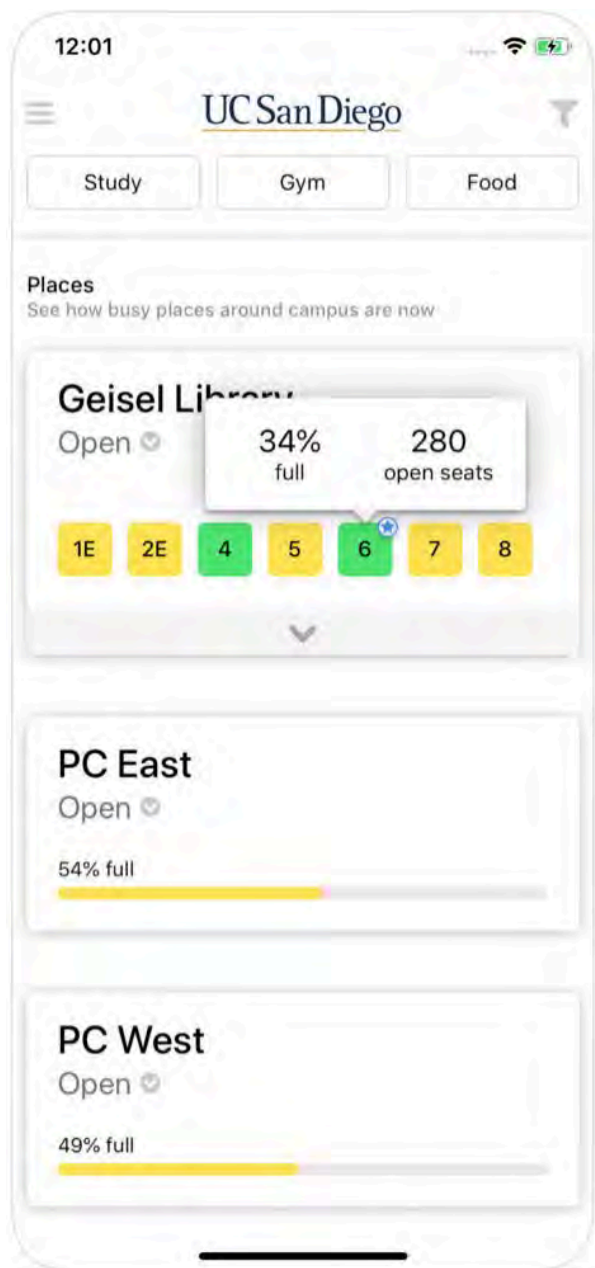
UC San Diego Waitz App

Good luck as you move ahead! We encourage you to forecast your future seating, to share your data in our public Google Sheet to contribute to build this open access planning resource, and to test out some of the emerging utilization tools for yourself. Get in touch if you have questions or need advice!

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Where Students Want to Spend the Night: A Two-Phase Examination of Overnight Study Spaces

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Abstract

Over the past three years, overnight study hours have shifted between two different library branches and a new student-run facility that was intended to be a learning commons that would be managed by the student body of a southeastern US academic research library. This paper presents a completed two-phase study examining the preferences, needs, and uses by students of two on-campus, overnight study spaces. Multiple university researchers used online student surveys, unobtrusive observations, and sentiment analysis of over 2,000 open text survey comments to provide comprehensive data for administrative decision-making. Each facility has unique elements and services but only one could be funded to remain open overnight. The findings indicated that the most practical solution remained the traditional library setting for its greater number of seats and abundance of existing library features (public computers, group rooms, quiet spaces) that students expect in a study space.

Introduction

Academic libraries are increasingly transitioning their spaces from shelves with physical books to wide open spaces deemed "learning commons" in which users expect to find all types of technology, furniture, and other resources that support their expectations of study spaces.[1] This presentation summarizes the efforts undertaken in two examinations of students' overnight study space use at a large southeastern US public university, including the more than 5,500 codes associated with the open text comments submitted in the Phase One online survey and the Phase Two analysis of the occupancy and feature-use in each facility during the overnight hours. The findings suggest that students have passionate and concrete ideas of what should be provided in an overnight study space and that study space design requires a nuanced approach to provide the appropriate number of seats and types of features that users always want available, even overnight.

Background

The university's libraries have operated overnight study hours since fall 2014. In fall 2015, the hours moved from the humanities and social science (HSS) branch to the newly renovated science library, precipitating an often-passionate discussion between students, university administration, and library leadership, focusing on the question of which location offered the most comprehensive services and resources to meet student needs. Since student government (SG) has been the source of overnight library hours funding, the student voice has always weighed heavily in the decision-making. In response, a survey was conducted in spring 2016 to provide more evidence with which to justify the decision about where to locate the overnight study hours.[2] Based on the results, the overnight study hours were moved back to the HSS branch. All of this occurred with the understanding that, in spring 2017, SG would reopen an historic campus building, renovated to provide a modern study space for students. Almost immediately, there was resistance to overnight study hours not being made available at a ***library***. Complaints from students cited insufficient seating and lack of quiet study spaces, among other concerns. But since SG was the source of funding for these hours, the assumption was that this body should make this decision, so they chose to host the hours at the new study hall but appealed to the university provost to support keeping the HSS branch open overnight for the fall 2017 semester. It was agreed that, during this time, the assessment office of student affairs and the libraries' assessment librarian would conduct a study of the SG study hall and the HSS branch to determine which location would best suit students' needs. The scope of this study did not provide convincing data, so the study period was extended into the spring 2018 term.

To understand the students' needs, uses, and preferences of study space used overnight, as well as the capacity of each building to meet these concerns, a two-phase study was conducted in the fall 2017 and

spring 2018 semesters: the first was about the perceptions, preferences, and needs of students, and the second was an occupancy study of the hours between 12:00 a.m. and 8:00 a.m. In fall 2017, an online student survey was conducted; in spring 2018, we collected headcounts at each location for six weeks, eight times per night between 12:00 a.m. and 8:00 a.m., examining the use of specific spaces and calculating the productivity and capacity utilization of each location.

The HSS branch is spacious and has 1,600 seats, almost 300 public access computers, with group and quiet study space on each of its five floors, but has limited nearby parking and is located far from student housing. The new student-run study hall is a modern, brightly lit open space with 365 seats, no public computers but is close to student housing and transportation. This space was intended to host the overnight hours, replacing the four-year service held in the libraries. This paper presents the two-phase study that spanned two semesters, fall 2017 through spring 2018.

Literature

Schwieder and Spears conducted action research using both online and print surveys of academic library users in two campus libraries that had both run overnight library services to determine which branch users preferred and the features users valued at each.[3] Given the limited funding available for overnight study spaces, only one branch could be funded to operate on a 24-hour, five day per week (24/5) basis. Switching the overnight location in the prior year generated a great deal of mixed feedback. So instead of providing anecdotal evidence for the siting decision, the library's assessment librarian conducted a survey, creating an extensive survey distribution process designed to gather feedback from both users and non-users of the libraries. In response to the siting choice selected by students, library leaders moved the overnight study hours back to the older, more traditional humanities/social science library. At the time of the switch, the services were extended to 24 hours, seven days per week (24/7).

In another study, Curry surveyed library users to determine feasibility of opening past 10:00 p.m. during spring/summer terms.[4] Curry first identified that many studies are based on preliminary or anecdotal information that is either user-focused (preferences, usage) or management-focused (security, service levels, staffing, funding). Curry's survey used several of these criteria as decision-making indicators about whether extending a library's hours would return greater value given the library's limited available funding. The data indicated that increasing hours for a greater number of students for the entire year provided more consistent service and aligned the service with the library's designated discipline (education), rather than attempting to meet the needs of a secondary stakeholder group at the expense of the primary stakeholder group.

In another study of overnight hours prompted by funding concerns—an issue for every library—researchers developed a metric based on gate counts and occupancy that identified that each overnight service hour cost 20 cents per patron per hour for use overnight.[5] The study found that extended hours cost the library 20 cents per hour per overnight user; ultimately, the library administration was compelled to measure costs versus gains (benefits to the student body) and did not extend the library hours into overnight hours but increased the number of days the library was open during the day.[6]

One library director used gate count increases, circulation increases, ILL increases, course reserve increases and anecdotal observations to decide to increase library hours.[7] This decision also aligned with the library's new vision of expanding services and creating new features for students and faculty. The library saw an increase of 30% over the same period in the previous year. Rather than switching off 24-hour service during lower service periods, the library administration opted for consistency of service provision and retained the hours year-round. Lawrence and Weber conducted a multimethod study to examine the frequency and reasons for their use of the library during late-night hours (midnight to 2:00 a.m.), finding that users were interested in the quiet nature of the library atmosphere, computing, printing, group study, and resources during later hours and valued the library for its late-night access.[8]

Overall, researchers commonly use multiple institutional data points to inform different study aspects such as overall traffic, anecdotal observations, service use (printing, computing, Wi-Fi), and use of collections,

often integrating one or more methods of data collection such as surveys, interviews, observation, mapping, and statistics.[9]

Limited studies have looked at the impact of late-night library hours on student achievement. Multiple studies rely on self-reporting from surveys, such as one study that examined both how students used the overnight hours and users' perceptions of academic impact, finding that 90% of users thought overnight hours contributed to their academic success.[10] Some impact studies used multimethod approaches but only three so far have attempted to examine relationships between student use of overnight study spaces and academic success: in two, they gathered self-reported success measures (GPA ranges);[11] in the third, they gathered student identifiers and used these to associate success as tracked by campus institutional research offices.[12] In the case of studies that include occupancy, counts are reported in aggregate and not segmented by type of usage.

In summary, a selection of the relevant literature suggests that most studies have focused on staffing, security, and services but need data on what users use during overnight hours; relatively few have looked at the impact on student success in general. Studies were initiated to assess either the overall use of the overnight services, focused on hours ranging primarily between 9:00 p.m. and 2:00 a.m., and used a wide variety of data to infer student needs, preferences, and usage. Sowell and Nutefall look at overnight use and impact but only from a self-reported viewpoint. Surveys are the primary mode of collecting data, with institutional data (gate counts, circulation, computing use) usually included to provide a broad view of users' diverse needs. In similar fashion, this study examines the actual use in the spaces, compares the use to both locations' available capacity,[13] and compares these findings with the self-reported preferences by users.

Methods

The original proposal for this study was to analyze fall 2017 hourly traffic and occupancy of both spaces and to collect occupancy data using the traffic tracking systems of each building to better understand who is using the spaces. However, neither traffic systems proved to be reliable enough; in the absence of reliable occupancy data, we extended the study to a second phase to combine actual observed use of the spaces, conducting hourly occupancy counts segmented by seating and space type (individual, group, quiet, public computer station, etc). The phases are described as the distinct data collections that they were, but the analysis will combine the aspects of each that figured into the evidence to answer these three questions:

1. What are students' preferred features for an overnight study space?

2. What are the traffic and occupancy levels of the HSS branch library and the SG Study Hall during overnight hours from 12:00 a.m. to 8:00 a.m.?

3. What features and services are visitors using when they are in the HSS branch library and the SG Study Hall during overnight hours from 12:00 a.m. to 8:00 a.m.?

Phase One included analysis of use data, collected from both traffic and occupancy using the people counting sensors at both locations, and a survey distributed to all students during the fall 2017 term. The intent was to describe the study space usage and preferred features from the students' perspectives as well as to understand who was using the spaces and how frequently they visited. The survey focused on the usage of each space overnight; the frequency of resource use; the difficulty in finding available space overnight; and, the user's preference of where to study overnight. Demographic data collected included class standing and current major.

The survey was distributed by the SG to the entire student population of 52,669—including over 17,000 graduate students and almost 3,000 distance learning students. Multiple channels were also used to promote the survey in print and social media. For example, the HSS branch library and the SG study hall placed posters around the entrance encouraging visitors to complete the survey, with high profile university leaders (e.g., university president's Twitter account) supporting the survey. The survey gathered demographics,

usage frequency, and preferred features; the key question asked of respondents was to indicate the space preferred for overnight study use (from 12:00 a.m. to 8:00 a.m.). The survey received 5,585 complete responses, providing an 11.3% response rate.

Phase Two gathered data on traffic and occupancy for both locations using the people counter sensors for traffic and unobtrusive, in-person counts every night from 12:00 a.m. to 8:00 a.m. for six weeks. The unobtrusive observations were collected hourly, counting the number of users on all floors in each building, categorized as follows:

- Individual seating with public access computers
- Individual seating without public access computers
- Tables/countertops with multiple seating with public access computers
- Tables/countertops with multiple seating without public access computers
- Group study rooms
- Monitors in use—individual
- Printers
- Whiteboards

Categories below were collected to determine features and services utilization, but these counts were excluded from the occupancy count:

- Monitors being used in group study rooms
- Group (3+ people) study clusters—talking
- Group (3+ people) study clusters—quiet
- Individuals (= 2 persons) talking
- Individuals (1 or 2 persons) quiet

The second phase of the study was designed to collect hourly headcounts (occupancy) conducted between 12:00 a.m. and 8:00 a.m.; types of furniture and spaces being used (features); and, the types of activity taking place (quiet/talking behavior).

Findings
In Phase One, we collected 5,585 complete responses; undergraduates comprise more than 76% of survey respondents, while graduates are almost equally represented by masters and doctoral students. All 16 colleges are represented in the survey with just four (Liberal Arts & Sciences, Engineering, Business Administration, and Agricultural & Life Sciences) making up 63.3% of respondents. Over 66% of respondents indicated a preference for the HSS branch library, over 20% would use either space, and almost 12% indicated a preference for the SG study hall.

Figure 1. Preferred location for overnight study space (n=4,841)
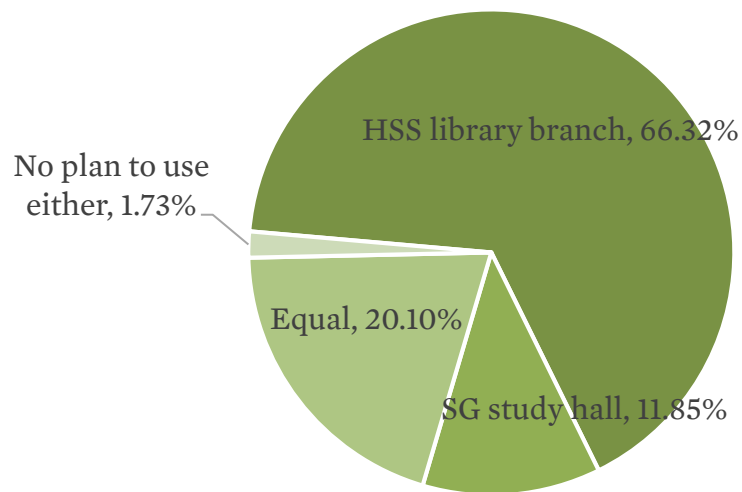
Usage of HSS Branch Library/SG Study Hall

Respondents were asked to report their usage frequency of each space; those who answered that they "never" used either space were asked to provide comments. Specifically, participants were asked, "In the past 6 months, how often did you use the HSS Branch Library [SG Study Hall] during overnight hours (between 1:00 am and 8:00 am)?"

Figure 2 illustrates the usage at each location by frequency, from "Once" to "Never." 5,585 respondents answered this question about each space.

Figure 2. Frequency of use for each overnight study space.
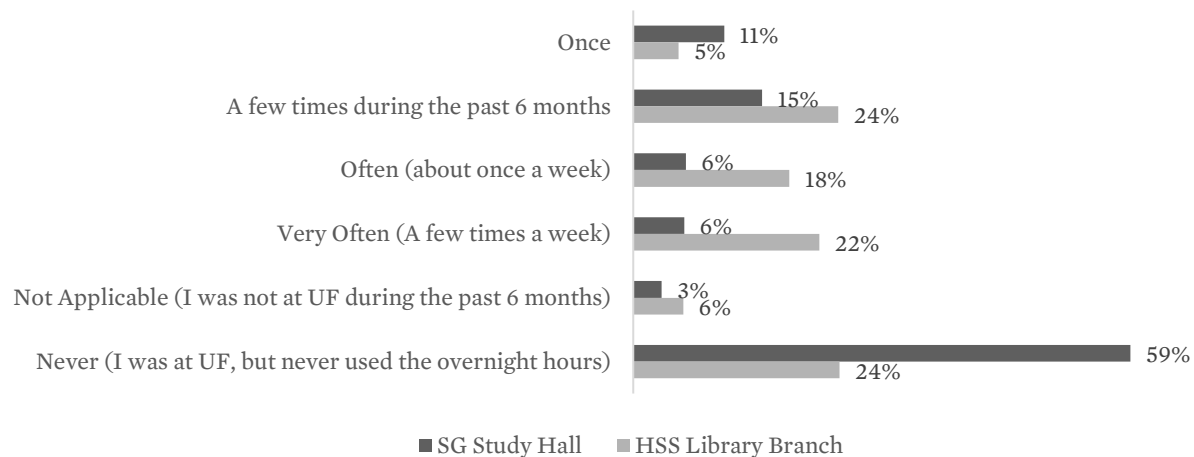
Non-use of overnight study spaces

Findings are presented from the multiple-choice survey questions and the 5,452 open-ended responses describing the respondents' choice of "Other." There were 6,202 codes generated that encompass three topics: reasons for non-usage, descriptions of barriers to use, and additional comments. Some comments have multiple codes, e.g., a comment might present a positive comment about a location and then mention seating, food, resources, etc. The topics shift by question type, depending on the space being considered. The final question was an open-ended prompt for additional comments.

If respondents indicated they did not use an overnight space, they were asked the following question that solicited qualitative responses: "You indicated that in the last 6 months, you did not use the HSS [the SG study hall] during overnight hours (between 1:00 a.m. and 8:00 a.m.). Why not?"

We coded both explicit statements participants made about each space as well as implicit comments indicating reasons why they did not use a space. The 423 respondents who "never used HSS library branch" indicated that they did not use the HSS library branch because they prefer other locations: the Science library branch (178); an alternative space (119); just do not prefer the HSS library branch (77); or, the SG study hall (32). The 1,725 respondents who "never used the SG study hall" indicated that they did not use the SG study hall because they prefer other locations: the HSS library branch (506); they do not prefer the SG study hall (220); the Science library branch (145); an alternative space (41); or they live off campus (23). The reasons for not using each space were coded for implicit and explicit meaning.

Table 1. Implicit/Explicit Reasons for not using a study space (most frequent codes)

SG Study Hall (n=1,714 comments, 1,734 implicit codes)		HSS Library Branch (432 comments, 225 implicit codes)	
Insufficient Seating	418	Other (No collaborative space, outlets)	39
Space not Conducive for Studying	399	Proximity to Residence	34
Too Noisy	183	Insufficient Seating	28
Insufficient Table/Desk Space	122	Safety to/from building	25
Other (Privacy, Lighting, Transport.)	97	Insufficient Parking	25
Prefer Library Setting	83	Location (on campus or other)	20
Uncomfortable study space	64	Insufficient Nighttime Transport	14
Insufficient Parking	48	Uncomfortable Study Space	11
No Public Access Computers	48	Inconvenience of Looking for Space to Sit	8
Location on Campus	32	Lack of Fri/Sat Evening Hours	7
Inconvenience of Looking for Space to Sit	31	Insufficient Resources (computers, printers, etc.)	5
Too Social to Study In	27	Too Noisy	5
Far from Residence	22	Awareness of Availability	4
Insufficient Outlets	20		
Awareness of Availability	20		
Stairs Waste Space	19		
Not Open on Game Day	18		

Answers such as insufficient seating or outlets indicate that respondents were not restricting their responses to the overnight experience, at least in the HSS library branch. While these responses provide formative value for management of the spaces, they do not reflect an accurate "overnight" experience. Therefore, an examination of the traffic for each space provides additional context for the use of each space during overnight hours.

For a complete examination of the use of the two spaces for overnight study during the fall 2017 term, Figure 3 illustrates the weekly average per hour of entries into both the SG study hall and the HSS library branch between the hours of 6:00 p.m. and 5:00 a.m. The weekly average traffic per hour should be viewed in contrast to the total seating capacity of 1,600 at the HSS library branch and a capacity of 365 at the SG study hall.

Figure 3. Average per hour comparison of the SG Study Hall and the HSS Library Branch.

	6PM	7PM	8PM	9PM	10PM	11PM	12AM	1AM	2AM	3AM	4AM	5AM
■ HSS Library Branch	204	202	166	126	77	53	40	16	9	6	9	10
■ SG Study Hall	21	25	25	27	20	12	8	7	2	1	1	3
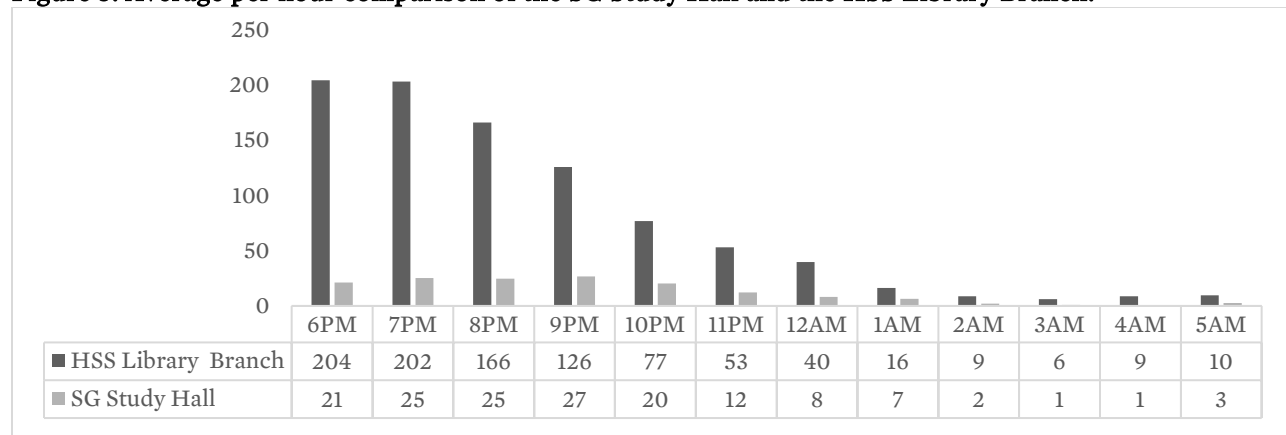
Because the responses in the Phase One survey were not reliably based on the respondents' views of the study spaces as used during the overnight hours, Phase Two was designed to actually observe the number of users in the spaces and analyze this use based on the type of space or feature being used.

Phase Two Key Findings

The body of the report includes visual and narrative description of overnight occupancy and traffic for both the SG study hall and the HSS library branch, as well as the different types of seating and spaces in use and the type of activity (quiet/talking) in which overnight users were engaged. The Phase Two study represents six weeks of data collection that occurred each night at both the SG study hall and the HSS, from 12:00 a.m. to 8:00 a.m. The study team counted occupants at each facility once per hour, alternating the order of visiting each building with the median per hour displayed (Figure 4).

Figure 4. Median occupancy per hour for each overnight study space.

	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00
—— SG Study Hall Median OPH	60	45	27	15	8	7	6	10
—— HSS Library Branch Median OPH	230	150	88	51	31	30	29	53
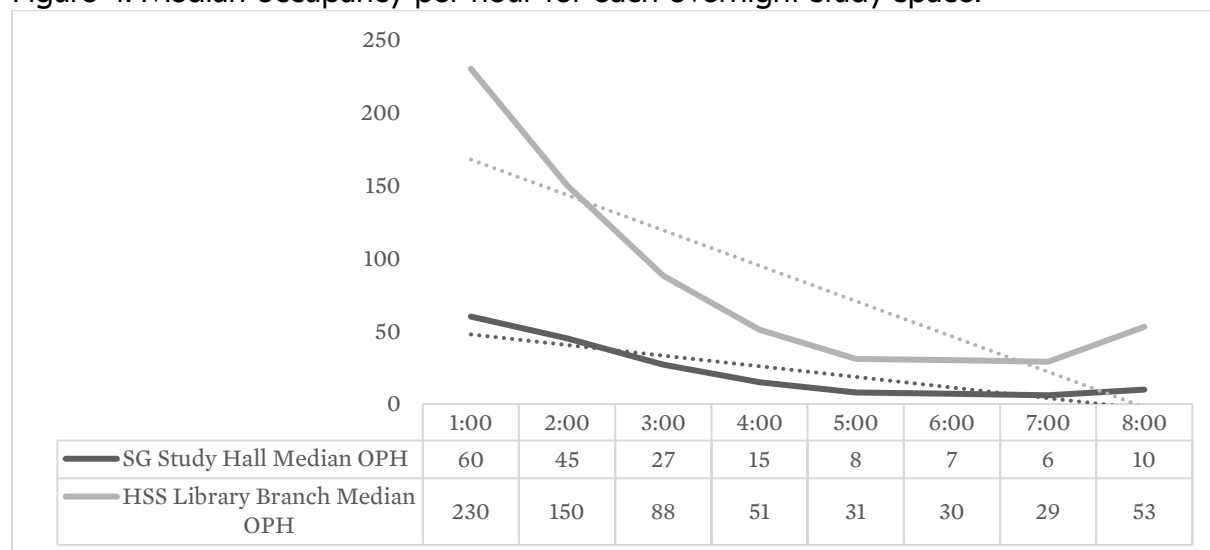
Figure 5 displays the total occupancy of the facilities for each night of the six-week period. These occupancy totals range from a low for the HSS library branch of 162 occupants (Saturday, February 17) to a high of 1,465 occupants on the Wednesday before spring break (February 28); for the SG study hall, the low occupancy was 65 occupants (February 17) and the high was 483 occupants on Wednesday, February 28. While the total occupancy for each night represents duplicate counts (one individual being counted each hour they use the

facility), it provides an accurate representation of the total occupancy and uses of the facilities between the hours of 12:00 a.m. and 8:00 a.m.

Figure 5. Total daily occupancy for each overnight study space, January–March 2018.
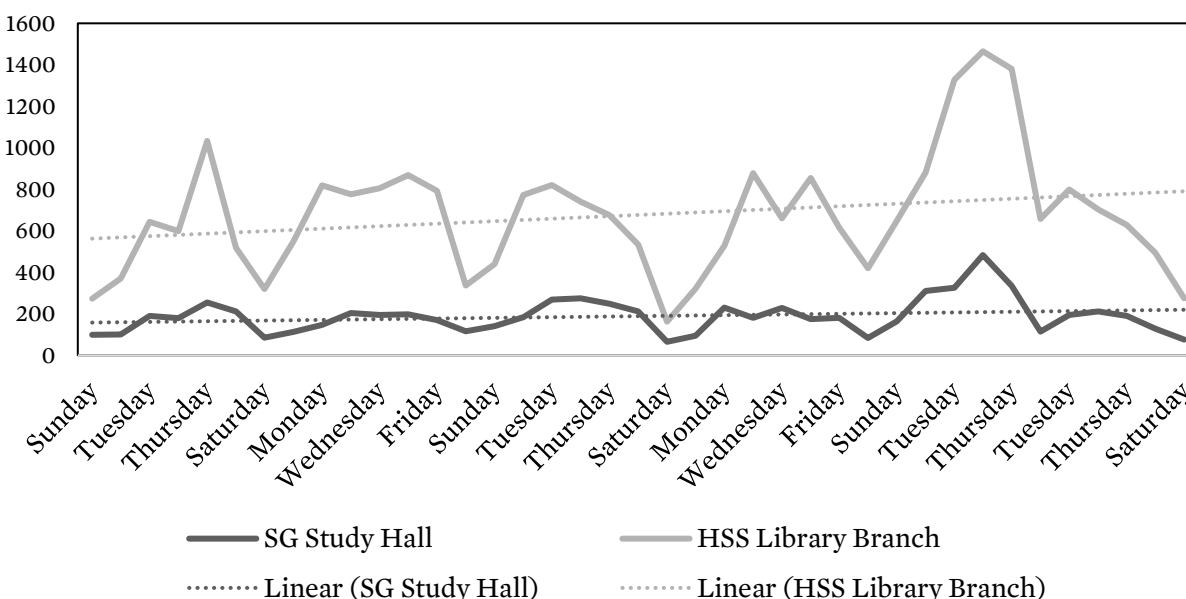
Capacity Utilization Based on Occupancy Totals

If we assume that all users would use one building if both buildings were not open during the overnight hours, the data shows that the SG study hall alone is insufficient to meet the current demand for overnight study space.

Table 2 is a sample of the hourly chart with which we tracked occupancy by hour and capacity utilization for both the SG study hall and the HSS branch library. **Total capacity** is 1,965, the combined maximum seating capacity of both facilities (365 for the SG study hall and 1,600 for the HSS branch library). **Total occupancy** for each hour is determined by adding the occupancy in both buildings. With this data, we can illustrate the effect of the **total occupancy** by hour for each facility and present the percent of capacity utilized. For instance, in the table below, on Tuesday, February 27, the sum of occupants in both buildings from 12:00 a.m. to 1:00 a.m. equals 504 occupants. Dividing that number by the total seating capacity of the SG study hall shows that seating demand (504) exceeds capacity (365 seats) by 38.1%; for the HSS branch library, the seating demand (504) would utilize just 31.5% of its capacity (1,600 seats).

During the six-week study period, there were a total of 30 hours in which the **total occupancy** exceeded 75% of the capacity of the SG study hall. Of these, there were nine hours in which the combined occupancy of both buildings exceeded 100% of the capacity of the SG study hall. Most of these hours occurred from 12:00 a.m. to 1:00 a.m. (n=21). It is important to note that Marston Science Library was still open during this time (closing at 1:00 a.m. on all of these evenings).

Table 2. Sample Capacity Utilization by Facility

Date/Time	SG Study Hall (365)	HSS Lib 1600)	Total Occupancy	SG Study Hall Capacity	HSS Lib Capacity
Tuesday 2/27/2018					

Date/Time	SG Study Hall (365)	HSS Lib 1600)	Total Occupancy	SG Study Hall Capacity	HSS Lib Capacity
12–1	100	404	504	138.1%	31.5%
1–2	68	344	412	112.9%	25.8%
2–3	55	200	255	69.9%	15.9%
3–4	35	119	154	42.2%	9.6%
4–5	20	78	98	26.8%	6.1%
5–6	19	49	68	18.6%	4.3%
6–7	9	46	55	15.1%	3.4%
7–8	20	88	108	29.6%	6.8%
Total	326	1328	1654		
Wednesday 2/28/2018					
12–1	125	450	575	157.5%	35.9%
1–2	120	344	464	127.1%	29.0%
2–3	90	201	291	79.7%	18.2%
3–4	53	113	166	45.5%	10.4%
4–5	31	86	117	32.1%	7.3%
5–6	25	72	97	26.6%	6.1%
6–7	21	84	105	28.8%	6.6%
7–8	18	115	133	36.4%	8.3%
Total	483	1465	1948		
Thursday 3/1/2018					
12–1	85	406	491	134.5%	30.7%
1–2	75	309	384	105.2%	24.0%
2–3	51	232	283	77.5%	17.7%
3–4	45	135	180	49.3%	11.3%
4–5	23	83	106	29.0%	6.6%
5–6	19	68	87	23.8%	5.4%

Date/Time	SG Study Hall (365)	HSS Lib 1600)	Total Occupancy	SG Study Hall Capacity	HSS Lib Capacity
6–7	16	63	79	21.6%	4.9%
7–8	20	84	104	28.5%	6.5%
Total	334	1380	1714		

Feature Utilization

The study included counts of features in use (e.g., tables, carrels, couches). Table 3 illustrates the features being used at the SG study hall and the HSS branch library. The strongest feature for both facilities is 'seating for multiple users'; 'individual seating' is the second most frequently used feature. However, the HSS branch library can provide 'individual seating' both **with and without** public access computers. As illustrated below, use of seating with public access computers occurs at the HSS branch library throughout the entire overnight period. The data also show that group study rooms in the HSS branch library average up to twenty users per hour until 3 a.m.

Table 3. Features Used at Each Study Space

Feature	SG Study Hall (N)	SG Study Hall (%)	HSS Branch Library (N)	HSS Branch Library (%)
Tables/countertops with multiple seating **without** public access computers	4336	63.8%	11256	43.4%
Tables/countertops with multiple seating **with** public access computers	n/a	n/a	243	0.9%
Individual seating **with** public access computers	n/a	n/a	5574	21.5%
Individual seating **without** public access computers	2121	31.2%	5192	20.0%
Group study rooms	256	3.8%	2986	11.5%
Dining	80	1.2%	521	2.0%
Couches	255	3.8%	n/a	n/a
Other (restrooms, printer)	155	2.3%	168	0.6%
Total Six-Week Occupancy	**6793**	**100.0%**	25940	100.0%

The use of public access computers averages above 10 computers per hour until 5:00 a.m. Figure 6 shows the median per hour use of public access computers at the HSS branch library throughout the overnight hours. Each facility has features not found in the other, notably public access computers and designated quiet space in the HSS branch library, and couches and stair seating in the SG study hall.

Figure 6. Median use of public access computers (HSS branch library only).
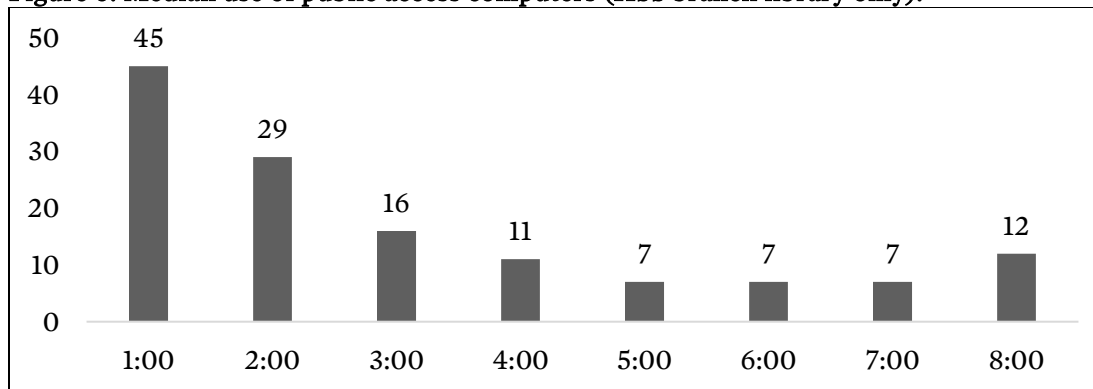
Use of Overnight Spaces for Quiet Study

Finally, the study team observed the occurrence of both quiet and talking behavior with each count of occupants (Table 4). Quiet activities occurred among pairs or groups of users until 4:00 a.m. There was no observed activity after 4:00 a.m. for either facility as, at that time, most users were singles. Although the lack of designated quiet space at the SG study hall had been noted by student comments during the fall 2017 survey, the data gathered during this study do not support a lack of quiet space during the overnight hours.

Table 4 illustrates the instances of quiet/talking uses. Both facilities demonstrate similar trends in use of most features, especially of quiet space activities.

Table 4.

Type of Use	SG Study Hall	HSS Branch Library
Quiet pairs	295	1,133
Talking pairs	170	756
Talking groups	168	643
Quiet groups	76	391
Monitors in Use in Group Study Rooms	20	87

Discussion

Analysis of the survey findings indicates that when students were offered a choice between the HSS library and the modern study hall for overnight study hours, the traditional library setting was preferred by 6 to 1. Also, in analysis of the open text comments, almost 15% of respondent comments indicated a preference for a third space (the nearby science library).

Students commented about space use in general, not just their overnight use, so the survey had marginal value in answering questions about usage during those hours. This phenomenon precipitated the spring 2018 study, as the student government and the provost did not want to rely on self-reported data in the absence of occupancy data that would conclusively indicate what students actually use.

In the survey comments, students indicated that certain elements make a facility a "library," and these were not present in the study hall, thereby diminishing its value and eliminating features students want, even overnight. These elements included adequate tables, chairs suitable for long periods of writing and reading, adequate quiet space, sufficient and comfortable seating, and public access computers. Students

overwhelmingly indicated reasons for not using the SG study hall for overnight, with over 1,700 comments made in response to a query about non-use of a space specifically designated for and managed by the SG. Almost one-third of the comments (399) stated that the "space is not conducive for studying."

Based on the qualitative nature of the survey and the inaccurate response pattern of the participants (i.e., referencing experience that was not restricted to overnight hours), the assessment librarian and key HSS branch library staff designed the occupancy count-by-feature, thereby gathering counts of users per overnight hour and collecting data on the physical use of the spaces, quantifying features students used overnight such as public access computers and group study. Key findings include the analysis of the traffic and occupancy levels, which, when combined to understand the total number of students using an overnight study space, exceed the capacity of the SG study hall on several weeknights for several hours until about 3:00 a.m. If funding is only available for one study space, then the space has to accommodate all of the students studying on campus overnight.

It is also clear that the SG study hall is missing features available at the HSS branch library during the overnight hours that students are clearly using. It is notable that an average of almost 30 students are using public access computers at 2:00 a.m. Even if the SG study hall added public access computers, it would still need some space redesign to provide enough quiet study space and some more traditional study furniture to provide for those students who need this type of furniture.

While student responses from the online survey indicated not only a preference for the traditional library for overnight study, they were equally vocal about the shortcomings of a space design intended to facilitate the collaborative needs of student study. However, key fundamental elements appeared to be missing (e.g., public access computers, quiet study space) and the study hall simply does not have enough seating to accommodate the number of students using overnight spaces after all the other study spaces close for the evening. This study suggests that, while collaborative spaces are suggested to be in demand by students, there is more demand to meet the study needs of students that libraries inherently provide.

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1. Mosley et al., "Making It Fit," 91–103.
2. Schwieder and Spears, "Studying the Night Shift," 2–19.
3. Schwieder and Spears, "Studying the Night Shift."
4. Curry, "Opening hours," 375–385.
5. Heim, "Open twenty-four hours."
6. Heim, "Open twenty-four hours."
7. Sewell. "24-hour access," 14–27.
8. Lawrence and Weber, "Midnight–2.00 am," 528–548.
9. Curry, "Opening Hours"; Lawrence and Weber, "Midnight–2.00 a.m."; Sewell, "24-hour access"; Bowman, "24-hour academic libraries," 217–239; Sanders and Hodges, "An overnight success?" 309–320.
10. Sowell and Nutefall, "Mysteries in the night," 96–114.
11. Saka, "Extended hours," 27; Sowell and Nutefall, "Mysteries in the Night."
12. Scarletto et al. "Wide awake at 4 AM," 371–377.
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Using the LibQUAL+ Survey to Inform Strategic Planning

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Abstract

The Arthur Lakes Library at Colorado School of Mines participated in an extensive strategic planning process in the spring of 2017 resulting in the development of a strategic plan for 2017–2020. The impetus for this planning process was the addition of seven new faculty and staff members, including a new university librarian. Strategic planning involved input from all library employees as well as library stakeholders (students, faculty, and university staff members). In February 2018, the library's assessment committee conducted the latest round of LibQUAL survey data collection. The library has participated in the LibQUAL survey every three to four years since 2003. Our focus with previous surveys had been to make improvements in the library based on survey comments. After reviewing the results and comments of the 2018 LibQUAL survey, committee members Patricia Andersen and Christine Baker observed that information gleaned from the survey data and comments could be connected to goals and objectives in the library's strategic plan. In-depth analysis of survey data and comments could be used to assess relevance and achievement of goals in the current plan and as a tool for developing future strategic plans.

The first step involved analyzing the LibQUAL data and utilizing a coding system for the comments. The authors chose to adapt Brown University Library's ***Methodology for Coding Qualitative Data (User Comments)***.[1] After the comments were categorized and the LibQUAL survey data analyzed, connections between the results and the strategic plan were identified. The next step entailed an in-depth examination of the library's strategic plan highlighting all components that related to data and comments from the survey.

We found that many of the comments (both positive and negative) linked directly to goals, strategies, objectives, and actions in the strategic plan. Most of the comments involved physical space and use of space (e.g., more study space/rooms or needs updating, etc.) and ambiance (e.g., too noisy, good natural light, etc.). The responses to the core questions for the library as place dimension are aligned with the comments. The library is currently advocating for a renovation and the results from this survey demonstrate that stakeholders agree with the need to improve library spaces and ambiance. Several stakeholders mentioned the need for renovating the existing space or building a new library, adding evidence to the library's advocacy efforts. Addressing other aspects of the strategic plan, the library recently acquired new resources and implemented new services prior to the 2018 LibQUAL survey. Survey data and comments indicated that these resources and services were both welcomed and well-publicized.

Strategic planning and LibQUAL survey results and comments can be used together to assess resources, services, and space in the library. 2018 LibQUAL survey results and comments support and validate the direction of our current strategic plan and can be used as an assessment method as we move forward with our plan and develop future strategic plans.

Introduction and Background

The Arthur Lakes Library at Colorado School of Mines (Mines), an applied science and engineering school with approximately 6,000 students, is the only library on the Mines campus. The library has held a LibQUAL survey every three to four years since 2003, with the most recent survey held in 2018. While the LibQUAL survey gathers feedback from faculty, as well as graduate and undergraduate students, the undergraduate students are the heaviest users of the physical library and make up the largest number of respondents to the survey. The response rate for each user group ranged from 10% to 11%.

In January 2017, a year prior to running the LibQUAL survey, the Arthur Lakes Library participated in an extensive strategic planning process resulting in the development of a strategic plan for 2017–2020. The impetus for this planning process was the addition of new faculty and staff members, including a new

university librarian, as well as a newly created library faculty position for a scholarly communications librarian. Once the strategic plan was completed, an outreach and engagement librarian position was created in response to the library's goal of expanding outreach and engagement.

The library's strategic planning process began with the development of new mission, vision, and values statements. Library staff then conducted a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. Various assignments throughout the planning process involved gathering and sharing information among the library staff about current library trends, happenings, and renovations via literature reviews. Brown bag sessions were also held throughout the planning process inviting feedback from students, faculty, and university staff. The culmination of these activities provided the library with the information needed to set strategic goals. Once the overarching goals were established, each library staff member selected a goal based on interest, to flesh out strategies, objectives, and actions for the library's strategic plan. A review of the results allowed for final edits and updates. The library's new strategic plan was completed and implemented in May of 2017.[2]

The Arthur Lakes Library's seven strategic plan goals[3]:

1. Enhance the user experience

2. Cultivate and strengthen information competencies

3. Dynamically respond to users' resource needs

4. Expand outreach and engagement

5. Become the campus nexus for scholarly communication

6. Commit to career development for all library staff

7. Formalize library development

An important aspect of any strategic planning process is assessing the relevance and effectiveness of the plan after it is in place. Is the library on the right track in addressing the needs of our users? Have we achieved our goals and objectives? To begin addressing these questions, two members of the library's assessment committee, Patricia Andersen and Christine Baker, formed a team to examine how LibQUAL survey core questions, local questions (developed with the strategic plan in mind), and attached survey comments could be used to assess relevance and achievement of the library's goals. The team observed that 2018 survey data and comments could be connected to initiatives in the strategic plan and used as a tool to assess relevance and achievement of goals in the library's current plan and as an effective tool for developing future strategic plans.

Approach

The first step involved analyzing the LibQUAL data and utilizing a coding system for the comments. Once the comments were categorized and the LibQUAL survey data analyzed, connections between the results and the strategic plan were identified. The next step entailed an in-depth examination of the library's strategic plan highlighting all components that related to data and comments from the survey.

Two tables were compiled. Table 1 shows how the five local questions in the LibQUAL survey correspond with strategic plan goals and Table 2 shows direct links between the LibQUAL core questions and strategic goals.

Table 1.

LibQUAL survey local questions	Library strategic plan goals
1. Accessing library resources from off-campus	1. Enhance the user experience 3. Dynamically respond to users' resource needs
2. An environment conducive to learning through classes, events, and activities	1. Enhance the user experience 2. Cultivate and strengthen information competencies 4. Expand outreach and engagement 5. Become the campus nexus for scholarly communication
3. Contribution to the intellectual atmosphere of the campus	5. Become the campus nexus for scholarly communication
4. Reliable mix of technology to help me complete my work	1. Enhance the user experience 3. Dynamically respond to users' resource needs
5. The library keeping me informed about library resources and services	3. Dynamically respond to users' resource needs 4. Expand outreach and engagement 5. Become the campus nexus for scholarly communication

The five local questions and corresponding Arthur Lakes Library strategic plan goals

The library recently introduced EZproxy in response to ***Goal 3. Dynamically respond to users' resource needs***. Therefore, local question 1 was included despite its similarity to the first question in the LibQUAL survey's information control dimension: ***Making electronic resources accessible from my home or office***. New librarian positions were added to address strategic plan initiatives and led to the inclusion of local questions 2, 3, and 5. Local question 4 was included to help gauge satisfaction with recent technology acquisitions and existing computing resources.

Table 2.

Library strategic plan goals	LibQUAL Survey core questions
Goal 1. Enhance the User Experience	Readiness to respond to users' questions Employees who have the knowledge to answer users' questions Employees who understand the needs of their users Willingness to help users Dependability in handling users' service problems Making electronic resources accessible from my home or office A Library website enabling me to locate information on my own Printed materials I need for my work Electronic resources I need Easy to use access tools that allow me to find things on my own Print and/or electronic journal collections I need for my work Library space that inspires study and learning Quiet space for individual activities A comfortable and inviting location A getaway for study, learning, or research Community space for group learning and group study
Goal 2. Cultivate and Strengthen Information Competencies	Community space for group learning and group study
Goal 3. Dynamically Respond to Users' Resource Needs	Making electronic resources accessible from my home or office Printed materials I need for my work Electronic resources I need Easy to use access tools that allow me to find things on my own Print and/or electronic journal collections I need for my work
Goal 4. Expand Outreach and Engagement	Employees who understand the needs of their users
Goal 5. Become the Campus Nexus for Scholarly Communication	
Goal 6. Commit to Career Development for all Library Staff	Employees who instill confidence in users Giving users individual attention Employees who are consistently courteous Employees who have the knowledge to answer users' questions Employees who deal with users in a caring fashion Employees who understand the needs of their users Willingness to help users Dependability in handling users' service problems
Goal 7. Formalize Library Development	

Arthur Lakes Library strategic plan goals and corresponding LibQUAL survey core questions

After the 2011 LibQUAL survey, a graphic representation was made to augment the radar graphs and present comparative data on the superiority mean for the core questions for the undergraduate, graduate, and faculty user groups.[4] The purpose was to show administration and stakeholders improvements to our services. After completion of the 2018 LibQUAL survey, data sets from 2014 and 2018 were added to the graphic representation. Nine graphs were prepared displaying the core question superiority mean for each of the three LibQUAL dimensions by user group and tables were used to show the superiority mean of the 2018 core questions. The team compared the data from the last three surveys to show trends in answers to the

core questions and to see if implementation of 2017 strategic initiatives may have positively impacted 2018 survey results.

Next, the 2018 survey comments were analyzed. A total of 703 LibQUAL survey respondents, 22 faculty, 73 graduate students, and 188 undergraduate students provided comments that were then exported into an Excel spreadsheet. The team adapted Brown University Library's **Methodology for Coding Qualitative Data (User Comments)** to manually code and categorize respondents' comments. Brown University's methodology organizes comments according to LibQUAL survey dimensions: affect of service, information control, and library as place.[5] We also opted to create one general category that encompassed both positive and negative comments of a more general nature, such as "I really like the library" or "thanks for doing this survey."

The number of both positive and negative comments were recorded within each category. All comments phrased as suggestions were recorded as negative within their appropriate category. If one comment addressed multiple categories, it was recorded in each of the relevant categories. Color-coding was utilized to emphasize comments involving electronic content and collections; outreach and engagement efforts; and specific references to building updates or a renovation, due to the library's investment of energy in strategic initiatives encompassing these areas.

The comments were also organized by user group (faculty, graduate students, and undergraduates) allowing the team to see which concerns were most important to each group. Once the comments were coded and tallied, connections to goals, strategies, objectives, and actions in the library's strategic plan were identified and highlighted. The highlighting allowed the team to quickly observe areas of the strategic plan that aligned and connected with survey data and comments. Highlighting also allowed the team to see areas of the strategic plan that were not addressed by the LibQUAL survey.

Findings and Observations

The review of the library's strategic plan and the LibQUAL survey data and comments revealed that there were many direct links between the strategic plan and the data collected during the survey. We expected to see links with the local questions because these questions were developed with the strategic plan in mind. Many of the core questions in the survey can also be linked to goals in the strategic plan. Table 2 lists the strategic plan goals and connections to the LibQUAL survey core questions.

The team looked at the graphic representations and related tables of the core question responses over the last three LibQUAL surveys to examine trends, particularly for the questions that addressed strategic plan goals. Each user group was examined by the LibQUAL dimensions: affect of service, information control, and library as place.

Many of the core questions in the affect of service dimension show progressive improvement over the last three surveys. There is a trend to give low ratings to the questions **Employees who understand the needs of their users** and **Dependability in handling users' service problems** that continued in 2018 with lower scores from undergraduates and faculty.

Graduate students give the highest ratings in 2018 for questions in the affect of service dimension except for **Dependability in handling users' service problems**. Faculty gave much higher ratings to **Dependability in handling user service problems**, but gave the lowest ratings over the last three surveys to **Employees who understand the needs of their users**. These survey questions link to the library's strategic plan **Goal 1. Enhance the User Experience, Goal 4. Expand outreach and Engagement** and **Goal 6. Commit to Career Development for all library staff.**

Table 3. 2018 Superiority mean for Affect of Service questions

Affect of Service Questions	Ugrads	Grads	Faculty
Employees who instill confidence in users	0.13	-0.13	0.17
Giving users individual attention	0.02	-0.03	0.11
Employees who are consistently courteous	-0.17	0.39	-0.4
Readiness to respond to users' questions	-0.06	-0.14	-0.17
Employees who have knowledge to answer user questions	-0.13	0.03	-0.4
Employees who deal with users in a caring fashion	-0.04	0.15	-0.22
Employees who understand the needs of their users	-0.5	0.11	-1.31
Willingness to help users	-0.01	-0.11	-0.21
Dependability in handling users' service problems	-0.63	-0.8	0.22

In the information control dimension all three user groups give low scores for the question: ***Easy-to-use access tools that allow me to find things on my own.*** These questions relate to library's strategic plan ***Goal 1. Enhance the User Experience***.

Table 4. 2018 Superiority mean for Information Control questions

Information Control Questions	Ugrads	Grads	Faculty
Making electronic resources accessible from my home or office	-0.76	-1.26	-1.25
A library website enabling me to locate information on my own	-0.83	-1.06	-1.43
Printed library materials I need for my work	0.08	-0.44	-0.29
Electronic information resources I need	-0.4	-0.94	-0.96
Modern equipment that lets me easily access needed information	-0.84	-0.32	-0.82
Easy-to-use access tools that allow me to find things on my own	-1.06	-1.22	-1.69
Making information easily accessible for independent use	-0.63	-1.18	-1.45
Print and/or electronic journal collections I need for my work	-0.41	-1.1	-1.7

In the library as place dimension the question ***Library space that inspires study*** has a low rating for undergraduates whereas the graduate students gave the lowest score to ***Getaway for study, learning, or research***. Faculty indicate that ***Comfortable and inviting location*** and ***Community space for group learning and group study*** show the lowest ratings. These questions all relate to the library's strategic plan ***Goal 1. Enhance the User Experience, Strategy 1-3 Physical Space***.

Table 5. 2018 Superiority mean for Library as Place questions

Library as Place Questions	Ugrads	Grads	Faculty
Library space that inspires study and learning	-1.2	-0.82	-0.61
Quiet space for individual activities	-1.03	-0.89	0.75
Comfortable and inviting location	-0.81	-0.86	-1.31
Getaway for study, learning, or research	-0.55	-1.1	0.27
Community space for group learning and group study	-0.82	-0.43	-0.67

An evaluation of the 2018 comments by LibQUAL survey dimension, using Brown University Library's ***Methodology for Coding Qualitative Data (User Comments)***,[6] showed that most comments aligned with the library as place dimension followed closely by information control, with the least amount of comments aligning with the affect of service dimension.

Looking at specific comment categories within dimensions, the majority of faculty comments concerned the online content and customer service categories. Graduate students were equally concerned with online content, ambiance, and use, while most comments provided by undergraduates addressed use and ambiance. Customer service and access to computers and electrical outlets were also frequently referenced by undergraduates, but not to the same extent as comments referencing use and ambiance.

Brown University Library's coding methodology describes use as "references to how the user works and uses (or would like to work and use) the physical space. It is also used to refer to the overall quality of the work environment."[7] This category includes references to physical space and renovations, as well as the organization and remodeling of space within the library building. Ambiance includes comments with "references to environment and atmosphere of the library, often an ambiguous emotional comment."[8] We also included comments referencing "quiet" or "noise" in this category.

The emphasis of undergraduate and graduate student comments on use and ambiance indicates that the library's space and atmosphere matter a great deal to students. While many students rated the library highly in these areas, more rated the library negatively (e.g., more study rooms, less noise, more designated quiet space, and more space to study and work both individually and in groups). Information from these comments connect to the library's strategic plan ***Goal 1: Enhance the User Experience***, and especially to ***Strategy 1-3. Physical Space***.

One of the objectives of ***Goal 1. Enhance the user experience*** is to "***Develop a shared vision for a complete library renovation (Objective 1-3-1)***." The Arthur Lakes Library has been advocating for a new library or renovation for years. A library Building Advisory Committee (BAC) consisting of several library staff as well as other members of campus formed to address this initiative. In an effort to help BAC members better understand the needs of our library users and to boost support for a new building or renovation, a ***Comments of Note for the BAC—LibQUAL+ 2018***[9] document was created. This document includes both direct quotes from the survey comments as well as summaries of comments that addressed specific issues relating to the building and space. More than 100 of the 283 comments addressed aspects of the library's building and physical space, with some suggesting a renovation or a new building.

LibQUAL survey comments can also be linked to the survey's local questions and, consequently, to strategic plan goals. For example, students noted that they appreciated the new scanner in the library as well as the new technology available for checkout (e.g., thermal cameras, small mobile projector) and would like to see the technology collection continue to grow. On the other hand, students noted the lack of technology in the

study rooms, such as large screens for practicing presentations, and lack of available computers. Several students stated that they use other spaces on campus in order to access needed technology. These comments are connected to *Local question 4. Reliable mix of technology to complete my work* and can be tied to *Goal 1. Enhance the user experience.*

Comments addressing *Goal 3. Dynamically respond to users' resource needs* indicate that recently acquired resources have been noticed and are appreciated across all user groups, with undergraduates expressing the most satisfaction with the library's print and electronic collections. The comments also exposed gaps in the physical and electronic collections. Some comments included specific title or subject recommendations, while others did not elaborate on their resource needs. Comments relating to resource needs can be tied directly to *Objective 3-1-4. Involve stakeholders and increase knowledge of and participation in collections*. Finding ways to effectively engage our stakeholders in the library's collections process is a challenge and the library will continue to work toward accomplishing this objective.

Goal 4. Expand Outreach and Engagement involved the creation of a new faculty librarian position to promote library services, resources, and programming. *Local question 5. The library keeping me informed about library resources and services* is the only local question that received positive scores for both undergraduates and graduate students. This data, along with positive comments regarding new resources, technology, and services, seems to indicate that the library has made progress addressing strategic initiatives involving outreach and engagement.

Additionally, the large amount of customer service related comments seem to indicate that customer service is an important part of our users' overall library experience and that initiatives in this area, *Goal 6. Commit to career development for all library staff*, are worthwhile and relevant.

These are just a few examples of how the comments contributed valuable feedback that validates the current plan and will help inform the library's next plan. LibQUAL survey data and comments primarily address the following strategic plan initiatives: *Goal 1. Enhancing the user experience*; *Goal 3. Dynamically responding to users' resource needs*; *Goal 4. Expanding outreach and engagement, and; Goal 6. Commit to career development for all library staff*. Survey data and comments also provided some insight into users' needs concerning *Goal 2. Cultivate and strengthen information competencies* and *Goal 5. Become the campus nexus for scholarly communications.*

Limitations

Some of the services and resources that were evaluated through the local questions were very new; for example, EZproxy was introduced several months before conducting the survey. The data indicates that students were more aware of our new services than faculty. This is not surprising as students are informed of library services during instruction sessions and workshops.

Additionally, qualitative data can be open to interpretation. For example, if survey respondents comment that they cannot find specific journals via the library's website, it may be that the library does not subscribe to the journals or it may be that the respondents are having difficulty navigating the library's website and online resources. These issues require further exploration and will need to be addressed using other forms of assessment.

Conclusions

The LibQUAL survey results and attached comments corresponding to strategic plan initiatives have confirmed that the library is on the right track to understanding our users' needs, especially concerning library as place. Comments were particularly helpful in clearly identifying shortcomings of the building and its space and in providing a venue for the voice of our users. The data and comments also validated longstanding concerns of library staff regarding the building and its space. Addressing other aspects of the strategic plan, LibQUAL survey data and comments have been helpful in assessing the relevance and achievement of current goals and will be effective in reminding the library what is important to our users

when developing our next strategic plan. Including the same local questions in our next LibQUAL survey will be beneficial in providing insight for the library's current and future strategic planning initiatives in the areas of information literacy, scholarly communications, and outreach and engagement. Inclusion of these questions will also allow the library to better understand whether initiatives in these areas have positively impacted our users over the next few years. Survey data and comments did not address all of the library's strategic initiatives and, as noted above, further information gathering and assessment methods will need to be explored.

Next steps include presenting our findings to the entire library staff as we prepare to assess the current strategic plan as a group and move into our next strategic planning process.

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Impacting Student Success: A Practical Guide to Assessing Library Services at the Community College Level

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Abstract

Library assessment is a well-established necessity for proving a library's worth to administration. Yet few documented library assessments focus on assessment of community college library services, instead concentrating on library collections at four-year universities. Library services can include reference, information literacy instruction, and library outreach, all of which directly tie to students' academic success. This paper seeks to fill the gap in the literature on community college assessment of library services by presenting the results of a mixed methods assessment of library services at Bakersfield College during the fall 2017 semester. The results of this study were quite positive, although gaps in service were identified and addressed post-assessment. The library plans to continue assessing its services every three years with this model of assessment. This assessment is replicable for any community college library that wishes to begin its own formal assessment practices, as well as any academic library interested in beginning to assess its services.

Assessing Community College Library Services

With the recent completion of ACRL's **Assessment in Action** program, academic library assessment has become a hot topic.[1] Although always integral for service-oriented professions, assessment often serves a unique purpose for academic libraries in that it can also show how the library and its services impact student success and the college as a whole. The study results published in **Assessment in Action** document the ways in which libraries contribute to student success at their colleges or universities, highlighting how necessary it is for library services to respond and evolve to the needs of their individual campuses.[2]

Historically, library assessments have focused on library collections rather than library services.[3] However, an argument can be made that a more effective form of library assessment focuses instead on student usage of library services and the degree to which student library usage relates to academic success.[4] Although many library assessments show a link between student success and the academic library, it is difficult to find studies that focus on this link at community colleges rather than at four-year colleges and universities. When looking at the list of the 203 institutions participating in the Association of College & Research Libraries' **Assessment in Action** program, less than 15% of these institutions are community or technical colleges.[5] This shows a clear gap in the research on assessing library services at the community college level. In addition, the mission of community colleges in California focuses on teaching and learning rather than research. As a result, community college libraries are less concerned with higher level research and more concerned with providing the breadth of basic services necessary for community college student success, proving the need for assessment of those services. This paper demonstrates methods for a full-scale assessment of community college library services, taking an assessment done during fall 2017 for the Bakersfield College Grace Van Dyke Bird Library as its paradigm.

The Bakersfield College Grace Van Dyke Bird Library

Bakersfield College (BC) is one of 114 California community colleges. Bakersfield is located in Kern County, part of the highly agricultural San Joaquin Valley. This area has a low socio-economic rate, with a poverty rate approaching 23% and fewer than 16% of adults obtaining a bachelor's degree or higher by the age of 25.[6] As of the 2016–2017 academic year, the college had an FTE of about 15,500 with a very diverse, non-traditional student population. BC also awards the highest number of degrees of any institution of higher education in Kern County.[7] Many of the close to 30,000 students on campus stream through the library's doors every day, interacting with the librarians multiple times per week—much more than they interact with their professors and counselors. Moreover, due to the nature of BC's student population, many students who

come to our library have never been in a library before or have not entered a library for several years or decades. As a result, our library services do not simply orient them to the differences between an academic library and a high school or public library, but introduce them to the library as a concept.

Since the library teaches both for-credit and not-for-credit courses, the BC library reports to a vice president of instruction at the college. However, it is colloquially considered part of campus' Student Services along with non-academic units such as the Writing Lab and the Tutoring Center. There are five full-time tenure-track faculty librarians on staff at the main campus library, along with three adjuncts. Of the five full-time librarians, one serves as a technical services librarian (and is currently our chair), while the rest serve simultaneously as reference, instruction, liaison, and outreach librarians. The library currently offers access, reference, instruction, and technology services. However, before fall 2017, we had no formal measurement for each of these categories. Without this measurement, we had no evidence of library use or perception other than a once-per-decade collection inventory, had no data to provide to administration regarding the impact of the library on student success, and were lacking in concrete data we could use to make staffing or technology requests.

Assessing Library Services at Bakersfield College

During spring 2017, the library conceptualized its assessment design. We focused on two questions to assess during the fall 2017 semester:

1. Does the current level of library services adequately fulfill the needs of the student population at Bakersfield College?

2. How should the library change or enhance its services to better meet the needs of its community?

To measure these two questions, the library designed a mixed-methods assessment that utilized quantitative usage statistics as well as qualitative surveys targeted to students and faculty at the college.

Rather than choosing to assess one week or month of the semester, we decided to assess our services across the entire semester in order to establish an assessment benchmark. Several tools helped us gather library usage statistics. Since the library does not own door-counting software, I took a manual headcount of students four times per day (9:30 a.m., 12:30 p.m., 3:30 p.m., and 5:30 p.m.), library hours permitting. Our circulation staff kept track of study room usage each week and tallied up the weekly and semesterly totals in a report at the end of the semester. These two counts helped us measure overall usage of library space. I also pulled end-of-semester reports on printer and copier usage, e-book and database usage, and circulation statistics. We used these to measure our technology and access services.

Measuring reference and instruction services required a combination of quantitative and qualitative instruments. The library uses the Springshare platform to collect reference statistics, which meant I could easily pull reports at the end of the semester to measure the number, type, length, and frequency of reference questions throughout the semester. However, to measure student perception of our reference services, I gave a targeted reference survey (via SurveyMonkey) to any student who asked a reference question during October 2017.[8] I chose this month because October is one of our busiest months and I hoped I would be able to collect a maximum number of survey responses this way. To measure our library instruction, I not only tallied the number of library research skills workshops and library orientations (one-shots) we taught throughout the semester, but I also asked each librarian who taught instruction sessions to give me a headcount for each session they taught during the semester.[9] We captured student perception of the research skills workshops by asking each student who attended a workshop to fill out a brief paper survey, while we captured faculty perception of library orientations by sending a SurveyMonkey survey to all faculty who brought their classes into the library that semester.[10] This survey asked faculty about their experience with the orientation and whether they felt it had helped their students.

I also sent out a broad SurveyMonkey survey on library perception to the all-campus Listserv during October 2017.[11] This survey measured the library perception of any student who had used the library recently or in the past. Finally, I sent a SurveyMonkey survey on library perception to the all-faculty Listserv in order to include the perception of faculty who may not have requested a library orientation during fall 2017.

Assessment Results

I compiled the results of this assessment during spring 2018. Since so much of the data was in the form of usage statistics, and since I used a survey software that easily creates reports and data tables, this process was quite simple. The results of our assessment were far more positive than we had anticipated. Based on these results, the library is both highly used by the campus community and very positively perceived by both students and faculty at Bakersfield College. The final headcount for the semester was over 40,000, with an average of 122 students in the library at all times and a record headcount of 333 students at 12:30 p.m. on October 3, 2017. Our five study rooms were checked out a total 1,550 times during the semester, or just about 16 times per day. The headcount and study room data have been extremely helpful as a tool to prove the sheer volume of BC student presence in the library.

We also recorded over 5,000 reference questions, which is just over 300 per week. The reference data helped us identify the busiest times for reference, which led us to reconfigure staffing at the reference desk. In addition, we taught 94 different library orientations to 2,180 students over the semester as well as 44 research skills workshops to 343 students, for a total of 2,523 students taught over the semester. This means that about 10% of the total student population received some form of library instruction during fall 2017.

The survey results show that both faculty and students feel positively about library services. The general survey to all BC students shows that 35% of respondents use the library multiple times per week, and over 82% of the respondents indicated that one of their primary reasons for using the library was as a quiet space to do homework, with database use coming in second at 63%. This drives home the fact that the library is one of the only spaces many of our students feel they have to complete their homework. Many of our students live with family or have children, and they find that they have too many demands on their attention at home to complete their school work. The library as a space is vital for them.

About 25% of the respondents for the general survey and the targeted reference survey indicated that they ask librarians a question about once a week, while the targeted reference survey responses revealed that librarians were perceived as helpful 90% of the time. Moreover, students were happy with their access to reference librarians 100% of the time. These results were a phenomenal affirmation of our reference services; we were particularly pleased that our students find reference desk hours sufficient for their needs. On the instructional side of things, when students were asked to rate how helpful the information they learned would be for their classes, the average answer was a 4.7 out of 5, with 1 being "not at all" and 5 being "essential." All faculty survey respondents who requested orientations said that the orientation their students received met their expectations, and over 85% indicated that they had noticed an improvement in their students' research skills after the orientation. We were very happy with these instruction results.

Although the primary goal of these surveys was to gain an understanding of library perception on campus, I had a secondary goal of using them to create a way to capture the library's impact on student success at Bakersfield College. When creating the assessment as a whole, I had hoped to be able to track the GPAs of students who had participated in library instruction in order to compare their GPAs with overall GPA statistics on campus. Other community colleges have set a precedent for this type of tracking—Austin Community College in particular has a wonderful model.[12] However, when I approached the college about this, the BC Admissions & Records Department cited FERPA concerns and denied my request. Given this development, I decided to implement the library's student surveys on library perception as a way to gain data on library impact on student success. I added a question to the general student survey related to each of BC's Institutional Learning Outcomes (ILOs) to help determine whether students perceived that the library had helped them achieve these learning outcomes. For every ILO, at least 40% of students stated that they "strongly agreed" that the library had helped them achieve this outcome, while fewer than 5% disagreed that

the library had helped them achieve any particular ILO. While this data is self-reported, we were quite happy with these results in the absence of access to student grades.

As a whole, the library found the results of this assessment incredibly helpful. We were able to use the assessment data we gathered as key evidence during our campus' accreditation renewal in fall 2018. I also presented the results of this assessment to the campus' Assessment Committee as a method for non-academic units on campus to assess their services. Based on preliminary discussions within the library, we plan to assess our services every third year with this model. We came to this number based on the fact that all California community colleges follow a six-year accreditation cycle through the Accrediting Commission for Community and Junior Colleges (ACCJC). By assessing library services every third year, we will ensure that our services are assessed twice during each six-year accreditation cycle.

Addressing Gaps in Library Service

While there were almost no negative responses to any of our surveys, we did identify two gaps in our services after analyzing the survey data. The first was a lack of consistently quiet study space for students in the library and the second was a lack of awareness among faculty of the services they could use at the library. The library began addressing these issues during fall 2018.

As stated previously, over 80% of surveyed students stated that their primary reason for using the library was as a quiet space to complete homework, with about 45% of students coming to the library for this reason multiple times per week. Yet a consistent response to our open-ended survey question asking students whether the library meets their needs as a student was that the library is often too crowded or too noisy for students to be able to work effectively (in fact, one student compared our noise level to the campus cafeteria!). As community college librarians, we know that the library is one of the only places on campus where students can study—unlike residential campuses, BC has no student union and study space is very limited at the writing and tutoring centers. This means that it is not only very important for students be able to study quietly in the library, but also for students to have space for group study (as demonstrated by the extremely high usage of our study rooms). To help with the noise level while still allowing space for group study, we instituted noise zones throughout the library. The library is contained on one floor, so we cannot use the easy solution of one quiet and one group study floor; instead, we moved all large tables to the front of the library and called the front half of the library our "hushed-talking zone" where students may talk quietly while studying together. The back half of the library is the "no-talking zone" for completely silent study. To help shift the culture of the library to reflect these two zones, we placed prominent signage at the entrances to each zone, and the librarians regularly walk around the library to check on noise levels. Noise complaints have decreased this semester now that students have a more consistent idea of how to use the library, and students seem much happier now that they have a clear way to tell how they should be using the library.

We discovered the second gap in services, the lack of awareness of library services among BC faculty, as a result of the all-faculty survey sent out at the end of fall 2017. In it, we identified five services faculty can use at our library (library workshops, customized library orientations, reserve textbooks, ordering course-supportive books, and collaborating with librarians on research assignments) and asked faculty how often they used these services. In every case, at least 13% of faculty were not aware of the service, and in three cases, nearly 45% of faculty were not aware of the service. To help with this, the library has been more proactive in advertising how faculty can use its services. The last newsletter of the 2017–18 year devoted its front page to our different faculty services, and we created a library brochure for faculty that our librarians distribute when they attend department meetings in their liaison areas. We also sent out an email to both full-time and adjunct faculty listing our services at the beginning of fall 2018, and our chair attended the new faculty orientation in fall 2018 to explain our services to the new faculty. We hope this renewed effort helps lessen the gap in faculty knowledge of library services.

A Framework for Assessing Community College Libraries

While recognizing that this assessment was created for the unique needs of the Bakersfield College Library, this assessment is fully replicable for any community college library that wishes to begin its own formal

assessment practices and, in fact, for any type of academic library interested in beginning to assess its services. The basic concept remains the same: identify which services you would like to assess and determine which quantitative and qualitative data methods might best work for your library's needs. Relying largely on usage reports and surveys of the campus population is particularly helpful for institutions that do not subscribe to assessment services such as Qualtrics, Ithaka S+R, etc.

The method for measuring library services laid out in this paper can be quite work-intensive, depending on the level of staff at your particular library, but it is extremely useful for gaining as complete a picture of library usage and perception as possible. If your library does not have a baseline for assessing library services, it may be helpful to begin by assessing all services as described here. However, when deciding on assessment design for your own library, it is also important to consider the depth and breadth of your needs: do you need to assess all library services, or would you like to focus only on reference or only on instruction? Do you have the work force and the time to complete daily assessment tasks, or would it be better for your library to focus on usage reports pulled at the end of the semester? Do you have permission to conduct qualitative research on your campus? This last question is often contingent on whether your college has a department of Institutional Effectiveness or an IRB; BC had no IRB when I began designing the assessment, which made the process of determining how to gain consent to conduct human research for this assessment a little tricky.

In addition, community colleges are different than traditional colleges or universities. I say this with no intent to create a sense of rivalry between the two types of institutions; instead, I am referring to the differences in staff, mission, and faculty research support between the two types of institution. While community college librarians might have the same drive for research and assessment as their four-year colleagues, we are generally stretched a little thinner. Whereas a four-year university might have 10 or 100 librarians (including entire librarians dedicated to assessment!), it is quite common for community colleges to have five or fewer librarians who wear many different hats. This means that community college librarians have almost no time for individual research between collection development, reference, teaching one-shots and workshops, and conducting student outreach. In addition, the majority of community colleges do not require research during the tenure process. Since research is not required to gain tenure or promotion, there are significantly fewer institutional services and supports for faculty research at community colleges. As argued at the beginning of this paper, this combination has led to a lack of published assessment for community college libraries.

However, this does not mean community college libraries are doomed to assess less than their university peers. All of the assessment accomplished in this paper was cooperatively conducted by a team of five librarians and four library staff, none of whom were previously trained in library assessment practices. If our library can do it, your library can do it as well! This mindset also applies to smaller colleges or universities in addition to community colleges. Libraries at smaller institutions might feel that their staff would be overwhelmed by a full-scale assessment, and so they might shy away from developing an assessment like the one presented here. Instead, I encourage any type of academic librarian to sit down and develop a list of their library's services, then determine the best way to assess each service, using the examples I have listed in my own assessment as well as any additional assessment you might need.

Conclusion

Assessing library services makes it possible for the library to have real data on how effective the library is in helping the many students they come into contact with each day. This is helpful not only when communicating the value of the library to campus and district administration, but also when the need for new equipment, more staffing, etc. comes into play. For example, with no assessment data to point to, administration might not place a need for more librarians during a certain time of day at a high value when making budgetary decisions. In addition, lack of assessment data can become a problem during processes like accreditation renewal. Bakersfield College went through its accreditation renewal during fall 2018 and the data from our library assessment was incredibly useful not only for the college's self-assessment report to the accreditors, but also during discussions with the accreditors during the accreditation site visit. Without it,

we would not have been able to answer questions of how the library assesses the campus' institutional learning outcomes, and how we assess our own program and student outcomes.

Although the act of creating an assessment framework from scratch can seem daunting, my hope is that community college librarians reading this paper will be heartened by the fact that community college assessment of library services is alive and well, and thus feel encouraged to begin their own assessment process. Community college libraries provide a unique service to their campus and their communities and it is important that our efforts are known, quantified, and acknowledged.

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2. Brown, "Documented Library Contributions."
3. Matthews, *Library Assessment in Higher Education.*
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5. ACRL, "Assessment in Action."
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7. Data USA, "Kern County, CA" and Bakersfield College, "Renegade Scorecard."
8. See Appendix A.
9. See Appendix B.
10. See Appendix C.
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Appendix A
Reference Survey

1. Why did you come to the library today? (Choose 1)

To do homework
I took workshop(s) for extra credit
My class had a library orientation here
I use the computers to go online or write papers
I print papers for class or use the copy machines
To find books
To use the databases to find articles
To ask librarians for research help
Other:

2. About how often would you say you use the library?

This is my first time here
1–2 times per semester
1–2 times per month
1–2 times per week
Daily

3. What are some of the most common reasons why you use the library? *(Choose up to 3)*

To do homework
I took workshop(s) for extra credit
My class had a library orientation here
I use the computers to go online or write papers
I print papers for class or use the copy machines
To find books
To use the databases to find articles
To ask librarians for research help
Other:

4. Is this the first time you've asked a reference librarian a question?

Yes
No

5. Did you feel as though the librarian helped you with your question?

Yes
No
Kind of

6. How likely are you to ask librarians for help the next time you have a research question?

Very likely
Likely
Not very likely

Not likely at all

7. Do you ever use the resources on the library website (EBSCOhost, the library catalog, etc.) from your home computer, cell phone, or other off-campus computers?

Yes
No
I don't have access to a computer off-campus

8. *(Only appears if yes)* **Have you ever needed help while doing research off-campus?**

Yes
No

9. *(Only appears if yes)* **Have you called the reference desk to ask for help while doing research off-campus?**

Yes, I call a lot
Yes, I have called once or twice
No, the library was closed when I needed help
No, I hate talking on the phone
No, I didn't know I could call and get research help
Other:

10. Do you feel that librarians are available for help most of the time you are on campus?

Yes
No, I need help on weekends
No, I need help later in the evening
Other:

Appendix B
Library Orientation Faculty Feedback Survey
1. Based on the instruction you received, did the orientation meet your expectations?

Agree
Somewhat agree
Somewhat disagree
Disagree
N/A

2. The library instruction session was appropriate for the course level and assignment.

Agree
Somewhat agree
Somewhat disagree
Disagree
N/A

3. Electronic and/or print sources relevant to the course were identified and demonstrated.

Agree
Somewhat agree

Somewhat disagree
Disagree
N/A

4. Do you routinely request library instruction for the courses you teach?

Yes
No

5. If you answered yes to the previous question, have you noticed an improvement in your students' research papers or assignments as a result of the library instruction?

Yes
Somewhat
No

6. Please rate the overall session

Very effective
Somewhat effective
Somewhat ineffective
Ineffective
NA

7. What did you particularly like about the session?

8. Suggest one change that would have improved the library instruction session.

Appendix C
Faculty Survey

1. The following questions were asked via table so that they were visible as one question with several parts

    a. Have you ever brought a class to the BC library for a research orientation tailored to your class' research needs?

    Yes, I do this every semester
    Yes, I have done it once or twice before
    No, I don't think this will benefit my students
    No, I didn't know I could do this
    Other:

    b. Do you tell your students about the library's research skills workshops?

    Yes
    No
    I didn't know these existed
    I don't think they're helpful for my students

    c. Have you ever asked a librarian to order books for the library that would be useful for your students or for your research?

    Yes

No
I didn't know I could do this

  d. Have you ever placed a textbook for your course on reserve at the library?

Yes
No
I don't know what this means

 2. Do you have any suggestions or feedback for the library?

Appendix D
General Student Survey
1. Have you been to the library while you've been a student at BC? *(If answer is no, skip to question 38)*

Yes
No

2. About how often do you use the library?

1–2 times per semester
1–2 times per month
1–2 times per week
Daily

3. What is the most common reason you use the library? *(Check up to 2 options)*

To do homework
I took workshop(s) for extra credit
My class had a library orientation here
I use the computers to go online or write papers
I print papers for class or use the copy machines
To find books
To use the databases to find articles
To ask librarians for research help

4. Do you use the library as a quiet space to do your homework? *(If answer is no, skip to question 5)*

Yes
No

5. Have you ever used the computers at the library? *(If no, skip to question 8)*

Yes
No

6. What do you mostly use the computers for? *(Check one)*

Going online to check my email
Going online to use social media such as Facebook or Twitter
Going online to use different websites for class
Doing research using the library databases (EBSCOhost, etc.) or the library catalog

7. Do you think there are enough computers for students to use in the library?

Yes
No

8. Have you ever asked a librarian a question? *(If no, skip to question 13; if I'm scared to ask, skip to 12)*

Yes
No
I'm scared to ask

9. What kind of questions have you asked the librarians?

Technical (how to print, how to copy, how to use the computers)
Reference (how to look up books or articles, whether we have a certain book in the library, what search terms to use)
General (Where's the bathroom? Do you have a stapler?)

10. Are the librarians helpful when you ask them reference questions?

Yes
No

11. Have you ever been nervous or scared to ask the librarians a question? *(If answer is no, skip to 13)*

Yes
No

12. Why have you been scared to ask the librarians a question?

They might think my question is dumb
They probably won't know the answer
I don't know them
I feel overwhelmed by the library

13. Have you ever been in a class that has come to the library for a research orientation with a librarian? *(If no, skip to question 24)*

Yes
No

14. How much did you feel this orientation helped you find and evaluate research sources for your class(es)?

It helped a lot
It helped a little
It didn't help very much
It didn't help at all

15. Have you ever attended a workshop at the library? (If no, skip to 19)

16. Which workshops have you attended? *(Check all that apply)*

Strategies for Effective Research

Finding Books & eBooks
Finding Periodicals Online
Beyond Basic Google
Evaluating Internet Sources
Ethics of Research/Avoiding Plagiarism

17. Why did you attend this workshop?

My professor required me to attend
My professor gave extra credit for attending
EOP&S, Financial Aid, Early Alert, or Student Life required that I attend
I wanted to learn more about using the library or researching

18. How helpful was this workshop for the research you need to do at BC?

Very helpful
Helpful
Not very helpful
Not helpful at all

19. Have you ever taken LIBR B1: Introduction to Library Research? *(If no, skip to 22)*

Yes
No

20. Why did you take this class?

My professor encouraged me to/offered extra credit if I took it
I wanted to learn how to research better
I needed an extra unit

21. After taking this class, how confident are you in your ability to find and evaluate research sources?

Very confident
Confident
Not very confident
Not confident at all

22. Have you ever checked a book out from the library? *(If no, skip to question 24)*

Yes
No

23. When you check out books, are they reserve books (textbooks that you get downstairs) or general books (books from the shelves upstairs)?

Reserve books
General books

24. Have you ever used the library catalog to look up books that we have in the library? *(If no, skip to question 26)*

25. Where did you learn how to use the library catalog?

I asked a librarian
A professor showed me
I went to a library workshop
My class came to the library and a librarian showed us how to use it
I figured it out myself

26. Have you ever used one of the library databases (such as EBSCOhost or Opposing Viewpoints) to find articles? *(If no, skip to end)*

Yes
No

27. Which databases have you used before?

(insert list of databases)

28. Which database do you use the most?

(insert list of databases)

29. Where did you learn how to use the library databases?

I asked a librarian
A professor showed me
I went to a library workshop
My class came to the library for an orientation
I figured it out myself

Thank you for completing this survey! Your information will be extremely helpful.

Linking Incongruent Data Sources: A Case Study of a Summer Library Program

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Introduction

A wealth of empirical evidence demonstrates that the educational achievement gap is exacerbated by economic inequality. Compared with children from advantaged backgrounds, children from low-income families are less likely to score as proficient on school reading assessments,[1] graduate from high school,[2] and attend college (Goldrick-Rab & Pfeffer, 2009; Bailey & Dynarski, 2011).[3] Although there are many underlying causes of income-based disparities, low-income children are more vulnerable to summer learning loss than their wealthier peers.[4]

To better understand summer learning loss, the "faucet theory" suggests that opportunities to learn and access educational resources are "turned on" for all children during the academic year and are accessed equally; however, the school resources are "turned off" during the summer months when school is not in session.[5] As a result of the faucet being shut off during the summer months, low-income students whose families cannot afford to provide supplemental educational resources and learning opportunities are put at a distinct disadvantage compared to their affluent peers. On average, children from middle-income homes have access to approximately twelve books per child, whereas children from low-income families have access to about one book per child.[6]

To combat summer learning loss, a number of districts and communities have implemented summer reading programs. Local public libraries are a key player in the delivery of summer reading programs, as this is one community establishment that offers all children, regardless of income level, equal access to learning opportunities (e.g., books). Over 95% of libraries in the US offer a summer reading program.[7] Research has found promising evidence regarding the success of public library summer reading programs on enhancing student reading outcomes.[8]

The literature on summer learning loss and summer reading programs address major aspects of the efficacy of these interventions on student outcomes; however, the literature leaves important questions around measurement largely unanswered. Many evaluation studies utilize the same standardized reading assessment, such as the Scholastic Reading Inventory (SRI), to measure the impact of library reading programs on student outcomes.[9] Few studies explicitly explore the methods necessary to successfully leverage extant reading data across multiple school districts, which often contain myriad reading assessments.

Study Purpose and Research Questions

A major challenge to evaluating the impact of a library summer reading program (SRP) is accessing the necessary data to adequately measure program success. Many programs do not have the resources nor time to administer a specific reading assessment to participants. A cost-effective alternative is to obtain reading data from the local school districts that send students to the library's reading program. However, school districts choose benchmark assessments individually and there is considerable variability across schools, grade levels, and content areas in terms of which benchmark assessment is used. Thus, working with multiple districts, many of whom choose different assessments, poses some methodological challenges.

The purpose of this study was to develop a data-driven research method that could be used to measure and evaluate the impact of SRP. The primary research question that guided the evaluation study was: Do students who participate in an SRP experience comparable levels of summer learning loss compared to similar students who did not participate in the program?

Data

The SRP that was evaluated in this study was developed by the Mid-Continent Public Library which serves the Kansas City Metropolitan Area (KCMA). Data for this study were derived from two primary sources: the SRP program records and extant academic data from participating school districts. Data for this analysis corresponded to three time periods. Pre-intervention data were denoted **Spring** and came from the spring of academic year 2016–17. Post-intervention data were denoted **Fall** and came from the fall of academic year 2017–18. Intervention data were denoted **Participation** and corresponded to the intervention which occurred during the summer of 2017.

Approximately 11,000 students from 21 public school districts as well as various private and charter schools across the KCMA participated in the 2017 SRP. Data were solicited from 16 of the 21 public school districts, and data sharing agreements were ultimately executed with eight. The 16 districts were chosen primarily due to size. The data sharing agreement specified that **Spring** and **Fall** datasets be submitted as separate rather than aggregate files. This specification necessitated additional time to be set aside to create a matched **Spring-Fall** dataset. Commentary regarding the rationale behind this decision and its applicability to areas of high student mobility may be see in Appendix A. The distribution of participants across districts and by participation status may be seen in Figure 1.

Spring and **Fall** data were administrative data provided by the eight participating public-school districts. **Spring** and **Fall** data elements consisted of identifiers such as name, birth date, state identification numbers, demographic information, and benchmark reading scores. **Participation** data were self-reported by participants and then provided to us by MCPL. The data corresponded to students who participated in the 2017 SRP. **Participation** variables consisted of name, birthdate, school, and grade. Note that **Participation** data did not include numeric identifiers; this created challenges, as discussed later in the paper, when joining the various datasets. A full list of requested elements may be seen in the sample Memorandum of Understanding located in Appendix B.

Methods

The analytic sample for this study consisted of a **treatment** group, defined as first through fifth grade students who participated in the 2017 SRP, and a **control** group of similarly-aged students who did not participate. Figure 2 presents the grade distribution of all participants in the SRP as reported by the parents of these participants or by the participants themselves to the MCPL staff. Notice that a substantial percentage of participants did not report grade information. Due to the higher likelihood of inaccuracy in these data, observations were dropped based on district data rather than **Participation**. More specifically, student records were dropped if they could not be linked to district data at all or if, once linked to the district data, students appeared to be outside the range of first through fifth grades. Students who were in kindergarten or younger during spring 2016–17 were dropped from the analytic sample due to lack of assessment measures. Students older than fifth grade were dropped due to small sample sizes.

Linking Data Sources

The decision to match **Spring** with **Participation** data rather than **Fall** with **Participation** was arbitrary, but the decision to match district data to **Participation** before matching district to district was intentional. As evaluators, our primary responsibility was reporting on the efficacy of the program, but due to the annual replication of this study, it was equally important that we assess the quality of data collection related to participation and make recommendations accordingly. **Participation** data, particularly the identification variables such as name and date of birth, were prone to errors, missing information, and, as discussed in Appendix C, informal variations of names. We wanted to know how much the quality of these data influenced our ability to match **Participation** to district data. By matching **Participation** to **Spring** first, we could determine the percentage of SRP participants that were identifiable in the district data through name-matching. This percentage provides insight into the quality of the **Participation** data and the related collection process.

Standardizing Assessment Scores

The raw data for this evaluation reported student assessment scores across five different reading measures: Lexiles, Fountas & Pinnell (F&P), Curriculum-Based Measure of Oral Reading (RCBM), Rausch Unit Scale (RIT), and STAR Reading (STAR) Scores. Because these assessment scores were based on varying scales, we standardized each to get scores that are comparable across all districts and grades. Student records containing only F&P scores were dropped from the analytic sample. This is because F&P scores are non-numeric and currently there is no agreed-upon method by which to quantify these data. While this only affected one of the eight districts, it was the largest of the participating districts and dropped a substantial number of observations. The equation used to standardize the remaining assessments was:

$$Z_i = \frac{Assessment\ Score_i - Sample\ Average}{Sample\ Standard\ Deviation}$$

Sample averages and standard deviations were functions of assessment type and grade. For example, the z-score calculation for a third-grade student taking the RCBM assessment utilized the sample average and standard deviation of the third-grade students across the eight districts that took the RCBM assessment. However, when assessment companies publish norming sample means and standard deviations, these statistics were used in place of our sample-based statistics.

The benefit of standardizing assessment scores was two-fold. First, it allowed us to keep observations of students who took a different assessment in the fall than what he or she took in the spring. This was particularly important because it was not uncommon for districts to change assessments from one academic year to the next, and, with a highly mobile student population, it was also likely that students would move from one district to another that took a different assessment. The second benefit of standardizing assessment scores was that scores became comparable across all grades and assessment types. Because assessment scores were then interpreted as the number of standard deviations that a given score was away from the corresponding mean, the downside of standardizing was that it could be difficult for practitioners and lay audiences to understand the findings. The ease in which we could convert z-scores into something meaningful depended on the audience (e.g., parents, practitioners, administrators, etc.), but was necessary because of the inconsistency of assessment types.

Results
Nearest Neighbor Matching

One problem with basic regressions is that involvement in the intervention is not randomly assigned. If students in the **treatment** and **control** groups had similar characteristics resulting in an equal likelihood of entering treatment, this would not be an issue. However, **treatment** and **control** groups look somewhat dissimilar in terms of observable characteristics. Figures 3 and 4 illustrate some of these differences.

Treatment group students were more likely to be white (61 percent compared to 53 percent), and less likely to be male (47 percent compared to 50 percent), black (17 percent compared to 23 percent), or Hispanic (12 percent compared to 14 percent). Asian and other racial groups were represented similarly in both the **treatment** and **control** groups.

It also appeared that **treatment** students were also less likely to receive free or reduced lunch, but it was difficult to determine whether that was actually the case. The Community Eligibility Provision (CEP) allows districts that are 40% FRL or higher to designate all students as FRL. One of the districts in our sample used this provision and this may have altered the distribution of this variable across treatment designations. **Treatment** group students were much more likely to be enrolled in summer school (68 percent compared to 33 percent). Although summer school attendance may have been another important factor in determining the effect of the SRP intervention on student reading outcomes, this variable is missing in a substantial number of cases.

Because of these differences in demographic characteristics and the fact that assignment to the intervention is not random, we opted to create a matched sample.

Creating the Matched Sample

A nearest-neighbor matching algorithm was used to create the **control** group. The nearest-neighbor algorithm estimates the counterfactual for each observation by identifying one or more students who are similar in terms of a collection of designated observable characteristics. More specifically, the comparison group for a treated student will be made up of one or more students who are untreated but have similar observable characteristics. **Treatment** and **control** students matched exactly on the district that they attended in the spring, otherwise, **treatment** and **control** students were match based on a weighted function of gender, race, English language learner status, and spring test score. The reason that we included the spring test score as a matching element is that we wanted to ensure that students were starting out at a similar level of proficiency. The logical argument behind this idea is that if we look at two students who are similar in all ways except their exposure to the intervention, then the more likely it is that the intervention is the cause for any differences in the outcome variable.

Once the match was made, the estimate of the counterfactual outcome variable was calculated. The average difference between all students' actual and estimated counterfactual outcomes is called the average treatment effect (ATE).

Table 1 presents our nearest-neighbor estimates of the ATE of the SRP intervention on student reading outcomes. Compared to similar students, SRP participants had better fall reading outcomes following the intervention. The estimated average treatment effect was 1.660 (**p** = 0.082), meaning that reading outcomes would be 1.660 standard deviations higher when all students participate in the SRP compared to when no students participate. The output also indicates that ties-in-distance caused at least one observation to be matched with five observations. What this means is that the nearest-neighbor matching algorithm identified all equally good observations and averaged the associated outcomes to calculate the counterfactual in an effort to reduce bias.

Matching **treatment** students to **control** students with the same summer school status increased the ATE to approximately 5.3 (p = 0.002). This estimate means that, when summer school is taken into account, if **treatment** and **control** students alike participated in the SRP, the reading assessment outcome would, on average, be 5.3 standard deviations higher than it would be otherwise. This estimate is significant at the 1 percent level. Including FRL status with (6.7, p = 0.000) and without summer school status generates estimates that are also significant at the 1 percent level (2.7, p = 0.015).

Conclusion

Leveraging secondary data sources is a cost-effective approach to evaluating community programs, such as a summer library program. However, complexity is introduced when data is solicited from multiple sources (e.g., school districts, public library), which pose many challenges for linking and summarizing outcomes. The purpose of this study was to highlight a data-driven, research method that can be used to measure and evaluate program outcomes that rely on data from numerous sources. This case study highlights a methodological approach that was used to evaluate the impact of a summer library program on reducing summer learning loss. Results indicated that the SRP was an effective intervention for reducing the impact of summer learning loss for participants.

1. Jencks & Phillips, 1998; Reardon, 2011.
2. Losen, 2004; Rumberger, 2011.
3. Losen, "Graduation rate accountability" and Rumberger, ***Dropping Out***.
4. Cooper, et al., "The effects of summer vacation" and Entwisle, "Summer learning and home environment"
5. Entwisle, et al., "Summer learning and home environment."
6. Celano and Nueman, "When schools close."
7. NCES, ***Services and resources***.
8. Roman and Fiore, "Do public library" and Shin and Krashen, ***Summer reading program***.
9. Roman and Fiore, "Do public library."

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Tables
Table 1: ATE Estimates

	Without Summer or FRL	With Summer (exact match)	With FRL	With FRL and Summer
Average Treatment Effect	1.660*	5.288***	2.650**	6.676***
Standard Error	(0.955)	(1.695)	(1.091)	(1.855)
With Summer (exact)	12,039	10,256	9,540	7,756

Figures
Figure 1: Distribution of SRP participants across school districts

Percent SRP Participants By District and Participation Status (N = 10,934)
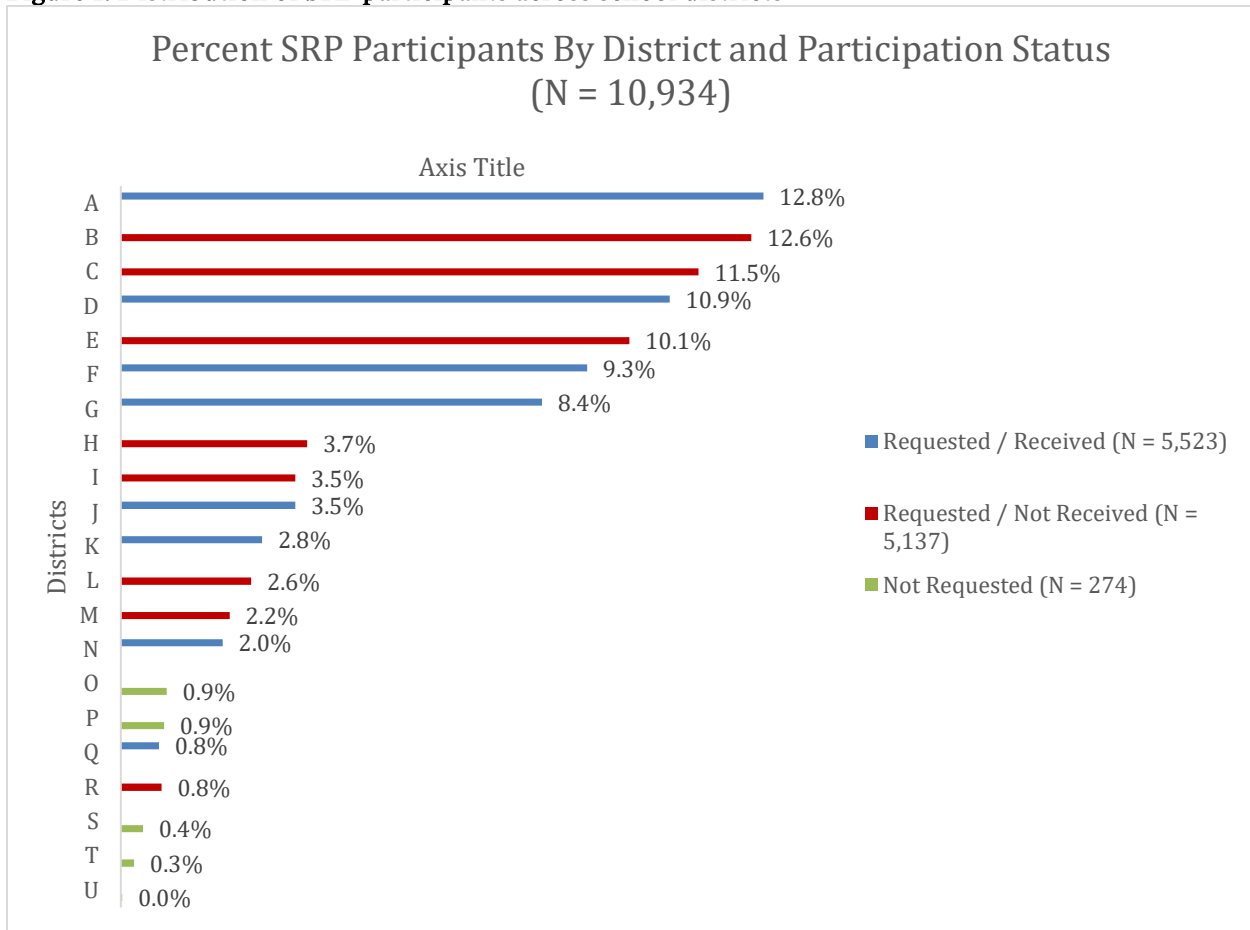
Figure 2: Grade distribution of SRP Participation data

Grade Distribution of SLP Participants

0% Babies and Toddlers, 3% Preschool, 10% Kindergarten, 13% 1st Grade, 12% 2nd Grade, 13% 3rd Grade, 11% 4th Grade, 10% 5th Grade, 7% 6th Grade, 5% 7th Grade, 3% 8th Grade, 2% 9th Grade, 1% 10th Grade, 1% 11th Grade, 1% 12th Grade, 9% Missing
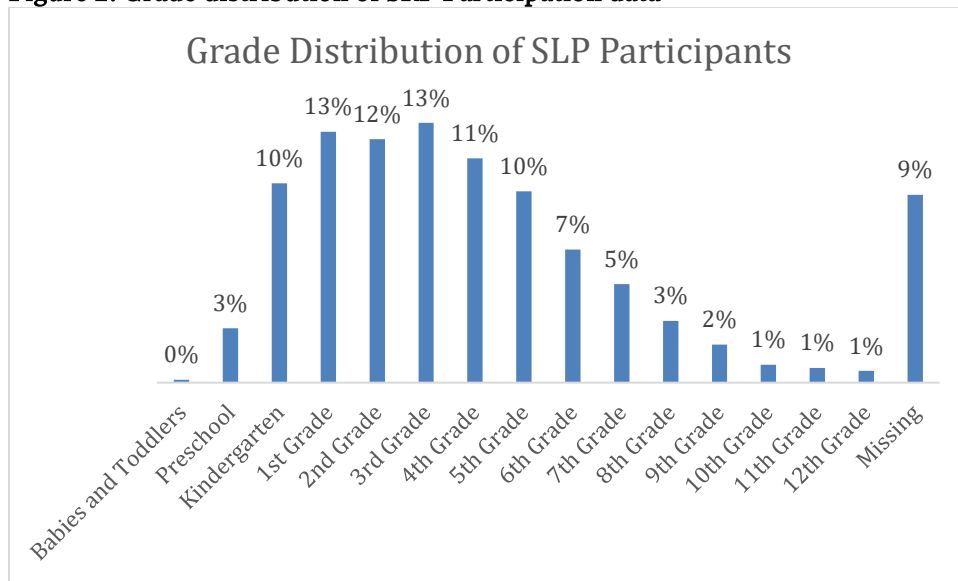
Figure 3: Demographic Characteristics by Treatment Status

Race, Ethnicity, and Gender Distributions by Treatment Status

White: Control 53%, Treatment 61%
Black: Control 23%, Treatment 17%
Hispanic: Control 14%, Treatment 12%
Male: Control 50%, Treatment 47%

■ Control ■ Treatment
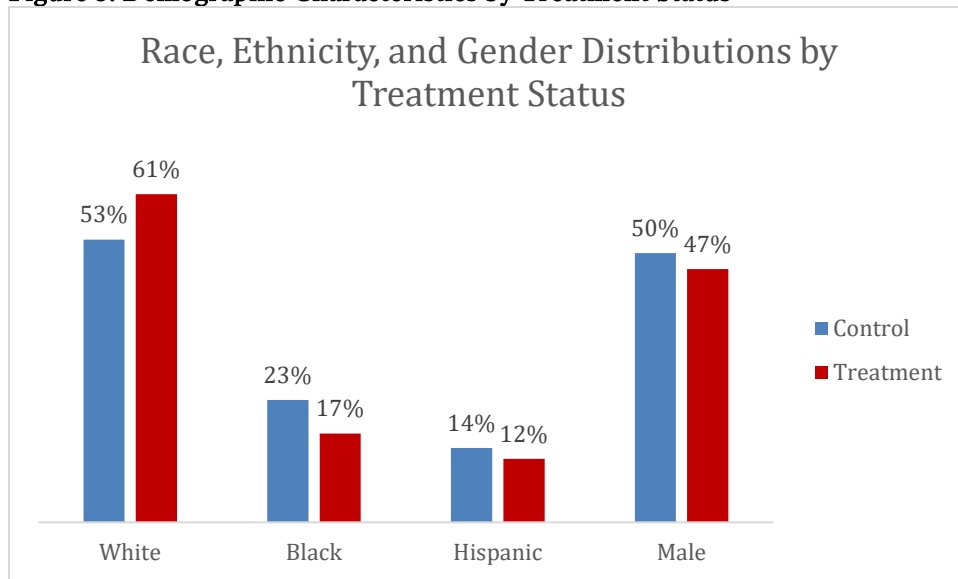
Figure 4: Demographic Characteristics by Treatment Status

Selected Characteristics by Treatment Status

Summer: Control 33%, Treatment 68%
FRL: Control 48%, Treatment 45%
SPED: Control 14%, Treatment 13%
ELL: Control 5%, Treatment 3%

■ Control ■ Treatment
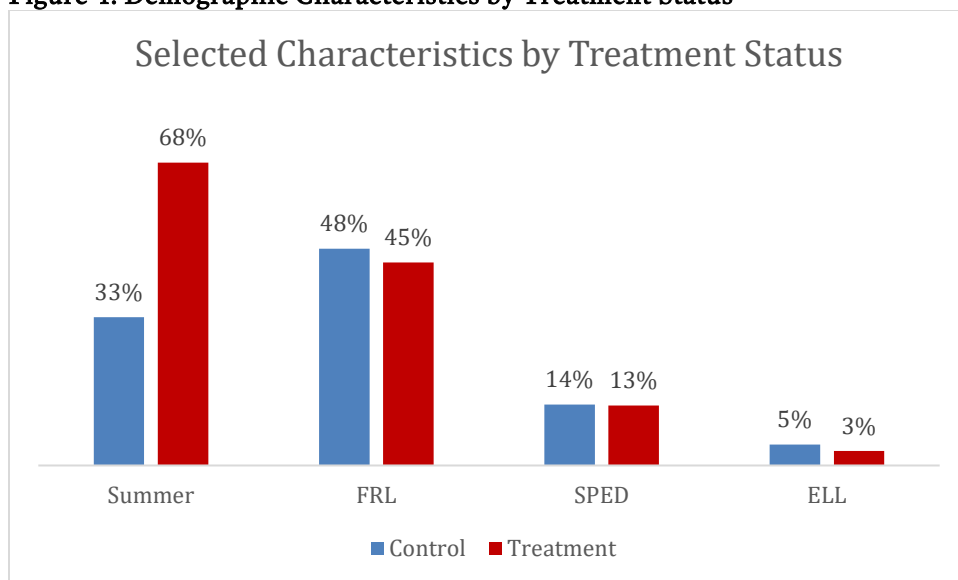
Appendix A: Separate versus Aggregate District Data

In the early years of the evaluation process, districts were asked to submit spring and fall data as a single dataset rather than separate files. While not needing to merge spring and fall datasets saved considerable time, there was one major disadvantage. Some of the participating districts have highly mobile student populations, and when submitting the data for analysis, districts often deleted any incomplete student records. In other words, when a student was not enrolled for both spring and fall semesters, districts often dropped the student from the district data submission. Incomplete records are usually dropped during analysis, so under typical circumstances it would not matter whether the district submitted the incomplete student records. Since we work with a number of districts in close proximity to each other, we have an opportunity to identify missing student data across multiple districts. For example, if a student attended District A during the spring and then transferred to District B during the fall, if District B is one of our participating districts, then we can maintain that student's record in the analytic sample by simply matching his partial record from District A to his partial record from District B. Although districts would have been willing to resubmit the data to include incomplete student records, we tried to avoid this whenever possible. Because the continued success of this project hinges on district participation, it is important to minimize the effort required by district staff.

Because we received two data files, *Spring* and *Fall*, from each district for the summer 2017 evaluation, we recoded variables for individual districts and then created master spring and master fall datasets which contained all student records from all districts for the corresponding semester. The master *Spring* dataset was matched with MCPL *Participation* data, and then the resulting data were matched with the master *Fall* dataset.

Appendix B: Example Memorandum of Understanding

Memorandum of Understanding between <u>SCHOOL DISTRICT</u>, MID-CONTINENT PUBLIC LIBRARY and the UNIVERSITY OF KANSAS CENTER FOR RESEARCH, INC.

WHEREAS, <u>School District</u>, the Mid-Continent Public Library and the University of Kansas Center for Research, Inc. (KUCR) on behalf of the Kansas City Area Education Research Consortium (KC-AERC) wish to create an independent, non-partisan vehicle of the very highest quality to evaluate the effect of the summer reading program efforts and contribute to basic scholarly research on public schools and educational programming; and

WHEREAS, in order to advance these goals, it is necessary to create a digital data archive consisting of longitudinal data that have been fully cleaned, integrated, and documented; and

WHEREAS, data on student characteristics, student academic performance, and school characteristics are necessary to address the foreseeable research questions of the Consortium and the public it serves; and

WHEREAS, to achieve these purposes, the Consortium will release standardized data to a broad public while protecting the individual-level confidentiality.

Now therefore, the parties agree as follows:

1. <u>School District</u> will appoint a data liaison to coordinate this work (at <u>School District</u>) who will facilitate access to the data, and arrange for the staff resources necessary to create all data files to be provided to KUCR.

2. The Mid-Continent Public Library will appoint a liaison to coordinate this work, facilitate access to the data, and arrange for the staff resources necessary to conduct the project. The library will support data technician(s) on KUCR staff or as consultants, as necessary and commensurate with the scale and scope of actual data transferred.

3. Once this MOU has been fully executed by all parties, KUCR will provide resources to clean, organize, match, and manage all data files provided for the project. KUCR will design and execute a methodology for analyzing the data.

4. School District will, through a data liaison, or other representative, resolve in a timely fashion through discussions with the Executive Director or other staff of KUCR any questions that arise concerning the content, timing, or other aspects of the data transfer.

5. School District will provide the staff resources needed to assist, in a timely fashion, with the design and documentation of the data, and create or supply the extract files for KUCR from the administrative systems of the School District.

6. School District and Mid-Continent Public Library will provide KUCR with the data needed to sustain the mission of evaluating efforts of the reading program. School District will provide extracts containing the following types of student information for every student enrolled in pre-kindergarten through 12th grade for the school years 2016–2017 and 2017–2018:

Spring, Academic Year 2016–2017	Fall, Academic Year 2017–2018
MOSIS (or KIDS) student identification number (scrambled using an agreed-upon algorithm)	MOSIS (or KIDS) student identification number (scrambled using an agreed-upon algorithm)
Student first name	Student first name
Student middle name	Student middle name
Student last name	Student last name
Student date of birth	Student date of birth
Student grade level	Student grade level
Student race	
Student gender	
Student free lunch status	
Student reduced lunch status	
Student special education	
Student English Language Learner (ELL) status	
Student benchmark reading and math assessment scores (e.g., i-Ready, STAR, AIMSweb)	Student benchmark reading and math assessment scores (e.g., i-Ready, STAR, AIMSweb)
Indicate if student attended district summer school in 2017	

7. It is anticipated that modifications to this MOU will be issued for future requested data elements for the following school years: 2018–2019, 2019–2020, and 2020–2021. Any modification of this MOU shall be in writing and shall be signed by both parties.

8. <u>School District</u> will provide KUCR with the data described above for students in pre-kindergarten through 12th grade attending all schools for which <u>School District</u> maintains data, including elementary, alternative schools, collaborative programs and special education programs. The feasible beginning date (i.e., historical and longitudinal character) of the data will be determined in consultation with <u>School District</u>.

9. KUCR will preserve the confidentiality of all personally identifiable information about all individual students obtained pursuant to the Memorandum of Understanding in accordance with applicable law, including the Federal Social Security Act, the Family Educational Rights and Privacy Act and any regulations promulgated there under. All studies will be conducted in a manner that does not permit personal identification of parents, teachers and students by persons other than required for research activities undertaken by representatives of KUCR. As such, KUCR will not disclose any such information to any persons except as authorized by law and upon formal approval of <u>School District</u> and will include results in aggregate or in some other non-personally identifiable form. KUCR assures all researchers who are given access to data with individual-level identifiers provided pursuant to the Memorandum of Understanding will have undergone appropriate training.

10. KUCR will subject all research initiated under this Memorandum of Understanding to review and approval by KUCR's Human Research Protection Program, as applicable. KUCR may publish results, analysis, or other information developed as a result of any research based on the data made available under this agreement only in summary or aggregate form, ensuring that no personally-identifiable information is disclosed.

11. KUCR will create a standardized series of data files for broader public release. Standardized data is defined as aggregate school-level data or individual-level data that has been stripped of individual-level identifiers and cannot generate any possible multivariate analysis combining data fields that would yield less than five records per any data cell. Standardized data files will be reviewed for considerations of accuracy and privacy by <u>School District</u> prior to public release, if a public release is planned.

12. The agreement between <u>School District</u>, the Mid-Continent Public Library, and KUCR is effective as of the date of the last signature and shall continue 60 days after the evaluation agreement authorized by MCPL and KUCR ends. It is anticipated that the evaluation agreement will continue through 02/28/2021, unless terminated earlier by either party. Either party may terminate this agreement provided written notification is received by the other party 30 days prior to the proposed termination date.

By signing below, the official certifies that he or she has the authority to bind the organization to the terms of this Understanding and that the organization has the capability to undertake the commitments in this Understanding.

Appendix C: Difficulties Related to Name-matching

As previously noted, **Participation** data do not include a numeric identifier, so the matching process between **Participation** and **Spring** datasets relied primarily on names. Name-matching these two datasets was a time-intensive endeavor for three main reasons: use of informal name in the **Participation** dataset, inconsistent spelling of names, and missing information. The biggest challenge of the three is the use of informal names. District data provide formal or legal names while **Participation** data are typically more informal (i.e., nicknames). For example, the name "Theodore" in **Spring** might be listed as "Ted," "Teddy," or "Theo" in **Participation**. Although these variations on the name "Theodore" make algorithmic matching difficult, it is still possible to join this student's data from one dataset to the other because these variations are commonplace and widely known. Where this process may become impossible is when informal names are unrelated to the formal name. This is particularly prevalent in districts with high immigrant populations where some students may register under anglicized names. For example, a student legally named "Fan" may decide to sign up for the SRP using the name "Sam." Because these names are phonetically unrelated it may be impossible to match this student's district record with his **Participation** record. It is possible to circumvent this problem by using additional information such as grade, date of birth, and last name, but even with this additional information, students are often unmatchable.

To reduce the amount of time needed to match **Spring** and **Participation** files, we utilized a user-written command in STATA called "matchit" (from Julio Raffo). Matchit measures the distance between two text strings and produces a similarity score for the pairing. If two text strings match exactly then the similarity score is equal to 1, and all other matches result in a similarity score less than 1. Exact matches were automatically kept, and all other potential matches were considered individually. Once **Spring** and **Participation** were matched, the resulting dataset was then matched to **Fall**. This part of the matching process was straightforward in that **Spring** and **Fall** datasets contained numeric identifiers upon which we could connect student records from one semester to another.

Appendix D: Duplicate Student Observations with Mismatched Outcome Data

Once **Spring** and **Participation** are matched, the resulting dataset is matched to **Fall**. The matching process is straightforward in that **Spring** and **Fall** datasets contain numeric identifiers upon which we can connect student records from one semester to another.

One thing to be aware of during this stage of the data preparation is that students, who should appear only once in the fully matched set, sometimes appear more than once. This happens occasionally when students move from one district to another, so student information may exist in both the previous district as well as the current district. For example, a student lives in District A and takes the District A assessment. During that same spring, the student moves into District B, and District B uses a different assessment than District A. District B has the student take their assessment during that same spring. During the fall, the student moves to District C. In the fully matched dataset, the student will have two records. One record will be District A in the spring with District C in the fall, and the other will be District B in the spring and District C in the fall. We have no reason to conclude that one record is more correct than the other, but each student may only appear in the analytic sample once. Which observation pair do we choose? If we decide to always choose the observation pair with the higher spring score, or likewise with the lower spring score, then we may introduce bias into our estimate of the effect of SRP on student achievement. Although we do not observe this phenomenon very often, it is still important to avoid introducing bias if possible, so we randomly select one observation for students with more than one record.

Qualifying for Services: Investigating the Unmet Needs of Qualitative Researchers

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Abstract

This study investigates the needs of qualitative researchers and the ways in which libraries may address some of those needs. Using qualitative interview methods, we conducted 10 semi-structured interviews with individuals from two stakeholder groups: researchers (faculty and doctoral students) and librarians. Among the variety of needs that emerged, ranging from methods training to identifying sources of funding, we discuss two implications for library practice in detail: (1) the need for depth in library resources on qualitative methodology, and (2) potential ways for the library to support communities of practice around qualitative research tools and methods.

Introduction

Though libraries have built, enhanced, and expanded service offerings to support scholarly needs across all stages of the research lifecycle, with particular emphasis on research data management, these services have tended to privilege quantitative approaches.[1] Similarly, researchers are likely to encounter greater support for quantitative methods than qualitative ones elsewhere on campus and in dialogue with external funders.[2]

Developing services that attend to the needs of qualitative researchers will enable libraries to provide more inclusive services that intersect with and support a greater range of interventions and which encompass the research life cycle comprehensively. Through outreach and assessment activities, libraries can learn more about the needs of qualitative researchers across disciplines and develop services in alignment.

Through a series of semi-structured stakeholder interviews conducted at the University of Michigan, this study provides insight into unmet needs of qualitative researchers and corresponding opportunities for library engagement. Analysis to date has highlighted opportunities for libraries to enhance their support for the development of methodological competencies. In particular, the interviews suggest that libraries may enhance support for communities of practice and lend more focused attention to the role of collections in supporting methodological learning.

Literature Review

According to recent studies, qualitative research is on the rise globally, especially in the social sciences and interdisciplinary studies.[3] Though qualitative research is not new, recognition of its value in elevating stories that cannot emerge from quantitative methods alone has gained traction in recent years.[4] Consequently, many disciplines have observed increased interest in and adoption of emerging qualitative and mixed methods approaches.[5]

As a result of the rise in popularity of qualitative research, some fields have experienced a corresponding increase in novice qualitative researchers. The literature suggests that these new researchers face many challenges in obtaining sufficient training, services, and support, even when they receive some training through methods courses. For example, Lena W. Carawan et al. developed an interdisciplinary qualitative analysis course and reported that student encounters with the "epistemology, ontology, and methods of qualitative research" were "disorienting and difficult" while Eleanor Mattern et al. found gaps between the methods training that doctoral students received in the classroom and the demands of their research projects, across methodologies.[6]

Though libraries have developed services to support all phases of the research and scholarly communication life cycle, these services have tended to center around quantitative methods and approaches more so than qualitative or mixed methods, a characteristic that is especially true for the research data management services that libraries have developed over the last decade.[7] Moreover, the services that libraries do provide do not tend to include support for methodological learning.

While the library's potential role in supporting methodological learning remains underexplored in the literature,[8] there is evidence to suggest that libraries may serve as valuable partners or facilitators for the community of practice model of peer learning and support.[9] Several studies recognize the community of practice model as distinctly valuable for advancing the skills and competencies central to qualitative approaches.[10]

Communities of practice convey disciplinary norms, foster knowledge and skills, and provide intellectual scaffolding. Though they have generally been portrayed as disciplinary, with the communication of disciplinary norms considered essential to their formation, less formal cross-disciplinary communities of practice based on methodologies have also emerged, as represented in the studies cited above. Communities of practice have also served as vehicles for mentorship, as noted by Jean Lave and Etienne Wenger, who describe how laboratory based mentoring of novice community members contributes to "the development of knowledgeably skilled identities in practice and to the reproduction and transformation of communities of practice."[11] In this model, novices are given increasing responsibility and independence over time, sometimes progressing from observing to supervising, in order to replicate and advance the community.[12]

In 2016, Joan Eakin reported that communities of practice formed a "system level" strategy for qualitative research, finding that remaining within a discipline allowed qualitative researchers to consult "like-minded researchers for support, concrete assistance, and a sense of legitimacy and belonging."[13] However, Andrea Malone et al. reported a sharp increase in interdisciplinary work and connected it to researchers' abilities to broaden skills and techniques through collaboration.[14] Regardless of disciplinary boundaries, the community of practice literature tends to emphasize community, both in its capacity as "social endeavor" and its unique role in knowledge formation as well as researcher development.[15]

Several studies suggest that library presence within and library facilitation of communities of practice can fill a gap in training for novice researchers. In their work with new doctoral students, Kathryn Roulston, Judith Preissle, and Melissa Freeman found that working with other scholars and librarians to better understand the extant body of work helped students not only understand the contribution of their work, but also allowed new topics of interest to emerge.[16] Similarly, Andrew S. Gordon et al. have attributed the success of their video data repository to intentional collaboration and information sharing among librarians, information scientists, and disciplinary researchers.[17] Ann Green and Myron Gutmann have argued that reciprocal partnerships formed around academic support roles help to make both interdisciplinary and domain-specific expertise available throughout the data lifecycle.[18] Roger and Halas previously reported similar findings, noting that collaboration with libraries for training and workshops not only strengthened research communities across disciplines, but helped to foster communities of practice between researchers and library support services.[19]

Through a needs assessment for qualitative researchers, this study will contribute to a growing body of knowledge about communities of practice with insight into the library's role and ability to develop and align relevant programs and services.

Methodology

As noted in the literature review, support for qualitative research is often lacking in academic institutions and libraries have played various roles in supporting the information, analysis, and technology needs of qualitative researchers. We asked the following research questions.

- What are the needs of qualitative researchers and how do these intersect with the library?
- How can the library support communities of practice?

In order to investigate the needs of qualitative researchers and the services provided by the library on our campus, we employed a qualitative interview methodology. We selected a qualitative approach because this was an exploratory study and we wanted to understand the underlying motivations and sensemaking of qualitative researchers in the context of campus resources and services. Although we knew of the general needs of qualitative researchers from the literature, we had little knowledge of the specific needs within the context of our university. Thus, a qualitative approach enabled "the collection of data in a natural setting sensitive to the people and places under study, and data analysis that is inductive and establishes patterns or themes."[20] We were also planning a larger scale survey of all qualitative researchers on campus and viewed the interviews as a way to identify themes and areas for questioning that were not present in the literature. John W. Creswell recommends this "sequential exploratory strategy."[21] Each data collection activity builds upon previous data collection and the combination of interviews and a survey collects data that addresses issues of both breadth and depth in the target population.

Participant selection

We identified two stakeholder groups: qualitative researchers and librarians. Among the qualitative researchers, we were interested in understanding whether individuals in different career stages (e.g., faculty and doctoral students) had different needs. Therefore, we sought out participants from each of these researcher groups. Librarian participants were selected by virtue of their positions and job responsibilities. They either worked with departments or units on campus with qualitative researchers or offered services in the library which were perceived to be of use to qualitative researchers.

Researcher participants were selected in several ways. We began with a convenience sample of known faculty and graduate students. Using a snowball methodology, we asked the participants to recommend other qualitative researchers who we might interview. In selecting researchers to interview we tried to balance participants from different academic disciplines and those who worked with different types of qualitative data (e.g., observations, interviews, and video) from different sources (e.g., field studies, social media sites, etc.). This article reports on an initial set of ten interviews: four faculty, three doctoral students, and three librarians, all from social sciences fields.

Data collection

We developed two interview protocols, one for librarians and one for researchers (faculty and doctoral students). Questions were developed after consulting the literature and based on responses during the pilot interviews. Many of the questions were unique to each stakeholder group but there were some overlapping questions through which we elicited answers on the same topic (e.g., qualitative analysis tools) from both groups.

The protocol was semi-structured, so additional questions were added in response to participants' responses. For the researchers, we asked questions about their area of research and the research questions motivating their work, the methodological approaches used, the types of qualitative data collected, how and when their research processes intersected with the library, how they gained expertise in conducting qualitative research, where they went for support, their greatest needs as a qualitative researcher, and questions pertaining to the different research stages. We asked the librarians questions pertaining to their role in the library, frequency and nature of interactions with faculty and students engaging in qualitative research, when in the research lifecycle they engaged, the types of questions faculty asked, and the librarian's familiarity with qualitative methods. These hour-long semi-structured interviews took place in participants' offices or meeting rooms on campus.

Data analysis

All interviews were recorded, transcribed, and checked. We then imported the transcripts into NVivo qualitative analysis software for coding. We developed the code sheet using two approaches. We began with

themes from the literature and then added codes inductively from the interviews as the coding process evolved. We developed a codebook with definitions. Two team members initially coded the same transcripts and calculated interrater reliability (IRR). The coders discussed each transcript during the interrater reliability process to reach agreement on the final coded transcript. After several rounds of iterative coding and discussion, the two coders reached an IRR of 72.4% using Scott's Pi. Subsequently the coders met periodically to nominate new codes and discuss coding questions.

Limitations

There are two major limitations to this research. First, since the research project is early in the data collection process, the number of interview participants is limited and we have not reached saturation in the emerging themes, so results are preliminary. Second, the distribution of researcher participants does not cover all disciplines employing qualitative research techniques. We aim to address these as we continue this study.

Findings

Our findings will refer to the anonymized interview participants with their participant codes; each code includes a participant type indicator and a unique sequential number. Participant types are doctoral students ("D"), librarians ("L"), and faculty ("F").

General Needs

Analysis of the interviews highlighted a diverse array of disciplinary, methodological, and resource-based challenges faced by qualitative researchers on our campus. Interviewees revealed varying levels of engagement between qualitative researchers and librarians and varying attitudes toward the perceived presence or potential value of library services. While some interviewees indicated that they were likely to consult the library for assistance with coursework, as distinct from research, others were simply unaware of the services and resources offered. Researcher F01 did not know what the library offered them as a faculty member and also did not recognize any potential value, stating: "…being a faculty member, you're already kind of a content expert in your area, so I don't really depend on anyone for content advice." Multiple faculty members and librarians acknowledged the library's potential as a resource for students in need of research training. As noted by L01: "I think with graduate students, that's where we really have the gap…students need someone to guide them in research methods…they need kind of like a consultant and that is where the hole is…because there isn't somebody in the library who can do that." Overall, interviews demonstrated perceived value to novice researchers of several forms of instruction, including literature review workshops, database workshops, and software classes.

Some interviewees recognized the potential value of library resources and services for themselves and their students alike, even if they demonstrated lack of awareness of specific existing services. A predominant need expressed in the interviews was for workshops on qualitative tools, methodologies, and data management. F03 described inconsistent levels of library support for the use of qualitative software tools. One doctoral student in the middle of fieldwork, D02, described confusion identifying the library's available workshops: "I'm sure they are offered as well, and maybe I'm just not seeing them because I'm a little bit disconnected right now." Other researchers echoed this theme and described their lack of specific knowledge of library services while acknowledging these services' potential benefits. Many participants, including F03 and L02, discussed the need for instructional support for specific qualitative data analysis and data management tools, such as NVivo, Dedoose, and ATLAS.ti. Librarians (L02 and L03) pointed to the breadth of tools and methodologies available to qualitative researchers as a challenge to providing support.

The interviews revealed diverse attitudes and varying levels of confidence surrounding data management plans and practices. While disciplinary and departmental conventions often inform protocol for data management and data storage, researchers discussed their efforts developing systems and practices to fit personalized needs. These individualized data management plans described by interview participants (F01, F03, D02) included everything from Excel spreadsheets to external hard drives to cloud-based storage, such as Google Drive and Box. Many participants described valuing their colleagues' insights into data

management practices and some shared that they had simply not thought very deeply about data management. Others described unfavorable outcomes, such as the "massive data management problems" that F03 experienced, following the migration of their data from one institution to another and resulting software licensing issues.

Collections and Tools

The interviews suggested that the state of library collections may contribute to challenges faced by qualitative researchers, especially in cases where libraries hold limited copies of methods texts. Researchers described a scenario in which high-demand, discipline-specific methods texts are either physically checked out or unavailable electronically, seemingly perpetually, prompting them to purchase their own copies or wait for long periods to access needed resources. Researchers readily connected the ability to access specific texts with the library. As stated by D03: "It's totally a library role. I think that's really the big one."

Beyond methods texts, researchers also commented on the complexities of accessing specific forms of content, including news and scholarly articles, through electronic databases. D01 described their experience with a particular database as a "nightmare" but found the support of library staff helpful in these instances, and surmised that, "Presumably, they deal with it all the time, and so they figured out how to solve it."

Though researchers did not necessarily identify software or analysis tools as aspects of library collections, they described frustrations related to access and licensing consistent with other complications with library-licensed electronic resources. As F04 pointed out, "Anybody who's done qualitative research has probably ranted about the software at some point." Campus resources often do not support widespread qualitative analysis software for all staff and students. If available, access might only be available to parts of campus or specific schools, so some have to turn to their own departments for this support. Availability is further complicated by access and licensing problems; qualitative analysis software can be expensive for academic departments to support. When licenses expire, researchers may find their data trapped or inoperable on new systems.

Communities of Practice

Interviews revealed researchers' awareness of relevant expertise among peers and colleagues, with recognition of the potential for learning and growth as well as the responsibility to contribute knowledge for the benefit of others. As mentioned above, researchers were likely to reference their colleagues' expertise pertaining to various aspects of research data management. For example, D02 described not being "super well-versed" in data storage and analysis but referenced the potential opportunity to learn from colleagues: "I do know that there are folks in my department who are more well-versed in...data analysis and data storage than I am. I would love to have their insight...." Conversely, D01 described having knowledge and experience of use to others, specifically related to qualitative data analysis tools: "Most of my colleagues who come to me because they hear that I've used them, and they're like, 'How do you use them? Can you teach me? Is there a good guide?'"

In addition to opportunities for learning and development, researchers alluded to benefits of community formation for the improvement of tools and resources. For example, F03 shared: "I would love to see us push back as a community on these software developers."

Some researchers described learning that occurred largely without formal training but which benefited from access to networks of peers and colleagues. For F03, learning occurred "mostly just through doing it....And doing reading on my own...I've read way more textbooks about case study research than I ever wanted to. And then also asking friends, call collaborators and things like that." Researcher D01 emphasized the importance of "good grad student mentoring of other grad students."

Despite conveying positive outcomes of peer and community learning, the interviews revealed that knowledge sharing among peers is not necessarily easy to initiate or sustain. Considering the circumstances of graduate students, D01 described "anxiety" that may make it difficult to approach a peer and ask, "How

does Atlas.TI work?" Addressing graduate student circumstances, researcher F01 described their practice of encouraging students to seek guidance through library instruction as well as directly from other graduate students as a complement to formal classroom instruction. F01 also identified a need for coordinating and facilitating community engagement, suggesting that "the library could serve as a hub that brings together qualitative researchers and where we can kind of share…I think would be really useful."

Discussion

This study's findings demonstrate a general sense of user confidence in the library's existing and potential resources and services, accompanied by a lack of awareness among many researchers of the availability of specific tools or services, such as workshops relevant to qualitative researchers. While faculty researchers were unlikely to recognize value in library support for the intricacies of their own research, they tended to take a favorable view of the library's potential to help train and equip their students with methodological resources and expertise. This finding reinforces existing awareness of faculty support for the library's instructional role and value and also underscores a gap between the bibliographic training that libraries have offered historically and unmet needs for methodological learning. Libraries may need to consider approaches to developing and extending methodological training for graduate student user communities.

The emphasis on collections that emerged through our analysis was of particular interest given our expectation that researchers would discuss tools for methodological analysis more so than texts. Researchers' discussions of library collections indicate their perception of the library's role as collections steward and access provider and reinforces awareness that our users continue to maintain an expectation for finding, utilizing, and accessing needed texts in a timely and convenient manner. The discussion of collections also lends insight into researchers' processes for methodological training and development, which includes consulting relevant texts via library collections. The researchers' descriptions of their efforts to learn through methodological handbooks reinforce our awareness that qualitative research skills and competencies often develop outside of formal training or coursework and may be self-initiated by researchers whose reliance on library collections may both meet and complement course requirements. The expressed need for more robust research methodology resources also has implications for how these items are collected. In large research libraries, collections are often developed through subject-specific liaison roles, and methodology resources can fall between the cracks. Ensuring these resources are purchased and maintained is one important contribution the library can play in the research landscape.

Reinforcing evidence from the literature, the interviews demonstrated that researchers engage with the knowledge and experiences of their colleagues and peers in order to extend methodological and tool-based learning and competency. The behaviors and activities described align well with our field's understanding of the interactions that characterize communities of practice. Researchers described meaningful engagement within and beyond disciplinary and departmental boundaries in order to bolster learning and support for data management, qualitative data analysis, and various programming software or languages.

Recognizing communities of practice as central to qualitative researchers' processes and development presents multiple opportunities for library engagement. The library's role as a non-evaluative resource provider situates it well to accommodate the "anxiety" described by D01 that may be especially prevalent among graduate students who feel compelled to demonstrate particular knowledge or competencies with tools and methodologies, but may resist approaching their peers or advisors for assistance. If the library is able to provide resources and support for communities of practice to develop and flourish, they can both bolster organic support networks and fill in gaps that those networks may not be meeting. If the library offers opportunities for learning and engagement around specific tools and resources, it saves individual researchers from having to ask for the training and may also bring researchers with common interests together.

Conclusion and Next Steps

The research described in this paper and presented at the Library Assessment Conference in 2018 is preliminary. As we continue our collaborative effort to learn more about qualitative researchers' unmet

needs and opportunities for library engagement, we expect to more than double the number of interviews analyzed thus far and then move into survey development. As we continue to code interview transcripts and update our codebook as necessary, we are excited by the possibilities that we recognize at this early stage in our research.

Our analysis to date reveals that qualitative researchers' concerns with tools, methods, and best practices are paramount and that methodological learning extends well beyond formal classroom instruction. Researchers' references to the insights and experiences of their peers and colleagues were frequent enough to prompt us toward emphasis on communities of practice in our coding and analysis, a theme which stood out to us given its prominence in the literature. We are optimistic about potential opportunities to develop service models that incorporate community of practice tenets and principles, especially given faculty researchers' likelihood to suggest developing library workshops to support research and methodology training for graduate students. The success of any kind of library-led methodological learning would rely on a highly collaborative approach, reinforcing our awareness that efforts to provision services as well as collections benefit from the perspective that libraries must partner effectively with our user community in order to be of service.

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Appendices
Appendix A Interview Protocol
Faculty and Graduate Students Interview Questions
1. Introduction

    a. What are the main research questions you are pursuing?

    b. Tell me about your research and the methodological approaches you use?

    c. What types of qualitative data do you create/collect?

        i. Format

        ii. Degree of sensitivity of the data

    d. How does your research process intersect with the library?

        i. How do you interact with your subject librarian? With other librarians or library staff?

        ii. Do you make use of research guides or other library expertise?

2. Expertise/Support/Assistance

    a. When were you first exposed to qualitative methods?

    b. How did you gain research expertise in qualitative data research?

3. Needs

    a. What are your greatest needs as a qualitative researcher?

4. Proposal stage

    a. In developing research proposals, have you had to create data management plans?

    b. What is your experience creating data management plans? (Can I see a typical one?)

5. Project set up

    a. When setting up a project, what are your initial needs?

    b. What type of literature review is needed in the beginning?

    c. Do you seek assistance from the library?

    d. IRB—Does your IRB allow for data sharing at the conclusion of your project?

6. Data analysis

    a. At what point do you begin thinking about data analysis?

    b. What types of decisions affect

    i. Data analysis?

    ii. Tool selection?

    iii. Data management?

7. Data management

  a. Do you have a "standard" data management protocol?

  b. Where do you store different types of data?

    i. Probe: Is secure storage an issue for you? Do you back up data?

  c. Do you use a file naming convention?

8. Tools

  a. Do you use any data analysis tools?

    i. Which ones?

    ii. How did you learn to use this tool?

    iii. Why did you select this tool?

  b. Do you have difficulties using this tool? Do you have difficulties accessing this tool?

  c. Who or where do you go to when you have questions about this tool?

9. Project conclusion

  a. Is qualitative data sharing common in your discipline? (Probe if they share if not stated)

  b. Do you share your qualitative data?

  c. What barriers are there to sharing data?

  d. Have you reused qualitative data generated by others?

    i. Would you talk about that experience?

  e. Is there anything we didn't ask you that you would like to talk about?

Information Professional Interview Questions

1. Tell us about your role in the library.

2. How often do you interact with faculty and students engaging in qualitative research?

3. At which stage in the research life cycle do you most often interact with qualitative researchers?

  a. Probe depending on what they say, e.g., proposal stage, data analysis (look above to see the areas in which we asked students and researchers)—intuitive probe response

4. What are the typical questions from faculty? Students?

5. How familiar are you with different approaches to qualitative research? Could you talk about different you've witnessed or experienced?

6. How familiar are you with different qualitative analysis software applications? Have you personally used any of these analysis tools?

    a. Which ones does your library support (either instructionally or actually provide access to the software)?

    b. Why did you select these tools to support?

    c. Who or where do you go to when you have questions about this tool?

7. Could you talk about your familiarity with other services offered by your library to support qualitative research (data deposit, tools, databases)?

    a. What about data management?

    b. What about literature review?

8. How about other services on campus?

9. Do you refer qualitative researchers to other librarians? Which librarians?

10. What things impede you in offering qualitative data analysis support?

11. Is there anything we didn't ask you that you'd like to talk about?

Research Administrators Interview Questions

1. What is your role and central responsibilities in your position?

2. How do you interact with qualitative researchers?

3. Is there a difference in your office's approach to qualitative researchers?

4. How often do you interact with faculty and students engaging in qualitative research?

5. At which stage in the research life cycle do you most often interact with qualitative researchers?

6. What are the typical questions from faculty? Students?

7. How familiar are you with different approaches to qualitative research?

8. [If applicable] How familiar are you with different qualitative analysis software applications?

9. Do you refer qualitative researchers to other campus units? Which campus units?

10. How familiar are you with other services offered by your library to support qualitative research (data management, data deposit, tools, literature review / search, databases)?

11. How about other services on campus?

12. What things impede you in offering qualitative data analysis support?

13. Is there anything we didn't ask you that you'd like to talk about?

Appendix B Codes

Coding and Analysis

To date, 10 interviews have been conducted and coded using NVivo software. Codes were developed from the interview data and applied independently by two coders.

Interviewing and coding are currently on-going, with the intention of broadening the collection of data among researchers across campus where sampling has not yet occurred, particularly in the health sciences. Analysis of the data for emerging themes and patterns is iterative and is expected to lead to further development and refinement of the codebook. The following list of codes represents codes that have been developed and applied in this project to date:

List of codes

Attitudes

Isolation

Others not understanding research

Attitudes

Qualitative Methodology

Library

Data Management

Data Sharing

Infrastructure on campus

Needs

Needed and in development campus centers

Library services

Library circumstances

Qualitative methodology

Disciplinary approaches

Mixed methods

Qualitative methodology tools

Software licensing restrictions

Software

Tools used

Tool access

Selection of specific tools

Tool support

Skills

Gaps

Learning

Teaching

Support

External funding

Collaboration

Between library and faculty or students

Within the library

Outside the library

Social identity

Communities of Practice

From Indifference to Delight: Gauging Users' Preferences Using the Kano Model

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Introduction

The library user's perspective and experience are an essential component in the design of services and spaces in libraries. User involvement and feedback during the planning and development process ensures that our spaces, websites, and services meet user expectations through the best and most suitable solutions. As a result of this emphasis, there has been an increase in the number of studies and projects under the user experience umbrella that detail qualitative research assessment methods utilized in libraries. Prominent in recent library literature are those that are broad in scope, such as those aiming to detail the various aspects or steps undertaken by patrons (students or faculty) in their research process.[1] There are also many examples that describe and illustrate methods utilized to answer very specific research questions, such as usability testing for websites[2] or those utilized to reconfigure library services or library spaces.[3]

Many of these studies are inspired by ethnography and rely on qualitative research methods that involve interviews or focus groups and provide rich user information that is often unavailable via other means. The benefit of such methods is a more nuanced and holistic understanding of the experience, interactions, and perceptions that our users have about the library. One of the drawbacks, however, is that those research methods are usually time- and resource-intensive. While their benefit is not to be underestimated, alternative methods might serve well when there are time constraints and limited resources. It is in this context that we situate our paper.

We provide an overview of the Kano Model and its use in total quality management (an organizational activity with commitment to quality achieved through the employee in a continuous improvement process)[4] to derive customers' satisfaction and needs, and some of its application in libraries. It is a versatile method as it can be used to elicit information in libraries regarding online or physical services and was used successfully to evaluate customer needs for Guadalajara's Digital Library.[5] The drawback may be that it works best for very specific and targeted research questions and does not offer the depth that some interviews or other qualitative methods provide. One useful aspect is that it forces the researcher to carefully think about what is essential to find out from users and make those thoughts explicit and precise in the questions asked of users.

In this paper, we share two different applications of the Kano Model, one for space at Cornell University Library, and one for digital signage at Penn State University Library. Both projects generate insights on user perspectives and provide direction for next steps. We discuss the strengths and challenges of using the Kano Model and how we moved forward based on the obtained results.

Kano Model

The Kano Model is based on the work of an emeritus engineering professor, Noriaki Kano, in the department of management science at the University of Tokyo. The pivotal, coauthored article that details his ideas regarding quality and customer satisfaction was published in Japanese in 1984.[6] In the intervening 34 years, there have been numerous references to these ideas and his work regarding total quality management.

Since the 1984 publication, the Kano Model has been a popular quality model used in marketing because it helps identify specific attributes that have the potential to elicit customer delight and its opposite, dislike. Since the original method was proposed, modifications have extended or attempted to extend its quantitative power in support of measuring the relationship between customer satisfaction and customer needs or requirements.[7] Examples of uses of the Kano Model include its application for new designs in Turkish jewelry and tile-making[8] and supplier development in manufacturing chains,[9] among others.

Premise of Kano Model

Violante and Vezzetti provide a detailed overview and history of the Kano Model and its variants. They state that "[s]ince the attributes of a product/service do not play the same role in satisfying the customers' needs, identifying the critical factors that determine satisfaction is essential to the sustained success of any organization."[10] In other words, not all service features or attributes are equally important to customers, and identifying the ones that increase satisfaction are critical for success. By way of example, let us take cars. One of the minimum requirements for a car is to have seats so it can be driven, but the fact that seats can be heated and adjusted to the height of the driver and/or passenger provides additional value above and beyond the minimum requirement of having seats. What is key in this example is the concept that the different qualities of the products or services we offer (heated and adjustable seats, for example) have an impact in eliciting customer satisfaction or dissatisfaction. Allocating resources and thought to increasing customer satisfaction by determining the qualities that matter to our users will be worth the effort.

How the Kano Model Works

There are three main steps in the Kano Model: a questionnaire, a scoring table, and an evaluation table.[11] To these three steps, we add one more, which is the final tabulation of frequencies into a table that indicates which features or attributes are important to users or customers who participated in the study (figure 1 and table 1).

Step 1. The questionnaire, unlike survey or interview questions, is designed to include pairs of questions per product or service attribute. In other words, each question is about a ***single feature*** and is asked twice, once phrased from what the authors call a "functional" form and the second time from a "dysfunctional" form. The first question is to elicit how the person feels about having that feature or requirement present, and the second one asks how they feel if it is absent. Participants are asked to respond by only using short phrases that include the following words or express the same sentiment: like (or delight), expect (or must-have), neutral, tolerate (I can live with this) and dislike. According to Jan Moorman of UX Magazine,[12] Kano posited that there are five different emotional responses to any given product feature, ranging from dislike to delight. Furthermore, the key to customer satisfaction was in finding the right combination to provide both surprise and delight.

Step 2: In the second step of the process, the responses from participants for each question, get noted in the scoring table. These tallies feed the third step in the process, which consists of identifying where the responses fit in the evaluation table.

Fig.1. Kano Model three-step sequence: 1 questionnaire; 2 scoring table; 3 evaluation table (after Center for Quality Management Journal[13] and Michael Schofield[14]).
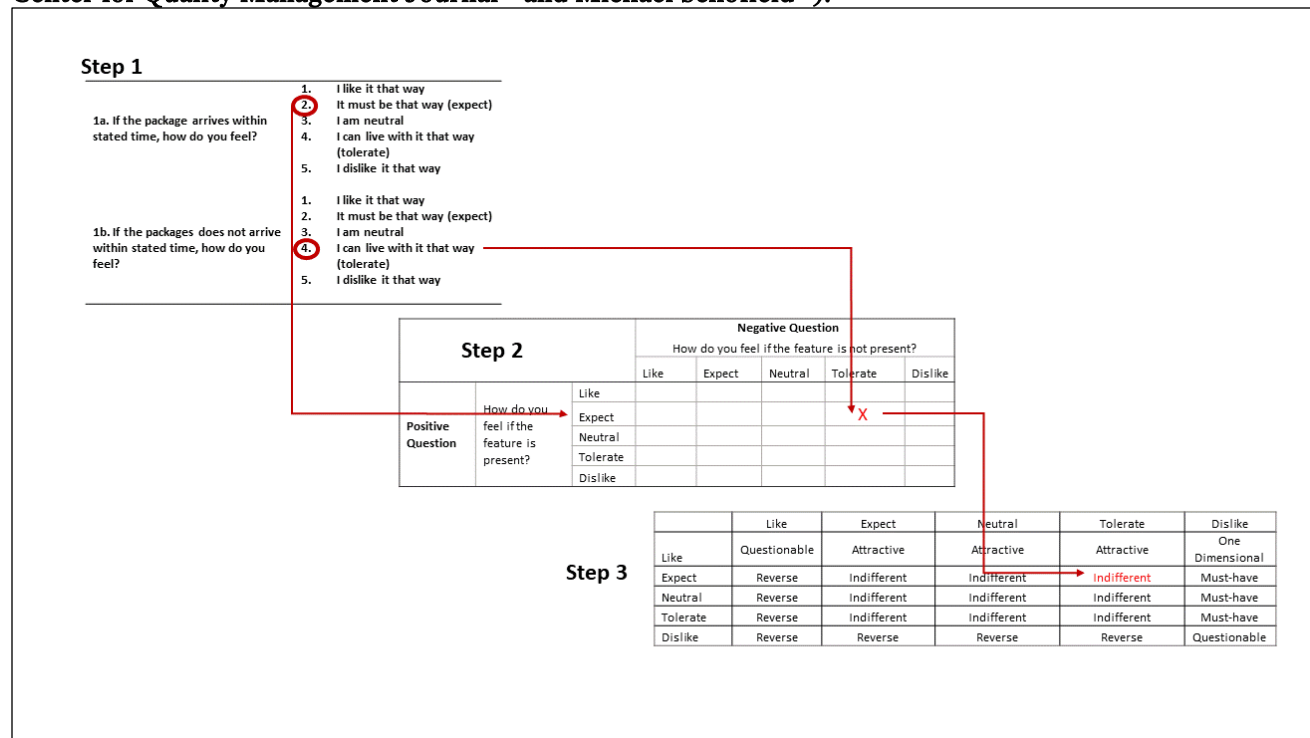
Step 3: The evaluation table is unique in that it is more like a matrix with pre-assigned values that correspond to the five types of responses elicited from participants (dislike to delight). This table classifies the quality attributes into six categories: Attractive, Must-be, One-Dimensional, Indifference, Reverse, and Questionable (see below). These categories are often represented in the literature in a graphical form to explain the relationships between customer satisfaction/dissatisfaction and functional/dysfunctional requirements in products (figure 2). The six categories are described as follows:

1. **Attractive:** Attributes which have the greatest influence in how satisfied the customer will be—the unexpected qualities in a product (e.g., in the early years of mobile phones, connecting to the internet).

2. **Must-be**: Attributes that are expected, often taken for granted. If they are unavailable, the customer will be very dissatisfied (e.g., having no brakes in a car).

3. **One-Dimensional**: Attributes that inform a linear relationship between the function of a product and customer satisfaction (e.g., better gas mileage provides more customer satisfaction, lower gas mileage greater dissatisfaction).

4. **Indifference**: Attributes whose presence or absence does not affect customers' satisfaction or dissatisfaction.

5. **Reverse**: Attributes whose presence causes dissatisfaction and whose absence results in customer satisfaction.

6. **Questionable**: A contradiction in client's response or a poorly phrased/understood question.

Fig.2. Kano Model (after Violante and Vezzetti[15] and Center for Quality Management Journal[16])
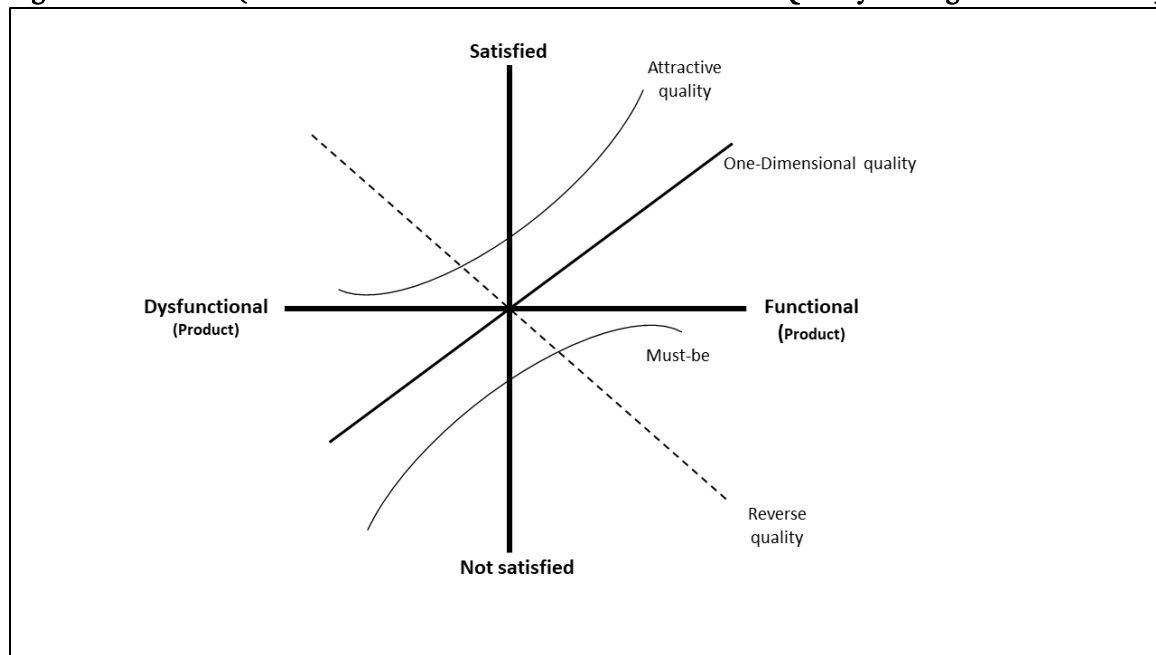
Step 4. In the final steps of analysis, after all results for each question have been collected, a new table that tabulates customer preferences per feature (question asked) is created. In table 1 below, the totals per column indicate participants' responses to each feature. Attribute number 3 garnered high "attractive" marks from participants, indicating to the researchers that that feature would be a very welcome addition to a product or service, while feature number 2 is something customers would expect for ongoing satisfaction with that product or service. When results are even on several dimensions, context may help clarify, and if not, further investigation regarding questions or study is needed.

Table 1. Tabulated results for each attribute from evaluation table (Step 4).

Attributes /Features	Attractive	Must-be	One-Dimensional	Indifference	Reverse	Questionable	Total	Grade
No. 1	1	2	21				24	O
No. 2	2	20		1		1	24	M
No. 3	14	1	6	1	2		24	A
....etc.	6		2	14	1	1	24	I

Kano Model Applied to Space Design—Cornell University Library
Background and research prompt

Prior research studies and surveys conducted in the social sciences/humanities library (Olin Library) on the Cornell University campus had indicated that library carrel holders (all graduate students) frequently complained about the use of their assigned carrels by other students, namely undergraduates. They described how their books were rearranged, food detritus left behind, and, worst of all, the uneasiness they felt in asking carrel trespassers to move to another space. Carrels in this library are not open, closable spaces, but rather desks with a set of shelves above them that also function as privacy dividers. The carrel desks are located along the perimeter walls of the building, arranged in a single file one after the other and adjacent to book stacks. Non-carrel holders who use the library feel that if carrels are vacant, they are open for their own use, despite signage and policies that indicate they are reserved for specific individuals (graduate students).

Ongoing complaints voiced by graduate students who were assigned carrels prompted the access services librarian in Olin Library to find a solution that would help them. She considered creating a graduate-student-only shared space in another location in the same library. Conceptually, the space was envisioned not to duplicate the features of another existing graduate student library lounge with many other amenities, but rather provide a small subset of graduate students a place to study devoid of undergraduate intrusion. As such, it would only be available to about 30–35 designated graduate students and only provide basic functionality with desks, chairs (and outlets), and a shelf or location to check out and store library materials for each person assigned to the room. Access to the room would be restricted either by ID card or keypad controls. Carrel holders signing up to use the shared graduate student room would relinquish the use of an assigned open carrel elsewhere in Olin Library.

Method

To explore if the idea of a shared graduate student space was of interest to current graduate students who are carrel holders, we developed a set of questions to highlight the main features of the proposed new space. We interviewed 16 graduate students (all open carrel holders), using the Kano Model as a means to tease out their potential satisfaction and perception of value in the idea of a shared graduate student space. Interviews were scheduled in the library and were conducted by two library staff members.

Participants were read a description of the anticipated shared room/space and the features it would have. They were then asked to answer six pairs of questions using the Kano Model phrasing, as in this example:

> 1a. How would you feel about the availability of an assigned study space in Olin that would be shared with other graduate students?

> 1b. How would you feel if this assigned shared space for graduate students were **not** available?

The six questions specified particular features available or connected with using the new space. All students were asked to answer using the stipulated phrasing (***I like it, I expect it***, ***I am neutral, I can tolerate it*** (or ***I can live with that***), and ***I dislike it***). Their responses were tallied according to the scoring table illustrated above in steps 1 and 2. The table below (table 2) captures the attributes we asked about (in positive and negative form) and the responses each garnered after all interviews were completed.

Table 2. Example of attributes asked about new space in Olin Library and their evaluation results

	Questions/ Features regarding Space	Evaluation Category (derived from totals from all 16 participants)
Feature 1	Availability of an assigned study space in Olin that is shared	Attractive
Feature 2	Restricted access by card or keypad	Indifferent & One-Dimensional
Feature 3	Sharing space with as many as 30 other graduate students	Indifferent
Feature 4	Desk/chair not assigned to individual	Reverse
Feature 5	Option to check out and safely store library and other personal materials	Attractive
Feature 6	Relinquish of current carrel if assigned to new shared space	Reverse

Analysis and Results

After all responses were tabulated using the evaluation table, we learned that students would be delighted to both have a graduate student space that is shared with other graduate students (feature 1) and have the

opportunity to check library materials out and safely keep them in that space (<u>feature 5</u>)**.** If they shared such a graduate space with others, they would prefer that desks or seats within that room be assigned (<u>feature 4</u>). More students felt indifferent to the idea of sharing a room with as many as 30 other graduate students (<u>feature 3</u>); in other words, this feature did not provide either satisfaction or dissatisfaction to them. However, almost an equal number would find that possibility attractive. Some students find themselves indifferent to restricting access to the shared space (<u>feature 2</u>), but an equal number of students felt that if the library provides this feature, the more satisfied they will be. Despite the positive response to the idea of a shared room, graduate students interviewed did not like the idea of relinquishing their open carrel to be able to use the room (<u>feature 6</u>). This was a key point. This information suggested that investing in a graduate-student-assigned shared room would only work for graduate students if they were allowed to keep their carrels.

These results clearly pointed out that a new space would not be a welcome addition if it meant that they had to give up their private and individually assigned carrel in the library. The library saved itself a renovation by investigating in a very specific way what it would mean for the users of that space.

Kano Model Applied to Digital Signage—Penn State
Background
In the summer of 2017, the Digital Signage Project Team at Penn State University Libraries (PSUL) was charged to develop the design of the newly acquired digital signs to be displayed by the main entrances at the Pattee-Paterno Library. Unlike the previous TV-like models, the new monitors included interactive touchscreens similar to a tablet and could be pivoted from horizontal orientation to vertical. Previous monitors could only display either promotions for library events and exhibitions or information about computer availability. The new vertical signs were set to function like a bulletin board displaying a combination of different information, including library events, available computers, and the open hours for the library building and café. Additional features such as the weather and time were positioned on the top right corner (see figure 3). The display itself was basically a single HTML page. The touchscreen interactive feature was not activated because there were no links available on the page. The UX Librarian was asked to evaluate if the setup of the new digital signs met users' needs.

Fig. 3. The new digital sign at Pattee-Paterno Library, Penn State University, used for testing.
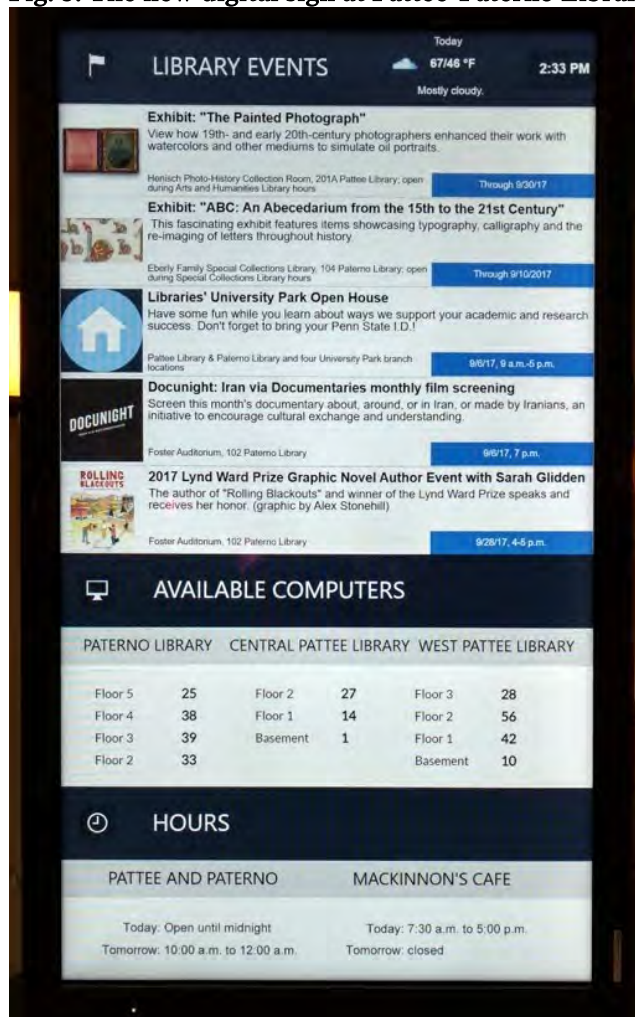
Considering the fixed, limited space of the interface and the rapid, immense traffic flow by these entrances, students' attention to or interaction with the signs are expected to be fairly brief in general. The design of these signs needed to be strategic in its use of content. The Kano Model's classification of product features was used to clarify which types of information students deemed to be essential and which to be trivial.

To decide what features to test, in addition to what was being displayed, a preliminary survey was conducted with library staff from the "Welcome Desk" to identify questions frequently asked by students. A total of 29 "Welcome Desk" staff participated in the preliminary survey. With their feedback, we identified that the most frequently asked question was, "Where is the restroom?" followed by, "Where is room xxx?" Other inquiries included locations of available computers/printers, group study rooms, hours for library spaces and café, and item locations for a specific subject (e.g., books about engineering). It was clear that wayfinding was the main concern for students and the floor plans with layouts of the rooms might be needed to address this information need. It would be a challenge to develop an effective interface to direct students to a specific room on the limited space of a digital sign. An additional factor is that the project team made a decision early on to break this project into manageable phases to keep development time and delivery time to reasonable lengths. Developing detailed floor plans at that point was deemed out of the project scope.

It was decided to use the current interface as the baseline to test the current content (i.e., time, weather, exhibitions and events, available computers, and hours) using the Kano Model questionnaire. In addition, the project team wanted to know if users would prefer a more image-based design and if the advantage of the

touchscreen and addition of links to the interface would allow users to navigate more easily. To answer these questions, two more features were added to the questionnaire: interactive interface and big appealing images.

The survey and brief interviews were conducted adjacent to the library entrance and next to a new digital sign. Participants were introduced to the sign and the purpose of the study. They were then asked, "How do you feel when you see that the digital sign has the following information?" while showing them a list of features and the five response options: *I like it*, *I expect it*, *It doesn't affect me*, *I can live with it*, and *I don't like it*. After finishing the functional question for all the features, we asked them the dysfunctional or negative question, "How would you feel if the digital sign didn't have the following information?" with the same list of features and response options.

Result and Analysis

Twelve students participated in the digital sign feature survey. The results clearly indicated that the "available computers" information is a one-dimensional feature. All 12 participants responded they like it when "available computers" is present and they would by annoyed if they did not see the feature that indicates computer availability. Table 3 shows the tabulated results for all the features.

Table 3. Students' responses to the features of digital signs at the Pattee-Paterno Library.

	Attractive	Must-be	One-dimensional	Indifference	Reverse	Questionable
Available computers			12			
Library hours	2		6	4		
Library events	2		6	4		
Time	4		2	6		
Weather	7			5		
Interactive interface	4	1	1	3	3	
Big images	4			3	4	1

The responses did not generate a significantly preferred category, except for the "available computers." Both "library hours" and "library events" are categorized as one-dimensional by half of the responses, though one-third of the participants felt indifferent toward the features. The distinction between "attractive" and "indifferent" is less clear-cut than expected. For several features, there seems to be a split between these two categories. Interestingly, about one-third of the participants deemed "interactive interface" and "big images" as reverse features, meaning that the participants would rather not see the feature on the digital sign. For "interactive interface," students expressed concern over a scenario that they might not have time to wait for their turn if the screen was occupied by others. Likewise, they preferred not to see big images fearing that the images might hinder access to the needed information.

According to Daniel Zacarias, features are categorized by the most frequent responses and should be prioritized as followed: must-be features, one-dimensional, then attractive.[17] As a result, the project team would invest their efforts in providing information for available computers, library hours, and library events, three one-dimensional features. Time and weather are considered as bonus features as participants pointed out that they have cellphones for time and weather information. Further study will be needed to test for both "interactive interface" and "big images" due to the close three-way split between attractive, indifferent, and reverse in the results. Hopefully, such ambiguity will be resolved by increasing the pool of participants. Although the study draws out rather complex responses from the participants, it provides an efficient and straightforward approach to help the project team prioritize next steps and focus on improving the essential elements.

Lessons Learned

In both cases, the studies conducted were very specific and had a well-defined scope that fit the parameters of the Kano Model. Other kinds of qualitative methods would have also been appropriate, but perhaps taken more time to develop, conduct, and analyze. In the case of the graduate student space at Cornell, the interviews took longer to schedule than the actual time spent with students and analyzing. One lesson learned from the Cornell study is that we inadvertently inverted the positive and negative format of the questions for one feature, and that took some untangling in terms of figuring out the correct way to tabulate and interpret the results. The other thing we learned was that the format of asking questions—since we did this in person—sounded rather contrived to our interviewees. In order to maintain consistency with every participant, we repeated the questions exactly as we wrote them for every student and every feature, and we heard from our trial tests that we should explain the method in advance to them. That also helped them feel more comfortable providing responses using the stipulated words/short phrases we requested them to use (I like it, I tolerate it, etc.). Lastly, students generously clarified their selection or choice of answer after we concluded the interview, and that helped to fill some of the gaps or questions that their choice of response elicited. This would not have been achievable if we had not done this face-to-face.

Another possible confusion is that participants may misinterpret the five responses as continuous levels of intensity in sentiment, such as from strongly agree to strongly disagree. Because of the model's unique way of analyzing data, we should make it clear to participants that the survey is not an incremental 5-point Likert scale and the five expressions are discrete and should be taken at face value.

Asking participants how they feel about a non-existent feature can be a challenge. Participants may not be able to fully grasp the capabilities of the feature without experiencing it, as happened with the digital sign at Penn State. We originally speculated that users would be delighted by the touchscreen and the inclusion of appealing images, with the expectation that these two features would be "attractive" to them. It is possible, however, that students' responses and ensuing results are an indication of status quo bias[18]—the suggestion that any change from the current baseline (status quo) might be perceived as a loss. The participants anticipated that an interactive interface would be an obstacle for them to access information and could imagine a scenario where they had to wait for others to take their turn. They did not consider that a well-designed interactive interface, including appealing images, could potentially bring them delight. On the other hand, it is logical not to expect too much from an absent feature because its development and future application might not occur. Though the Kano Model does not specify how many participants are needed, in the case of the digital signage study, more subjects would probably yield more meaningful results. Also, as time passes and technology evolves, users' viewpoints about a product might shift, and studies are always needed as expectations change.

Conclusions

The Kano structured model of question and answer scored on a table was an efficient and time-saving method for both library staff and library patrons. It forced us to isolate from the start the service aspects we wanted feedback on without resorting to more time-consuming research methods. Likewise, it provided quick answers and supporting evidence to facilitate decision-making for our administrators, allowing us to calibrate our services to match our users' needs.

In both cases, the path forward was very clear, even with the potential ambiguous results yielded at Penn State Library for one question. In essence, one of the most gratifying results of both projects was exactly the clear direction to follow. We found the application of this method by others to an online library environment encouraging[19] and we hope this paper encourages others to make use of this tool.

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From Default to Design: Design-Based Assessment for Libraries and Librarianship

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Introduction

There can be no doubt about the recent rise of interest in assessment in librarianship. Popular assessment methods range from quantitative approaches (such as user surveys, usability heuristics, and data and search logs) to qualitative techniques (user interviews, photo elicitation, immersive ethnographies, and more). Many discussions ensue about which of these scientific-based methods is best applicable to the library work at hand, but few have questioned the assumption that scientific methods are the most relevant and applicable assessment methods for librarianship overall.

In the early 20th century, the education of American librarians shifted from vocational training situated in work practices to more formalized higher education. The subject's inclusion in the university system at the graduate level shifted focus away from procedural training towards more scientific approaches.[1] Situating librarianship in the academy helped legitimize it as a profession rather than a vocation, but also emphasized scientific research and publication over practice.[2] Librarians were increasingly educated in an environment steeped in science, research, and the academy, and in turn, took such scientific conceptualizations with them as they moved into practice. Scholars and researchers in library science emphasized the need for scientific evidence to justify and assess libraries' social and educational value, rather than reliance on experience-based assumptions and conclusions.[3] Various approaches to gathering scientific assessment evidence were drawn upon throughout the 20th century, such as positivistic approaches;[4] social epistemology;[5] qualitative inquiry;[6] hermeneutics;[7] and evidence-based librarianship.[8]

However, new diverse perspectives on librarianship—distinct from science—are emerging. In recent years, a well-established record of research has demonstrated design as an alternative approach to science. Design is often conceptualized in a limited way in librarianship, focusing on architecture and interior spaces or technological applications like web user experience (UX).[9] But design is not limited to furniture choices or usability testing. Scholars have identified consistent factors and aspects of design processes across a diverse range of domains that unite design as a unique discipline, distinct from science. Designers from all fields— from architecture to engineering, from fashion to technology—undergo similar processes, revealing a common set of fundamental principles that underlie what Cross calls a "designerly way of knowing."[10] This is more than just the popular model of the "design thinking" process—it is a fundamentally different approach to knowledge. While science observes and describes the existing world with the goal of replicability and prediction, design creates artifacts intended to solve problems and, ultimately, change the world from its existing state to a preferred state.[11] Science is about *what is*, while design is about *what could be* (or arguably what *should* be).[12] Emergent research demonstrates that the field of librarianship is more aligned with these designerly ways of knowing than with science.[13]

This paper argues for the inclusion of design evaluation techniques in library assessment. First, the paper introduces perspectives on assessment from the discipline of design, contrasting them with more traditional forms of scientific assessment. Three common design assessment techniques—rationale, critique, and reflection—are discussed in more detail, with examples to illustrate application and relevance to librarianship. The paper concludes with a discussion of implications for library assessment, including the need for advocacy regarding design approaches in librarianship and how these approaches contribute to furthering the values of librarianship and library services.

Assessment in design

Unlike science, which aims for predictable, consistent results, design specifically aims for deviations and variations.[14] Such alternative approaches to knowledge generation naturally will not hold up to scrutiny and critical evaluation based on scientific epistemologies. Because what counts as legitimate knowledge in design is different, then so too must any evaluation methods be different. While science relies on specific constructs of evidence, design considers interpretation as a valid form of epistemological evidence.[15] Scientific evidence may be of assistance to designers by describing existing situations so as to inform decisions. But unlike science, the purpose of design is not to describe the existing world in a factual or objective manner; rather it seeks to change situations and add meaning to them. Therefore, subjective interpretation is a valid form of evidence in design, manifesting through evaluative elements like rationale, expert critique, and reflection.

Just because design evaluation is not objective in the traditional sense does not mean it is less valid or invalid. What may seem like arbitrary subjectivity to outsiders is actually evaluation based on an extensive repertoire of personal knowledge.[16] The lack of pre-established and explicitly defined criteria does not automatically mean that an evaluator's subjective opinion comes arbitrarily from thin air. Understanding of values and norms of evaluative criteria have built up over time, from a designer's first critique through all subsequent design evaluations and experiences. It is conformance to—not deviance from—these values that demonstrate and reify an evaluator's authoritative role. Anyone who attempted to arbitrarily assess a design according to their own personal criteria would lose their community status as a reliable and expert evaluator. This idea of community-based affirmations of rigor and value are not limited to design: even the notion of objectivity in scientific epistemologies breaks down when viewed from the perspective of social construction. Pinch and Bijker posit that "there is nothing epistemologically special about the nature of scientific knowledge: it is merely one in a whole series of knowledge cultures."[17] They reference "'primitive' tribes" and other indigenous ways of knowing,[18] but there is no reason that the epistemology of design is not also a different yet legitimate, knowledge culture. At minimum, design evaluation should consist of a reflective critique by the design's creators.[19] The following sections describe three examples of evaluative techniques in design—rationale, critique, and reflection, all of which are considered valid, rigorous criteria in any design school or firm, across a variety of design disciplines.

Rationale

In design, rationale is defined as the "reasons and justifications for choices"[20]; that is, the reasons why certain choices were made during the process of creating a product or service, and why those choices were selected for enactment and development over others. Unlike more scientific approaches to assessment, which are often conducted after the program or service has been deployed, rationale is a technique that happens after the fact but is also ongoing throughout the design process. Because design (unlike science) does not have any one "right" answer, only better or worse answers,[21] design relies on the reasoning and rationale behind the choices to understand what led to or what makes a result "better" or "worse."

Rationale-based assessment is gleaned through an examination of the design process: how a design was made, including choices faced, decisions made, and justifications for those decisions.[22] As an example, I would like to discuss a real project from a library based on a paper I was once assigned to review. The submission discussed the creation of a new database of mural art. Yet the paper was not published, because it did not demonstrate that the database had any sort of effect on patron use. We might say that the paper was not published because it lacked assessment of the project, to know how well it did (or did not) succeed. However, just because the project did not utilize traditional scientific criteria for assessment does not mean that the project went unassessed. Although it did not offer findings from a traditional scientific assessment for usage data or feedback from a patron survey, it did discuss reasons for decisions made throughout the creation process. For example, the mural art database enabled users to search for works by both artist and geographic location. The intention of this function was to offer multiple access points for connecting with works, and let users both identify locations where art might exist as well as learn more about a work they had encountered in the city. The mural art database project also offered rationale for selecting location as an access point by connecting it to the goals of helping users identify and learn more about a work they encountered while out in the city—without location metadata as an access point, a user who encounters a

mural at 123 Main Street would not be able to find information about it in the database. The assessment in this case stems not from the inclusion of location metadata in and of itself, but the explication of the reasons and rationale for its inclusion, and the connection of that rationale to the project's stated goals.

Critique

Critique is often a scary word, calling to mind memories of harsh, negative criticism, perhaps in front of a large peer group, like reading a poem aloud in a creative writing class only to have the instructor and classmates rip it to shreds. Such experiences are often the extent of knowledge about critique for non-designers. However, although some similarities exist (such as classroom and peer settings), well-executed design critique is not simply subjective negativity: it systematically articulates a framework for evaluation and then compares the work against that framework in the form of an ongoing, interactive conversation,[23] moving beyond the simple "I like it" versus "I don't like it" to the ability to see what users need and how well or poorly any given design may address those needs.[24]

In contrast to science, the underlying purpose of design is not to describe the existing world in a factual or objective manner, but to change situations and add meaning to them. In contrast to scientific measures of assessment that seek to identify whether something has improved or increased (such as in the case of information literacy testing scores), a novel design artifact may have no meaningful baseline. Therefore, subjective interpretation is a valid form of evidence in design, manifesting through evaluative elements like reflection and expert critique.

Quality critique does not come from thin air—it is a learned skill. A staple of design education, "crit" sessions provide budding designers with direct feedback on the project at hand, prepare them to give and receive constructive feedback, and construct frameworks for evaluation. While assessment may traditionally occur at the end of a project or after a product's deployment, critique sessions should happen throughout the design process, since critique raises questions and potential issues that can and should be addressed before a program or tool or service is deployed. At minimum, design evaluation should consist of a reflective critique by the design's creators.[25] Unfortunately, for the case of the mural art database, critique only occurred implicitly, in the form of the peer review of the report, not during the project itself. By then it was much too late and much too disconnected from the project.

Reflection

Many of us are familiar with reflection, or the idea that we look back on a completed project or past situation with serious thought and consideration, such as a reflective essay we might write for English class. Designers, too, look back on projects in a reflective manner, often drawing on such reflection as an evaluation technique. Reflection can help designers learn from their experiences, become more conscious about design activities and choices, and analyze what worked well versus what did not.[26] This type of after-the-fact is familiar to most people. Schön calls this idea of designers iteratively making decisions based on previous and potential future decisions "reflection-on-action."[27] There is documented evidence of this type of reflection occurring in librarianship, such as in the Valuable Initiatives in Early Learning that Work Successfully (VIEWS2) project, which found that purposeful reflection is a key component in the continuous improvement of storytimes intended to increase literacy skills.[28]

But it is arguably designers' engagement in "reflection-in-action," or the ongoing, continual reflection throughout the process of creation that is one of the major aspects distinguishing design from other epistemology. Design is often attributed to innate talent or intuition by people unfamiliar with design epistemologies, both people external to design processes as well as some designers themselves who are ignorant of ways to explain their knowledge. Numerous studies show that designers refer to relying on their personal discretion or intuition when making choices.[29] Tacit understanding of what is meant by "personal discretion" or "intuition" often contributes to the mystery perceived to surround the design process. But what is commonly attributed to intuition has been dissected and teased out by design scholars and researchers as a type of knowledge based in reflection-in-action.[30]

Reflection-in-action can only occur during the process of creating a design artifact, which is why documentation of the design process is critical for design assessment. In the case of the mural database, the reporting authors did offer documentation of the design and development process; however, this was found to be unsatisfactory for the standards of the publication venue, which were based in traditional scientific notions of assessment. Reviewers offered suggestions such as collecting usage statistics and patron feedback surveys to glean the legitimate assessment measures necessary to validate and publish the report of the project. A scientific-based assessment addressing usage (such as a patron survey or database analytics) may have offered knowledge about local adoption and needs. But the discussion and reflection around challenges and decision rationale could offer universally applicable knowledge adaptable by other libraries and related settings, and would therefore be more useful to other professionals and researchers in the field than a survey of local patron use. Such a reflection might include what the researchers learned about library patrons; technological constraints and how they were (or were not) overcome; or how their repertoire was expanded through increased knowledge of art, just to name a few ideas.

Implications

Rationale, critique, and reflection are all key components of assessment in design. They are also not absent from librarianship. However, when and where they occur in librarianship, they do so implicitly and unsystematically, without the knowledge and substance necessary for rigorous design assessment. This means that librarians are not doing rationale, critique, reflection, and other design methods as well, as rigorously, or as robustly as they could—certainly not at the level designers do.

Advocacy for design approaches in librarianship

To address this issue, librarians need to advocate for acknowledgement of and capacity for design assessment in librarianship. Librarians need to explicitly embrace these design approaches, embed them in their assessment projects, and learn to do them well. To achieve this will require significant shifts in organizational administration and management, publication and communication venues, and professional education.

Library organizations and institutions—and administrative entities who manage them—need to recognize design assessment as a legitimate and rigorous approach to the evaluation of library tools and services. In addition to mere acknowledgement, management can support design assessment by building in explicit staff time for tasks like critique and reflection, and mandate content such as discussions of rationale in any internal reports. Requiring these design processes as part of any assessment project—and dedicating time and resources to them—demonstrates administrative commitment.

Yet this managerial buy-in will not emerge from thin air. Parallel support from the larger library community is necessary. One major arena for this is dissemination venues like publications and conferences. Many of these venues implicitly establish norms about acceptable approaches and methods through the topics and methods they choose to publish and share with the community. Discussions of rationale and reflection should be mandated in the same way as currently required standard sections like problem statements and literature reviews. Conferences and similar events should include critique sessions, using examples such as the annual video and website critique sessions offered at conferences like Museums and the Web as springboards.[31] Requiring the inclusion of design evaluation methods in publications not only lends credence to these approaches, but ensures that more readers are being exposed to communications about the application of these techniques. If existing venues are not willing to support these aims, new venues that acknowledge the legitimacy of design evaluation need to be created.

Instituting these types of inclusions will require librarians with expertise not only in library-related subjects, but also in design methods and approaches. Contrary to popular belief, design skills are not intuitive—they are learned and honed through explicit education, training, and practice. People unfamiliar with design often assume that it is a simple, linear process, in the same way that people unfamiliar with librarianship often assume the work of librarians is easy, entailing nothing more than reading books all day. What librarian has not been asked why anyone would need a graduate degree to do library work? Librarians must not make the

same assumptions about other fields like design. While the design process may seem like a black box to outsiders, significant education and training has occurred to make the design process appear easy and seamless, in the same way that librarians can make a complex database search look simple to those not versed in Boolean operators and controlled vocabularies. Therefore, to ensure both understanding of and rigor in design as a legitimate assessment practice, librarians need design education. This can be supplied in a variety of means, from local or national professional development sessions to inclusion of design as a fundamental component of formal graduate library education programs like MLIS degrees.

How design approaches support the values of librarianship

Why is it so important to include design techniques as a legitimate aspect of library assessment? Design assessment methods like rationale, assessment, and critique are what is going to allow us to take the next step beyond use and satisfaction and let us assess whether or not we are aligned with the values we set forth and stand for as a profession. The idea of seeking purposeful change is an inherent characteristic of design, which rests on the idea of problem solving and changing from current states to preferred ones. While design is about solving problems, it offers two differing yet complementary perspectives on problem solving: creating a solution based on what *could* exist, or creating one that *should*.[32] The former identifies possibilities while the latter makes a judgment about the world. All design artifacts carry these value judgments— whether or not they explicitly admit to doing so.[33] Therefore, despite librarianship's tradition of offering a neutral and objective standpoint,[34] values and perspectives about how the world "should" be are embodied in all library artifacts regardless of neutral intentions.

The implicit treatment of design in American librarianship reveals a significant disconnect between the creation of library tools and services and the values those tools and services embody and reflect. Librarianship is theoretically guided by values that separate libraries from other commercial providers of information tools and services. For instance, the American Library Association lists 11 core values that ostensibly underlie the profession, including such values as privacy, intellectual freedom, and diversity.[35] Scientific measures may let us observe and describe the current state of values in librarianship, such as how diverse our staff currently is, or how many challenges to intellectual freedom are received. Quantitative assessment data from a user survey may demonstrate the popularity of a given service, but using values as rationale can demonstrate where that popular service may be failing terms of values like serving diverse and/or marginalized populations or offering equitable access. Even when traditional methods demonstrate positive assessment, they may be masking issues. But since design is aspirational and normative, driven not by how things *are* but how they *should be*, design assessment lets us see where outcomes do (or do not) align with those values, and lets us make changes to support those aspirations, thus purposefully furthering values for which the profession claims to stand.

Conclusion

Many discussions ensue about which of these scientific-based methods is best applicable to the library work at hand, but few have questioned the assumption that scientific methods are the most relevant and applicable assessment methods for librarianship overall. As the alignment between librarianship and design becomes increasingly evident, librarians need to understand that there is more to design than just a simple process model.

Relying on default traditional scientific methods to assess the outcomes of a design process is like using a ruler to measure a two-liter bottle: it may tell you something, but it may not offer all of the relevant and useful information. Instead, design has its own established evaluation measures, such as rationale, critique, and reflection. It is imperative that, as more and more librarians adopt design approaches, they also adopt assessment methods appropriate to those approaches. Not only can design evaluation provide more appropriate evaluation of library tools, programs, and services, but due to its normative nature, it is the only method that allows for the assessment of alignment with core professional values. As people increasingly rely on publicly-available and often commercially-driven information tools and services to meet their information needs, libraries are set apart from these other information providers by a commitment to core values like democracy, diversity, privacy, intellectual freedom, and lifelong learning. Libraries and librarians

need approaches that highlight and advocate for this difference, and they need methods that help assess the inclusion of these values in all library services.

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Reflections on Creating a Multi-Site, Mixed Methods, and Interpretive Assessment Project

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Introduction

In this paper, we reflect on the experiences of our research team in conducting a multi-site, mixed methods, and interpretive project concerning first-generation students and academic libraries. After a description of the context of the study and of our research methods, we examine both the strengths of the project and the challenges we encountered, with the aim of providing recommendations for library researchers who may be interested in pursuing a similar project.

Context

A team of library professionals from three public universities in Colorado collaborated on a mixed-method research project to explore the experiences of first-generation college students across Colorado universities. We sought to understand students' campus experiences, especially in using academic libraries. An understanding of the mindsets and skills first-generation students bring with them to college, as well as the challenges they face on campus and when using the libraries, could help to provide insights to improve library spaces, services, and collaborations with campus programs that serve first-generation students.

The research team included library professionals from the University of Colorado Boulder (CU Boulder), Colorado State University (CSU), and the University of Northern Colorado (UNC). All three are public, doctoral-granting institutions with largely residential student populations, but there are some notable differences among the universities.

CU Boulder has an approximate student population of 33,200. Of those students, 59% are in-state Colorado students and 13.8% are first-generation students. CU Boulder's University Libraries has five libraries. It is a comprehensive graduate research university and is known as the flagship university in the state of Colorado. CSU is located in Fort Collins, Colorado. Its student population is 31,600 students, of whom 70% are in-state students and 18.5% are first-generation students. CSU has a main library and one branch library. It was founded as a land-grant school and retains outreach to communities across Colorado in its mission. UNC is located in Greeley, Colorado. The student population is approximately 12,000 students, of whom 83% are in-state students and 41% self-identify as first-generation students. UNC has two libraries. It was founded as a normal school and continues to be known for excellence in the field of education.

Our three campuses have much in common, particularly that they are public, doctoral granting, primarily residential universities. However, our histories, missions, and student bodies differ substantially. We recognize that not all types of higher education institutions are represented in this research project, but we hope that the range of student experience is broad enough to prove relevant for library professionals at a variety of institutions.

Methods

The project grew out of conversations among the team members through professional networking channels. We discovered a shared interest in better serving first-generation students in our libraries. While some team members already worked closely with campus units that serve first-generation students, others were interested in expanding their work with this substantial campus population. Just over a year ago, we began meeting roughly once a month, usually online but occasionally in person, alternating among our three campuses. Early on, we agreed on the main outline of the project, namely that it would be a multi-site, mixed methods, interpretive/constructivist study. We chose to collect data at multiple sites instead of a single site to increase the number of potential participants as well as to "show the particular and unique as well as what is common to all" sites.[1] In addition, a mixed methods design promised "a more complete understanding of a problem" through the use of both quantitative and qualitative data that complemented each other.[2] The choice to use an interpretive/constructivist framework stemmed from our shared philosophy that "there are multiple realities, or interpretations, of a single event," and that meaning is created through social interactions.[3] Further, this framework allowed us to focus on students' understandings of their experiences rather than evaluating them with a set of preconceived criteria.

After the initial planning stage, the research team developed a survey that contained both closed- and open-ended questions. The survey gathered demographic data, such as gender, race, and academic major. A set of Likert-scale questions addressed students' feelings regarding the importance of a range of library services and their comfort using those services as well as the frequency with which they actually used them. Further, the survey included open-ended questions regarding positive and negative experiences using the academic library. We distributed the survey to as many self-identified first-generation students at each of the three sites as possible, which varied substantially due to institutional contexts, structures, and policies. Respondents indicated at the end of the survey whether they would be interested in participating in individual, in-depth follow-up interviews.

We then conducted an initial analysis of the survey results and identified findings to be explored further in subsequent interviews. For example, there was a discrepancy between how important respondents felt library services were and how often they reported using them. As a team, we developed a research guide with five common interview questions. Yet we also developed individual questions tailored to the context of each institution. For instance, two of the institutions were particularly interested in information literacy instruction and therefore included questions about that topic in their interview guide. Interviews were audio recorded and subsequently transcribed. Next, we coded the transcriptions at each site to determine important themes in the interviews. Team members from another of the three institutions conducted a second round of thematic coding to increase intercoder agreement, that is, the extent to which we agreed in coding decisions.[4]

Team members divided analysis and writing tasks according to experience, interests, and availability. We came together regularly to confer, workshop data analysis techniques and tools, offer assistance and support, solve problems, select possible conferences and journals where we could submit our work, and coordinate writing and presentation of findings. We have presented initial findings at the Colorado Association of Libraries Conference and the First-Generation Southwest Symposium. For this current research experience paper, we gathered reflections on the research process from team members. Beyond this paper, we are writing an article that focuses on the qualitative findings and are planning a second, mixed methods article that draws from both the quantitative and qualitative data sets.

Strengths
Research Team

Several features of the research team and how we interacted contributed to our success in carrying out the project. Our varied backgrounds, research training, and experiences of working with first-generation students made for a culture of challenging discussions and mutual support. Team members shared knowledge and expertise from prior research projects, offering mutual advice and assistance, such as time-saving tips for more efficient interview transcription. During an in-person meeting, we practiced thematic

coding using hard copies of transcripts and markers at first and then using Dedoose, the online tool we would later use to conduct coding. These workshop activities allowed us to interact in a different way, face-to-face and using hands-on tools. They drew on some team members' research expertise and appealed to varying work and learning styles. We also found that taking time to visit the three universities in person, gain a sense of the campuses and libraries, and get to know each other over a shared meal helped build trust, generate deeper conversation, and inform our collaboration.

Indeed, communication was a key factor at all stages of the research process, from research design to reporting findings. Regular meetings, virtually and occasionally in person, were integral in negotiating expectations, sharing responsibilities, and meeting goals. We often divided the project into subtasks, such as developing the survey instrument and writing the literature review. Small groups with representatives from each institution worked on those tasks. Having a knowledgeable and experienced team leader to guide the project, divide tasks, check in with teams, offer encouragement, and help us meet deadlines was a crucial element. Another factor that helped our research team collaborate successfully was striking a balance between defined roles and deadlines on the one hand and flexibility and understanding for team members' institutional and individual challenges and limitations on the other. Finally, our teamwork benefited greatly from an atmosphere of respect, trust, and humor. The diversity of the group was complemented by our shared goals and fundamental research perspective: to learn more about first-generation students' experiences using an asset-based approach in order to improve library services and eliminate barriers to library use.

Research Design

Another source of strength in this project was the research design. Beyond the advantage of an increase in potential research participants, the multi-site design of the project involved multiple researchers from three campuses. This plurality of voices made for a rich discussion of research design, drawing on our range of knowledge and skills. Some team members had more experience with quantitative research methods, for instance, and others with qualitative research. Another benefit of the multi-site design was the discovery of differences among our institutions. This research project provided an opportunity to examine our local practices in a new light and to consider changes that would have otherwise not occurred to us, such as coordinating disparate services to first-generation students on our campuses in order to avoid silos and to prevent duplication of effort. In addition, the fact that our findings reflected institutional differences may render them more relevant for library researchers working in a variety of contexts than if we had collected data at a single site.

A second prominent feature of the research design was the use of mixed methods. Multiple sources, collection methods, and types of data complemented and supplemented each other. For example, from the survey responses we learned that some students did not feel welcome in the academic library. Such preliminary findings later informed the development of our interview guide and the topics we explored in-depth with interview participants. Qualitative data provided rich detail of personal experiences and viewpoints that illuminated quantitative findings from the survey. We discovered in the interviews, for instance, that students choose study spaces for a variety of reasons, from noise levels to feeling a stronger sense of belonging in other campus spaces, such as cultural centers or first-generation support program offices. Using a mixed methods design afforded us glimpses of issues from several perspectives. Taken together, the quantitative and qualitative portions of the project provided a fuller sense of first-generation students' attitudes toward and experiences of using academic libraries than if we had used a single method.

The third significant feature of our research design was the use of a constructivist or interpretive framework. This choice had several consequences for our project. We felt that the project should take into account the richness and nuance of students' experiences and viewpoints. Incorporating students' own voices was therefore of the utmost importance. This is especially true given the historical tendency in library and information science to frame first-generation students using a deficit model, an approach that includes frequent references to lower retention and graduation rates and other ways in which first-generation students purportedly differ from their continuing-generation counterparts.[5] Using a constructivist or

interpretive framework enabled us to highlight students' own understandings of their experiences, focus on their strengths, and discover the barriers that our institutions had created.

Thus, several features of our project contributed to its success. The characteristics and practices of the research team, such as the breadth of experience and knowledge in the team and positive communication habits, were crucial factors. Research design decisions, including our choice of data types and theoretical framework, were also fundamental to the effectiveness of the project.

Challenges

Despite a number of strengths, conducting the study provided a number of challenges as well. The challenges included working across three campus and library structures, securing funding for all stages of the research, and developing a foundation and shared understanding for the project.

Campus and Library Structures

Working across three campuses led to a number of challenges. There were differences in semester start and end dates, which affected when team members had time to devote to the study. This also influenced the timeline for completing interviews, as the approaching end of the semester created a need to quickly interview students before students left campus for the summer. We did not have sufficient time to communicate about how the interviews were going or to make adjustments to the interview guide as the interviews progressed, steps that could have increased the quality and consistency of the interview data across sites. In addition, scheduling regular virtual meetings and in-person meetings on each of the campuses was challenging due to varying semester dates.

In addition to differing academic calendars, our campuses had divergent structures for first-generation student support services. Some universities had a central office to serve first-generation college students and allowed the survey to be sent to all first-generation college students on that campus. This impacted our ability to communicate with potential survey respondents and resulted in varying response rates across sites. One university had separate first-generation student support services in each department, some of which agreed to distribute the survey and some of which did not, leading to greater survey response from students in particular majors and lack of responses from students in other majors.

The libraries on the three campuses had different priorities and strengths for their spaces and services, and members of the research team therefore had varying preferences for survey and interview questions. For example, some campuses had robust instruction programs and wanted to ask more specific questions about first-generation student experiences with library instruction. This led to challenges in balancing the individual campus preferences with the overall project goals. The solution was the development of common interview questions, so that comparisons and common themes could be drawn from all three campuses, as well as institution-specific questions so that each campus could collect data on their particular spaces and services.

Funding

Each campus had different levels of funding support for this research project, and we did not thoroughly consider all the possible costs when the project started. An initial funding need was to provide gift card incentives to encourage survey response and interview attendance; some campuses had more gift cards to offer students than others. The variation in funding led to discrepancies in the number of participants across sites. In addition, we did not anticipate the time commitment involved in transcription, and thus did not seek funding for professional transcription services.

Also linked to funding were varying research requirements and support. The three universities and the various types of positions in each library had disparate research and tenure expectations. This especially impacted the reporting stage of the research project, as we discovered that our respective institutions evaluated and valued conference presentations and publications differently. Further, team members had

different levels of funding support to attend and present at conferences. These differences impacted the roles and levels of involvement of individual team members in presenting our findings.

Foundation and Shared Understanding

Larger-scale challenges that affected our research project through most of the stages included creating and adhering to a timeline; establishing shared understanding and priorities; managing a variety of working and communication styles; and learning to leverage our differences into strengths. These were all challenges that, upon later reflection, we could have focused on more at the beginning of the study. At times, it felt as if we were jumping ahead without sufficient planning due to our enthusiasm in learning about first-generation students in order to serve them better. For instance, we applied to our first conferences somewhat early. Though the impending deadline of a conference presentation is an excellent motivator, greater initial planning and development of common ground could have created more focused direction and greater efficiency.

By sharing some of the challenges we faced, from working across varied campus and library structures to securing funding and developing a foundation and shared understanding early in the project, we are able to share recommendations that may help other library researchers interested in undertaking a similar project.

Recommendations

We learned a number of lessons and have recommendations for conducting multi-site, mixed methods projects, including developing a strong shared understanding early in the project, taking time to thoughtfully collect data, carefully selecting the research tools and applications, and emphasizing flexibility and commitment to the research team and each other's strengths in addition to the products of the research. These recommendations draw from both the strengths and challenges of our project.

Starting with a strong foundation is key, particularly with a large-scale project. We recommend choosing collaborators deliberately. Shared research goals, compatible work styles, and experience with a variety of research methods and tools are beneficial. Further, the selection of research sites should align with the aims of the project. For example, including three public, doctoral-granting, residential universities provided a large pool of first-generation student research participants. However, including other types of higher education institutions, such as community colleges, private institutions, or commuter campuses, could have highlighted diverse student experiences that were not captured by this study. Other tasks we recommend spending substantial time on from the outset are: developing the theoretical foundation, mapping out the various steps of the project in detail, creating subteams to work on the various steps or aspects of the project, and clearly defining the roles for those subgroups. These steps can help ensure that all team members have a deep and shared understanding of the project and the practical requirements to carry it out. Finally, we recommend securing funding for each step of the project at the beginning to ensure that each campus can participate equally and fully in recruitment, data collection, transcription, data analysis, and reporting of findings.

We suggest allowing plenty of time to conduct interviews to enable team members to practice interviewing, conduct pilot interviews, reflect on initial interviews, discuss with team members, and make adjustments to the interview guide.[6] These steps can improve the quality and consistency of data collection. We would also suggest including open-ended questions only when qualitative data are truly desired. For instance, our open-ended questions about commute time and academic major unnecessarily complicated data analysis. Closed question types would have provided sufficient information and streamlined analysis. In addition, though performing our own transcription increased our familiarity with the interview data, we recommend seeking funding for a professional transcription service to save time and ensure standardized transcripts. Researchers can listen to the audio to review transcripts and gain familiarity with the data without spending a large amount of time and effort in transcription.

The online applications a team uses are another integral factor. We found web conferencing tools such as Zoom and productivity applications such as Google Drive essential to completing all stages of the project. In

developing the survey, Qualtrics allowed for the creation of a unified instrument but also enabled us to brand and tailor it for each institution. We found that an automated transcription application such as Dragon yielded mixed results. Some research team members found that it saved them time in transcription. However, the quality of the transcriptions varied substantially due to such factors as the quality of the recordings, proximity of audio recorders to participants, and potential bias in the transcription application toward particular dialects or accents. The cloud-based coding application Dedoose enabled the team to develop, monitor, and discuss an emerging set of shared thematic codes across sites, though it did require training—and thus valuable time—for most team members to learn. The cloud-based citation management application Zotero allowed team members to gather sources, minimize duplication, and add comments to sources to aid in writing later. All of the applications offer no- or low-cost options. When there is a charge, we recommend exploring the possibility of sharing accounts, thereby minimizing cost.

No matter the level of careful planning and coordination, there is no way to foresee or prevent all challenges that may arise. We encourage flexibility and understanding for the hiccups that may occur at the individual and institutional levels. All of us are, after all, practicing library professionals who juggle multiple responsibilities and projects. Understanding, mutual support, and commitment to the research team (and not just the products of the research) are therefore vital parts of a successful collaboration.

Conclusion

From inception to dissemination of findings, our project was characterized by plurality. This was the case in terms of research sites, team members, research methods, and data sources. Such an approach offered a richness of perspectives and data, thereby resulting in a more comprehensive understanding of first-generation students' experiences with academic libraries. Nevertheless, that abundance brought with it a set of challenges in managing the team and the data. For library researchers considering a similar undertaking, we suggest a balance between planning and flexibility to manage the complexity of a multi-site, mixed methods, interpretive research project.

Notes

1. Bishop, "Multi-Site Case Study," 587.
2. Creswell and Plano Clark, **Designing and Conducting**, 65.
3. Merriam and Tisdell, **Qualitative Research**, 9.
4. Saldaña, **The Coding Manual**, 37.
5. For an example of the focus on first-generation students' differences from traditional students, see Tyckoson, "Library Service for the First-Generation College Student," 91–99.
6. Creswell and Poth, **Qualitative Inquiry**, 165.

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Building a "Library Cube" from Scratch

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Introduction

Library assessment research in academic libraries has grown over the last several years with a particular emphasis on measuring the effects of library resources on student success (often GPA and retention) to demonstrate value and impact.[1] Through assessment departments, often in partnership with institutional researchers, academic libraries can build foundational datasets important for reporting value and impact. At Florida State University (FSU), these efforts within departments and divisions have resulted in silos of data that speak to temporary or singular questions or decisions. However, when brought together, these data might impact broader decisions and gain attention from campus administrators with influence over budgeting and resource allocation. These studies might be momentarily compelling or important for specific divisions but could contribute to telling the larger story about the collective impact of an academic library's services, spaces, and resources. Building a multidimensional data warehouse could help an institution gather and connect these studies and datasets in one unified database for easy querying and reporting. Translating this concept for use within academic libraries, we will discuss the many steps involved in planning a library cube. Ultimately, this database brings together measures of student demographics, resource usage, and outcomes such as GPA and retention rates. This enables assessment librarians and administrators to make connections between the impact of library services, spaces, and collections on student success in a more cohesive and organized way. Additional environmental factors could include instruction and learning, grades, extracurricular activities, parental educational attainment, use of other campus resources, jobs after graduation, etc. A library cube can help libraries streamline data analysis and reporting integral to engaging with campus decision-makers, which is especially helpful in navigating a higher education landscape that emphasizes performance metrics and demonstrations of value and impact.

Ideally, these advancements will lead to multidimensional, real-time datasets from which library stakeholders could ask research questions using myriad variables at the point of query. Standardized data could automatically be pulled from different data sources already cleaned, merged, stored, and ready to use. Data points on library usage, such as circulation, equipment borrowing, tutoring services, study rooms, library databases, and working with librarians, can all be linked via a unique identifier with student demographics, pre-college, and engagement variables. This, when combined with institutional research data, such as student grades, course load, major, and GPA, can then be used to gauge usage and trends of library use and services among the student population that uses the library. Academic libraries should engage in many discussions about the theoretical and empirical reasons for including certain variables regarding libraries and student success. Taken together, these variables should facilitate the most complete framework for understanding the impact of libraries on students, making their collection and selection particularly important in the decision-making process. There are many models on the various factors affecting student success that might be of value to libraries when making these decisions, for example, Astin's Input-Environment-Output (I-E-O) Model of Student Involvement.[2] By increasing the number of data sources available for analysis, a more complete and comprehensive picture can be provided of the impact of library usage on student and faculty success.

Background of the Cube Concept

In 2010, before there was any mention of a Library Cube, ACRL's Value of Academic Libraries (VAL) Initiative was an impetus for academic libraries to measure their impact on student success outcomes (through the Assessment in Action [AiA]: Academic Libraries and Student Success program).[3] Since then, many academic libraries through AiA have collected data that measure the relationship between library usage and impact on student success outcomes, often with an emphasis on specific aspects of the library experience (e.g., space, instruction, equipment use, database use, etc.) on one or more student success outcomes (e.g., student learning, retention, engagement, GPA, etc.).[4] In addition to AiA's collection of

research, there have been research studies measuring the effects of an array of library usage points on a number of student success factors, such as at the University of Minnesota or, in the case of the Library Impact Data Project, multiple variables at multiple institutions at once.[5]

University of Wollongong

Academic libraries have long struggled with how to demonstrate value and impact using all the data they collect in an organized, accessible, and streamlined way. The UOW Library was the first of a few university libraries in the world who addressed this issue. They created a system that, for them and their data, served this purpose and set the stage for other academic libraries to follow. This is especially important as qualitative and quantitative data about library usage is being collected from library staff of services from all facets of the library, yet the data remains siloed into separate streams of library evidence.

In 2012, the UOW Library in New South Wales, Australia, described their creation of a database—its moniker "Library Cube"—that combined library use data with student data to determine library impact and value.[6] At the Library Assessment Conference in Seattle, Washington (August 2014), attendees learned about the progress of UOW's Library Cube, a relational database that tied together aggregate student data to reveal that there was, in fact, a positive relationship for students using separate library information measures (using EZProxy logs and number of circulations) on student academic performance.[7] Using this interactive data warehouse, they rescued data from existing silos and made it possible to create standardized and customizable reports. To address these issues, the UOW "developed the Library Cube, a tailored database and reporting function that joins library usage data with student data, including demographic and academic performance information."[8] As a result of bringing the data of library information usage, student demographic, and success variables together (e.g., student grades), they were able to discover relationships to tell a more evidence-based story of the library's impact and value at their university. This ultimately helped them build an infrastructure to measure multiple dimensions of library value, not just using traditional measures of library.

Furthermore, UOW's Library Cube enabled their library administration to securely access an array of data and analyze it by using an in-house, web-based UOW-wide "Performance Indicators Portal" provided by UOW's Performance Indicators Unit.[9] Their portal resembles the business intelligence software that the Office of Institutional Research provides access to different FSU stakeholders. UOW Libraries started building the Cube with circulation (loans) and online resources data by looking at time series data.

University of Huddersfield

In addition to the introduction to the Cube concept from UOW, the Library Impact Data Project, a collaboration between the University of Huddersfield and JISC, a digital support company serving the educational sector in the UK, measured students across three universities (over 30,000 students) using multiple dimensions of student library usage to examine its relationship with student degree attainment.[10] One of the most comprehensive studies of its kind, researchers also needed to develop elements of a library cube to connect the student usage and success measures across three universities.

As the concept grew in theory and practice across these institutions, it simultaneously revealed the need to manage, warehouse, and de-silo data necessary for analyzing the many ways that library usage and engagement can collectively impact student outcomes. In the United States, Kennesaw State University (KSU) and the University of Minnesota (UMN) Libraries have emerged as leaders in library cube development.

Kennesaw State University

KSU Library replicated the work done by UOW to develop their own LibCube project and found the same strong correlation between library resource usage and higher student GPA.[11] The library was able to partner with the KSU Office of Institutional Research and campus administration to collect, analyze, and publish their findings. KSU administration realized the value of this type of assessment and committed early on to buying the SAS statistical suite and Tableau for campus wide use. The Office of Institutional Research was

able to leverage this investment and start a campus-wide project to measure student success in other areas beyond the library. The KSU Office of Institutional Research also provided expertise in data analysis and data visualization to the library and other university departments.

University of Minnesota

The Library Data and Student Success project, which keeps track of individuals' IDs and general library use, is stored separately from other library data because of the way various projects have evolved. However, the University of Minnesota has been waiting for their university's organizational data office to bring LDSS data together with other library data to create a more complex database moving forward.

In the meantime, and for the last seven years, people from around the libraries send data to their organizational data strategist or give them access to pull the data needed for additional analyses. They use a Microsoft Access database stored on an Office of Institutional Research (OIR) server that includes demographic data as needed from PeopleSoft. The strategist does not store anything locally, for data privacy and security reasons. Although there is a need to retain student IDs in order to do longitudinal studies, any spreadsheet or other derivation of the data at the individual level (rather than, say, aggregated by college) is anonymized and the actual ID is only kept on the OIR server.[12]

Florida State University

FSU Libraries' Assessment Department—influenced by the VAL initiative and a campus-wide push to measure how library spaces and services impacted student success—conducted two studies. The first, beginning in 2010, collected longitudinal data from a library-intensive course and measured the effects on student GPA and graduation rates.[13] The second major study examined card swipe data to estimate the effects of library visit duration and frequency of visits on first-time-in-college (FTIC) students' GPA and retention rates.[14] Both of these studies and their continued data collection have made it clear that we need to integrate large data sets, such as card swipe data, with other disparate library usage data sets with student outcomes. By rebranding the library cube as LibCube at FSU Libraries, we initiated planning to create a centralized, searchable, and accessible database to decision-makers that is connected to de-identified student data—the process for which we outline in this paper.

Purpose

The purpose of this paper is to describe the process used at FSU Libraries for building a multidimensional library database or "Library Cube" from scratch to make this process easier for others to develop, identify various challenges, including technical and ethical issues, and to build on library cube trends established by UOW, UMN, KSU, and the Library Impact Data Project (University of Huddersfield and JISC).

As previously demonstrated by the institutions at the forefront of these efforts, library cubes can enable data-driven decision-making for internal stakeholders, provide access to data for real-time queries and standardized reports, link data together with common identifiers across internal and external institutional information or outcomes, and allow for cross-sectional and trend studies of library services and impact. Academic libraries will find a library cube particularly useful for linking the use of library resources with student success, for improving decision-making about resource allocation in the library and seeing whether services are effective and how they can be improved.

Getting Started with a Library Cube
Library and Campus Environmental Scan

After conducting our initial research on the use and development of a LibCube, it became obvious that we would need to look outside of the library for resources and expertise. We reached out to other campus units to gauge interest in forming partnerships. What we discovered was that several units on campus were already working on similar projects. We found that both the Office of Institutional Research and the Office of Distance Learning were both conducting research linking use of university resources to student success. Though both campus units were working towards the same goal, they were not collaborating on the project. They were also using different techniques for storing and analyzing their data. The Office of Distance

Learning had invested considerable resources in developing on-premise big data analytical capabilities. The Office of Institutional Research had just recently started the process of moving to a third-party cloud-based vendor for data analysis.

These two approaches are common when analyzing big data and have their advantages and disadvantages. In-house solutions provide greater control but have the usual drawbacks of technology upkeep and management. The cloud-based solution eliminates these drawbacks since the technology is not owned, but there is less control and often significant expenses associated with moving data in and out of the cloud.

During this information-gathering process, it became apparent that, while the library lacked resources, we did have one valuable commodity: our patrons' data. We found that several parties were interested in exchanging resources for access to our data. While this may be an answer to the lack of resources, it raises significant concerns about data governance, sharing, privacy, and how the data would be used by those requesting access. This is part of a larger discussion that developed out of this project, questioning the stance of our library about what patron data is collected and how it is stored and used. Currently, we are working to develop a library-wide consensus on this issue through town halls and information sessions involving various stakeholders.

Data Security and Privacy Conversations

We attended two meetings that have been helpful in structuring these discussions with the Office of Institutional Research and the Office of Research Institutional Review Board (IRB). Representatives from both units engaged in conversations with us about consent, ethical research, data collection protocols, data security and storage procedures, retention and archiving policies, and data sharing policies and agreements. Many of these had not been previously discussed within our library and there were no policies or procedures in place to help us deal with these issues. Several working groups were convened to do environmental scans on data governance policies on campus and within academic libraries as well as to review data privacy standards within academic libraries, especially those using or building library cubes.

Developing the Concept

The cube concept is sometimes difficult to describe in a simple and appealing way to engender buy-in from stakeholders who may want to invest in the project. In the first visualization of the cube, we had not even built a master file with more than two datasets, so articulated steps were based on theory and existing documentation of the process (see Figure 1).

Figure 1. Developed by Malcolm Shackelford
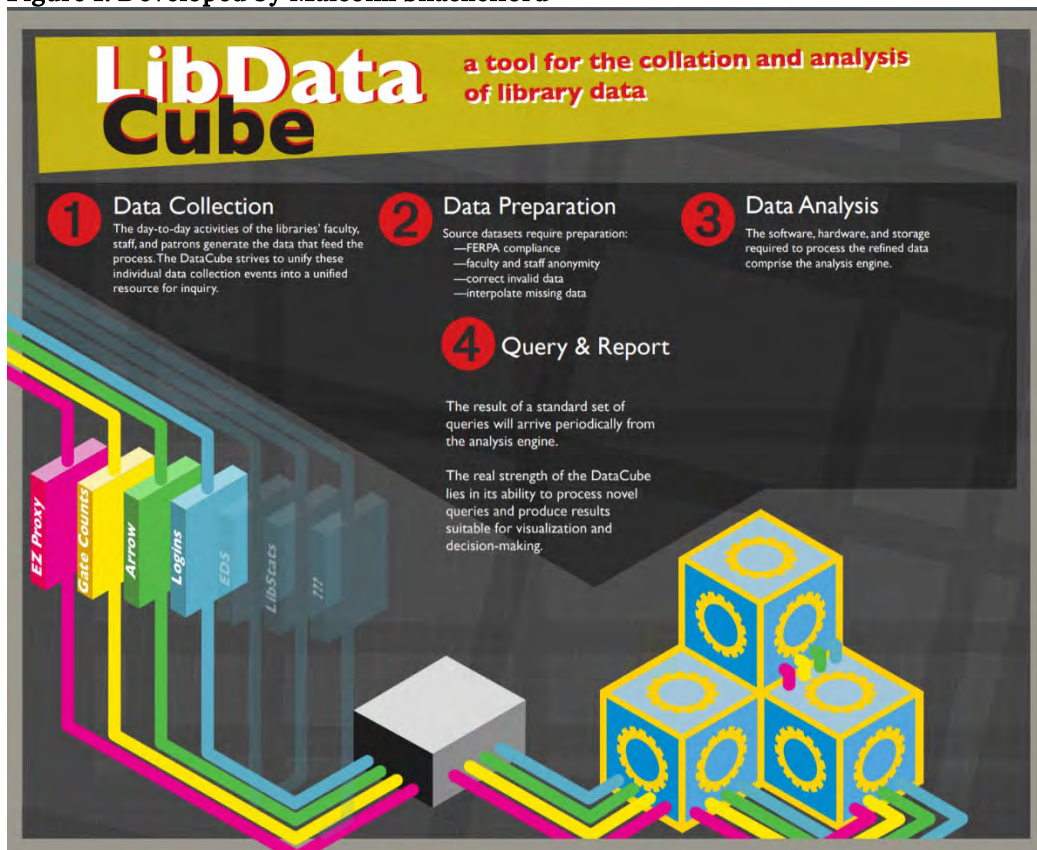
One issue that came up from this design was that proprietary names should not be associated with datasets, such as LabStats, EZProxy, Arrow, EBSCO Discovery Service (EDS), or LibInsight (for example, using e-resource authentication as a description, rather than listing the EZProxy service by name). This would allow us to expand potential content based on theoretical and empirical frameworks that might become useful while exploring data for inclusion into the LibCube.

In Figure 2, we developed the previous figure to account for the data management process that is necessary to clean and merge any data before integrating it into the cube. For FSU Libraries, this aspect was most challenging for the turnstiles or gate count data, one of the larger datasets that involves several steps to clean and merge by month. Unfortunately, there have been many problems in cleaning our gate count data because of matching, duplications of swipes and visitors, and determining inclusion or exclusion criteria for staff. Merging this data includes several physical points of entry across two libraries by individual units to get aggregate counts of frequency and duration of library visits. Each dataset comes with its own unique data management challenges, which must occur prior to merging data with unique identifiers—shown more clearly in this rendering:

Figure 2: Developed by Louis Brooks
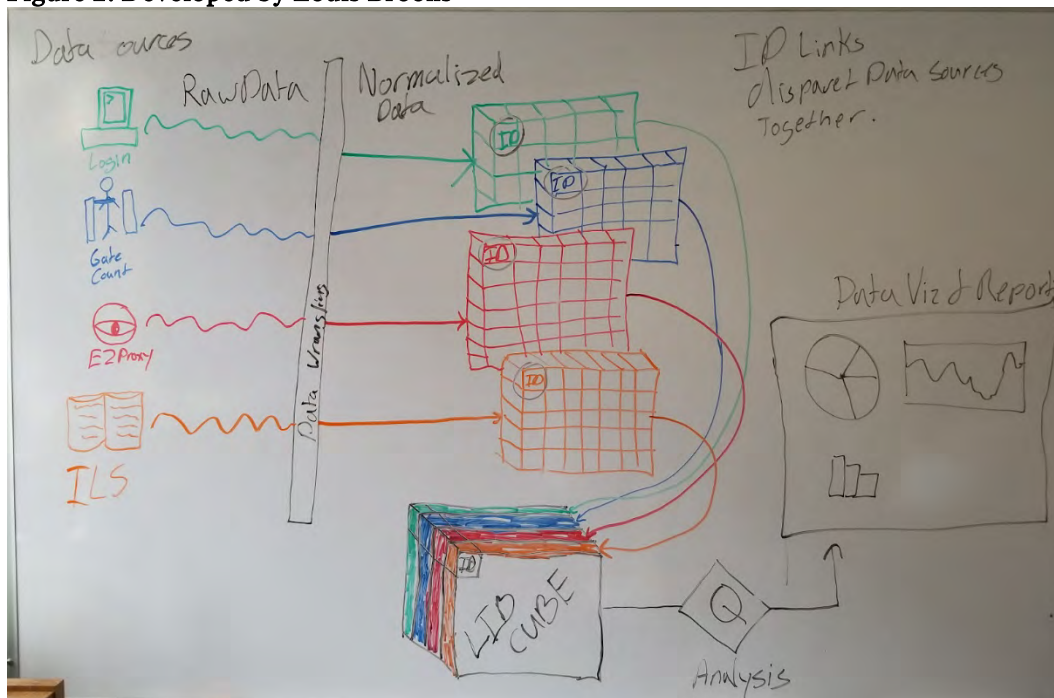
Expanding on these previous frameworks and from the experience of getting started on cleaning and merging a few datasets, we had a clearer understanding of the process necessary for us to build the LibCube at FSU Libraries. We capture this more thorough process in Figure 3, which includes data collection, data processing, and using the LibCube.

Figure 3: Developed by Chris Brennan
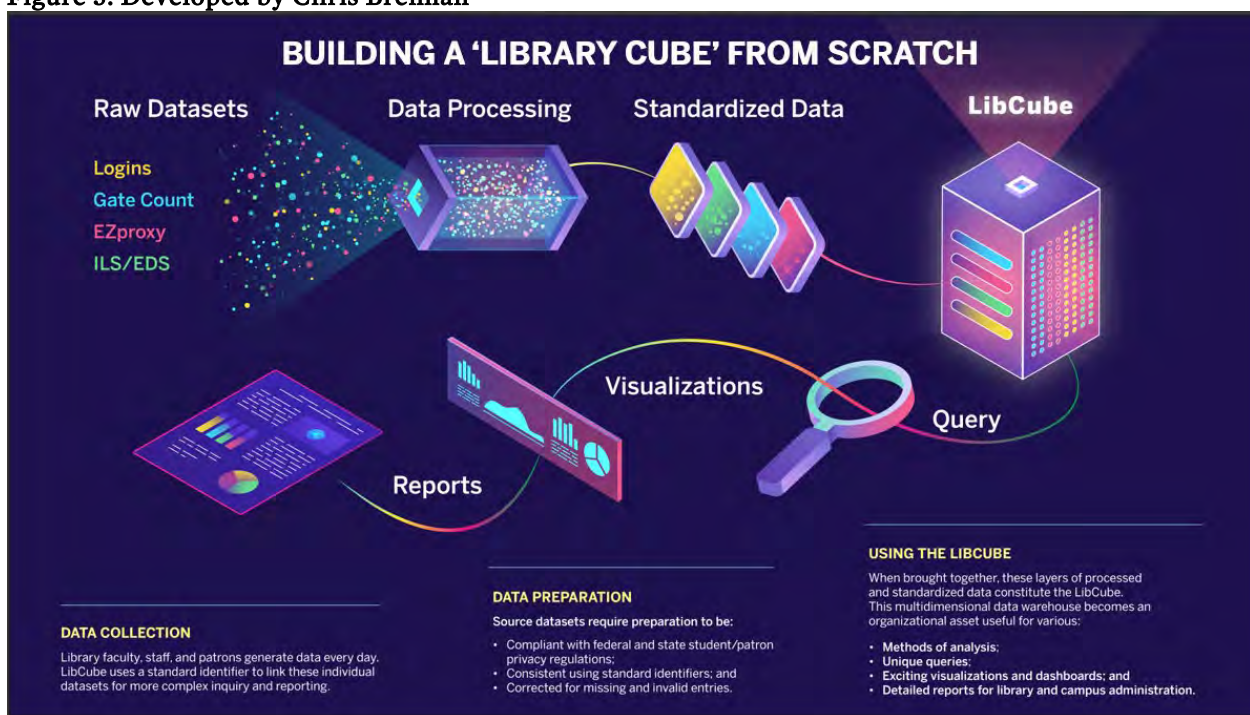
Data Inventory and Creating Community Buy-In

Between the assessment and technology departments, we already had an idea of the datasets we could merge in the LibCube; however, we knew there were many more datasets floating around the library. A team of committed, cross-departmental staff planned and implemented a data inventory across the library to help us understand what data was being collected, why, and where it was being stored. Documentation for the inventory process, including workflows, submission methods, and dictionaries for terms, was made available to everyone and was also emailed to the organization with support from the interim dean. This support from library administration was an important first step for garnering community buy-in and participation. We had a positive response from participants, many of whom thought it was fun to learn more about data in general and to feel like they were data management experts. We cannot overstate how much we learned from this project, not just for LibCube but for the entire organization, including learning what datasets are being collected, how they may be connected to other datasets, duplications of effort, data protections and storage practices, ways to get data out of silos, and how to prioritize and possibly centralize datasets for ease of access. It initiated further conversations about our organizational practices regarding survey creation and data collection, as well as inquiries to library administrators about the types of data and analyses they needed to communicate compelling narratives about the library to stakeholders.

Data Wrangling and Processing
Data Management Best Practices

A project like this one starts with good data management. For example, many of the files merged to form the card swipe/turnstile dataset were not named consistently. Files at various stages of the data cleaning and merging process were spread out over different locations, including flash drives, external hard drives, and a shared internal drive. The data inventory revealed over 140 datasets spread out across the organization, many of which were not subject to good data management practices. Building a culture of data management and finding ways to educate and standardize norms about file naming conventions, storage best practices, and terminology for describing data is a long-term solution. Through internal training and creating content in LibGuides and video tutorials, we have started this journey with our colleagues, but understand that changing organizational culture around these practices takes time and patience.

Choosing a Data Key

To make any library cube work, a major step is choosing a master key or a data point to link all datasets that is low-risk for revealing private or protected information of library users. Many files contain student identifiers, including usernames, card numbers, email addresses, and student or employee identification numbers. At FSU, we found identification numbers called EMPLIDs to be a stable identifier across time assigned to each student and staff. This type of identification number was also used at UOW to join their datasets together. When isolated from other identifiers, these numbers do not reveal information about the individual and can therefore be used to connect data that is easily de-identifiable for further analysis. It is important to keep these concerns for data privacy in mind when deciding on stable identifiers and should be deemed minimal risk to the student as opposed to Social Security numbers, which are high risk and highly protected information. FSU card numbers, the card swipe identifier for gate counts, are unstable because, if a student loses their card, they get a new card with a new number. Therefore, EMPLIDs were a logical choice for the master key and it also connects with student success data using the university's business intelligence software.

Data Collection Technical Issues

There were several technical questions that had to be answered when we started collecting data. What data was to be collected for use in the cube? How was it to be collected? Where was it to be stored and in what format? Who would have access? How would data be moved between each stage of the project? Obviously, the answers for these will depend on your environment and how your IT infrastructure is set up. Initially we identified three sources of data that we wanted to collect to get the project started. These sources were gate count data, computer login data, and e-resource usage. These were all stored in unique systems that were not designed to work together. The gate count data was collected and stored by the University Police

Department. Computer login data was collected using a cloud-based tool called LabStats. E-resource data proved to be the easiest to collect through our proxy server since that was managed internally.

Each data source had a unique method of collection, storage, and transmission. In several instances, getting access to the data proved difficult because the systems were not networked or were controlled by an outside entity. An example of this was the gate count data that we used. As mentioned above, this was controlled by the University Police Department and it took two years of effort to get access in a usable format.

Patron privacy has always been at the forefront of our thoughts when developing this project. While we are only interested in collecting data on cohorts of patrons, not individual patrons, the data collected is at the individual level. This requires limiting who has access to the data and ensuring that it is always secure. Unfortunately, every time you add a data source, you will invariably add people to the group who have access. Our solution was to try to minimize who has access to each individual data set and to further limit access to the complete database to only the authors of this paper and a couple of library administrators. We also set up a central location for all data to be stored. Unfortunately, moving the data to this location is still a very hands-on effort, but we are working on automating the process.

Building the LibCube
Developing Proof of Concept with Prototype

Building on previous literature, we developed the theoretical foundation for the LibCube and sought support from library administration to start with a "baby cube" using several extant datasets, including desktop logins, turnstile data, tutoring data, and student data. These data are like those used in the UOW library cube. We also received feedback from library administration about their end-user expectations for how to work with the data, including a desire for Tableau or Power BI data dashboards that would allow them to interact with real-time, aggregated data. In addition, they expressed a need for easy-to-access querying and reporting using the database for creating reports to use in their campus meetings. These requests helped us further develop the "Using the LibCube" end of the process and to think about the shape of the data that would allow us to meet those expectations.

Technical Data Warehousing Considerations

There are many ways to go about storing large quantities of data, including cloud-based data warehousing, local server data warehousing, local analytical cubes pulling from other files, large workbooks with pivot abilities, and/or large spreadsheets. Each of these options have their own maintenance and technical advantages and disadvantages, all of which we have not fully explored. With the amount of data we currently have, we have been able to manually combine datasets within an Excel worksheet. Although we have not yet decided on our strategy for the data warehouse once we outgrow our current master file method, we have been discussing these options with other campus organizations and academic libraries to determine the best path for our library.

Considering the End User and Accessibility

Different levels of consumption by end-users (i.e., statisticians, IT, library administrators, staff, etc.) influence the shape and technical specifications of a data warehouse, which are also expensive to build, so thinking about these things ahead of time will save an organization time and money. Our current master file approach may be useful for importing data into statistical analysis software; however, as the file grows and we add more data, this method is becoming difficult to maintain and it is difficult to query or use for reporting. Databases are easier to query and create dashboards, which were both important to our administrators. Before we proceeded with building the LibCube, we considered our end-users, the data they will need, and the format in which they will need it. As one can imagine, this line of inquiry easily becomes overwhelming because it further introduces questions and concerns about data governance, privacy, storage, and sharing. Without these organizational policies to guide us, we run the risk of making patron data vulnerable in the process of attempting to make it useful. These and other issues will continue to be grappled with as we move the project forward.

Conclusion

Trends in assessing academic libraries have focused on bringing together diverse sets of measures that reflect many facets of services, spaces, and collections that benefit our campuses and patrons. This, paired with measuring library impact on a spectrum of outcomes—including grades, retention rates, student learning, engagement, and even employability after graduation—shows a greater demand to find data solutions that will allow for this range of inquiry. Now, FSU Libraries seems to be stuck in the merging phase of the building process, with many data management challenges emerging, but we are also engaged in necessary policy conversations. Also, the library data inventory that was completed in fall 2018 will hopefully help us identify what data we have and to assess the gaps in the data sets we still need.

The library's IT department and data services librarians are essential to guiding the process regarding technical and data management issues that are critical to building the cube. Support from library administration is key, though if the goals for the cube are not clearly communicated, especially if the initiative of building the cube is at a grassroots or middle management level, the process moves slowly. At FSU Libraries, the process of tying student measures to card swipe data is not streamlined because card numbers are not stable identifiers and takes a lot of processing to clean, manage, and tie to identification numbers. That is just one data set!

The infrastructure of a cube cannot be built without support from campus partners in institutional research and guidance from university data governance and ethics initiatives. We need to balance the protection of patron privacy with the need for academic libraries to hold themselves accountable as contributors to the success of the university. Mapping the dimensions and measures that LibCube could contribute to demonstrating alignment with the university strategic plan or state performance metrics will guide the development of the cube. We can also learn from the experiences of other campus organizations that are developing their own databases, including the Office of Distance Learning, University Housing, and Campus Reimagined.

We have also connected with other university libraries that have gone through the process of creating similar databases. When we spoke to Jim Stemper, the organizational data strategist at the University of Minnesota Libraries, he described how they created a cube-like database using Microsoft Access that is tied to the campus research office. Titled the Library Data and Student Success project, their research has resulted in many publications and improvements to their libraries' services. Recently, we corresponded with Arizona State University's Mark McCann about EZProxy data gathering and connecting that data with student usage and outcomes—something they are interested in doing at their library. We hope that sharing our experiences through these conversations and proceedings might help other universities and colleges grappling with similar issues and projects.

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Notes

1. ACRL, Academic Library Impact on Student Learning and Success.
2. Astin, Assessment for Excellence.
3. ACRL, Value of Academic Libraries; CRL, Academic Library Impact on Student Learning and Success.
4. ACRL, Academic Library Impact on Student Learning and Success.
5. Haddow, "Academic library use and student retention"; Soria, Fransen, and Nackerud, "Library Use and Undergraduate Student Outcomes"; Soria, Fransen, and Nackerud, "Beyond Books"; Soria, Fransen, and Nackerud, "The Impact of Academic Library Resources on Undergraduates' Degree Completion"; Stone and Ramsden, "Library Impact Data Project."
6. Cox and Jantti, "Discovering the Impact of Library Use and Student Performance."
7. Jantti, "Unlocking the value from your library's data.
8. Cox and Jantti, "Discovering the Impact of Library Use and Student Performance."
9. Cox and Jantii, "Discovering the Impact," paragraph 4.
10. Stone and Ramsden, "Library Impact Data Project."
11. Evans and Golian-Lui, "Demonstrating the Library's Contribution Towards Student Retention, Progression and Graduation Rates."
12. Stemper, University of Minnesota Libraries' Organizational Data Strategist, in discussion with the authors, July 2018.
13. Hill, et al., "When in Doubt, Go to the Library," 116–136.
14. Mao and Kinsley, "Embracing the Generalized Propensity Score Method," 129–57.

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LibQUAL Results Bring More Questions than Answers

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Abstract

The Texas Tech University Libraries conducted the LibQUAL survey in 2017. After receiving the survey results, the libraries had many unanswered questions—what is the next step? What are the problem areas? Which problems should be addressed first?

The website was identified as a topic that merited further study. The user experience (UX) department collaborated with the web librarian to outline projects to gather more evidence that would guide their action. They used a variety of research methods to assess the website: X/O tests to allocate valuable home page real estate to the services and features of most interest to users; card sorting to design a more understandable website navigation; usability testing to evaluate whether common tasks could be performed easily; heuristic evaluations of frequently used webpages to see if they conformed to accepted usability principles; A/B tests to compare different design prototypes; and subsequent surveys to re-evaluate the modifications. By the triangulation of several data sources, they made informed decisions about how to improve the website.

As an initial step, LibQUAL does not offer specific answers, but suggests potential directions for further study. This paper describes ways to iteratively test the UX of a website using several complementary methods following an exploratory survey. These strategies extend the value of survey results, making assessments more effective and practical. This pattern can be used not only for a website but for evaluating other services.

Introduction

In 2011, the Texas Tech University (TTU) Libraries conducted the LibQUAL survey. After receiving the results, the library dean made the comment, "LibQUAL results bring more questions than answers." At that time, the results were not well disseminated beyond administration, and limited action was taken in response to the survey. In 2017, under a different dean and with a newly-formed user experience (UX) department, the TTU Libraries opted to conduct LibQUAL again. They used a census and received 3,631 valid surveys—a sizable increase over the 584 received in 2011 when they used a sampling method. Participants came from all the sub-groups defined by LibQUAL, and their subject areas covered all the disciplines the university offered. In addition, 1,433 participants shared comments and suggestions about the libraries' services and resources. The libraries wanted the LibQUAL findings to have a greater impact on services, resources, and spaces than they had in 2011—how to interpret the results, how to share them, and how to make improvements became a challenge for the libraries and the UX department.

Comment Coding and Data Revisualization

Reviewing best practices for interpreting LibQUAL results was a useful starting point, such as the report, "Libraries Act on Their LibQUAL+ Findings: From Data to Action."[1] There were a few presentations that focused on the practical aspects of analysis: "Analysis and Interpretation of the LibQUAL Results,"[2] and "It's Not about You! Using LibQUAL at Brown University and at the University of Connecticut Libraries."[3] The latter was informative about the importance of coding comment data. Both presentations gave useful guidance on interpreting charts and understanding zones of tolerance. They provided instructions for identifying what was actionable from the results by cross-tabulating desired and adequacy mean scores in order to determine what users rated as most needed but least adequate.

Organizing the open-ended comments was a key part of the analysis process. The LibQUAL email list was tremendously helpful at this stage as other librarians discussed their strategies for reviewing comments, such as using Brown University's 2005 Codebook[4] as a guide, using an emergent coding strategy,[5] and developing a "comments slicer" in Excel.[6] The initial work was completed by the UX department's library associate (a

staff position) who carefully coded over 1,400 open-ended responses into topics and sub-topics. The UX librarian served as the second coder, and together they refined codebook definitions and ensured adequate inter-coder reliability.

The survey results notebook generated by ARL included graphics that were not easily understood—complicated, multicolor radar charts, and high-low charts with interior and exterior bars. Those graphics communicated a great deal of information, but they were not effective at showing "at a glance" what results were most significant and actionable. The UX department and UX team members—a group of a dozen employees from other departments—collaborated to create new charts and infographics to highlight key findings. The revisualization and reorganization of the data made relevant information more understandable to stakeholders. Because UX team members represented different departments, they developed strategies for sharing data. They varied their approach, either scheduling additional meetings for a presentation and discussion, having team members report the data to their own areas during already-scheduled department meetings, or by sharing selected summary data via email.

LibQUAL Results about the Website

The UX team cross-tabulated desired and adequacy scores to determine what users rated as most needed but least adequate and identified the website as a problematic area. In the 2017 survey, two questions were directly related to the website. One was the core question in the Information Control section: "A library Web site enabling me to locate information on my own." Another was a local question: "Ability to navigate library Web pages easily." The general (overall) results of these two questions showed that the perceived mean was between the desired and the minimum, which means that the website was neither terrible nor excellent. However, when looking closely at the results by user group, respondents from different user groups scored the website differently. This study focused on results from undergraduate students, graduate students, and faculty members. Figure 1, Perceived Mean versus Minimum-Desired Range, shows the differences between user groups:

- Undergraduate students had the lowest expectations on locating information or navigating the website, and they were comparatively satisfied with the current website.
- Graduate students perceived the website to be only slightly higher than their minimum-acceptable level.
- Faculty members had the highest expectations, but their perceived control over locating information and navigating the website was below acceptable levels.

Figure 1: Perceived Mean versus Minimum-Desired Range
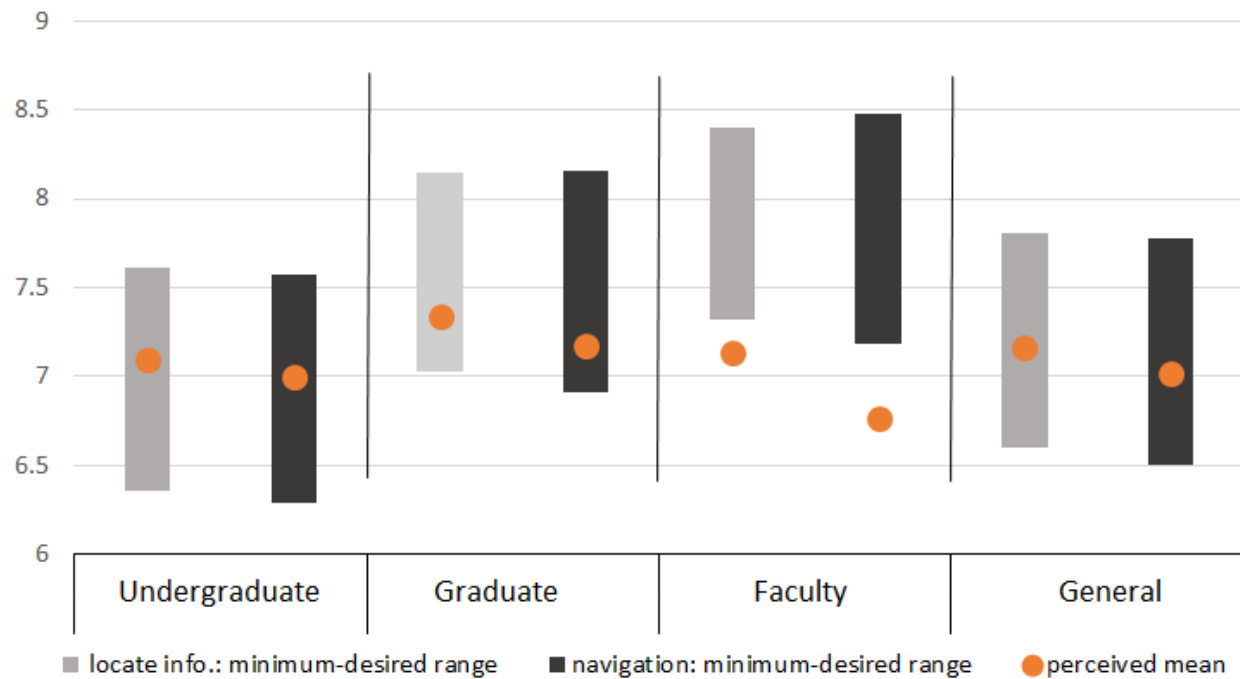
The survey results about library usage on the premises and online showed that faculty and graduate students constituted a much higher percentage of frequent (daily and weekly) online users, while undergraduate students tended to use onsite resources more than faculty or graduate students (see Figure 2).

Figure 2: Library Usage – Premises vs Online
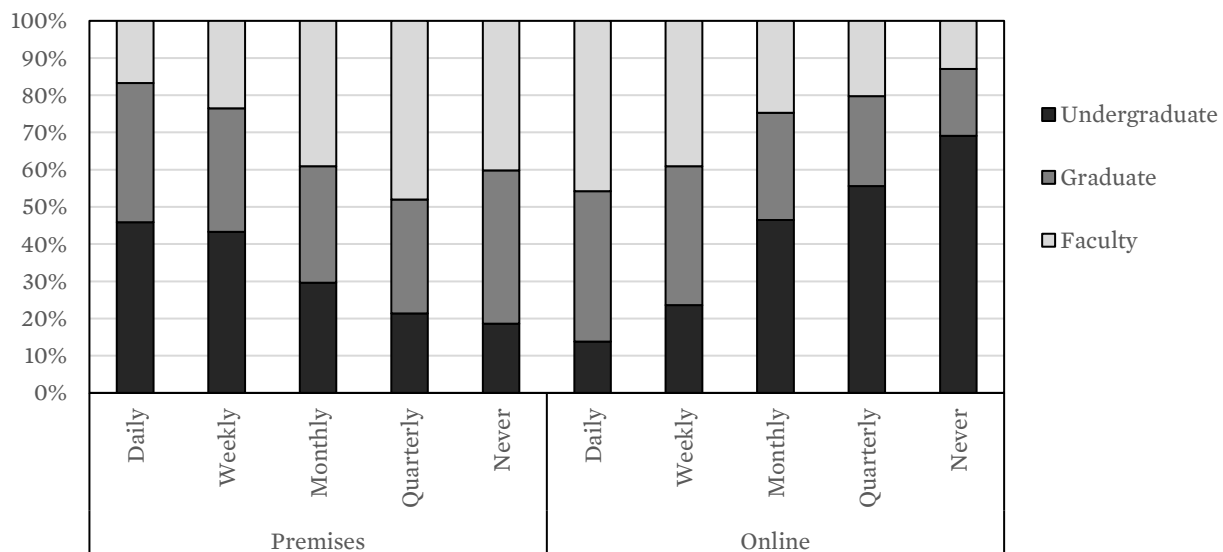
In comparing user satisfaction and usage, faculty and graduate students used the website more and had higher expectations, but they were not satisfied with the offerings in information access and website navigation; undergraduate students used onsite resources much more than online resources, and they were more satisfied with the website.

Beyond the survey questions, out of the 1,433 participant comments, 17 were coded under the subtopic "Website." Some of the comments referred to more than one aspect of the website. UX team members could not always determine whether ambiguous comments related to the website or discovery tool, because users did not distinguish between them. In this analysis, they tried to exclude comments about the discovery tool or resources such as databases and journals that a person might access through the website.

Table 1: Comments on the Library Website

Category	Number of comments	User group distribution	Action
General	9	Undergraduate–4 Graduate–4 Faculty–1	
Navigation	5	Undergraduate–1 Graduate–3 Faculty–1	Add a guide to explain the homepage content and online services
Physical resources	1	Undergraduate–1	
Other research tools: Google Scholar, Nvivo, etc.	2	Graduate–2	Add link to Google Scholar and configuration
Blackboard & eRaider	1	Undergraduate–1	Ignore
Information coverage	1	Graduate–1	
Currency	1	Graduate–1	
Major-based information	1	Graduate–1	Categorize personal librarians by college and area
Recording studio	1	Undergraduate–1	Contact the recording studio

These were the directly actionable suggestions in the comments:

- Five out of seventeen commenters experienced difficulties navigating the website. One suggested giving a training about the website. A reference librarian added a new LibGuide to instruct users on the features of the website.
- Despite the fact that only one participant suggested including Google Scholar as a research tool, some personal librarians taught students how to use Google Scholar and set up TTU Libraries as "My Library" on Scholar. Because the librarians were in favor, the web librarian decided to add Google Scholar to the quick links section on the homepage.
- One graduate student recommended offering major- or discipline-based information. Considering that personal librarians support teaching, learning, and research by subject area, the list of librarians was reorganized by college and subject.
- One comment suggested adding links to university resources like Blackboard or eRaider. We decided to ignore the request because the library was not responsible for these services and users can easily find these links through searching or on other TTU sites.

The comments were only useful up to a point in resolving issues. The authors needed to conduct further research to gain a better understanding of the problems identified in the two survey questions. Farrell introduced over 60 UX research methods and activities by stage in the design cycle and gave clues on which to use when.[7] Rohrer analyzed 20 user research methods along dimensions of attitudinal or behavioral, qualitative or quantitative, context of use, and development phase.[8] Both Farrell and Rohrer agreed that it is not realistic or necessary to use all the methods in a given project, but it is often helpful to use a mix of methods to obtain combined insights and ensure validity. The authors used several methods to test and evaluate the libraries' website homepage and navigation to further understand the existing problems and users' expectations: X/O tests to allocate valuable home page real estate to the services and features of most interest to users; card sorting to design a more understandable website navigation; usability testing to evaluate whether common tasks could be performed easily; heuristic evaluations of frequently used

webpages to see if they conformed to accepted usability principles; A/B tests to compare different design prototypes; and subsequent surveys to re-evaluate the modifications.

X/O Tests

An X/O test is a quick survey, where participants circle items they use or like on a website and cross out items they do not.[9] The web librarian and UX department conducted X/O tests of the library homepage in the fall 2016 semester though the spring 2017 semester. They divided the homepage into 15 areas, and 187 participants finished the X/O tests. The three most-used areas were the search box, menu, and library hours. Some users circled specific services or resources they had used before. The top three were study space reservations, EBSCO (database), and Turnitin (a plagiarism-checking tool).

Figure 3: Use of All Areas on the Library Homepage
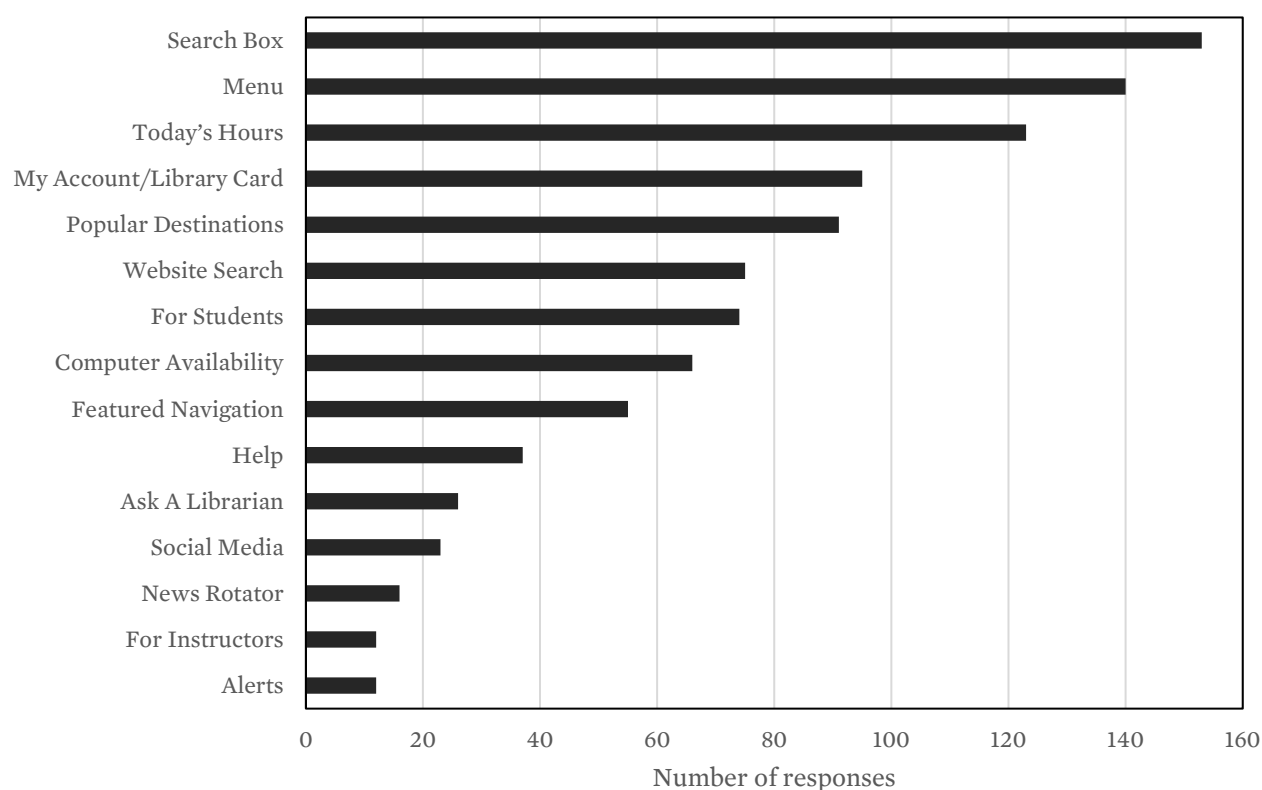
The web librarian reviewed the usage statistics from Google Analytics in conjunction with the X/O test results and adjusted the homepage:

- A section was created to host the most-used services and resources—Document Delivery, study space reservations, "my library account," personal librarians, citation style guides, and printing.
- The areas "For students" and "For instructors" were replaced with the section "Information for..." which displayed information to targeted groups.

These were lessons learned about the X/O method:

- Most X/O tests were conducted inside the university library, a space more frequented by undergraduates, so 149 out of 187 participants were undergrads. The authors would sample graduate students and faculty to make results more representative, because those groups use the website more frequently than undergraduates.

- Even though the alerts section was least-used, it remained because it was the channel where the libraries delivered system updates to users.
- The X/O tests included pre-survey questions to collect participants' demographic information and services they used on the website. Some users circled several areas but reported that they barely used the library website; others checked multiple services but circled only one or two areas in the X/O tests. These contradictions are a caution with self-reported responses. In deciding which items to keep on the homepage, the web librarian referred to both X/O test results and Google Analytics to mitigate the bias from self-reported data.

Card Sorting

LibQUAL results showed that users experienced difficulties navigating the libraries' website. The web librarian decided to use card sorting, which is a method to help design or evaluate a website's information architecture, to redesign the menu structure. Card sorting has two basic types, open and closed. Typically, in open card sorting sessions, participants are asked to organize cards into groups which make sense to them and label these groups. Closed card sorting uses predefined categories.[10]

The libraries' website had a four-level navigation system with 88 items, which was mainly structured around library departments. The web librarian picked 53 terms, printed these terms and their descriptions onto the two sides of colored card stock, and conducted four rounds of pilot tests among library staff and student assistants. After the pilot tests, terms related to collections or specific user groups were removed, reducing the number of cards to 27. The web librarian clarified card descriptions and simplified test procedures and instructions to minimize confusion.

The subsequent official open card sorting exercises with students went smoothly, and results were implemented as follows:

- The department-based menu structure was replaced with service-based and user group-based navigation.
- The four-level menu system was changed to three levels.
- Some sub-menu items were positioned in several places to increase their visibility and meet different perspectives. For example, Document Delivery (interlibrary loan) was under menus for both "Search & Check Out" and "Research & Teaching Support."

Table 2: Menu Item-Level Changes

Navigation Level	Old Site	New Site
Level 1	7	5
Level 2	18	21
Level 3	42	113 (14 duplications)
Level 4	21	-

These were lessons learned about the card sorting method:

- Pilot tests were helpful in determining the labels and descriptions used on the cards and optimizing procedures.
- In the pilot tests, library staff and student assistants developed meaningful category labels. In the official tests, students used vague terms such as "resources," "services," or even "helpful stuff," and did not come to a consensus about the categories. It was difficult to see a clear pattern because students suggested too many categories. The new navigation system was a combination of the

categories produced during the pilot tests and the official tests. If the official tests were changed to closed card sorting using labels developed in pilot tests, the results could be more controlled and useful.

- A bonus of pilot tests with library staff was obtaining buy-in among colleagues. Several librarians said they did not expect such difficulties organizing web content into categories that would make sense to students as well as to themselves.

Unmoderated Usability Testing

The UX department recruited students to participate in unmoderated usability tests to observe whether students could easily complete common tasks on the library website. Usability tests would provide behavioral, instead of self-reported, attitudinal data. Participants were asked to complete four simple tasks and then complete a short questionnaire composed of open-ended questions about their overall experience using the website and the System Usability Scale (SUS). Twenty-eight students participated in the tests.

No changes were made to the website as a direct result of the unmoderated usability testing, because testers were generally able to complete the tasks successfully. However, participant comments suggested ideas for future studies, such as evaluating the study space reservation system. These were lessons learned about the unmoderated usability testing method:

- Unmoderated usability tests did not require as much staff involvement during the testing, so many tests could be conducted in only a couple of hours.
- It is critical to run multiple pilot tests before testing. If testers do not understand the instructions or there are other problems with the testing design, you may not know it until after tests are completed. In this case, a few testers tried to answer some questions in the task scenarios without using the website.
- Many post-survey comments were very general, i.e., "It's good" or "It's great." There was not much actionable feedback. When watching the recordings of the tests, the UX department felt frustrated that they could not follow up on unexpected behaviors. These issues are less problematic in moderated testing when a facilitator can ask probing questions.

Heuristic Evaluations

The UX librarian collaborated with the TTU faculty member instructing the undergraduate usability testing course to create an assignment for practicing heuristic evaluations. The heuristic evaluation is a quick and comparatively inexpensive way to evaluate a website/page and compare it against accepted usability principles. The professor instructed students to evaluate the libraries' redesigned site using "Jakob Nielsen's 10 Usability Heuristics for User Interface Design."[11] Students were randomly assigned to review one of three frequently used webpages: the home page, the employment application page, or the library account page. The professor shared evaluations from 13 students in which they identified major problems, minor problems, cosmetic or low priority problems, and made recommendations for improvement. The web librarian and UX department aggregated the findings in a spreadsheet to assist with further exploration and resolution of issues.

Some issues evaluators mentioned in their reports were built in to the university-level website template, and these could not be resolved. The web librarian made the following changes to the home page:

- An indicator was added showing how many slides were in the news rotator.
- An "Advanced Search" button beside the discovery search box that caused users to commit errors— they thought the button would submit their query—was removed.
- Titles were added to quick link lists, such as "Find Articles."

These were lessons learned about the heuristic evaluation method:

- It does not require a high level of expertise to conduct a heuristic evaluation.

- Having multiple evaluators review the websites helped find patterns and areas that were repeatedly identified as problematic.
- The partnership with a class instructor and students presented many benefits—the libraries received detailed feedback from students, and students had an opportunity to do relevant "fieldwork" that supported their curriculum. A drawback from receiving written reports via the professor and not communicating directly with the students was that there was not a process to follow up with them. The problems they listed could not always be replicated with only the information they provided.

A/B Tests

After the new website was launched, at a monthly faculty meeting, librarians gave feedback on the new site, especially the homepage. At the center of the homepage, there was an area containing six colorful squares linked to six most-used services. It became the center of controversy: some librarians believed these colors made the services more visible while others thought they were not academic and looked childish. In the meeting, the squares were given a nickname: Post-it.

Figure 4: Post-it Area on the Library Homepage
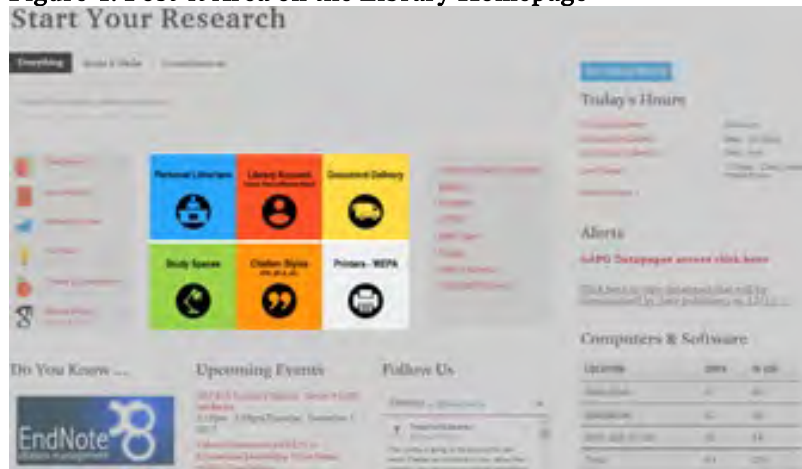
To learn students' opinions on this Post-it area, the UX department and the web librarian conducted further study with A/B testing. The web librarian created two additional designs that addressed comments from the librarians for comparison to the original design. Version A was the original design. Version B was a simplified version using the university's black and red color scheme and single-line titles. Version C was a combination of Version A and B color-wise; subtitles were added to each square and the icons were enlarged.

Figure 5: Version A (Original)—Version B (Simplified)—Version C (Colored Icons)

The UX department and web librarian ran tests simultaneously. Each participant was randomly assigned to use a different version of the site to complete set tasks. Afterward, they viewed all three designs and stated their preference and offered comments on colors, language, and icons. The UX department reported the results and made recommendations:

1. Continue to use the design with bright colors that makes the services stand out on the homepage.

2. Make the clickable area clearer by adding a border or white space around squares.

3. Incorporate subtitle text to explain the following services: personal librarians, library account, Document Delivery, and citation styles, which are not universally understood.

4. Explore whether a different icon for study spaces would be more meaningful.

Figure 6: User Preferences on 3 Designs

Design C
26%

Design B
12%
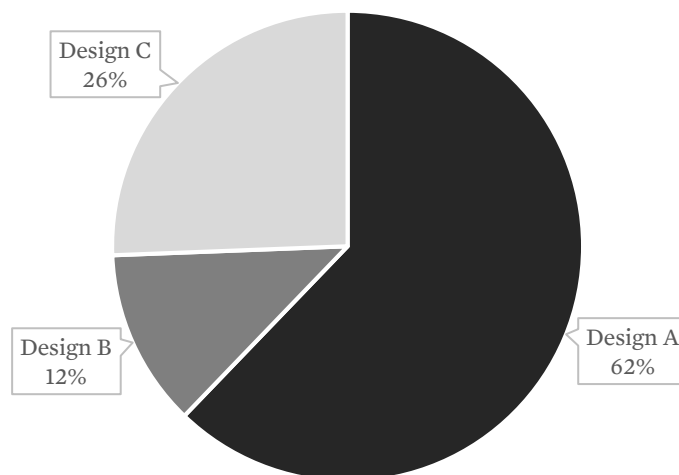
Design A
62%

The web librarian implemented these suggestions. The new Post-it area looks like Figure 7.

Figure 7: New Design after Implementing Suggestions
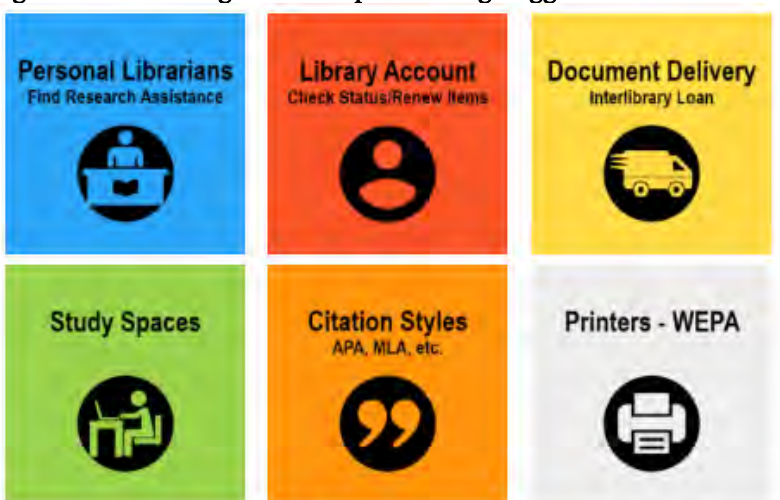
These were lessons learned about the A/B test method:

- At the start, the UX department and web librarian were doing a usability test in which they planned to compare the time required to complete tasks on each version as well as participants' preferences.
- After conducting nine usability tests, they switched to a survey and simply asked participants to choose their preferred design.
- Libraries probably cannot perform an A/B test the way a corporate website can. An authentic A/B test would randomly show different versions of the website to different visitors. "A/B testing can only be used for projects that have one clear, all-important goal, that's to say a single KPI (key performance indicator)" that is measurable, such as sales, new email newsletter subscriptions, downloads of a paper, etc.[12] Libraries are hesitant to create control and test groups where one group might receive less-preferable designs. Library websites, especially home pages, may not have outcomes that can be widely, usefully measured. Employees may not have the technical expertise or system capability to display different designs at random.

Subsequent Survey

In the months following LibQUAL, the web librarian and UX department had conducted several tests and made many changes to the website. The UX librarian planned to reassess those changes during the annual all-student survey administered by the campus, which reached about 6,000 students. In contrast to LibQUAL, where the libraries had little control over the questions asked, the all-student survey could be more tailored and specific about areas classified as problematic, such as the website. Students were asked to agree or disagree with the following statements: the information I need is easy to locate, the site allows me to complete the tasks I need to, and the overall design is appealing. The percentage of respondents who agreed with each statement ranged from 81–84%.

Figure 8: All-student Survey Results
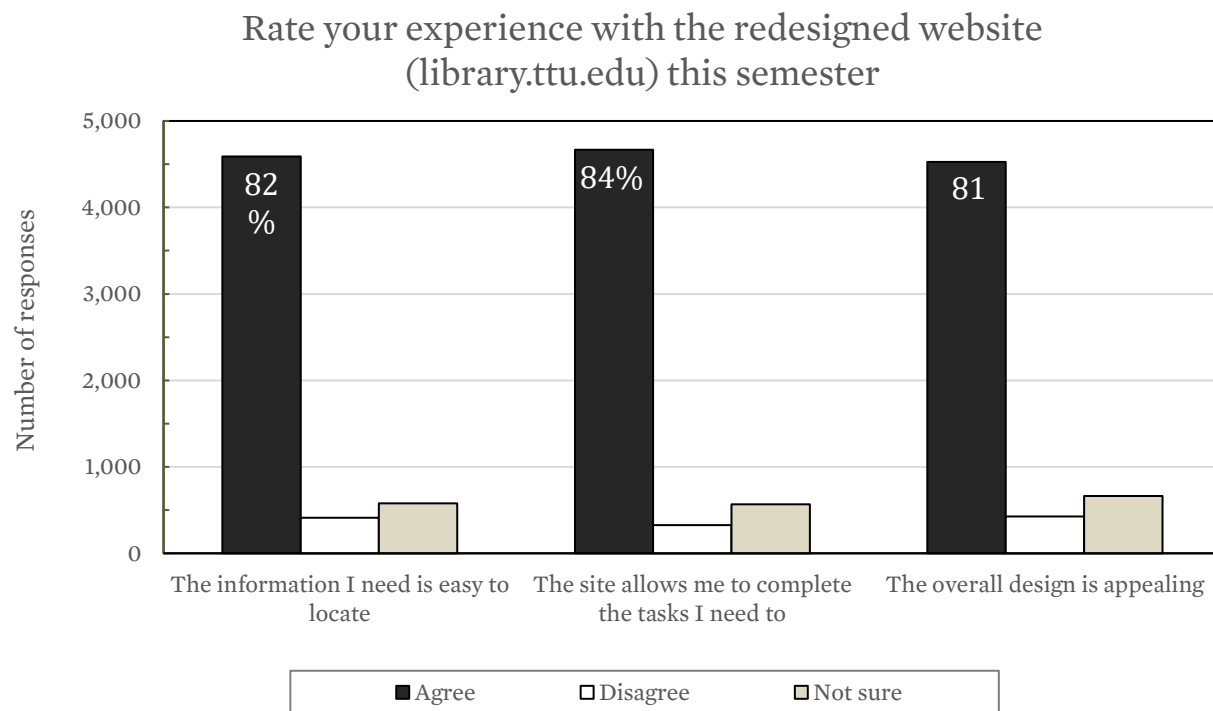
These were lessons learned from conducting this survey:

- A relatively high number of respondents answered "Not sure." It is unknown if this is because those respondents did not use the library website or if it was due to another factor.
- This was a student survey that did not include responses from faculty, who were less satisfied with the website than students. The UX department will seek other ways to reach faculty for their input.
- Like LibQUAL, this survey asked general questions that provided data about users' overall impressions rather than about specific issues. With such broad questions, no ability to screen participants, and no follow-up mechanism, you should not expect to get enough information to resolve individual issues.

Conclusion

The LibQUAL survey results provided a foundation that generated research questions related to specific areas. The UX department started by making the data more understandable to stakeholders and involving them in the process of reviewing and analyzing the data. Then they collaborated to investigate the problems and potential issues and implement changes.

The authors described how to iteratively test the UX of a website homepage and navigation system using several complementary methods. They adapted their methods during testing in order to gather more feedback. In the process, they learned about the strengths and drawbacks of the methods and obtained experience using each one. Each method helped evaluate different aspects of the library website. This shows ways to research a problem from multiple angles to triangulate several data sources.

These strategies extended the value of survey results and made assessments more effective and practical. The authors moved the library "from data to action" by involving stakeholders and collaborating on further studies, making changes, and then reassessing. Through this, they obtained answers to some of the questions raised by LibQUAL. This pattern can be used not only for a website but for evaluating other services and spaces.

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The Career Paths of Assessment Librarians: An Exploration of Professional Growth

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Abstract
Purpose
As the ability to gather, analyze, and use evidence to inform decision-making, as well as articulate the impact of library programs and services, has emerged as a key leadership and management competency for library administrators, assessment librarians may be ideal candidates for higher-level administrative roles. This study explores the career paths of Library Assessment Conference attendees from 2008 through late 2017. It questions whether there is a typical career pattern for assessment librarians by examining the education and experiences of individuals solely tasked with library assessment, or with assessment included within their job titles. Specifically, the study explores three questions:

- Do assessment librarians have a common educational background beyond the MLS?
- Is assessment a role typically assumed by entry-level or mid-career librarians?
- Do assessment librarians progress to higher-level administrative or leadership roles?

Design/Methodology/Approach
This study updated methodology used for a previous study of associate library directors by Moran, Leonard, and Zellers (2009), which relied on information gleaned from the ***American Library Directory,*** as well as methodology used for a study of academic law library directors by Slinger and Slinger (2015), which utilized CVs harvested online. This study focused on publically available LinkedIn profiles after finding that nearly 70% of LAC attendees since 2008 had complete profiles which met study criteria. Select data from these profiles was harvested over a two-week period in August 2017 and arranged for analysis following procedures outlined by Koch, Forgues, and Monties (2017).

Findings
By 2016, 63.1% of LAC attendees had job titles which indicated they were solely responsible for assessment. The educational backgrounds of the 194 individuals either solely tasked with assessment or who had assessment included within their job titles varied widely, from several undergraduate and graduate degrees in English to graduate degrees in public and business administration in addition to the MLS. While the average number of years of work experience between earning a professional library degree and assuming an assessment librarian role was 7.4 years for those working for doctoral institutions and 12.7 years for master's degree institutions, a visual distribution of the number of years of experience before an individual became an assessment librarian revealed that most LAC attendees recently joined the profession. More than 107 had fewer than 5 years of experience.

Practical Implications or Value
Results indicated that librarians tasked with assessment do not have a common educational background beyond the MLS. As a greater number of librarians are assuming the role of assessment librarian post-graduation from library school, it may be too early to determine whether assessment librarians are moving into management roles. Since the majority of assessment librarians included in this study were new to the field, more work is needed to determine both the skills and experiences these individuals bring to the job and whether the skills and experiences they obtain on the job help them mature and grow into higher-level leadership and administrative roles. Research on the career paths of academic librarians typically focuses on the education, skills, and experiences an individual must acquire to competitively position oneself to become a library director.[1] The parity of women in these highest-level leadership roles has been of particular interest.[2] Until recently, women's representation at the highest leadership ranks of the profession failed to reflect their overall workforce numbers.[3] Oft-cited reasons for this discrepancy include a lack of geographic

mobility, career interruptions, and "the extra effort needed to develop a career within the male parameters."[4] What if other structural barriers within the profession impede natural career progression, hindering the ability of talented library leaders to attain the experiences needed to mature and grow into a higher-level leadership role? This question is of significant interest as the profession becomes increasingly specialized.

Assessment is a relatively new specialization for academic librarians, and the journey of individuals into assessment librarian roles is broad and varied.[5] Some individuals are tasked solely with assessing the value of the library and its impact on students and researchers, while others have assessment appended to other core responsibilities such as teaching or public services. The assessment role does differ significantly from other library positions, requiring an ability to execute difficult tasks and complete complex projects either alone or in collaboration with varied individuals and units both within and outside of the library. Thus, it is important to consider when recruiting or reassigning librarians to assessment whether the individual will "lose any responsibilities, such as supervising others, that may adversely affect his or her professional growth or future employment opportunities?"[6]

Individual librarian career development is already constrained by vertical stratification, which limits an individual's efforts to move between academic, public, and special libraries.[7] As the academic library profession continues to specialize, funneling librarians into positions requiring higher levels of technical skills and finesse—such as assessment, digital humanities, or GIS—could other cultural and structural barriers be challenging or preventing individuals from growing into or assuming leadership roles? If the "ability to demonstrate and effectively articulate the impact of library programs and services on the larger community is emerging as a key competency for library administrators," a key competency that requires an ability to gather, critically assess, and use data, assessment librarians may be ideal candidates for higher-level administrative roles. With their specialization, however, are assessment librarians offered experiences and growth opportunities that may facilitate their career progression?[8]

This exploratory study examined the career progression of all librarians who attended the 2008 through 2016 Library Assessment Conferences (LAC). A broad array of individuals with varied portfolio responsibilities, from library directors, assistant directors, department heads, and dedicated assessment professionals, participate in this biennial conference, which is dedicated to building "a vibrant library assessment community by bringing together interested practitioners and researchers who have responsibility or interest in the broad field of library assessment."[9] Thus, all attendees presumably have an interest in assessment and nurturing their assessment skills. The study reviewed at a high aggregate level the types of institutions where LAC attendees are employed, and whether attendees solely specialized in assessment, or had assessment responsibilities included in addition to other responsibilities in their job title. The education and experience of attendees solely tasked with assessment or who had assessment included in their job titles was then examined to determine whether there is a typical career pattern for assessment librarians. Do assessment librarians have a common educational background? Is assessment a role typically reserved for mid-career librarians and do assessment librarians progress to higher-level leadership roles?

Methods

Previous studies of the career trajectories of academic librarians have primarily used surveys which directly ask participants to self-disclose their education and experiences leading to their present position.[10] Barbara Moran, Elisabeth Leonard, and Jessica Zellers took a different approach, updating Moran's 1983 survey using information gleaned from the ***American Library Directory***.[11] Michael J. Slinger and Sarah C. Slinger utilized the curriculum vitae of academic law library directors, locating the bulk of directors' CVs online and soliciting the remaining CVs directly via email.[12] As social networking has evolved, online resources such as LinkedIn offer a wealth of readily available information to study individual's career paths. A study of LinkedIn profiles of Georgia Southern University's information systems alumni, for example, offered insight into the overall career progress of program graduates, providing data on the types of entry-level positions graduates secured immediately after graduation, and whether alumni transitioned from technical to

managerial roles within fifteen years of graduation.[13] Daniel J. Mazzola, Robert D. St. Louis, and Mohan R. Tanniru analyzed the career profiles of over 100 CIOs on ***The Wall Street Journal's 2014 CIO Network Membership List*** to identify "the defining career experiences and educational characteristics of the rungs of the CIO ladder to provide insight for both the firms that hire CIOs and the IT professionals who aspire to be CIOs."[14]

To examine the career paths of LAC participants, the author first downloaded the list of attendees for the 2008, 2010, 2012, 2014, and 2016 Library Assessment Conferences. These lists were then culled to remove individuals working at institutions outside of the United States, library and information science educators, and vendors. To determine study feasibility, the author then searched for the remaining 1,443 attendees on LinkedIn and determined that 1,006 (69.7%) had complete publically available LinkedIn profiles which met study criteria. To meet study criteria, the attendee had to have earned an ALA-accredited master's degree and his or her profile had to have no employment history gaps greater than 5 years. The author then harvested information contained within these profiles over a two-week period in August 2017 and created a dataset following a model outlined by Michael Koch, Bernard Forgues, and Vanessa Monties for a study of Fortune 100 CEO career patterns.[15] To facilitate analysis, the data was shaped in long format, with each row representing one year in the LAC participant's employment history. In instances where an individual changed jobs during the year, the number of months the individual served in each job was calculated and the position with the greatest number of months was assigned. If the switch occurred in June or July of the calendar year, the position the individual held in the second half of the year was assigned. Data entered into columns included the year of employment, the full name of the LAC participant, his or her title during the corresponding year of employment, and his or her employer. The year the individual earned his or her MLS, MLIS, or similar ALA accredited degree, was also recorded, along with the institution where the MLS was earned. If the individual earned a second or third master's degree or a PhD, the year the degree was earned, along with the degree itself, and subject of the degree was recorded. The last columns recorded the year and field of the undergraduate degree and the years the individuals attended the Library Assessment Conference.

The name of the institution of employment was then cleaned to match the institution name listed in the 2015 Carnegie Classification of Institutions of Higher Education Data File.[16] This allowed the author to quickly enhance the dataset by adding the Carnegie 2015 Basic Classification Code, as well as the city and state of the employing institution to each row using a Microsoft Access database. Lastly, the author coded each position using the instructions for the 2017–2018 ARL Annual Salary Survey as a guide.[17] To facilitate analysis, the ARL codes were condensed into six categories, with a list of the types of titles included in each category:

- Director—Director, Dean of Library, University Librarian, Vice Provost of Libraries, and other equivalent titles, as well as Head of Medical Library of Head of Law Library;
- Associate—Associate Dean or Director, Assistant Dean or Director;
- Head Branch/Unit—except Head of Medical Library or Head of Law Library;
- Specialist—all positions classified as Digital Specialist, Functional Specialist, or Subject Specialist, except those coded for assessment;
- Assessment—Assessment, Management Information Systems, Planning, as well as Analyst and User Experience titles;
- Generalist—all other job codes listed in the instructions.

Since the instructions for the salary survey indicate that only one job code may be selected per appointment, if any of the titles listed for the assessment category were present in the job title, the assessment code was assigned. The titles for positions coded assessment were then further coded to parse out whether individuals were solely responsible for assessment, or assessment was an additional responsibility.

The final dataset was then connected to Tableau for visualization and analysis.[18] To explore potential career patterns of assessment librarians, level of detail (LOD) calculations were used to determine the number of years an individual worked in libraries after earning their library degree and before assuming a position with assessment responsibilities. LOD calculations were also used to explore mobility both within employers and

between employers before the individual's first assessment position, as both internal and geographic mobility is recognized as a factor relevant to advancement on the professional career ladder.[19] The educational backgrounds of assessment librarians were examined to determine the presence of additional graduate degrees beyond the MLS and the relation of an individual's undergraduate and graduate degrees to assessment. To explore whether assessment librarians grow into or assume leadership roles over time, a Sankey diagram showing the career paths of LAC attendees from 2008 to 2016 was constructed using SankeyMATIC, a d3.js-based open source tool, and the rough hierarchy of positions outlined by the ARL Salary Survey instructions.[20] Sankey diagrams are a useful visual tool for displaying the proportional quantity of flow from one category to another. They have historically been used to depict energy flows, and have many potential practical applications for the library profession.

Results

A profile of LAC participants since 2008 reveals that, before 2016, more library directors, associate directors, and heads of branch libraries or library units attended the conference than library assessment specialists (Table 1). This shift was particularly noted among doctoral-granting institutions, where attendance by higher-level administrators and middle managers in relation to assessment specialists fell from roughly 70.0% in 2008 to just 45.1% (n=204) in 2016. This may reflect the targeted hiring of assessment specialists by ARL institutions during this period and the ongoing growth of assessment as a specialized area of academic librarianship.[21] Of individuals classified as assessment specialists, by 2016, 63.1% (n=89) had job titles which indicated they were solely responsible for assessment (Table 2).

A view of the 194 assessment specialists whose LinkedIn profiles met the study criteria revealed a kaleidoscope of educational backgrounds, with English (n=32), history (n=9), psychology (n=9), and art (n=7) as the top undergraduate degrees and education (n=10), English (n=8), history (n=8), public administration (n=8), and business administration (n=7) as the top graduate degrees (Figures 1–2). Of these 194 assessment librarians, 7.2% (n=14) earned a PhD and 35.6% (n=69) earned one or more graduate degrees in addition to the MLS. When looking at the number of years individuals had in the library profession before assuming their first assessment position, experience ranged from the first job following graduation from library school to 41 years in various library positions (Table 3). The average number of years of work experience between earning a professional degree and assuming an assessment librarian role was 7.4 years for doctoral institutions and 12.7 years for master's-granting institutions. When looking at a visual of the distribution of the number of years of experience before an individual became an assessment librarian, however, it is clear that most assessment specialists recently joined the profession, with 107 having less than 5 years of experience (Figure 3).

Across all Carnegie classifications, assessment specialists worked for an average of 1.7 to 2.0 employers and held an average of 1.4 to 1.6 positions with each employer before assuming their role (Table 4). The majority of all assessment specialists only had one employer and one position with their employer (Figure 4). The Sankey diagram illustrates little movement for assessment specialists who first attended LAC in 2008 to other roles. A small number have shifted into associate director roles and a few have assumed generalist positions. Some generalists and heads of branches or units have moved into assessment roles.

Discussion

As the ability to gather, analyze, and use evidence to inform decision-making and articulate the impact of library programs and services has emerged as a key leadership and management competency, assessment librarians may be ideal candidates for higher-level administrative roles. Much political skill and finesse is required to rally librarians and staff to gather data, analyze it, and then either apply what they have learned to improve a program or service, or communicate the value of a library program or service to a broader group of stakeholders. Until recently, however, assessment has mainly been the purview of higher-level academic library administrators. Before 2016, more library directors, associate directors, and heads of library units attended LAC than individuals singularly tasked with assessment. The majority of assessment librarians attending LAC are relatively new to the field. Ideally this allows them "to put into immediate practice the research and assessment methods learned as a graduate student."[22] Still, it is of interest to know whether

assessment librarians with less than five years of experience feel positioned to be successful in their new roles. Have they acquired the soft skills necessary to advocate for change? Are they appropriately included in change initiatives so that their work is not in vain? Can they see the results of their assessment efforts? Are they viewed as individuals with leadership and management potential, or technical experts responsible for collecting and analyzing data? Since the bulk of individuals included in this study are new to assessment, it may be too early to determine whether assessment librarians are moving into higher-level leadership and management roles. Follow-up studies may be needed to answer these questions.

Overall, the lack of movement between categories suggests that more experienced librarians included in this study are not progressing in large numbers to higher-level leadership and management roles. Several theories and much speculation abounds as to why librarians, women in particular, either opt out or do not progress to higher-levels of leadership within academic libraries. Researchers cite barriers such as geographic mobility, career interruptions, and a lack of appropriate degrees, certifications, and experiences.[23] Some employers are biased against promoting internal talent, preferring to "[look] for 'new blood' to infuse an organization with fresh experiences and enthusiasm."[24] Other talent may be stymied by structural barriers, which prevent individuals from obtaining the necessary experiences and opportunities needed for career growth.[25] These factors alone, however, do not influence an individual's career trajectory. A major limitation of this study is that it assumes a traditional career, where individuals progress vertically through a series of entry-level through high-level administrative leadership roles, was a desired aspiration of LAC participants. It fails to consider a whole-life approach to career development, which recognizes that "professional development does not occur in isolation but in the context of the employee's personal and family needs, which change over the life course."[26] Valuable context, such as whether an individual is part of a dual-career couple, parent of a young child, caregiver, and more cannot be harvested from LinkedIn profiles nor represented by a Sankey diagram. A further study limitation is that newer librarians may be more likely to construct a complete LinkedIn profile and thus are overrepresented in the sample. Assessment librarians who have not attended a Library Assessment Conference were also not included.

A typical career pattern for assessment librarians remains difficult to discern. With an exception for psychology, the top undergraduate degrees were in the humanities. The humanities also dominated the subjects in which assessment librarians earned an additional graduate degree; however, business administration and public administration were present in the top five. Since the majority of assessment librarians included in this study were new to the field, more work is needed to determine both the skills and experiences these individuals both bring to the job, and whether the skills and experiences they obtain on the job help them mature and grow into higher-level leadership and management roles. With mentoring, training, and coaching of peers to support assessment listed as a key proficiency for assessment librarians and coordinators, assessment librarians may be well positioned to assume leadership and management roles, as long as care is taken to ensure that they are exposed to a full range of experiences that nurture their professional growth.

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Table 1. Profile of Library Assessment Conference Attendees, 2008–2016, by Carnegie Classification of Employing Institution

Conference Year	2008	2010	2012	2014	2016
Total Attendance	377	474	560	611	645
US Academic Librarians only	278	340	435	445	505
Meets Study Criteria	161	212	280	296	348
(% US Academic Librarians)	(57.9)	(62.4)	(64.4)	(66.5)	(68.9)
All					
Director	33	37	56	43	46
Associate Director	48	62	76	68	61
Head Branch/Unit	37	45	51	64	55
Specialist (including assessment)	105	139	168	182	230
-assessment only	45	62	85	103	141
Generalist	55	57	84	88	113
Doctoral					
Director	15	16	19	13	14
Associate Director	32	54	60	51	46
Head Branch/Unit	24	32	39	39	32
Specialist (including assessment)	80	107	137	144	172
-assessment only	35	53	77	86	112
Generalist	33	29	47	46	58
Master's					
Director	8	12	18	18	18
Associate Director	10	5	11	10	11
Head Branch/Unit	8	10	10	22	14
Specialist (including assessment)	17	22	23	28	35
-assessment only	5	5	6	11	17
Generalist	8	19	23	28	27
Baccalaureate/Associate's/Other					
Director	10	9	19	12	13
Associate Director	6	3	5	7	4
Head Branch/Unit	5	3	2	3	9
Specialist (including assessment)	8	10	8	10	23

Conference Year	2008	2010	2012	2014	2016
-assessment only	5	4	2	6	12
Generalist	14	9	14	14	28

Table 2. Number of 2008–2016 Library Assessment Conference Attendees Classified as Assessment Specialists, with Only Assessment in their Position Titles

Conference Year	2008	2010	2012	2014	2016
Total Number of Assessment Specialists	45	62	85	103	141
Assessment Duties Only	25	30	54	65	89
(% Assessment Specialist with Assessment Duties Only)	(55.6)	(48.4)	(63.5)	(63.1)	(63.1)
Remain in Assessment, 2017	8	19	26	42	78

Table 3. Number of Years in the Library Profession before First Assessment Position, by Carnegie Classification of Institution of First Assessment Position

Carnegie Classification	n=	Average # Years	Median	Range
Doctoral	151	7.4	6.0	0–35
Master's	24	12.7	9.0	1–41
Baccalaureate/Associate's/Other	19	5.3	3.0	0–31

Table 4. Average Number of Employers and Average Number of Positions with Each Employer before First Assessment Position, by Carnegie Classification of Institution of First Assessment Position

Carnegie Classification	n=	Average	Range
Average Number of Employers			
Doctoral	150	1.7	1–7
Master's	23	2.0	1–6
Baccalaureate/Associate's/Other	1.8	1.9	1–5
Average Number of Positions with Each Employer			
Doctoral	150	1.6	1–4
Master's	23	1.4	1–3
Baccalaureate/Associate's/Other	19	1.6	1–6

Figure 1. Undergraduate Degrees of Assessment Specialists Who Attended the Library Assessment Conference, 2008–2016

Figure 2. Graduate Degrees of Assessment Specialists Who Attended the Library Assessment Conference, 2008–2016
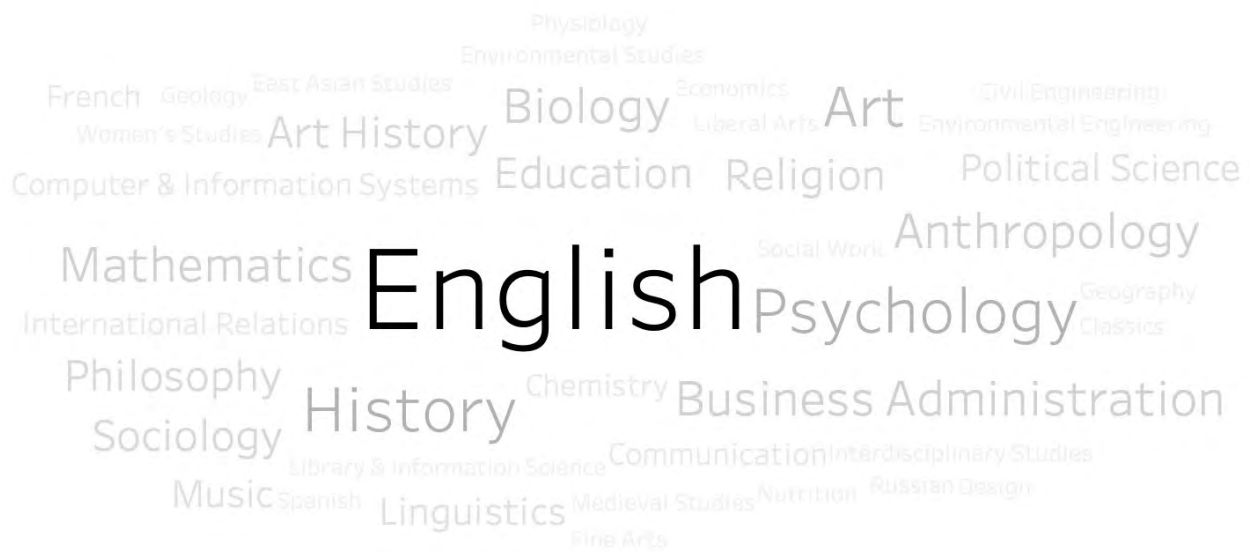
Figure 3. Histogram Showing Number of Years in the Library Profession before First Assessment Position, by Carnegie Classification of Institution of First Assessment Position
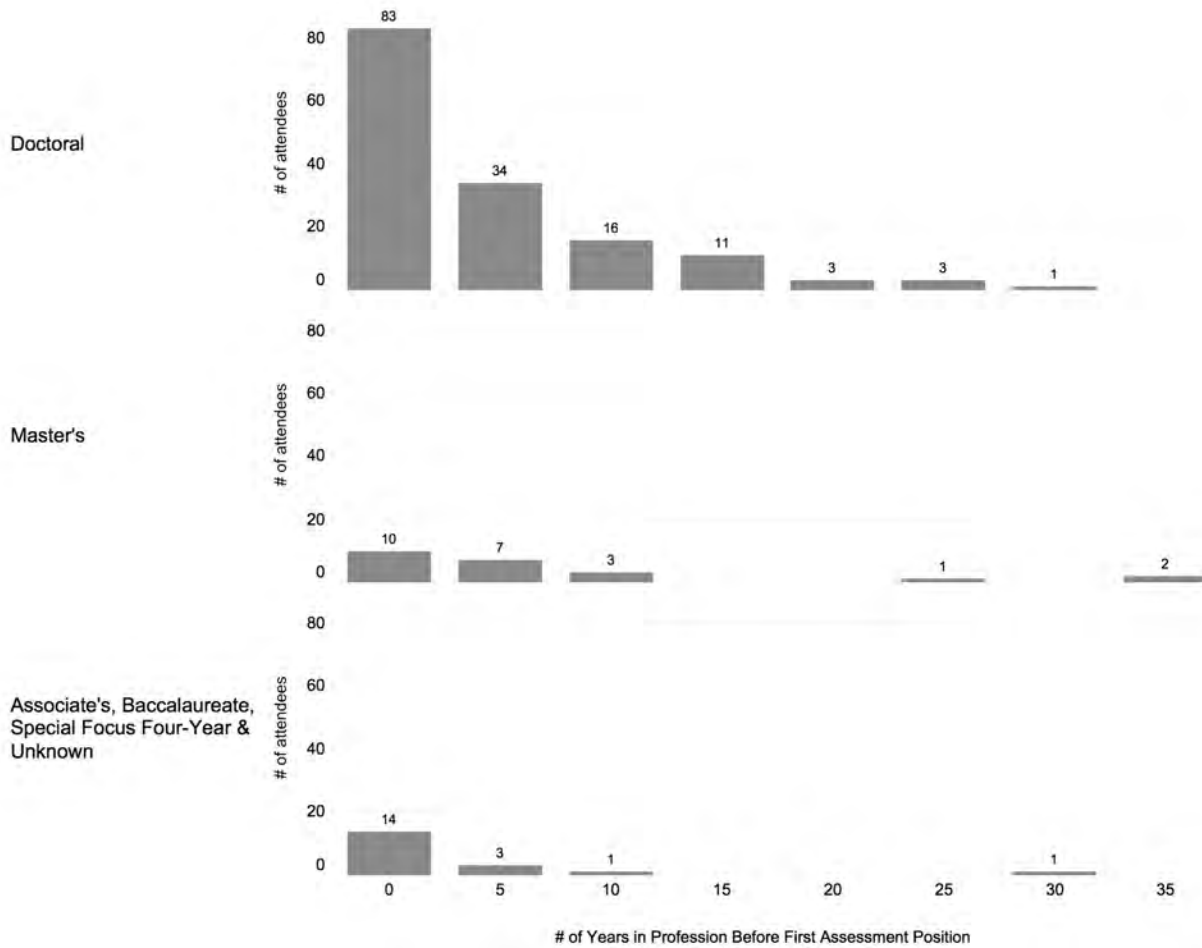
Figure 4. Number of Job Spells between Employers and within Employers for 2008–2016 Library Assessment Conference Attendees

Number of Employers

Category	# of attendees
1 employer, 114 attendee(s)	
2 employers, 40 attendee(s)	
3 employers, 23 attendee(s)	
4 employers, 7 attendee(s)	
5 employers, 3 attendee(s)	
6 employers, 4 attendee(s)	
7 employers, 1 attendee(s)	

Number of Positions With Each Employer

Category	# of attendees
1 position, 122 attendees	
2 positions, 43 attendees	
3 positions, 21 attendees	
4 positions, 5 attendees	
6 positions, 1 attendees	

Figure 5. Career Progression of Library Assessment Conference Attendees, 2008–2016

Assessing the Success of a Mentoring Program for Academic Librarians

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Abstract

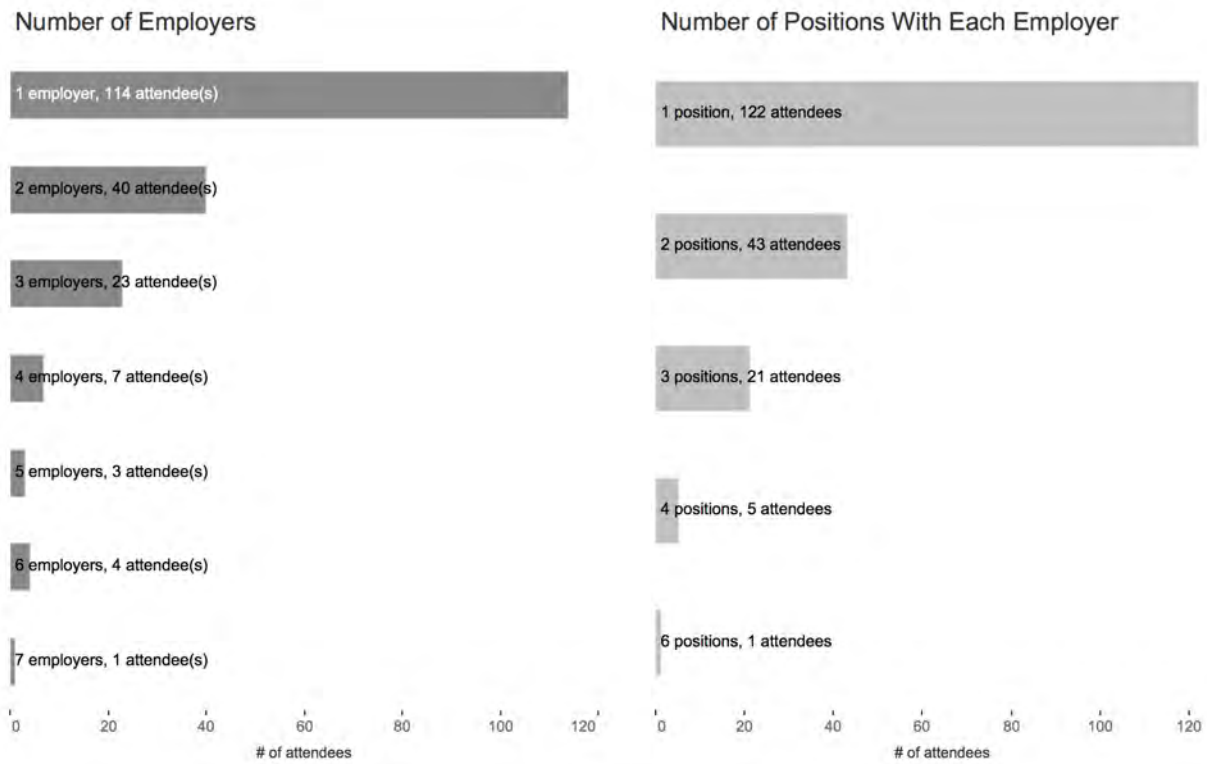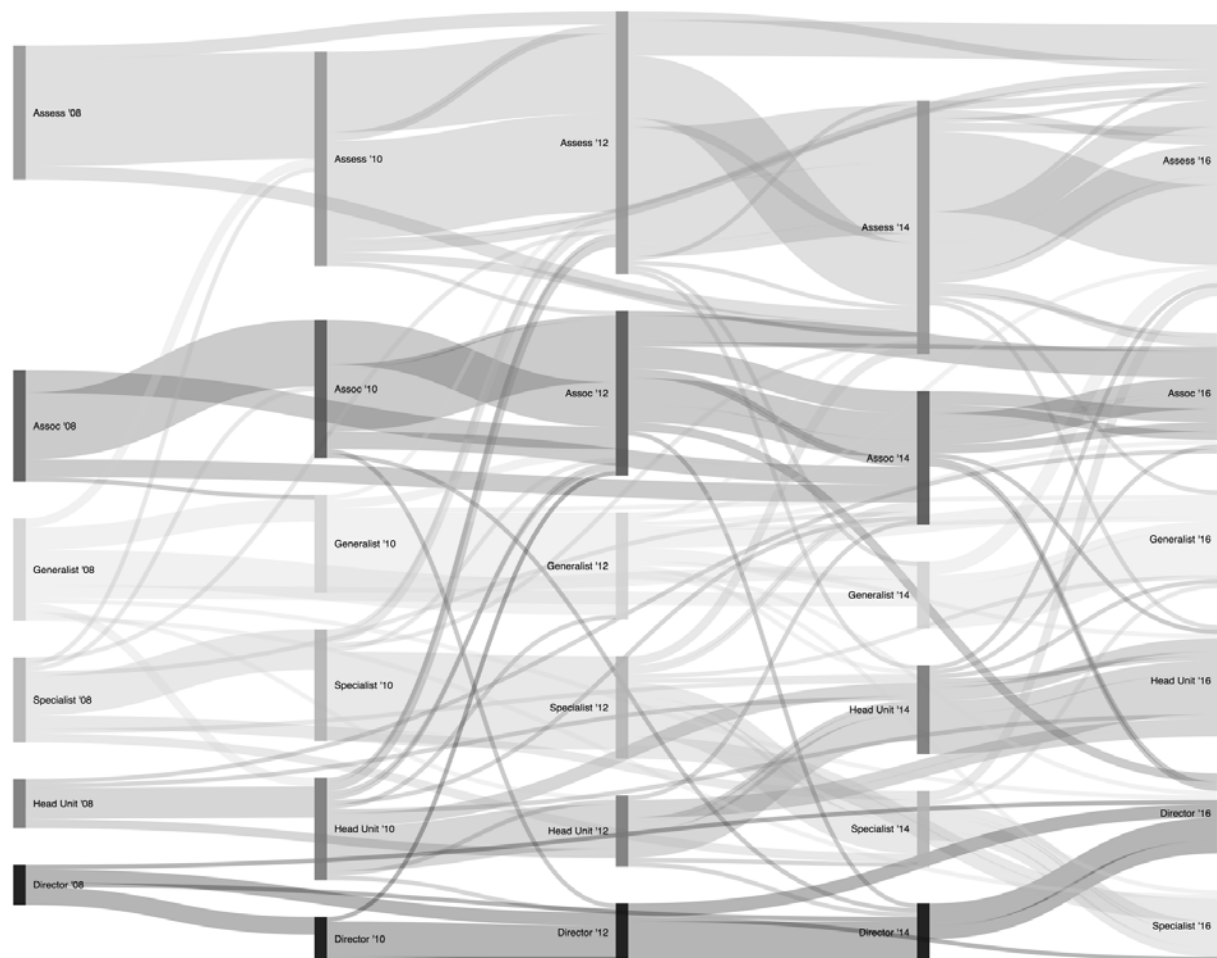A continuous cycle of assessment contributes to the success of a mentoring program, as illustrated in this case study from a large academic library. The Mentoring Competencies Assessment, the Fear of Negative Evaluation Scale, a satisfaction survey, and a focus group are used to assess the program. The assessment results indicate that the program is meeting its goals of facilitating the professional development of protégés, improving mentor competencies, increasing the confidence of participants, and expanding future participation in the program.

Introduction

Assessment contributes to the effectiveness, relevance, and sustainability of a mentoring program. Lunsford identifies several reasons for evaluating a mentoring program.[1] First, assessment provides unbiased information about adjustments needed in the program. Additionally, assessment information identifies how resources should be allocated to improve the program. Furthermore, assessment results can be shared with participants, potential participants, and stakeholders to emphasize the success of the program. Sharing assessment information with administrators may be a significant factor in securing program funding and time allowed for participants. Assessment also is needed to track the implementation of the mentoring program's plans and goals.[2]

The assessment of many faculty development programs is limited to participant satisfaction.[3] Although this measure could be used to address areas of dissatisfaction, it is limited in its scope. Little attempt is made to determine the impact of the program on the participants' abilities, skills, and future careers.

Literature Review

Surprisingly few academic libraries provide mentoring for junior librarians who face challenging requirements in scholarship and service to achieve promotion and tenure, and even fewer assess their mentoring programs. Goodsett and Walsh distributed a survey via professional Listservs to explore how mentoring programs help librarians achieve tenure.[4] Of the 60 responding librarians who had mentoring programs at their libraries, all reported that their programs were not assessed. The survey results are consistent with the findings of an earlier scoping review of mentoring literature from academic libraries conducted by Lorenzetti and Powelson.[5] Of the 40 case studies reviewed, only 18 included assessment of mentoring activities. This review revisits the 18 case studies and extends to literature published between 2014 and 2018 about assessment of academic mentoring programs. The focus of the review is the quality of the program assessments and their contribution to the field of library assessment.

The majority of the case studies reviewed by Lorenzetti and Powelson describe assessment by the survey method. The coordinators of the mentoring programs were thorough in administering surveys to all participants, regardless of rank, tenure status, or role (mentor/protégé), in both dyad and peer mentoring programs.[6] This is a strength of the surveys because measures of engagement and satisfaction of all participants are necessary for making improvements and winning administrative support for mentoring programs. A weakness of the survey instruments is the lack of testing for validity and reliability, which are characteristics valued in a rigorous survey method.[7] The most serious weakness in the preponderance of case studies is the failure to include the survey instrument itself, or even the survey questions. Cirasella and Smale[8] and Sapon-White et al.[9] did append the survey instruments, making it possible for the library assessment community to peer-review the battery of questions and replicate the assessments.

Two case studies identified by Lorenzetti and Powelson describe qualitative assessments of mentoring programs: interviews and round table discussions.[10] Qualitative methods have the potential advantage over surveys of revealing a deeper understanding of participants' perspectives and development over a course of a program. These case studies have a paucity of details about how the assessments were conducted, which makes peer review and replication of the methods problematic. For instance, Kuyper-Rushing reports facilitating separate discussion groups, but the discussion questions are not provided in the case study.[11] A more serious concern in both assessments is the lack of a safe space where participants could freely discuss their opinions. The coordinators of the mentoring programs at Louisiana State University[12] and California State University, Long Beach[13] facilitated the round table discussions and interviews respectively, rather than an impartial party. Their presence could have had an effect on the participants' discussion, resulting in responses that may have been less than candid and complete.

Ideally, assessment of a mentoring program should include both quantitative and qualitative methods, which can offset each other's strengths and limitations and provide triangulation.[14] The remainder of the case studies that were reviewed by Lorenzetti and Powelson and included assessment achieve this balance by using mixed methods in assessing mentoring activities.[15] However, these assessments suffer from the same weaknesses described earlier. Surveys were the most common quantitative evaluation used, but only one case study appended the instrument for peer review and replication.[16] The case studies failed to report the questions asked at group discussions and interviews, and most indicated the administrators of the mentoring programs conducted the interactions, rather than facilitators who had no investment in the programs.

The more recent articles identified for this review are notable for how little they contribute to the academic library community's knowledge of how to assess mentoring programs. The search for publications from 2014 to 2018 revealed no new case studies of mentoring programs including assessment. Two surveys of sizeable populations of individual librarians and ARL libraries found that few libraries assess the success of their mentoring programs.[17] Research about library mentorship is evolving from case studies to large-scale surveys, but three of these recent studies failed to include any questions about the assessment of mentoring programs.[18]

Rigorous assessment of mentoring programs is a challenge for academic librarians, who have limited time in which to learn, plan, implement, and thoroughly report qualitative and quantitative methods. Lack of time also affects librarians' ability to continually review mentoring programs, which is described in only one case study from 2009.[19] This case study presents a model of mixed methods assessment that is rigorous and sustained, yet can be accomplished by busy academic librarians. The authors hope to contribute to the improved assessment of mentoring programs in academic libraries with this study and its accompanying instruments.

Background

This case study describes the assessment of a mentoring program for librarians at the University of North Texas (UNT) Libraries in Denton. UNT is the largest public university in the Dallas-Fort Worth area, with over 38,000 students. The UNT Libraries' cataloged holdings include seven million print and digital items housed in six facilities. The libraries employ approximately 55 librarians. UNT librarians have faculty status, but not faculty rank or tenure. They are eligible for service on the Faculty Senate and its committees. They also are eligible for research funds, development leave, and faculty awards. The librarians are evaluated annually on their assigned duties, scholarship, and service. They must meet evaluation criteria in all three areas to attain contract renewal and promotion.

The UNT Libraries' Mentoring Program was created in 2015. The mission of the program is to support librarians to be successful in their careers. The program includes mentor-protégé dyads, mentor training, and group mentoring facilitated by one senior librarian. Table 1 provides the demographics of the participants of the mentoring program during its first three years (FY 2015/16 through FY 2017/18).

The Mentoring Program Workgroup administers the mentoring program. The workgroup is composed of librarians of all ranks from various divisions of the libraries. Workgroup members are appointed for staggered two-year terms. The current officers include two co-chairs, an assessment officer, a mentorship coordinator, and a secretary. The director of library administrative services is an ex-officio member of the workgroup. The authorship team of this paper is composed of current and former members of the workgroup.

The duties of the Mentoring Program Workgroup include managing the mentoring program and making recommendations for a budget. The workgroup also is responsible for assessing the program and making changes when appropriate.

The Mentoring Program Workgroup administers a continuous cycle of assessment with multiple measures and methods. The assessment instruments include the Mentoring Competencies Assessment, the Fear of Negative Evaluation survey, and the End of Program Evaluation. The workgroup also recently conducted a focus group composed of protégés in the mentoring program. Assessment measures address the goals of the mentoring program, which include facilitating the professional development of protégés, improving mentoring competencies, increasing confidence of participants, and expanding future participation in the program. The University of North Texas Institutional Review Board has approved all assessment instruments used by the workgroup.

Assessments
Mentoring Competencies Assessment (MCA)
The Mentoring Program Workgroup wanted to use valid and reliable methods for assessing the program's impact on the development of both protégés and mentors. The workgroup conducted a literature review and found a few case studies describing the evaluation of mentorship programs in libraries. The predominant measure reported was satisfaction with the program.[20] The workgroup was able to find more evaluation resources after extending the literature review to include other disciplines.

Medical researchers developed the Mentoring Competencies Assessment (MCA) to assess a multi-institutional program, the Clinical and Translational Science Awards (CTSA) Mentor Working Group.[21] This program supported the training of mentors of young clinical researchers at 16 participating sites using a standard workshop curriculum and training manual. The instrument was developed in three phases based on an extensive literature review, alignment with the training curriculum and manual, and cognitive interviews to assess the cognitive validity of the instrument. The final version of the assessment instrument consisted of 26 items on a seven-point Likert-type scale asking the mentors to assess their own skills, and for mentees to assess the skills of their mentors. The items covered six categories of competencies:

- Maintaining effective communication
- Aligning expectations
- Assessing understanding
- Fostering independence
- Addressing diversity
- Promoting professional development

In the validation study, the mentors and the protégés took the assessment prior to the training, which was provided some time after the mentorship program had begun. The sample tested included 283 mentors and 283 protégés from 16 different institutions. The MCA was subjected to rigorous testing of reliability and construct validity, and it was found to be moderately reliable and have strong construct validity.[22] The MCA is freely available from the University of Wisconsin.[23]

Because of the documented results of this rigorous validity testing, the MCA was chosen to assess the impact of training and support throughout the year for our mentors. While the instrument was developed for a program in a field wholly different from librarianship, the items were general enough to be applicable to

most mentorship training programs. One item in the original MCA (related to setting research goals) was removed because it was not a priority for our new librarians.

The same assessment measures were used for each of the three years of the mentoring program at the UNT Libraries, from FY 2015/16 through FY 2017/18. All participants in these three years were professional librarians. Most of the protégés were new to academic librarianship, while the mentors had extensive experience in their specializations, in academic librarianship in general, and at the university library specifically. Mentors and protégés responded to the assessments in each year. Some individuals participated in the program during multiple years and responded to assessments in each of these years.

The MCA results discussed in this assessment are accumulated from three consecutive annual mentoring programs. The Mentoring Program Workgroup determined the mean and standard deviation, median, and mode for each of the 25 items ranked by mentors and protégés to measure mentors' competency levels. The workgroup also compared the ratings from the surveys taken at the beginning of the program (pre-test) with those taken at the end of the program (post-test). Because the surveys were sent anonymously, analysis could be conducted only at the group level and not at the individual participant level.

The mean scores for the skills assessed on the MCA, as rated by the mentors themselves, are between 4.75 and 5.85 pre-test, with the lowest score for "Setting clear mentoring relationship expectations" and the highest score for "Acknowledging protégé's professional contribution" (Table 2). After the mentoring program, the range of the scores for the skills changed to 3.18–6.18, with the lowest and highest scores for "Coordinating effectively with supervisor(s)" and "Establishing a trustful relationship," respectively. The mean score and standard deviation of mentors' ratings of most skills were higher in post-test, compared to their ratings in pre-test.

The range of mean scores for the skills in the pre-test, as rated by the protégés, is between 5.28 and 6.56 pre-test, with the lowest and highest scores for "Helping protégé maintain work-life balance" and "Developing strategies to achieve goals," respectively (Table 3). The range of mean scores increased to 5.55–6.8 in the post-test. Similar to the ratings by their mentors, the mean scores assigned by protégés consistently increased in the post-test assessment. However, the standard deviation of the scores decreased (i.e., less variation in the post-test mean scores).

The mentors' ratings of their own skills, with only few exceptions, were consistently lower than the protégés' expectations of the mentors' skills both in the pre- and post-test ratings. For example, mentors' self-reported scores post-test were higher than 6.0 only for two skill items ("Establishing a trustful relationship" and "Acknowledging protégé's professional contribution"), while mean scores of protégés' expectations of mentors' skills were higher than 6.0 in eleven items. Both groups gave the highest post-test ratings to the "Establishing a trustful relationship" skill.

Fear of Negative Evaluation (FNE)

The Fear of Negative Evaluation (FNE) scale is used in clinical psychology to measure the likelihood of anxiety experienced by persons at the judgement of others in evaluative situations. It was described in "Measurement of Social-Evaluative Anxiety" by Watson and Friend in 1969.[24] The authors developed the FNE alongside the Social Avoidance and Distress scale (SAD) in order to attain "greater predictive validity for specific situations" rather than more general assessment of different social situations that other scales generated. The Mentoring Program Workgroup considered using the FNE scale, among other anxiety assessments, because librarians were shown to suffer from FNE in a 2015 study by Crawford et al.[25] The participants in the study reported through open-ended questions that FNE made them hesitant to take advantage of advancement opportunities.

The workgroup decided to use only the FNE to assess the protégé participants because it is best suited for measuring effects of anxiety in social situations while the SAD scale measures the avoidance of social situations. The results would also indicate whether the mentoring program was lowering the FNE barrier to

seeking promotion and other advancements among the protégés. FNE is defined as "apprehension about others' evaluations, distress over their negative evaluations, avoidance of evaluative situations, and the expectation that others would evaluate oneself negatively."[26] The FNE scale is available in the article and consists of 30 true/false questions. Watson and Friend crafted the questions to capture the targeted trait, "fear of loss of social approval," and its opposite, lack of anxiety about the evaluations of others, and not the presence of other traits such as the desire for positive evaluation.[27] The authors cite the validity and homogeneity of the FNE scale in their article.

The Mentoring Program Workgroup administered the FNE survey to the protégés at the beginning and end of each year of the mentoring program. The researchers scored the responses according to the key found in the Watson and Friend article.[28] Responses that were indicative of the construct "fear of negative evaluation" were given one point. The cumulative sum of the points indicated each participant's FNE score. The data were analyzed to find the mean, median, and mode among all participants for pre-tests and post-tests (Table 4).

The mean score for all pre-tests was 16.35 with a median of 15.50. This was consistent with the mean of 16.72 among the 403 librarians assessed in the Crawford et al. study.[29] The mean for all the post-tests was 15.60 with a median of 16.00 (Table 4). This represents a decrease in 0.75 points, or 4.6% in the mean score.

Satisfaction Survey (End of Program Evaluation)

The Mentoring Program Workgroup distributed End of Program Evaluation surveys at the Year-End Celebration during each of the three years of the mentoring program. The survey gauged participant satisfaction and collected feedback on areas of improvement and suggestions for future program years. This survey was developed by the University of Illinois at Chicago for a mentoring program developed for new clinical researchers. While there is no documentation of validity testing, the survey was available for reproduction, and the Mentoring Workgroup believed it to be a useful tool for measuring success. (Note: The survey is no longer available online, but the authors of this article printed a copy, which is available upon request.)

The tool consisted of a total of 28 questions: 22 in a Likert scale and six essay. Of the Likert-scaled questions, 10 focused on the features of the program, 10 on individual mentoring relationships, and two on the overall program experience. Participants responded on a five-option Likert scale ranging from "Strongly agree" to "Strongly disagree" for the program; an eight-option Likert scale for the relationship ranging from "Strongly agree" to "Strongly disagree," including a "not applicable" option, and a four-option scale for the overall program experience. The other six open-ended questions allowed for commentary on the scaled questions and inclusion of specific details about the mentoring relationship and experience.

The results of the survey discussed below are accumulated from two consecutive annual mentoring programs, FY 2016/17 and FY 2017/18. The results of the survey for the FY2015/16 cohort were not included in this report because of changes made to the survey instrument. The Mentoring Program Workgroup determined the mean, median, and mode for each of the questions answered by the mentors and protégés.

The mean satisfaction of the program ranged from 1.21 to1.74 on a scale of "Strongly agree" = 1 and "Strongly disagree" = 5 (Table 5). The highest responses were collected for "I would recommend the mentoring program to others" and the lowest for "The overall expected outcomes for the mentoring program were realistic."

The mean satisfaction of the mentoring relationships ranged from 1.75 to 2.90 on a scale of "Strongly agree" = 1 and "Strongly disagree" = 7 (Table 5). The highest responses were collected for "My mentor/protégé understood what I was saying and we had meaningful conversations" and the lowest for "My protégé shared concerns and asked good questions."

The mean satisfaction scores for the program's overall experience was 1.29 on a scale of "Extremely satisfied" = 1 and "Somewhat dissatisfied" = 4. The mean effectiveness score was 1.71 on a scale of "Very effective" = 1 and "Not effective at all" = 4.

Focus Group

The Mentoring Program Workgroup decided, after three years of evaluating the mentoring program through the MCA, FNE, and satisfaction surveys, that conducting a qualitative assessment would enrich the data gathered from mentors and mentees. Qualitative methods offset the limitations of surveys, some of which are the inability to describe the nature of subjects' development over time or capture the social context of responses.[30] The workgroup selected the focus group method to assess whether the mentoring program was meeting its goals. In addition to gathering a fuller picture of professional development of the participants, this method has the advantages of creating a group interaction in which ideas emerge that might be absent in individual interviews[31] and getting feedback from multiple participants during one event.

The workgroup concentrated on the protégés in the library's mentoring program for the focus group conducted in August 2018. It was the first focus group the workgroup had conducted; therefore, the group wanted to learn the method and improve the approach before assessing the mentors. The study population consisted of librarians who had completed two years in the mentoring program and had experienced both dyad and group mentoring. The Mentoring Program Workgroup selected these criteria to assess subjects with enough experience in the program to discuss their development over time, and to gather their insights on both the dyad and group mentoring. Twelve librarians fit the criteria for the study population, but two who are members of the workgroup were excluded for lack of impartiality. The final study population included 10 potential subjects.

The Mentoring Program Workgroup made anonymity of the subjects a priority throughout the implementation of the protégé focus group in order to encourage free discussion of the mentoring program. While none of the workgroup members were supervisors of the protégés, the workgroup did not want the protégés to curtail their responses from any fear of negative impacts. The UNT IRB approved the study, with special measures to protect the anonymity of the participants. The workgroup enlisted the help of a graduate student employed by the library, who had experience in conducting focus groups. He became the sole contact for the subjects throughout the process. The student sent an invitation email to the 10 librarians, and assigned random numbers to the five who agreed to participate. The numbers were used to identify the subjects from that point forward.

The focus group arrangements all worked toward making an environment where the protégés would feel comfortable sharing their honest opinions of the mentoring program. The workgroup asked an education professor experienced in qualitative assessment, who did not know any of the participants, to be the facilitator for the focus group. The conference room scheduled for the focus group was located in an academic building out of sight of the library. The setup time for the conference room and the arrival time of the participants were staggered to prevent the researchers from seeing the participants. The facilitator asked prepared questions written by the researchers, which were formulated along guidelines from Liamputtong.[32] The graduate student took notes during the two-hour discussion, identifying the speakers by their random number assignments, and made an audio recording of the event. During the focus group, the facilitator asked an additional follow-up question, which is listed with the prepared questions in Appendix 1.

The analysis of the focus group responses started with the transcription of the notes and audio recording. The graduate student transcribed the audio recording verbatim and included pauses, exclamations, laughter, and other expressions that lent context to the text.[33] Three researchers conducted a thematic analysis of the transcription, as described by Liamputtong. Initially all three read the transcription and identified themes. Then the common themes were used by one researcher to code the subjects' discussion in NVivo 12.

The focus group's discussion suggests that the mentoring program is progressing towards meeting its goals and needs improvements. One of the program's goals is to increase the confidence of the protégés. The junior

librarians have appreciated mentors who outline the steps needed to advance from a new librarian to one ready for promotion. Mentors also clarified the actual promotion application process and the types of documentation that should be in a dossier. Through group mentoring, the protégés were able to meet members of the Personnel Affairs Committee and get feedback on their curriculum vitae. All of these activities have made the protégés more confident about what they need to accomplish for their first promotion to associate librarian.

Another goal of the mentoring program is to improve mentoring competencies. According to the protégés, their mentors and peers have strong psychosocial skills. The protégés mentioned repeatedly that they value the confidentiality provided to them both through the dyad and group mentoring. The mentors and peers are good listeners with whom they can discuss work and professional concerns without being judged or labeled as having a bad attitude. All of the protégés expressed a sense of belonging because their mentors and peers have shared their own struggles with feelings of inadequacy and with finding suitable solutions to career problems.

While performing well in psychosocial competencies, the protégés' comments suggest the mentors need to improve in the areas of creating and aligning expectations and guiding professional development. Most of the protégés in this focus group had experienced a more informal relationship with their mentors, with few structured activities and objectives for professional development beyond promotion preparation. It was clear to the protégés who participated in the first year of the mentoring program that the mentors were still in training.

The protégés had helpful suggestions to improve the group mentoring, which they value for coordinated activities and camaraderie. They recommended making the names of the mentoring groups match their purposes. UNT's mascot is the eagle and the incorporation of eagle references in names muddied the intent of the groups. The protégés also favored having the group mentoring in cohorts, rather than changing the group composition every year, in order to maintain an environment where they feel comfortable sharing accomplishments and concerns.

Overall, the protégés are pleased with the mentoring program and want to see it continue. They mentioned multiple times that the program gives them a broader perspective of the library organization and of librarianship, showing them different solutions to work challenges and a variety of career opportunities. The protégés all agreed the library administration should sustain the mentoring program with funding. Finally, they were also in agreement they would all like to serve as mentors in the future based on their positive experiences.

Discussion and Conclusion

Because the UNT Libraries had never had a formal mentoring program for its librarian faculty members, the goal of the initial programs was to develop the librarianship skills of the new librarians, as well as the mentoring skills of the established librarians. Assessment of these goals was planned with the initial pilot of the program in FY 2015/16 using the three surveys described earlier. These surveys, developed from outside of the field of librarianship, were selected largely because there were so few options available from within our field. Most reports of mentoring programs in library literature did not include any assessment at all. Of those that did, the primary method was satisfaction surveys, which were not tested for validity, nor even included in the published reports.

The original Mentoring Program Workgroup wanted to establish a model of continuous assessment that could be used over the long term. This is because the number of individuals participating each year would be limited; accumulating responses over the years of the program will enable the workgroup to have more statistically valid analyses of effectiveness. Without these regular assessment efforts, the Mentoring Program Workgroup would have little basis on which to plan new programs and make improvements.

It became apparent, however, that quantitative measures of assessment alone have not provided enough information to improve the program. The workgroup wanted to learn more about how the participants felt about the program, their impressions of one-on-one mentoring, and their viewpoints of the quality of the program. Towards that end, the workgroup pursued a qualitative method, taking extraordinary efforts to reduce bias and protect anonymity by having a moderator from outside the library and conducting the focus group session in another building.

The results of the focus group support the results of the three surveys given to mentors and protégés. When the mentors took the post-test MCA, they rated themselves highest on the skill, "Establishing a trustful relationship." All protégés in the focus group agreed their mentors and peers had been successful in creating a trustful environment by providing confidentiality and strong listening skills. The protégés' comments were also consistent with the lowest mean score in the End of Program Evaluation, "My mentor offered guidance and knowledge." The protégés observed the mentors were helpful in promotion preparation, but beyond that area, needed to be more structured in providing guidance for a career trajectory. The confidence of the protégés increased regarding their upcoming promotion applications, which aligns with the decrease in the post-test score of the FNE.

Through these assessment measures, the Mentoring Program Workgroup has documented measures of success in meeting the goals of preparing new librarians for academic librarianship and the rigors of promotion. Their self-confidence has improved, as documented by the reduced scores of the FNE scale, as well as by their responses to both the open-ended questions of the evaluation survey and within the focus group. While there is documented improvement in the mentors' self-assessment of skills through the MCA scores, the responses to the open-ended questions and the focus group responses indicate that more effort is needed to improve mentorship skills.

There are a few limitations of our assessment method, notably the inability to analyze results at the individual and dyad levels, the difficulty of improving response rates, and the lack of a measure of ultimate impact on the protégés. In the first year, there was an attempt to track individual pre- and post-program responses to the MCA while maintaining anonymity, but it was not successful. Participants were asked to put in the last four digits of their phone number, but some did not include this data and others entered different numbers in the pre- and post-tests. For later iterations, the surveys were sent anonymously without any tracking capability. The Mentoring Program Workgroup has since received the UNT IRB's approval to change the survey from anonymous to confidential, enabling future analyses at group, individual, and dyad levels.

The response rates have only been modest since the first year, even with incentives. The workgroup has received approval to use additional incentives (five-dollar vouchers for the library coffee shop for each survey completed), which are included in the program's FY 2018/19 budget. The Mentoring Program Workgroup will track response rates to determine the value of this incentive program.

Most importantly, the above assessments do not measure the ultimate goal of the program, which is for the librarians who participate to be successful in their careers. While increasing confidence is a step towards that, the workgroup currently has no valid measure associated with this goal. Such an outcome is difficult to measure because the meaning of "successful in their careers" is ambiguous. Many factors contribute to such an outcome, and it would usually occur a long time after the end of the formal program. With these difficulties in mind, the Mentoring Program Workgroup will be reviewing optimal measures, including, but not limited to, time to promotion, annual evaluation scores, participation in other career development activities, and overall career satisfaction.

Endnotes

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Table 1. Demographics of Mentoring Program Participants

	FY 2015/16		FY 2016/17		FY 2017/18	
	Protégés	Mentors	Protégés	Mentors	Protégés	Mentors
Total # of individuals	5	4	15	14	11	13
By Gender (f/m)	3/2	3/1	10/5	12/2	8/3	8/5
By minority status* (y/n)	1/4	1/3	2/13	1/13	2/9	1/12

*_Member of any group that is not white, non-Hispanic, cisgender_

Table 2. Baseline Mean Scores for the 25 Skills Evaluated by the Mentoring Competency Assessment, as Rated by Mentors in FY 2015/16–FY 2017/18

Skills by competency	Pre-Test (N = 20)			Post-Test (N=17)		
	Mean	Median	SD	Mean	Median	SD
Maintaining effective communication						
Active listening	5.70	6	0.86	5.12	5	0.73
Providing constructive feedback	5.40	5	0.75	5.59	6	0.61
Establishing a trustful relationship	5.70	6	0.98	6.18	6	0.41
Identifying and accommodating communication styles	5.10	5	0.79	5.35	6	0.81
Applying strategies to improve communication	4.80	5	0.89	5.06	5	0.64
Coordinating effectively with supervisor(s)	5.20	6	1.11	3.18	4	1.32
Aligning expectations						
Setting clear mentoring relationship expectations	4.75	5	1.07	5.53	6	1.03
Aligning expectations	4.90	5	0.97	5.29	5	1.14
Considering mentor-protégés differences	5.20	6	1.01	5.76	6	1.27
Setting relationship goals	5.35	6	1.09	5.18	6	0.89
Developing strategies to achieve goals	5.40	6	0.94	5.59	6	0.92
Assessing understanding						
Assessing protégé's knowledge	5.15	6	1.14	5.35	6	1.32
Estimating protégé's ability	5.15	5	1.27	5.12	5	1.09
Enhancing protégé's knowledge and abilities	5.35	6	1.04	5.53	6	1.04
Fostering independence						
Motivating protégé	4.85	5	1.14	5.06	5	0.93

	Mean	Median	SD	Mean	Median	SD
Building protégé's confidence	5.20	6	1.15	5.53	6	0.83
Stimulating protégé's creativity	5.05	5	1.19	4.88	5	1.00
Acknowledging protégé's professional contribution	5.85	6	0.93	6.12	6	0.91
Negotiating a path to professional independence	4.80	5	1.44	5.35	5	0.79
Addressing diversity						
Accounting for biases and prejudices	5.15	6	1.09	5.59	6	1.02
Accounting for mentor-protégé differences	5.45	6	1.70	5.29	6	1.30
Promoting professional development						
Helping network effectively	4.80	5	1.51	5.00	5	1.15
Helping protégé set career goals	5.25	6	1.25	5.29	5	0.91
Helping protégé maintain work-life balance	5.10	6	1.41	5.24	5	1.33
Understanding impact as a role model	4.85	5	1.39	5.41	6	0.93

Table 3. Baseline Mean Scores for the 25 Skills Evaluated by the Mentoring Competency Assessment, as Rated by Protégés in FY 2015/16–FY 2017/18

Skills by competency	Pre-Test (N = 25)			Post-Test (N = 20)		
	Mean	Median	SD	Mean	Median	SD
Maintaining effective communication						
Active listening	6.20	7	1.08	6.30	6	0.73
Providing constructive feedback	6.44	7	0.71	6.50	7	0.61
Establishing a trustful relationship	6.48	7	0.71	6.80	7	0.41
Identifying and accommodating communication styles	6.00	6	0.82	6.15	6	0.81
Applying strategies to improve communication	5.96	6	0.93	6.10	6	0.64
Coordinating effectively with supervisor(s)	5.83	6	1.37	5.89	7	1.32
Aligning expectations						
Setting clear mentoring relationship expectations	6.24	6	0.78	5.70	6	1.03
Aligning expectations	6.04	6	0.68	5.65	6	1.14
Considering mentor-protégés differences	5.68	6	0.99	5.65	6	1.27
Setting relationship goals	6.16	6	0.99	5.80	6	0.89

Developing strategies to achieve goals	6.56	7	0.71	6.00	6	0.92
Assessing understanding						
Assessing protégé's knowledge	5.68	6	1.14	5.55	6	1.32
Estimating protégé's ability	6.00	6	1.08	5.85	6	1.09
Enhancing protégé's knowledge and abilities	6.38	7	0.88	6.15	6	1.04
Fostering independence						
Motivating protégé	5.48	5	1.16	5.85	6	0.93
Building protégé's confidence	5.68	6	1.03	6.05	6	0.83
Stimulating protégé's creativity	6.00	6	0.91	5.95	6	1.00
Acknowledging protégé's professional contribution	5.40	5	1.08	6.10	6	0.91
Negotiating a path to professional independence	5.92	6	1.38	6.10	6	0.79
Addressing diversity						
Accounting for biases and prejudices	5.52	6	1.00	5.58	5	1.02
Accounting for mentor-protégé differences	5.48	5	1.16	5.70	6	1.30
Promoting professional development						
Helping network effectively	6.16	6	1.03	5.95	6	1.15
Helping protégé set career goals	6.12	6	0.83	6.10	6	0.91
Helping protégé maintain work-life balance	5.28	5	1.43	5.74	6	1.33
Understanding impact as a role model	5.64	6	1.08	5.85	6	0.93

Table 4. FNE Score Analysis of Protégés in FY 2015/16–FY 2017/18

	Mean	Median	Mode
Pre-Test (n=10)	16.35	15.50	19
Post-Test (n=10)	15.60	16.00	25

Table 5. Results of the End of Program Evaluation Survey FY 2016/17–FY 2017/18

Evaluation Questions	Mean	Median	Mode
The Mentoring Program (1= Strongly Agree, 5 = Strongly Disagree)			
The kick-off event was informative and a beneficial way to start the program.	1.64	2	1
The goals and objectives of the mentoring program were clearly defined.	1.71	2	2
The structure of the program made it easy to perform my role in this relationship.	1.43	1	1
I felt supported by the mentoring committee.	1.39	1	1
The time commitment for each interaction was just right.	1.71	1.5	1
I felt the match between my mentoring partner and I was a good fit.	1.32	1	1
I believe the program will benefit my professional development.	1.46	1	1
The overall expected outcomes for the mentoring program were realistic.	1.74	1	1
Realistic Expectations	1.43	1	1
I would recommend the mentoring program to others.	1.21	1	1
Mentoring Relationship (1= Strongly Agree, 7 = Strongly Disagree)			
The match between my mentoring partner and I met my needs.	1.93	1.5	1
We met regularly.	1.89	2	2
We came prepared to use the time effectively.	2.21	2	2
We were confident about what to do when we started.	1.93	2	1
My mentor/protégé understood what I was saying and we had meaningful conversations.	1.75	1	1
I experienced learning and growth during the process.	1.89	1	1
My mentor offered guidance and knowledge.	2.36	1	1
My protégé shared concerns and asked good questions.	2.90	2	2
My mentor/protégé enlightened me.	1.86	2	1
This relationship will continue beyond the formal process.	1.82	1.5	1
Overall Experience (1= Extremely satisfied/Very effective, 4 = Somewhat dissatisfied/Not at all effective)			
How satisfied were you with your experience as a mentor/protégé?	1.29	1	1
How effective was the overall program?	1.71	2	2

Appendix 1: Questions for Protégé Focus Group

<u>Introduction</u>: Would you tell me about one highlight of your experience in the mentoring program?

<u>Transition</u>: How did you interact with your mentor?

<u>Focus</u>: How has the one-on-one mentoring influenced your job and development as a professional librarian?

<u>Focus</u>: How has the group mentoring influenced your job and development as a professional librarian?

<u>Focus</u>: How has the mentoring program impacted your attitude towards your job and librarianship in general?

> Follow up if needed: How has your confidence level in performing your job and contributing to your profession changed?

> *Follow up if needed: How has the program affected your sense of belonging in the UNT Libraries and professional communities?

<u>Focus</u>: How could the mentoring program be improved to increase participation of new librarians in the future?

<u>Focus</u>: What have you valued the most in your experience in the mentoring program?

**<u>Concluding</u>: Would any of you consider being a mentor in this program if you have the opportunity? If so, why would you choose to mentor?

<u>Concluding</u>: Is there anything else you think we should discuss about the mentoring program, but haven't?

*The facilitator did not ask this question because it had already been answered.

**The facilitator added this question.

Obligations and Intentions: An Exploratory Study of Indirect Cost Recovery Monies from Research Grants as a Revenue Stream for Funding Research Library Budgets

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Many academic libraries continue to face budgetary pressures and financial constraints, necessitating an examination of how they meet stakeholder needs. Consequently, academic libraries have seen greater attention given to assessment and student learning. Practically speaking, this laudable focus on student needs also directly connects to primary revenue streams. At higher education institutions that receive research grants, a certain amount of those funds is explicitly designated through Indirect Cost Recovery (ICR) to go to library expenses. Since there are a limited number of ways that an academic library may receive monies, the fact that one of these revenue streams seems to have been almost completely unexplored in the library research literature is quite surprising.

This came to the attention of the authors in quite different ways. One author, working at a private university library, was working with the library faculty committee that was examining different possibilities for increasing the library's budget. Faculty ruled out research grants as an additional source of revenue as library expenses are expressly written into the overhead (indirect) costs that go to the parent institution for providing facilities and administration. Another author, working at a public research university library which received a specific percentage of the research grant monies, was curious about how other university libraries utilized the funds and whether there were any restrictions attached to their use of these funds. Both authors were struck by the paucity of discussion regarding this topic.

In particular, it is a direct and explicit link between the support that a library provides to research in higher education institutions. As noted by Brinley Franklin, "U.S. Office of Management and Budget (OMB) Circular A-21 (the Circular) sets forth the principles by which educational institutions and their libraries can quantify and seek reimbursement for costs incurred in support of sponsored research."[1] These principles have been updated (as of December 2014) in the Council on Financial Assistance Reform's implementation of the OMB's Federal Uniform Guidance (2 CFR 200), but they still contain guidelines for reimbursement for library expenses. Would not this be a possible pathway to articulate and demonstrate a deficient level of funding for a core mission of the academic library? If academic libraries were able to tie research grant support explicitly to the increasingly expensive collections, this surely could be a lever to push back against decreasing the library share of university expenditures.

This project seeks to explore what the level of awareness of Indirect Cost Recovery (ICR) as a revenue stream is in academic libraries at Carnegie-designated Highest and Higher Research Activity institutions, whether they have specific policies about either ICR designations or expenditures, and how ICR fits in with their other revenue streams.

In addition to seeking and reviewing both library and information science and higher education research literature, the authors deployed a survey to deans and directors of academic libraries in the United States, specifically those at Carnegie Classification Highest Research Activity institutions and Higher Research Activity institutions. An invitation for follow-up conversations on the topic was included.

The history and changing role of ICR

Although ICR engenders almost no debate within the library and information science community, it also had little debate within the higher education community, with a few notable exceptions. One of the few times that a larger national debate occurred was in 1991, after a scandal broke about the use of these monies at Stanford University. Robert Rozenweig, then the chair of the American Association of Universities, wrote in the **Chronicle of Higher Education** about the history and logic for the system:

"...1947, when the Office of Naval Research, then a primary supporter of university-based research, developed a set of principles for determining reimbursement based on actual costs. Throughout the 1950's, most federal grants paid a fixed percentage for overhead costs, while the rates for contracts were negotiated. When university officials complained...that the rates were too low, the government's response was to raise the percentage gradually...In 1958 the Office of Naval Research principles were revised and issued as OMB circular A-21....Applies to research supported by all federal agencies, was designed to allow for variations in university governance and also to permit reimbursement for indirect costs to approach the true costs of research."[2]

Rozenweig noted the logical way to assess the proper reimbursements was not through a case-by-case negotiation, but by creating a charge based upon an aggregate. He specifically used an example of assessing all of the costs for operating campus libraries, negotiating with the government about what portion of those costs can fairly be assigned to federal research on campus. As a result of this attention, in 1991, the OMB put a 26% cap on administrative ICRs (but not facilities). Another brief discussion about ICR rose again in the late 1990s, as Congress was investigating the increases in facilities and administrative (F&A) costs. This initial inquiry resulted in a RAND Corporation Science and Technology and Policy Institute Report in 2000. Arthur Beinenstock added his analysis to the report's findings: "Indirect costs, referred to as facilities and administrative (F&A) costs, are those that cannot be associated with a specific project. Facilities costs include the operation, maintenance, and depreciation of buildings used for the research, research equipment for which the university has paid, interest on debt associated with buildings placed into service after 1982, and library expenses..."[3]

He goes on to note that other industrialized countries' governments pay for virtually all costs of research, while the United States relies extensively on research universities who are reimbursed only after paying for the infrastructure and staffing and only after successfully competing for the funds. The RAND report noted that universities had lower F&A costs than federal laboratories or industrial research laboratories. Universities were providing between 0.7 and 1.5 billion reimbursable F&A research support and were recovering between 70 and 90% of those costs. Beinenstock contended "Estimates that in 2000, at Carnegie R1 and R2 institutions, students were paying an average of $1,000/year to subsidize unrecovered ICR, or more than 50% of the average tuition increase since 1980."[4] However, this view should be complicated with Ehrenberg, Rizzo, and Jakubson's 2003 findings that students did bear an increased cost for supporting research in both tuition and class size/adjunctification, but that the effects were surprisingly small.[5] Furthermore, Phillips and Olson's study finds that cross-subsidies are integral to higher education finance. Student tuition, auxiliary operations (housing, bookstores, etc.), athletics, and research are all subsidized. State appropriations, endowments, and donors all provide the financial base for all other costs to be subsidized to the maximum possible amount.[6] Still, F&A cost recovery has never truly covered the full costs of research, and furthermore, ICR reimbursements have not risen concurrently with inflation, which further destabilizes the research environment at universities and tips research towards corporate interests for funding.[7] In a time where return on investment is a consistent refrain from stakeholders and administrators, this situation suggests further attention to the true costs of research are necessary, especially as the academic library is explicitly identified as a cost to be supported.

What this means for Academic Libraries

Today, academic libraries face significant and likely unsustainable financial pressures, which the 2017 ACRL Environmental Scan notes "[a]s the public awareness of college costs and student debt grows, so does pressure to contain costs."[8] Brinley Franklin, the primary source for literature regarding ICR and academic

libraries, worked extensively with universities on another tactic. He helped recover costs by negotiating ICR rates with the government, often through raising the rate owed to the university designated for library expenses. He found that on average, "…at research universities, 2 percent of sponsored research funding is eligible for recovery as an overhead cost from federal funding agencies to reimburse the universities for library expenses related to funded research."[9] This makes up about 1% of the overall revenue at [ARL] Public Research Universities, but ranged from 0.1% to 10%.[10] He suggested "there is a scarcity of information currently available pertaining to how research university libraries are funded" and worried that "…public university research libraries, like their host institutions, may be starting to resemble private university research libraries in the ways they are funded, particularly drawing upon private gifts, student fees, indirect cost revenues, and auxiliary income."[11] However, this all merely underlines our original research questions. With such an important and explicit role that library expenses play in research, what kind of monies are academic libraries actually receiving, what are they used for, and how does this fit with libraries' other revenue streams?

The Survey

In order to gain a better understanding of awareness, importance, and use of ICR, we surveyed library deans and directors at 115 Highest Research Activity (R1) institutions and 107 Higher Research Activity (R2) institutions as classified by the Carnegie Classification of Institutions of Higher Education.[12] Of the R1 institutions, 81 were public and 34 private, and of the R2 institutions, 76 were public and 31 private.

The survey consisted of four parts (see Appendix I):

1. Campus and library characteristics

2. Primary sources of revenue for library budget

3. ICR-specific

4. Would you be interested or available for a short follow-up conversation?

The survey was approved by Illinois Tech's Institutional Review Board (IRB 2018-075), distributed through Qualtrics, and available for responses in October 2018. Survey invitations were sent to 223 potential respondents, which resulted in 221 successful distributions—two emails bounced back repeatedly despite multiple attempts.

Survey responses overview

Overall, the survey had 58 responses. Of those, 40 were completed (18.1% response rate). The distribution across public and private institutions and R1 and R2 classifications was relatively consistent with the exception of Higher Research Activity public institutions that were lower than the other type and classification combinations.

- 23 Highest Research Activity (20%) and 17 Higher Research Activity (15.9%)
- 13 private and 27 public
  - Private institutions
    - 7 Highest Research Activity (20.6%)
    - 6 Higher Research Activity (19.4%)
  - Public institutions
    - 16 Highest Research Activity (19.8%)
    - 11 Higher Research Activity (14.5%)

Campus and Library Characteristics (Appendix 2)

The range of responses was quite substantial. For campus FTE, the largest survey respondent had 32.4 times as many students as the smallest. The respondent with the largest library budget was 46.74 times larger than

the smallest reported one. The campus annual total research funding amount for the entire institution showed a similar disparity, with the largest being 46.67 times larger than the smallest.

While the Campus FTE and total library budget had similar averages and medians, the annual total research funding for the entire institution had more outlier responses as demonstrated in the substantial difference between the median and average amounts.

Revenue Sources for Library Budget

Libraries were asked to note the percent of the library budget that came from five different categories with an additional option for "other." Given the large number of no or zero responses, the data was examined with and without those responses. The table below is for respondents with responses greater than zero.

	Average	Median	Range
State Support/ General Appropriations	30.8%	73.5%	2–98%
Tuition/General Revenue	46.1%	80.0%	2–100%
ICR Monies	0.97%	1.9%	.005–15%
Student Fees	6.6%	3%	0.3–100%
Specific Endowments	5.99%	5%	1–45%

Student fees could be library fees, technology fees, etc. Responses for "Other" included fundraisers, grants, contracts, federal appropriations, and unknown. Some respondents noted that funds appropriated to the library combined different categories of funding.

Particularly interesting were that the ICR monies response average was 0.97% (of those with responses) compared to 0.95% that Brinley Franklin noted in 2007, which demonstrates little change in the past decade.[13] Researchers also noted that ICR monies are less than one-sixth the averages for student fees and specific endowments.

	Yes	No	Range	Yes and No—Average	Yes—Average
State Support/ General Appropriations	21	20	0–98%	31.5%	61.6%
Tuition/ General Revenue	25	16	0–100%	44.9%	73.7%
ICR Monies	12	29	0–15%	1.2%	4.1%
Student Fees	14	27	0.3–100%	7.1%	20.7%
Specific Endowments	30	11	1–45%	8.2%	6.0%
Other	10	31	1.7–100%	9.3%	38.2%

Of those that reported the use of these revenue sources, the most substantial—not surprisingly—were state support/general appropriations and tuition/general revenue. For the roughly half that reported the former, it amounted to more than three-fifths of their budget (61.6%) and of the roughly three-fifths that reported the latter, it was nearly three-quarters (73.7%). Of the third of the respondents that reported the use of student fees, it was roughly one-fifth of their budget (20.7%)—the average was greatly influenced by the two respondents who receive 100% of the budgets from student fees. The most common revenue source were specific endowments with 30 institutions reporting their part in the library budget. "Other" was the least common response, but of those that responded, it contributed on average to nearly two-fifths of the budget (38.2%)—this was another response that had a sizable range of responses.

ICR-Specific (Appendix 3)
Of the twelve libraries that reported receiving ICR monies, this revenue source was 4.1% of their budget. Of all the reporting institutions that included no or zero responses, the percentage was down to 1.2% of their budget.

Of the twelve libraries that reported receiving ICR monies, only five noted they received a set percentage: 1.95%, 2%, 3%, 3%, and 10%. Of those five, in terms of campus oversight, only one reported any specifications or stipulations on the use of the ICR monies. Only four noted that the use of the ICR money was tracked and/or reported—primarily for financial and monitoring purposes. Only two had policies regarding carryover of the funds.

In terms of other effects of the rest of the campus on the libraries, in response to the question, "Does rise and fall of total research funding at the institutional level affect ICR monies to library?" nearly half (6) responded "yes." The affirmative responses noted there was not much of an effect given the stability in the small amounts and they were typically utilized for non-essential purposes.

In general, library usage of ICR monies are not well understood internally by the library or externally by campus. Despite the lack of clarity, there have been discussions between the library and campus. Of the ten responses, the following had multiple mentions: lack of unawareness of any conversations, lack of formula or policy, and description of methods of fund distribution or expenditures.

A number of questions were posted but did not receive any responses:

- Does the library itself set any preferred or policy specifications for the spending of these ICR monies?
- Why does the library set preferred or policy specifications for the spending of ICR monies?
- What purpose(s) does the library use the ICR monies for?
- What purpose(s) would the library like to use ICR monies for, but does not feel permitted to do so?

Two respondents volunteered for follow-up conversations. Those conversations had three common themes: a tension between the library's ability to use the funding effectively and campus pressure to spend to prevent large build-up of funds; interest in learning from other libraries' use of ICR funds; and an interest in what strategies have been utilized by others to identify and effectively lobby campus partners to impact this source of funding.

In terms of the tension between the library and campus, both noted there is a reluctance to use the funds because they are seen as a "rainy day" fund to deal with flat or reduced allocations, budget cuts or rescissions, or unexpected costs. On the other hand, any account in a public university that looks like it is sitting unspent makes it more challenging for the parent institution to request additional general revenue funds. Each had examples where sizable portion of ICR funds were converted to general revenue funds to ensure they were spent more readily.

Moreover, since the fund amounts are typically small and variable, there is reluctance to use them for sizable, recurring costs (e.g., electronic resource subscriptions). Should these funds be unavailable or greatly reduced in one year, the library would have to identify an alternative source of funding. However, library leaders were interested in seeing how other libraries utilized these funds in an innovative manner and if they were able to spend the ICR funds on something that had recurring costs, such as database expenditures. Also, they both noted a desire to use the funds to supplement library and information science faculty activity and research. Other possible uses mentioned included funding open access initiatives, such article processing charges creating partnerships for graduate student research funds, or for focused library facilities-related expenditures. There was a general curiosity on how the university came to the decision to appropriate the amounts, how percentages were chosen, and so forth. Intriguingly, there was a clear desire to know what might be other innovative uses for such funds, as well as identifying pathways to open conversations about this revenue stream across campus.

Possible future directions for the research

Since the survey was confidential, but not anonymous, the researchers could utilize other information resources (such as IPEDS, institutional websites, and the Council on Governmental Relations) to fill in missing survey responses and/or look for possible correlations. Each institution has other Carnegie classification identifiers that could be utilized for comparative purposes. Promising options include undergraduate program and graduate program profiles that note balance of majors with professional programs and level of overlap with graduate programs (e.g., "Arts & sciences plus professions, high graduate coexistence," "Research Doctoral: Comprehensive programs, no medical/veterinary school"). Other possibilities include enrollment profiles (e.g., "Four-year, full-time, more selective, lower transfer-in"), size and setting (e.g., "Four-year, medium, primarily nonresidential"), or community engagement designation. Further investigation could utilize other methodologies to focus attention on the ICR-specific questions that did not receive responses. And given the primacy, range, and size of the other revenue sources reported by libraries, research focus could shift to non-ICR options.

In conclusion, Brinley Franklin's observation is that the "...government allows educational institutions to seek reimbursement for library expenses related to funded research...[which] has given American academic institutions an incentive to measure the extent to which their academic libraries support sponsored research."[14] It offers a necessary reminder to neither neglect important stakeholders, nor to forget an important part of our mission as academic and research libraries. Although the level of ICR monies funding at institutions is generally lower than other revenue streams, given the explicit link between library services and the F&A portion of this type of funding, it merits further discussion. As costs of electronic resource subscriptions continue to outpace the rate of inflation, it seems striking that there has not been a reconsideration of the support needed from ICR, and we hope that this is the beginning of a renewed conversation on this topic.

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Appendix 1: The Questions

1. Demographic questions about institution

   a. Public/Private

   b. Size/Carnegie research classification (radio button for highest or higher research activity)

   c. Campus student FTE

   d. Total library budget

   e. Annual total research funding amount received for whole institution (if known)

2. Demographic of the person answering the survey

   a. Job title

3. Besides Indirect Cost Recovery monies, what are the primary sources of revenue for funding your budget? (check all that apply: state support/appropriations (if applicable), tuition/general revenue, student fees (e.g., library, technology), specific endowments, other [entry box for responses])

   a. Ranking or percentage, if known?

4. Are any Indirect Cost Recovery monies designated to go to the library budget?

   a. If so, is there a specific set percentage?

   b. Are there any specifications or stipulations for the use of those monies?

   c. What are those stipulations or specifications?

      i. Please copy and paste any other relevant language or text

5. Does the library itself set any preferred or policy specifications for the spending of these monies? Please copy and paste any relevant language or text.

   a. Why?

   b. What purpose(s) do you use the funds for?

   c. What purpose(s) would you like to use Indirect Cost Recovery funds for, but do not feel permitted to?

6. Is the library usage of Indirect Cost Recovery monies to support resource acquisition, support services, or other purposes tracked and/or reported? If so, for what purpose?

   a. How are the effects of impact of this support (or lack thereof) understood, valued, and/or articulated by the library?

7. Does the rise and fall of total research funding at the institutional level affect the revenue to the library? If so, what has been the impact that you have observed?

8. If the library receives Indirect Cost Recovery monies from campus, are there any policies regarding the carryover of funds (e.g., a requirement to spend a certain percentage a year)?

9. Briefly tell us about any experiences, conversations, etc. regarding Indirect Cost Recovery monies on your campus in relationship to the library.

10. Would you be interested or available for a short follow-up conversation? If so, please list your contact information: _____

Appendix 2
Completed responses only

Campus FTE

- average: 22,490.77
- median: 19,776.5
- range: 2,500–nearly 81,000

Total library budget

- average: $18,704,882.50
- median: $17,220,626
- range: $1,192,111–$55,725,125

Annual total research funding for entire institution, if known

- average: $330,953,568.30
- median: $140,000,000
- range: $30,000,000 – $1,400,000,000
- "unknown" or similar responses = 5

Appendix 3
Completed responses only

Are any Indirect Cost Recovery (ICR) monies designated to go to the library budget

- yes = 12
- no = 27

If your library receives any ICR monies, is there a set percentage?

- yes = 5
- 2%
- 1.95%
- 3% (from the top)
- 3%
- 10%
- no = 7

If your library receives ICR monies, are there any specifications and/or stipulations for the use of those monies? (responses from the five libraries that receive ICR Monies)

- No: 4
- Yes: 1

What are those specifications and/or stipulations for the use of ICR monies?

- "Must be used to support journal and software subscriptions"
- "To support faculty research"

Is the library usage of ICR monies to support resource acquisition, support service, or other purposes tracked and/or reported?

- Yes: 4
- No: 8

For what reason(s) is/are the library usage of ICR monies tracked and/or reported?

- We are an RCM campus (budget model); therefore, ICR is distributed to the unit that generates the ICR. The Libraries receive ICR that is associated with our own grants, not from collegiate grants. All ICR for collegiate or other institutional research is attributed to the unit that generates the grant.
- Financial reconciliation
- Tracked via normal budget process to see what was expended on subscriptions
- To monitor the expenditure of funds

How are the effects of the library usage of ICR monies understood, valued, and/or articulated by the library?

- NA (see last question)
- It is unclear
- This process in in the first year and so we have not articulated the value yet. However, the ICR monies are the reason we have not had to cut journal subscriptions.
- Not well understood in the past. However, efforts are underway to educate the Libraries' administration to its availability and usage purposes

Does the rise and fall of total research funding at the institutional level affect the ICR monies to the library?

- Yes: 6
  – "So far, not much impact, because the amounts are not too variable year by year
  – "These funds have been relatively stable, but have decreased once in the last decade when total funding decreased."
  – "We use the monies for special projects so it has less of an effect"
  – "very little, as we are (perhaps overly) cautious about spending these funds anyway"
  – "Less ability to offer travel to professional development activities for faculty"
  – "Historically, we hover around the 2 percent range but in some years have received more based on the research dollars."
- No: 6

Are there any policies regarding the carryover of ICR monies (e.g. a requirement to spend a certain percentage each year)?

- Yes: 2
  – "The monies are to be spent in the fiscal year received."

- "...depends on whether the IDC is following a PI or the office of the dean. Monies stay with PI, monies allocated to Deans may be swept if there is carryover. Library only receives IDC as part of our own grants or similar agreements, not as a general portion of research dollars. Cost recovery in grants for "library" is just part of general overhead."
- No: 10

Please briefly tell us about any experiences, conversations, etc. regarding ICR monies on your campus in relationship to the library.

- Before RCM, collegiate ICR did flow to the Libraries, but not based on any formula or policy. Under RCM, attribution of ICR to the Libraries (other than that which we generate) doesn't fit the model.
- Affirmed ICR monies through MOUs
- None that I am aware of.
- IRC monies are one funding source that makes up the general university allocation and are not broken out as a separate source of funds in the libraries budget.
- The way it is set up is very beneficial to the library and there is no heavy handed oversight, so far.
- As I said, this is a new arrangement between the Libraries and the Office of the Provost. It was put in place to remove subscription increase requests from the normal budget request process. We are piloting a lump sum distribution from the Provost's ICR monies that goes directly to journal, database and software subscriptions. The lump sum was calculated using industry figures and historical data. We agreed on a lump sum for 3 years with review after the 3rd year.
- Within the library, we discuss improving our planned use of the funds. No discussions outside the library of which I am aware.
- I should clarify that the foregoing responses refer only to indirect cost recovery via grants awarded to the libraries and specific allocations of indirect cost recovery funds to library initiatives. There have been no discussions to my knowledge about the use of indirect cost recovery funds to support general library operations.
- It often comes up that there is a library cost recovery (usually people talk about it as somewhere around 4%) on grants and "why isn't that allocated to us directly" and in a transparent manner. The answer historically has been that it is just part of the general overhead for campus facilities and services, it keeps the lights on, etc. At another institution I did see the specific federal formula/calculation for library cost recovery on grants, but again, it did not appear as a direct fund to the library.
- I'm only interim, but my understanding is that the formula was worked out in the 70s, and ever since then the budget has been a request to the provost based on previous year plus increase in collections costs.

Developing Objective Criteria for Promotion

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Abstract

While the Association of College and Research Libraries provides guidelines for appointment, promotion, and tenure of librarians with faculty status,[1] few academic libraries have created an objective set of categories and activities that is designed to reflect the broad range of professional work that can be produced by librarians and archivists in today's academic libraries. This paper will give a brief discussion and a description of the policy and the rubric created by the University of Texas Arlington (UTA) Libraries Associates of the Faculty Promotion Policy Task Force. The policy and the rubric were designed to provide an objective and progressive tool that could be used for candidates to self-assess their progress over the course of their career, and for the promotion committee to evaluate the evidence submitted in the candidate's dossier when an application for promotion was received. They address performance and evidence in three categories: librarianship, scholarly materials and activities, and service.

The rubric is designed to not only expand upon the evidence definitions created by the policy, but also to provide examples and criteria that will indicate the level of success evidenced by the supporting documentation. It provides a scoring strategy for each of the three categories based upon quantity, quality, or complexity of the activity that evaluates not only traditional types of scholarship and service, but also emerging scholarship and service as well.

Introduction

The UTA Libraries has had a promotion policy for nearly 20 years, which was intended to provide a mechanism for advancement for librarians and archivists outside of the management structure within the libraries. In 2013, a task force was charged by the dean of libraries to begin the process of drafting a new policy and an associated evaluation rubric. A comprehensive review of the literature related to tenure and promotion of academic librarians showed that the conversation in this area has largely revolved around the concept and definition of faculty status for academic librarians. While librarians and archivists within the University of Texas system do not have faculty status, and in fact have a unique status as associates of the faculty, the committee felt that an environmental scan of what the tenure and promotion process looked like, regardless of the possibility of tenure at our institution, would benefit its work. A national survey conducted by Betsy Park and Robert Riggs in 1989[2] collected and compared the standards used to evaluate academic librarians for promotion, among other things. Their **College & Research Libraries** article, "Status of the Profession: A 1989 National Survey of Tenure and Promotion Policies for Academic Librarians," urged the development of guidelines in academic libraries to make the promotion process more transparent. Subsequent articles by other practitioners broadly concurred with this recommendation, whether they were based upon internal reviews of policy, system level policy reviews, or national survey results.

Armed with this perspective and a charge from the dean of libraries to develop a more transparent promotion policy, the task force was created to do this work. This task force was initially composed of the original career status committee with two additional members. Some members of the group were managers and others were not. The group set about revising the libraries' existing policy, which had been in effect since 1995. The legacy policy addressed titles, equal opportunity employment and affirmative action, eligibility requirements, application to new hires, roles and responsibilities, and composition of the career status committee. Although some minor revisions had taken place in the previous five years, no substantive changes had been made.

Methodology

The first order of business was defining the desired outcomes of the initial charge. These were: creation of a coaching element specifically for supervisors, clear specifications for the use of recommendation guidelines,

inclusion of a mentoring element for new associates of the faculty, an opt-in or opt-out provision for all librarians and archivists, and criteria that were clear and objective and provided a clear pathway for development and promotion, as well as required documentation from both the supervisor and the review committee which could be provided to the candidate. Specifically, the policy should express a balance of both internal and external service and scholarship and reflect new models of intellectual engagement and contribution along with more traditional methods.

After clarifying the charge, the task force completed a literature review and an environmental scan to determine the current best practices. This was followed by a structured interview of 13 questions conducted with peers from libraries at four other institutions: one peer, two aspirational peers, and one small private college. The interviews resulted in identification of several themes, the most relevant of which were:

1. Just as had been discovered in the literature review, faculty status varied among the institutions that were interviewed.

2. All four institutions had progressive ranks or levels, three were similar to UTA, having assistant librarian, associate librarian, and librarian and one having librarians I through IV.

3. All institutions had transparent processes, which is to say that candidates were provided written feedback indicating the committee's decision.

4. There was no opt-out process for the first level of promotion at three of the four libraries, participation was required, and, in fact, if promotion was not received at those institutions, employment was terminated.

After interviewing a senior university administrator about the dean's desire to have a true tenure policy and realizing that this was not possible, it was decided that the new policy would mirror as closely as possible the non-tenure-stream faculty guidelines at UTA for promotion.

The Process

During the environmental scan, the framework set forth in the policy from the private college impressed the task force members sufficiently that permission was sought and obtained to use it as a foundational document. It would be the foundation for the document that would be created over the next three years, with the task force meeting weekly for three hours to work on it as a group. The task force paid great attention to the necessary balance between the dean's charge and the needs of the associates of the faculty. At several points during the process, sections of the working document were shared with all associates of the faculty for their feedback and input. While no promises were made as to inclusions or changes, care was taken to ensure that the task force was keeping all perspectives in balance.

Because participation could not be mandated, the policy describes two tracks for librarians and archivists. Track 1 is for those on the promotion pathway and Track 2 is for those who are choosing not to participate. Associates of the faculty on Track 1, the promotion track, receive additional incentives of a guaranteed base of financial support for professional development and travel, along with additional support for participation, such as conference presentations or committee work, as well as salary advancement as part of the promotion process. Those on Track 2 have no guaranteed support for professional activities and no salary increase based upon promotion, although they are still eligible for the university's merit increases, as all employees are.

Ultimately, the new policy included three broad categories of activity that were required of all librarians and archivists to be considered for promotion: librarianship, scholarship, and service. In order to increase objectivity and transparency in the process, a rubric was created so that candidates could evaluate their own dossier using the same criteria that the promotion recommendation committee would use. While the broad categories were clearly described in the policy itself, the rubric provides specific examples in each category,

with points associated with each type and/or frequency of activity. General descriptions of the three categories are:

- Librarianship—scoring reflects performance in the primary role. It is evaluated and scored using two metrics: average score on a minimum of two performance evaluations at UTA and the supervisor's recommendation for promotion, which is a pass/fail requirement.
- Scholarship—this was designed to be comprehensive but not explicit. This section is subdivided into formal scholarly publications, informal scholarly publications, and scholarly materials or activities. The challenge for the task force was to write descriptions that were general enough to allow for future activity that might not yet be imagined, but still specific enough to be useful in helping candidates evaluate their own performance. The supporting rubric provides much greater specificity with regard to scholarly output and activity. The broadness of the policy definition was intentional, as any future changes to the policy would require a successful vote by the associates of the faculty.
- Service—this includes service to the profession, at any level, from local to international, as well as teaching outside of core job requirements, mentoring, and supervision.

Each section is weighted as a percentage of the total, with a minimum number of points that must be achieved in each one in order for a candidate to be promoted. These section minimums must also be achieved in all sections, or the candidate is not promoted. The weighted values are different depending upon which rank a candidate aspires to. For those applying from assistant to associate librarian or archivist, job performance is weighted more heavily, while advancement to the senior rank requires more scholarly activity and service to the profession. And there is an overall requirement that there must be some activity in each category within the five years prior to application in order to be successful.

The policy itself defines all of the elements that must be included as part of a complete dossier, and candidates are told what kind of supporting documentation defines evidence of activity. The order of the completed dossier is provided, and the associated evidence for each activity is required to be included. The completed submission should be one continuous PDF document, submitted digitally for review by the promotion committee.

Rubric Creation

Merriam Webster defines a rubric as "a guide listing specific criteria for grading or scoring academic papers, projects, or tests." According to James Popham, rubrics have three essential features: evaluative criteria, quality definitions, and a scoring strategy.[3] In her 2009 guide for librarians about the information literacy instruction assessment cycle, Megan Oakleaf posited that when it comes to learning outcomes, rubrics offer a specific and systematic way to examine them and a method to examine tangible evidence of that learning.[4] The task force felt that a progressive description and evaluation of activities could best be expressed in the form of a rubric, one that would attempt to equate different activities based upon intellectual effort. While there is some subjectivity in the evaluation of intellectual effort, this was agreed to be the best starting point for the creation of an objective set of standards that would inform and guide all librarians and archivists. Beginning with the general list of activities from the policy itself, the task force then crowdsourced this list to add more details that could be used to create a comprehensive rubric. This was done both locally with our peer group and virtually, through several email lists that various task force members participated in.

As previously mentioned, the policy reflects activity in three broad categories. The rubric itself is an Excel workbook composed of seven worksheets. The first worksheet is an introduction, which describes how each worksheet should be used and how scoring and weighting of results is done. The second worksheet evaluates the completion of the dossier provided, as well as librarianship. As can be seen in Figure 1, all items from the required list must be submitted or the candidate does not progress.

Figure 1. Promotion Policy Rubric, Librarianship

Scoring Rubric

Items I-VIII from the Documentation for Candidates for Promotion submitted? YES ☐ NO ☐				
All items must be present for the candidate to continue in the process.				
Section 1: Librarianship or Archival Work (60% for associate and 45% for senior)				
Category	Superlative Contributions (3 points)	Adequate Contributions (2 points)	Minimal Contributions (1 point)	No Substantive Contributions (0 points)
Average scores from performance evaluation documents	Expert (Outstanding)	Proficient (Solid performer)	Developing (Needs improvement)	Unsatisfactory
Supervisor supports promotion	N/A	Yes	N/A	No
	0	0	0	
Candidate's total for Section 1	0			
Total possible for Section 1	5			

The third, fourth and fifth worksheets are used to evaluate scholarly publications and activities, with one worksheet for each of the three subgroups mentioned above. Section 2A reflects evaluation of more traditional publications, such as books, book chapters, and articles. The following two figures illustrate how point assignments vary within the same rubric in order to recognize what is regarded to be higher levels of intellectual effort required for a given activity.

Figure 2. Promotion Policy Rubric, 2A, top.

Section 2: Scholarly Materials or Activities (20% for associate and 30% for senior)			
Part A.1: Formal Scholarly Publications*			
9 points	6 points	3 points	0 points
Solo-authored book published by a scholarly press	Coauthored or solo-edited book published by a scholarly press	Coedited book published by a scholarly press	No book
3 OR MORE Solo-authored peer-reviewed journal articles	2 Solo-authored peer-reviewed journal articles	1 Solo-authored peer-reviewed journal article	No articles
3 OR MORE Solo-authored chapter contributions to an edited book	2 Solo-authored chapter contributions to an edited book	1 Solo-authored chapter contribution to an edited book	No chapters
0	0	0	

Figure 3. Promotion Policy Rubric, Section 2A, bottom.

Part A.2: Formal Scholarly Publications*			
6 points	**4 points**	**2 points**	**0 points**
3 OR MORE Coauthored peer-reviewed journal articles	2 Coauthored peer-reviewed journal articles	1 Coauthored peer-reviewed journal article	No articles
3 OR MORE Coauthored contributions to an edited book	2 Coauthored contributions to an edited book	1 Coauthored contribution to an edited book	No chapters
0	0	0	
3 points	**2 points**	**1 point**	**0 points**
3 or more articles in a journal or trade publication that are not peer-reviewed	2 articles in a journal or trade publication that are not peer-reviewed	1 article in a journal or trade publication that are not peer-reviewed	No articles
6 or more book reviews	5 book reviews	1-4 book reviews	No book reviews

Worksheet Section 2B is used to evaluate less formal publications, such as project related working papers, technical guidelines produced at any level and includes participation in a grant related project as well as participation in social media outlets that are "in-depth, substantive, currently relevant, and focused on the profession itself." As seen in Figure 4 below, this also includes activities such as software or app creation or derivative works of that kind.

Figure 4. Promotion Policy Rubric, Section 2B, bottom.

Creation and continued administration of 2 or more nationally known social media outlets that are in-depth, substantive, currently relevant, and focused on the profession itself (i.e., archives and libraries) or on issues closely related to the profession (e.g., a blog AND a Twitter account that have 2000 or more followers each)	Creation and continued administration of 1 nationally known social media outlet that is in-depth, substantive, currently relevant, and focused on the profession itself (i.e., archives and libraries) or on issues closely related to the profession (e.g., a blog OR a Twitter account that has 2000 or more followers) OR 30 or more postings to others' blogs or a Listserv that are in-depth, substantive, and focused on the profession	Creation and continued administration of 1 or more social media outlets that are in-depth, substantive, currently relevant, and focused on the profession itself (i.e., archives and libraries) or on issues closely related to the profession (e.g., a blog OR a Twitter account) OR 20-29 postings to others' blogs or a Listserv that are in-depth, substantive, and focused on the profession	No creation a[nd] continued administration [of] social media o[utlets] than 19 contri[butions] to Listservs
3 or more articles in or shorter contributions to international or national news outlets, magazines, or other popular press outlets	3 or more articles in or shorter contributions to city or state news outlets, magazines, or other popular press outlets	3 or more articles in or shorter contributions to university or library news outlets, magazines, or other popular press outlets	2 or fewer arti[cles] or shorter contributions t[o] popular press
0	0	0	
9 points	**6 points**	**3 points**	**0 point[s]**
Original or derivative creation of 4 or more mobile apps or other software relevant to librarianship or archival work	Original or derivative creation of 2-3 mobile apps or other software relevant to librarianship or archival work	Original or derivative creation of 1 mobile apps or other software relevant to librarianship or archival work	No creation o[f] apps or other software

| Introduction | Librarianship | Section 2A | **Section 2B** | Section 2C | Service | Summary |

The worksheet for Section 2C provides evaluation for scholarly activities, including things such as conference and workshop presentations, work in service of a conference or journal, and creation of digital

learning objects and datasets. Figure 5 provides some of the clearest examples of how the task force defined point differentials between activities. In this case, presenting a national or international preconference is valued more highly than a state or local level preconference, although it is possible for a candidate to score points in both. This example also clearly illustrates a decision that there were some activities that would be more limited in the points that could be accrued, in order to encourage associates of the faculty to have greater breadth in their scholarly work. Points earned for conference presentations will top out at "3 or more." There are similar upper limits for some formal scholarship as well. While this may seem counterintuitive when considering that the total points earned are what result in promotion or not, the task force felt very strongly that librarians and archivists should have a broad variety of professional contributions and activities.

Figure 5. Promotion Policy Rubric, Section 2C, top.

Part C: Scholarly Activities			
3 points	2 points	1 point	0 points
Service as an editor of a peer-reviewed journal	Service as an invited editor of a special issue of a peer-reviewed journal OR service as a reviewer of a peer-reviewed journal	Service as a reviewer of proposals for a scholarly conference	No service as an e or reviewer for a j or conference
Presenter at a preconference workshop at a national or international conference	Presenter at a preconference workshop at a state or multistate regional conference	Presenter at a preconference workshop at a regional (e.g., north TX) or local conference	No preconference presentation
Invited to teach at 1 or more national-level workshops (e.g., ACRL Immersion)	Invited to teach at 1 or more state-level workshops	Invited to teach at 1 or more local-level workshops	0 teaching invitatio
3 or more peer-reviewed conference presentations*	2 peer-reviewed conference presentations*	1 peer-reviewed conference presentations*	No conference presentations

Similarly, the service worksheet evaluates contributions at many levels, from participation in library committees and campus events to participation in national organizations, as well as service as a formal mentor to a library school student or practicum participant, and any awards or honors that the candidate may have received.

Figure 6. Promotion Policy Rubric, Section 2A, bottom.

N/A	10 or more opinion pieces in a journal or trade publication	1-9 opinion pieces in a journal or trade publication	N/A
	x		
3 or more professionally published bibliographies or other substantial, special-topic user guides (regular disciplinary subject guides are considered part of librarianship)	2 professionally published bibliographies or other substantial, special-topic user guides (regular disciplinary subject guides are considered part of librarianship)	1 professionally published bibliography or other substantial, special-topic user guides (regular disciplinary subject guides are considered part of librarianship)	No professionally published bibliographies or other substantial, special-topic user guides (regular disciplinary subject guides are considered part of librarianship)
X			
3	2	0	
3	2	0	
Candidate's subtotal for Section 2, Part A	5		
Subtotal possible for Section 2, Part A	60		

*Invited authorship of any of the above publications will lend weight to the publication and help candidates whose score may

As shown by Figure 6, each worksheet has a summary of points achieved for that particular subcategory or category. The final worksheet (see Figure 7) is a point summary page for the entire workbook—the combined totals of the formulas from all the previous worksheets—with weighted values compared to the required weighted minimums for each rank. The candidate must meet or exceed the minimum weighted score in each of the three categories, or they will not be recommended for promotion.

Figure 7. Promotion Policy Rubric, Summary Section.

		C	D		E	
Associate Librarian						
	Weighted Value (%)	Points Earned	Total expected points	Results of C/D	Candidate's Score (E x Weighted Value)	Minimum weighted score necessary
Section 1: Librarianship	60	0	5	0%	0	48
Section 2: Scholarship	20	5	23	22%	4	17
Section 3: Service	20	0	13	0%	0	15

		C	D		E	
Senior Librarian						
	Weighted Value (%)	Points Earned	Total expected points	Results of C/D	Candidate's Score (E x Weighted Value)	Minimum weighted score necessary
Section 1: Librarianship	45	0	5	0%	0	36
Section 2: Scholarship	30	5	30	17%	5	24
Section 3: Service	25	0	20	0%	0	20

Both the policy and the rubric are available to candidates in the Research Commons, the UTA Libraries' institutional repository.[5] All associates of the faculty are encouraged to use the rubric to score themselves prior to submitting their name for promotion consideration in each year's cycle, whether that is during the two-year review for assistant librarians and archivists or prior to their dossier submission. Additionally, supervisors are required to use the rubric to evaluate their direct reports during the annual performance review process so that they may guide their professional development.

Norming the Rubric

When the rubric was completed, the task force went through a process to validate the assignment of points and overall scoring. After requesting and receiving permission from a dozen past candidates to use their archived promotion dossiers, whether for promotion to associate or senior librarian or archivist, the group scored these dossiers using the rubric to determine whether the resulting scores were consistent with past results under a less objective system. In addition to giving the group experience in the use and usefulness of the rubric, the evaluation also showed that the overall points required in the service category should be slightly increased. This activity was also the first experience of norming the rubric on a specific subset of dossiers, and the group learned a lot in the process. Claire Holmes' and Megan Oakleaf's article, "The Official (and Unofficial) Rules for Norming Rubrics Successfully," was very useful to the task force who developed the rubric, as well as the subsequent promotion policy committees who evaluated the dossiers in the cycles following approval of the policy.[6] A good understanding of the "official" and "unofficial" rules helped to decrease tension when there was disagreement about scoring. Even though every attempt had been made to make the policy and the rubric as objective as possible and to create a committee with as broad a perspective as possible, there are still some activities where shared definitions are critical. One example, which indicated a need for an addition to the rubric, is the definition of a digital learning object (DLO), as described in Section 2C. Without a clear understanding of the UTA Libraries' definition of a DLO, which is found in a specific local document, it is an easy item to misunderstand.

Conclusion

Thus far, the rubric has been applied to three different groups of promotion candidates, with minor changes recommended from each cycle. It has been noted that supervisors, candidates, and committee members alike will benefit from a thorough reading and understanding of the documents. While some ambiguity within both documents was intentional in order to allow for activity that might not have been imagined by the committee during the creation of the document, a lack of understanding of the basic categories has motivated the promotion committee to offer both training and one-on-one mentoring through the process to any candidate who requests assistance. The current committee expects this need to continue to exist, and is exploring ways to mitigate some of the difficulty that candidates might experience in completing their dossier. There has been an exploration of the development of a web form for dossier creation, as well as the creation of a more durable form of the rubric for use by any associate of the faculty. Feedback from candidates has been generally positive, although preparation of the dossiers is still a very detailed and time consuming process. For those candidates who were not successful, there has been much greater clarity about what they can do to increase the number of points earned for a future application.

Norming the rubric each time that the promotion committee meets to evaluate dossiers is critical to a smooth process, and the committee has plans to create an exemplar dossier to do just that prior to evaluating actual candidate dossiers. The items chosen for this will be from a variety of different archived dossiers and the exemplar dossier will also be used to show candidates what their dossier should look like, in terms of CV and presentation of evidence. The policy and the rubric have practical implications in any libraries where librarians and/or archivists do not have faculty status within their university system, and where an objective and inclusive advancement process is desired. They are not only valuable to UTA but could also be adapted for use in any other academic library, as well as in other types of libraries.

Notes

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Meta-Assessment: The ARL Library Assessment Ecosystem Modified for Montana State University

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Abstract
How can we apply an assessment lens to our own assessment practices? To answer this question, we follow a mixed-methods approach by applying the assessment ecosystem design described in the recent ARL Assessment Program Visioning Task Force Recommendations (December 17, 2017). Our research synthesizes the evidence and insights gathered through three methods: a case study analysis, a comparative analysis, and a gap analysis.

First, we examined a case study of a UX and Assessment (UX&A) program recently developed at Montana State University (MSU). The vision of the UX&A program at MSU is to build and sustain a library that is useful, usable, and desirable for our diverse community of users. UX&A personnel work collaboratively with other library departments to continually measure, assess, and improve users' experience of library services and instruction, both physical and online. This new UX&A program was developed in tandem with a new library strategic plan, which is based on the Balanced Scorecard framework.

With the new assessment program and strategic plan in place, we conducted a second phase of research: a comparative analysis of the MSU UX&A program vis-à-vis the assessment landscape described in the ARL recommendations. In this analysis, we highlight which ecosystem elements are currently in place, which elements are in development, and which still need to be developed at MSU.

Next, we conducted a gap analysis comparing the ARL recommendations with established and emerging user experience and assessment programs in place at other research libraries to determine if there are additional elements outside of these recommendations that may be useful for describing, assessing, and improving a library's assessment framework.

Finally, we synthesized the insights gathered from our meta-assessment to create an enhanced version of the ARL ecosystem as applied to the MSU library. In terms of practical impact, this enhanced meta-assessment ecosystem can be applied to comprehensively evaluate and improve a library's user experience and assessment program. Our research ultimately demonstrates and models an approach for meta-assessment that can help inform the development of more effective and sustainable library UX and assessment programs for the ultimate benefit of our users.

Introduction
Just as library services can be improved through assessment, so too can assessment itself be improved through strategic, critical self-reflection. The research discussed in this paper represents a critical reflection of a User Experience and Assessment program recently initiated at Montana State University. We use the recently developed ARL Assessment Ecosystem as an initial guide for our meta-assessment. The ARL Assessment Ecosystem was developed in the spirit of reflecting critically on the long-standing traditional statistical gathering ARL has done over the years as well as on the more recent new measures initiatives that resulted in established library assessment protocols.[1] Additional self-assessment data was produced through qualitative interviews conducted with peer professionals at five different library organizations.

Project Context and Background

Library assessment has increased in prevalence and scope over time.[2] As assessment in libraries continues to develop, the practice has taken on a stronger intention around user-centeredness.[3] Consequently, library organizational structures have begun to reconfigure in order to amplify and integrate user experience design, user-centered design, service design, and other newer approaches that complement traditional assessment practices. Notable examples include [University of North Carolina Chapel Hill](#), [Duke University Libraries](#), [Yale University Libraries](#), [Harvard University Libraries](#), the [University of Tennessee Knoxville](#), [University of Michigan Libraries](#), [Iowa State University Library](#), [Emory University Libraries](#), [University of Illinois Urbana-Champaign](#), the [University of Washington](#), and the [University of Virginia](#), among others. These programs demonstrate a collective intention towards a user-centered assessment practice.

An evolving assessment landscape has generated an understanding of barriers and opportunities and has also established a set of skills and competencies.[4] The Association for Research Libraries (ARL) has also produced a report that presents recommendations for investment, maintenance, and disinvestment of assessment programs, services, and tools as well as for new service areas.[5] From this place of assessing assessment, we posed the following meta-assessment research question: how can we critically reflect on our own assessment practices? To answer this question, we follow a mixed-methods approach described in detail below.

Research Methods and Results

Our research synthesizes evidence and insights gathered through three methods: a case study analysis, a comparative analysis, and a gap analysis.

Case Study

Created in December 2017, the Montana State University Library's User Experience & Assessment (UX&A) program was established to enhance our organization's understanding of the user and increase our collective capacity for assessment by providing leadership and support for user-focused assessment work throughout the library, for the ultimate benefit of our users.

This new UX&A program was developed in tandem with a new seven-year library strategic plan, which is based on the Balanced Scorecard framework and places the user at the center of the future library developments.[6] Our vision is to build and sustain a library that is useful, usable, and desirable for our diverse community of users. Our mission is to achieve this vision by working collaboratively with all library departments to continually measure, assess, and improve users' experience of library services and instruction, both physical and online. UX&A staff comprises 1 FTE librarian and 0.5 FTE staff. We engage in the following activities that blend together the work of user experience and library assessment:

- Building and sustaining the library's organizational culture of faculty- and staff-led assessment, user-centeredness and user advocacy, and evidenced-based, data-informed decision-making;
- Collecting and analyzing data to evaluate the library's institutional impact and holistically understand the needs and priorities of library users;
- Proactively identifying and relieving "pain points" users may encounter in their experience with the library;
- Proactively identifying and amplifying "happy moments" users may encounter in their experience with the library;
- Amplifying the library's organizational culture of empathy and inclusion for faculty, staff, students, and the public through user-centered research, reporting, and trainings;
- Contributing to library leadership by providing user-centered analyses that inform decision-making and resource allocation;
- Contributing research and analysis that measures the library's progress towards meeting the goals and objectives of the library's strategic plan;

- Supporting library faculty, staff, and administration in aligning library effort around university and library strategic planning, and by crafting stories of value and impact for internal and external stakeholders; and
- Developing an organizational vision and practice for the collection, storage, usage, sharing, retention, and deaccessioning of user research and assessment-related data.

Recent accomplishments that highlight UX&A's local context and direction include strategic plan assessment, library learning spaces, and the Indigenous Participatory Design Toolkit.

Strategic Plan Assessment

With the MSU Library's seven-year strategic plan in place, UX&A's first major project was to refine and finalize the 26 measures that correspond to the plan's 12 objectives.[7] These measures have been developed in collaboration with personnel identified as key stakeholders for each objective. In alignment with UX&A's user-centered ethos, a participatory approach has been employed for this process. UX&A staff have met with these key stakeholders in a series of meetings that have emphasized a generative approach that relies on the knowledge and experience of all staff that have an immediate relationship to develop the identified measure. In these meetings, UX&A staff ask participants to refine measures to take into account local knowledge and expertise; determine which extant and/or new data will be needed for this measure; and possible initiatives that the library could collectively engage in to improve the measure over time. This approach exemplifies the synthesis of user experience and assessment that UX&A aims to achieve. By blending the traditional, quantitative approach to library assessment with the knowledge and lived experience that comes from our users, the hope is that the MSU Library's strategic plan yields a library that is useful, usable, and desirable for our diverse community of users.

Library Learning Spaces

In spring 2018, UX&A was charged with creating a Learning Spaces Taskforce to examine the contemporary needs and desires of library learners and teachers within the context of one of the MSU Library's classrooms. The charge of the Learning Spaces Taskforce was to: (1) present a series of recommendations for remodeling classroom space to better fit with contemporary needs and desires, and (2) amplify and align the strategic plan to emphasize the learning spaces ecosystem of MSU Library. Through mixed-methods research that included a survey and design workshop with library staff and students, the Learning Spaces Taskforce developed a set of findings and recommendations that ultimately informed recommendations for improving the MSU Library's classrooms and the overall library spaces ecosystem.[8] These recommendations are being taken into consideration as the MSU Library prepares to undergo a major remodel of its entire second floor over the next year. This project highlights the user-centered character of our assessment program, along with the range of methods that we employ for generating evidence that can inform decision-making.

Indigenous Participatory Design Toolkit

UX&A spearheaded the development of an Indigenous Participatory Design Toolkit with a desire to create a safe space for creative and critical thinking around the real challenges and strengths of Native students.[9] The purpose of this toolkit is to help generate dialogue and understanding across diverse populations, as well as to generate ideas for new services in support of Native student success. This project highlights our attunement to inclusion and equity for our library's diverse community of users.

Comparative Analysis

With the new assessment program and strategic plan in place, we conducted a comparative analysis of the MSU UX&A program vis-à-vis the assessment framework described in the ARL Assessment Ecosystem (Figure 1).[10]

Fig 1. ARL Assessment Framework.

Library Assessment Ecosystem, ©2017 Megan Hurst, Athenaeum21, for the Association of Research Libraries.
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Table 1 shows an overview of our analysis of the ARL Ecosystem compared against the MSU UX&A program. We classify the framework elements into three distinct categories: established, emerging, non-existent. In our analysis, "established" indicates those components that are in place and actively practiced in our assessment program. "Emerging" indicates those components that are represented in strategic goal-setting or are under development. "Non-existent" components are those that are not actively practiced in our program. To help guide our analysis, we also produced a set of self-assessment prompts for each component of the ARL Assessment Ecosystem. These prompts provided a useful frame of analysis for each component.

Table 1. Evaluating MSU UX&A practice via the ARL Assessment Ecosystem.

Ecosystem Element	Self-assessment prompts	Established	Emerging	Non-existent
Library's Culture of Assessment	- Assessment is evident in our planning documents such as strategic plans - Assessment is a campus priority - Administrators/managers are committed to supporting assessment - Staff accepts responsibility for assessment activities - There is support and rewards for staff who engage in assessment		X	

Ecosystem Element	Self-assessment prompts	Established	Emerging	Non-existent
	- Policies and procedures are designed to enable, not inhibit, fulfilling user information needs - Collaboration and cooperation exists among individuals and departments - My library considers user needs when allocating resources - My library actively cultivates a positive relationship with its users - Assessment leads to results in my library - My library routinely collects, uses, and disseminates meaningful user data/feedback - My library evaluates its operations and programs for quality - Staff have expertise and skills in assessment			
Library Staff Skills and Passion	ACRL Proficiencies for Assessment Librarians and Coordinators: 1. Knowledge of Assessment in Libraries and Higher Education 2. Ethics 3. Assessment Methods & Strategies 4. Research Design 5. Data Collection & Analysis 6. Communication & Reporting 7. Advocacy & Marketing 8. Collaboration & Partnerships 9. Leadership 10. Management 11. Mentoring, Training & Coaching RIPL Community of Practice		X	
Library Content Data	1. Collections 2. ILS 3. Institutional Repositories 4. Special Collections		X	
Library Services Data	- What every library employee does and the effects of his/her actions on library users			X
Library User Data	- What every library user does and the effects of these interactions in relation to learning, research, civic engagement and entertainment		X	

Ecosystem Element	Self-assessment prompts	Established	Emerging	Non-existent
Library Technology/ Infrastructure	- The management of system-generated (or computer-generated) data from library employee and library user interactions	X		
Parent Entity's Culture of Assessment	- Accreditation - Assessment is evident in our planning documents such as strategic plans - Assessment is a campus priority - Administrators/managers are committed to supporting assessment - Staff accepts responsibility for assessment activities - There is support and rewards for staff who engage in assessment - Policies and procedures are designed to enable, not inhibit, fulfilling user information needs - Collaboration and cooperation exists among individuals and departments		X	
Parent Entity Technology Infrastructure	- The university has a technology plan that supports its strategy and assessment goals.			X
Library Peer Groups within Parent Entity	- Universities may define their peer groups based on the mission of similar institutions, the extent of their resources, or the educational and citizenship outcomes of the people they service			X
Parent Entity's User Data	- Student data - Faculty data - Facilities use	X		
Other Parent Entity Data (e.g., learning, research)	- F&A Financial data - Student retention and graduation - Faculty research and publication data	X		
Global ranking and benchmarking	- Which ranking services are relevant for the institution? - e.g., USA Today best colleges and universities for veterans (Veteran services rankings)	X		
Governmental Reporting requirements	- IPEDS - ALS	X		

Ecosystem Element	Self-assessment prompts	Established	Emerging	Non-existent
Professional education standards	- Faculty status? - Campus-wide training/certifications for assessment, diversity, etc.		X	
WCAG 2.0 / Section 508 Accessibility Standards	- Has the institution conducted an accessibility audit in the last three years? - Does the institution hold itself accountable to meeting WCAG 2.0 / Section 508 Accessibility Standards? How is this happening?		X	
COUNTER standards	- Does the institution incorporate COUNTER statistics into decision making? - Does the institution utilize software that compiles easily COUNTER compliant statistics?	X		
Library assessment community of practice	- Publishing in relevant peer-reviewed publications - Participating and presenting at established venues such as the Library Assessment Conference, Performance Measurement and Metrics (UK), Evidence-based Library and Information Practice (EBLIP), Library Research Seminar (LRS), NISO Webinars, CNI, Code4Lib, etc. - Coaching and training the next generation of assessment professionals		X	
Library advocacy organizations	- Membership in library advocacy organizations such as SPARC or the Library Publishing Coalition		X	
Higher Ed & Research advocacy organizations	- Does the institution participate, for example, in the Council of Higher Education Management Associations in the US, etc.			X
Tech Vendors	- How does the library manage and interact with products and services provided by third-party technology companies? - How do library employees or library users manage and interact with products and services provided by third-party technology companies? (This really includes all technology vendors across the board even specialized ones such as technical, health, business, legal and other infrastructure components)			X

Ecosystem Element	Self-assessment prompts	Established	Emerging	Non-existent
Publishers / content aggregators	- How does the library manage and interact with products and services provided by third-party entities (vendors, publishers, consortia) for provision of content where library employees or library users interact			X

After reviewing the ARL Ecosystem, we prepared additional iterations that highlight the classification of each component: Figure 2 shows the ARL Assessment Ecosystem with highlighted parts showing which components are "established" at MSU; Figure 3 shows highlighted parts according to which components are "emerging" at MSU; Figure 4 shows highlighted parts according to which components are "non-existent" at MSU.

Fig 2. ARL Assessment Ecosystem showing components marked "established" in the MSU User Experience & Assessment program.
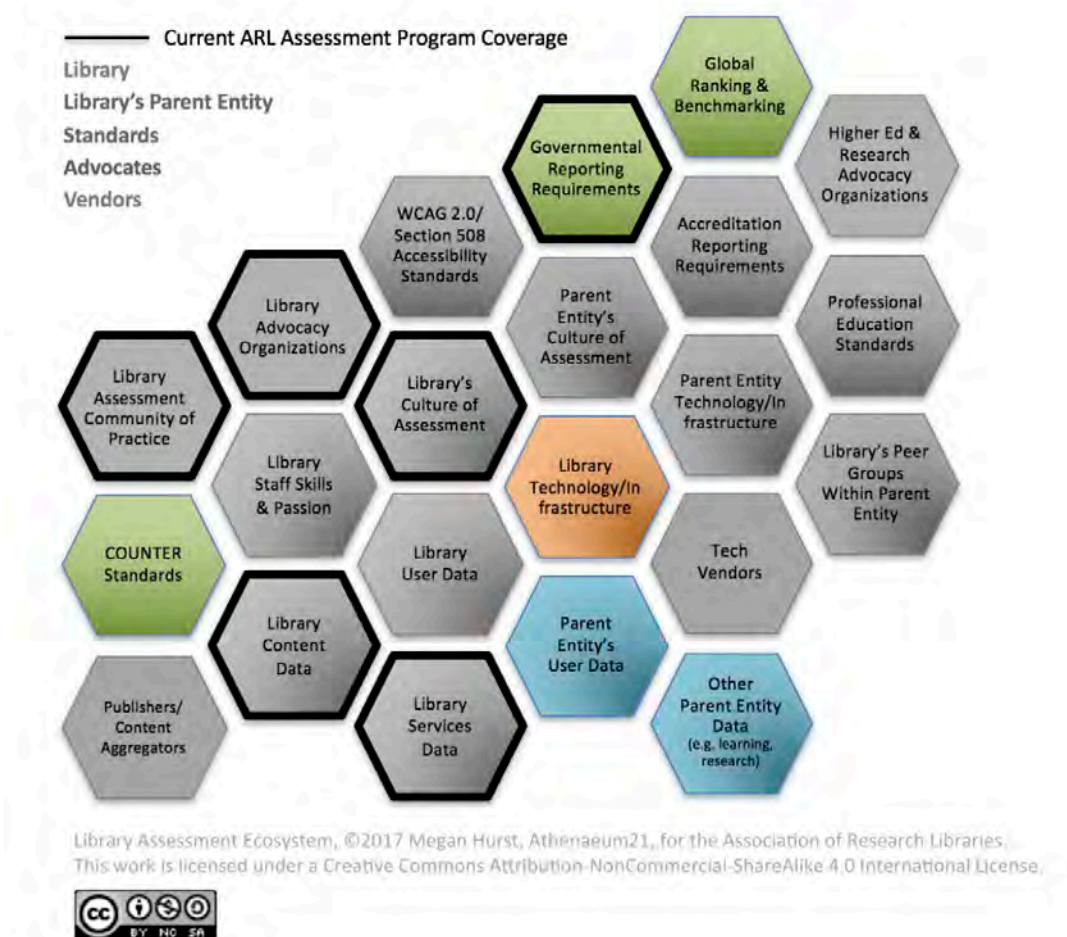
Fig 3. ARL Assessment Ecosystem showing components marked "emerging" in the MSU User Experience & Assessment program.

Library Assessment Ecosystem, ©2017 Megan Hurst, Athenaeum21, for the Association of Research Libraries. This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

Fig 4. ARL Assessment Ecosystem showing components marked "non-existent" in the MSU User Experience & Assessment program.
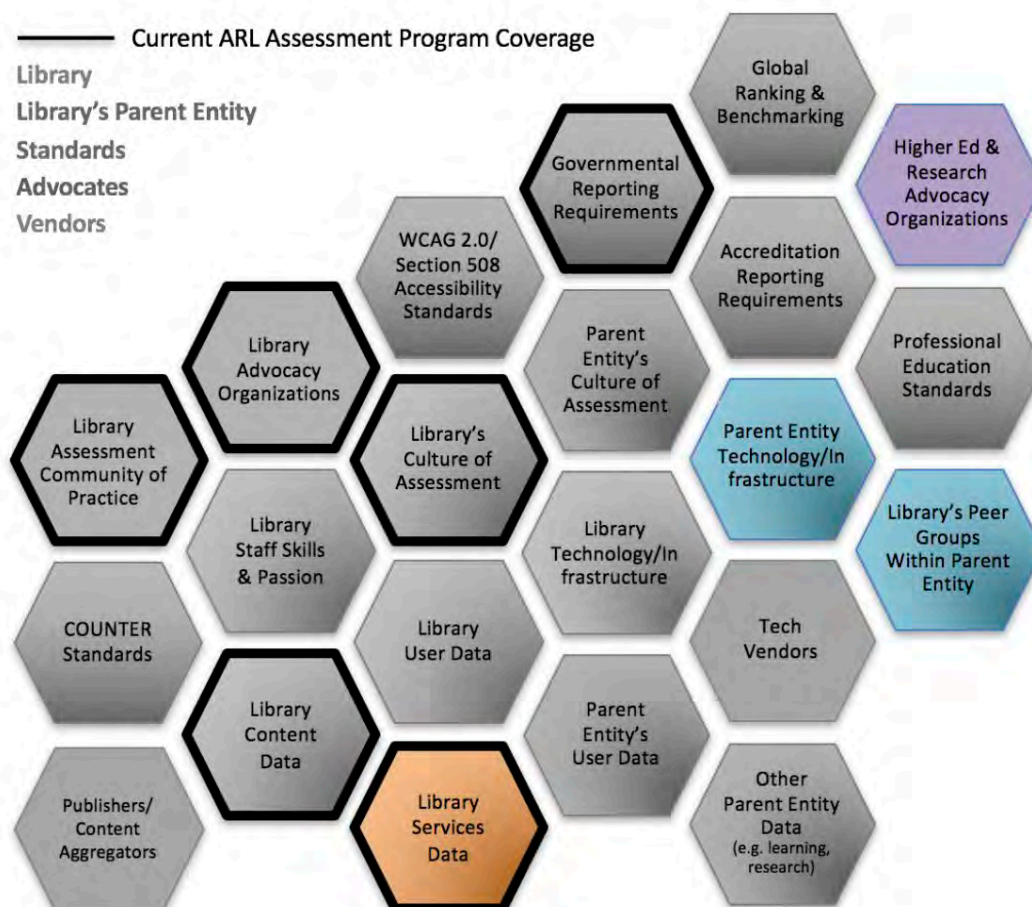
The process of applying the ARL assessment ecosystem to our assessment practice produced a number of useful insights. Most critically, this process allowed us to identify areas of strength and growth. Following the components of the ARL assessment ecosystem, members of the MSU UX&A program engaged in dialogue around the challenges and opportunities of our particular program. Our discussions revealed that our assessment practice is conditioned strongly by local factors, such as our *Library Staff Skills & Passions*, which are emerging and show promise, and our *Library Services Data*, which does not yet exist as such but will be essential for understanding our impact and value. We also discerned that the ecosystem components had various levels of relevance for our program. For example, *Higher Ed & Research Advocacy Organizations* did not have obvious influence for our practice, but *Library Technology/Infrastructure* plays a crucial role in our data collection and analysis. In sum, we found the process of comparing our practice to the ARL assessment ecosystem to be a worthwhile exercise, in that it provided a useful point of reference for self-assessment.

Gap Analysis

Next, we conducted a gap analysis comparing the ARL recommendations with established and emerging user experience and assessment programs in place at other research libraries. We conducted interviews with five different librarians working at four different institutions, each representing a user experience and assessment program in place at an R1 academic library. The interviews revealed common practices, opportunities, and challenges. In our presentation of the results, we focus on four main areas: overall themes, success factors, barriers, and future goals. Analysis was conducting following a content analysis methodology.[11]

Overall Themes

Two common threads tied together our five interviews. First, assessment and user experience programs are in the process of ongoing evolution and transformation. Many programs have been newly formed or recently revised, reflecting the innovative direction of combining user experience with assessment. Within a broader context of organization-wide evolution, assessment and user experience programs are working to establish stable identities and strategic impact areas. Second, programs continue to seek integration across the organization through regular consultation and communication with stakeholders. With a focus on building the culture and the capacity for assessment and user experience, the programs in our study maintain a view towards strategic alignment, staff-led assessment, and data-informed, evidence-based decision-making.

Assessment Success

We posed the following questions related to assessment success: "What does success look like for you?" We received a range of answers, paraphrased below:

- Success looks like people coming to our unit early in their thinking.
- Success is enjoying what you do and feeling you are making a difference. A project is successful when it impacts people.
- Success is when our work contributed to organizational objectives and change.
- Helping stakeholders store data and create reports that leads to consistent success.
- Success is completing the assessment lifecycle: see a problem, study it, develop recommendations, implement recommendations, and then study the implementation to validate recommendations.

Participants were then asked: "What helps success happen?" Three leading factors emerged across the interviews: leadership support, communication, and the integration of assessment into units throughout the organization. Participants were also asked: "What prevents success from happening?" The leading responses—lack of leadership support, lack of data, and poor or no communication—revealed an inversion of the success factors.

In comparing the programs represented in our interviews with the MSU UX&A program, we find useful commonalities and differences. Notably, the assessment programs in our study are similarly challenged in the area of data collection and analysis. Data often resides in different silos that render collection and analysis difficult. Telling a consistent story with inconsistent data is an ongoing challenge to overcome. In terms of difference, we reflected on the various levels of organizational integration and communication. Many of our interviewees expressed a philosophy of empathetic, consultative, and communicative assessment. At MSU, we strive to emulate these characteristics, noting their connections with assessment success.

Recommendations for Practice

Our conclusions are drawn from our case study self-analysis, the comparative analysis vis-à-vis the ARL Assessment Ecosystem, and the gap analysis via the interviews. A synthesis of this evidence allows us to propose a revised, context-aware ARL Assessment Ecosystem for the purposes of a self-assessment (see Figure 5).

Fig 5. Revised ARL Assessment Ecosystem, with updated components that reflect the Montana State University User Experience & Assessment program. In this figure, components that are marked in white have been removed, including *Parent Entity Technology/Infrastructure, Library's Peer Groups within Parent Entity,* **and** *Higher Ed & Research Advocacy Organizations.* **New components have been introduced in pink.**
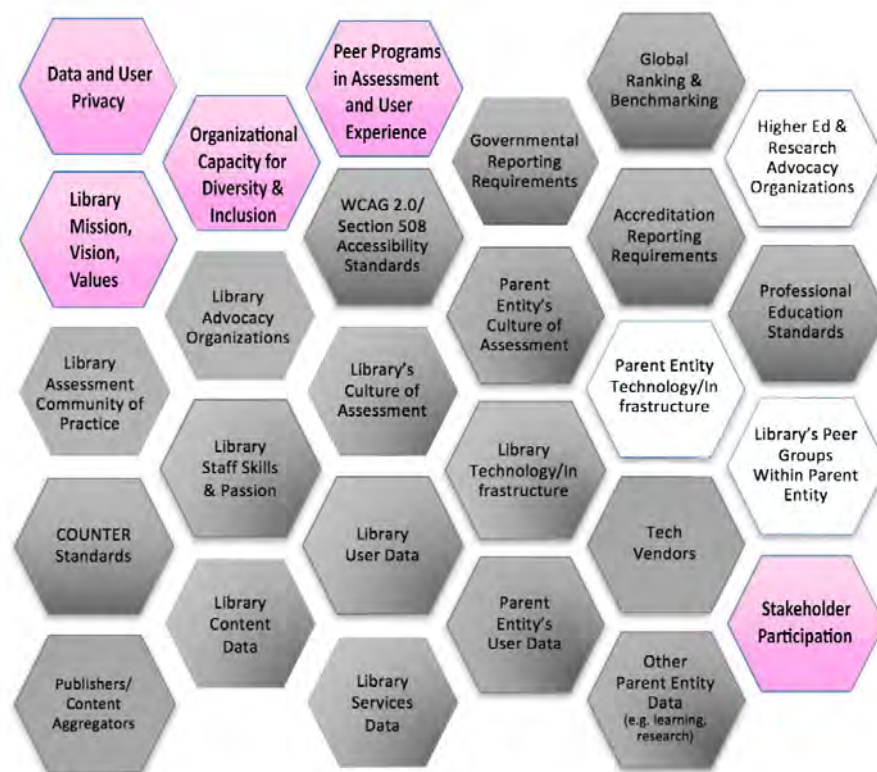
Following our comparative analysis and gap analysis, we modified the ARL Assessment Ecosystem so as to better reflect the local needs and strategic direction of our unique program. For instance, our self-assessment discussions around the ARL Assessment Ecosystem component ***Higher Ed & Research Advocacy Organizations*** helped us see that many higher education and research advocacy organizations do not significantly affect our assessment practice, since our library and parent entity are located in a rural, Western state, and therefore we are of a smaller size and scope relative to ARL libraries that are most typically served by higher education and research advocacy organizations. Likewise with the component ***Parent Entity Technology/Infrastructure***. Our discussions around this component led to the realization that our assessment technology is acquired at the library level and not at the university level. Our library is relatively autonomous within our university context, and our assessment practice is not at the present time significantly conditioned by our parent entity's technology.

For those components that were less relevant for our practice, we removed them in our revised picture. We then added five new components that we believe are relevant for our local assessment practice:

- Library Mission, Vision, Values

- Our library seeks to reflect our organizational mission, vision, and values through all facets of our work, including assessment. Adding this new component signals that these important aspirational and guiding statements are including in our assessment planning and practice.
- Organizational Capacity for Diversity & Inclusion
  - Diversity, inclusion, and equity are notable values for our library and our university. Striving to understand and achieve diversity and inclusion is a key strategic goal for our assessment program, and we deemed it essential to include in our revised, context-aware picture.
- Peer Programs in Assessment and User Experience
  - This new component was inspired by our interviews with other assessment programs. In planning the future development of our relatively new program, we have looked to other organizations for guidance and inspiration. We have also compared our work with advertised positions within our practice area, which has helped to provide insight as to job scope and goals. Comparisons with published assessment proficiencies have also generated useful insights in this area.[12]
- Data and User Privacy
  - In our analysis, we found the issue of privacy to be a notable omission from the original ARL Assessment Ecosystem. Considerations of data security, user privacy, library values, and professional ethics are central to our practice of assessment. This new component is closely related to the existing component for **Library Technology/Infrastructure**, as it influences our negotiations with third-party vendors.
- Stakeholder Participation
  - Our assessment program values participation across stakeholder groups, especially library users. Through a participatory practice, we seek a critically-aware attunement to power and justice in our library assessment practice.[13]

Conclusions and Future Direction

For this project, we conducted a self-assessment of the Montana State University User Experience and Assessment program by comparing our practice to the ARL Assessment Ecosystem and to other peer programs. We found that this process of meta-assessment generated critical reflections and stimulating discussions within our team. The process led to useful insights about our local practice that has informed further development of our new program. In our program, the other 0.5 FTE of the half-time assessment coordinator is dedicated to grant management and submission. Also, the librarian position has faculty status and is engaged in theoretical and applied research. Our 2 FTE program may therefore be better conceptualized as a UXA&R (User Experience, Assessment and Research) program as a result.

We also intend to reflect on our practice in relation to the ACRL Value of Academic Libraries and the five research topics presented in the ARL Assessment Framework prompts:

1. (How) does the library help to increase research productivity and impact?

2. (How) do library spaces facilitate innovative research, creative thinking and problem solving?

3. (How) does the library contribute to equitable student outcomes and an inclusive learning environment?

4. (How) do the library's special collections specifically support and promote teaching, learning, and research?

5. (How) do the library's collections play a role in attracting and retaining top researchers and faculty to the institution?

In terms of practical impact for other programs, our process of revising and contextualizing the ARL Assessment Ecosystem for our local assessment practice can be replicated and applied to evaluate and improve a library's user experience and assessment ecosystem. Even though we asked libraries to reflect on what elements of the ARL assessment ecosystem are reflecting internal strengths, we will need to pursue a conceptualization that would allow other institutions to categorize their activities as established, emergent, and non-existent in future studies. Our project ultimately demonstrates and models an approach for self-assessment that can help inform the development of more effective and sustainable library UX and assessment or UX, assessment, and research programs, for the ultimate benefit of our users.

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Strategic Library Assessment: Aligning with your University's Strategic Plan

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Introduction

Demonstrating academic libraries' value has been an important initiative in the profession since the publication of ACRL's ***The Value of Academic Libraries*** in 2010. This report encouraged libraries to become more closely aligned with their institutions' mission and goals as a mechanism to show their value and contributions to their campuses. Because academic libraries do not exist in a vacuum, but are part of their academic institutions, it is essential that they understand the institutional mission and align services and resources with them and communicate this alignment widely. As stated in the document, "Communicating that alignment is crucial for communicating library value in institutional terms."[1] Furthermore, academic libraries should let the institutional mission guide their assessment initiatives, an approach that provides libraries additional opportunities to show their value to their campus through good data.[2]

More recently, in its 2017 report, ***ACRL Academic Library Impact: Improving Practice and Essential Areas to Research***, ACRL further recommended that libraries:

- Match library assessment to institution's mission
- Include library data in institutional data collection[3]

The ***Impact*** report also recommended that libraries participate in the data environment used by their academic institution in order to report their accomplishments.[4]

And, in ACRL's new ***Standards for Libraries in Higher Education*** (2018), the Association included the following as performance indicators for the Institutional Effectiveness principle:

- The library defines and measures outcomes in the context of institutional mission.
- The library develops outcomes that are aligned with institutional, departmental, and student affairs outcomes.[5]

These guidelines confirm that academic library administrators and assessment librarians need to align strategic planning and assessment efforts with their university's planning operations as an important strategy to show the library's value and contributions to the campus.

The University of North Carolina at Greensboro (UNCG) is a high research activity campus with an enrollment of 20,000 that is part of the 17-campus University of North Carolina system. In fall 2016, the new chancellor began a strategic planning process. The university libraries participate actively in this process each year by submitting goals and metrics and aligning them with the university's strategic plan in the campus data system. This article presents a case study to illustrate how an academic library can demonstrate its value by developing assessments and strategic plans that support the university's mission.

Literature Review

Even before ACRL's value study, librarians began calling for academic libraries to align with their campus mission. Dillon stated in ***No Brief Candle: Reconceiving Research Libraries for the 21st Century*** (2008), "Academic libraries will survive as long as there are universities. However, libraries cannot thrive without aligning their workings directly to the core mission of their host institutions."[6]

More recent studies indicate a disconnect between academic libraries and their institutions' goals and mission. The 2016 Ithaka S&R Library Survey included responses from 722 academic library directors from all types of institutions. The results suggested that directors and their provosts do not always share the same

vision of the library's mission. Those respondents that indicated they had a well-developed strategic plan, however, felt they were more integrated with the institution's senior leadership than those who did not have a solid plan.[7] For ACRL's **Impact** study mentioned above, the researchers interviewed 14 provosts from a variety of institutions. Outcomes of these interviews revealed that communication is essential and that library administrators need to make provosts aware of library efforts that align with institutional mission and goals. Library administrators also need to employ the terminology used by provosts and other university administrators.[8]

In a study published in 2018, Murray and Ireland surveyed provosts at institutions from master's level or above to determine how they perceive academic libraries as playing a role with issues of institutional importance, what types of data they find useful, and what methods of communication are successful to increase library funding. Results showed that demonstrated correlations linking the use of library services and resources with academic success, retention and enrollment, and faculty research productivity were the most important for funding requests. Other types of useful information included use data, user satisfaction, qualitative data, and information literacy student learning outcome data.[9] Respondents indicated that the most helpful communication tool for budgeting was the formal annual report followed by budget presentations or meetings. Endorsements from other deans and administrators were also noted as influential.[10] The authors concluded, "Academic libraries are no longer the symbolic "heart of the university; instead, they must provide evidence to support funding requests that support the priorities of the institution as a whole."[11]

In other recent studies, researchers sought to determine how academic libraries use assessment to inform their strategic plans and align with their institution. In 2018, Miller conducted an exploratory study by surveying libraries in Australia, Canada, and the UK to determine how university libraries engage with their university community when developing strategic plans. Respondents expressed that libraries use a variety of methods with surveys being the most popular followed by focus groups, interviews, and consultations.[12] Also in 2018, Springmier, Edwards, and Bass explored how academic libraries use data and strategic planning documents to communicate with their stakeholders and others with the hypothesis that a strong commitment to assessment would correlate with the presence of data on the library's website. The authors conducted a content analysis of 97 North American websites and scored them with a rubric. Of these libraries, 57% made data available to the public with the most usual being "counting" statistics of volumes held, classes, gate counts, etc. Libraries that scored higher on their evaluation also provided benchmarks or comparisons. The most effective strategies used data to tell the story of the library and communicate its impact on the campus. These libraries devoted a section of their website to assessment and provided archived documents of initiatives.[13] Madsen and Hurst with Athenaeum21 Consulting conducted 96 interviews with library administrators from the United States, the United Kingdom, and Germany between 2015 and 2017 to examine the landscape of library assessment and the culture of assessment in academic libraries. Their inquiry included exploring the relationship between assessment and the library's strategic plan, how the library's assessment tied into the parent institution's plan, and the importance of integrating with the institution's assessment operation. They also conducted a survey in 2017 with 211 assessment librarians and other administrators completing it. The libraries in this study reported that assessment activities were closely tied to their strategic planning; fewer libraries, however, reported a strong link with their university's strategic planning.[14] The authors recommended that, with the current progression toward impact assessment as opposed to service quality improvement, libraries need to better align assessment to their institutions priorities; also, libraries need to pair their data with better reporting tools and link it directly to both the library's and institution's mission and goals.[15]

A few librarians have published articles specifically about tying assessment to library and campus strategic planning efforts. Franklin discussed such activity at the University of Connecticut. In 2009, the university launched a new strategic plan and each academic unit was charged with adapting its plan to support that of the university.[16] The library's planning team developed its strategy and used LibQUAL® data as supporting documentation. Goals, measures, and metrics were defined that directly followed the university's guidelines.[17] In a follow-up article in 2012, Franklin noted the impact of these efforts on the library. The new strategic plan influenced a reorganization of the library and assessment data tracked growth and changes for

each goal of the strategic plan, thus showing how the library supported the university's mission.[18] Also, the LibQUAL survey administered after changes were made showed improvement in service quality scores.[19] Walter provided a case study in 2018 that discussed aligning across university units to promote awareness of the library's value. The library at DePaul University adopted the university's strategy for its own 2012–18 plan and focused on initiatives relating to teaching and learning associated with academic quality and educational innovation. They used data from the Ithaka Local Faculty S&R Survey to demonstrate that DePaul faculty perceived the library as important to their teaching and developing undergraduate critical thinking and information literacy skills.[20] Walter also reported that the library is in the process of integrating with the campus learning analytics system.[21] In another 2018 study, Britto and Kinsley described using a logic model to develop the libraries' strategic plan at the University of Florida to submit to the university's institutional effectiveness plan.[22] Library units were asked to develop assessment measures to demonstrate to stakeholders how they contributed to the university's mission.[23]

Case Study

The University of North Carolina at Greensboro (UNCG) is a high research activity university with an enrollment of 20,000 students and part of the 17-campus University of North Carolina system. In fall 2016, the new chancellor began a strategic planning process with a focus on "big ideas" and "giant steps." The strategic plan employs a framework that emphasizes student, knowledge, and regional transformation in three areas of focus: Health and Wellness, Vibrant Communities, and Global Connections:

Table 1

Areas of Transformation	Areas of Focus
Student Transformation	Vibrant Communities
Knowledge Transformation	Health & Wellness
Global Connections	Regional Transformation

Each year, specific goals and key performance indicators with metrics are identified for each of the areas of transformation and foci.[24] The plan also follows the five areas identified in the strategic plan for the University of North Carolina system, which include access, affordability and efficiency, student success, economic impact and community engagement, and excellent and diverse institutions.[25]

University Libraries Strategic Planning Process

The UNCG Libraries, while they do have an established mission along with goals and values, do not have a long-term strategic plan; instead, an annual strategic plan is developed each year.[26] The process begins with a retreat of the leadership group that includes the dean, assistant deans, and all department heads. This group develops an initial plan that the dean and assistant deans then finalize at another retreat. Each goal includes action items with assigned responsibility, metrics, and targets, and indicates which aspect of the UNCG plan it supports. This plan forms the basis of what is then entered in the template required by the Office of Assessment and Accreditation. Figure 1 illustrates this process.

Figure 1 University Libraries Strategic Planning Process

UNCG Strategic Planning Process

UNCG's Office of Accreditation and Assessment (OAA) is charged with organizing and implementing the annual strategic planning process. All academic and administrative units are required to submit their strategic plan (formerly called the institutional effectiveness plan) for the upcoming year to this office with identified objectives, measures, and targets. The units' mission statements are also included. This plan emphasizes change and improvement. At the end of the year, units submit a strategic planning report with findings to show if these objectives were accomplished or not along with analysis and explanations. This report also requires an action plan to show how the unit will follow up on their findings. Activities may also be recorded. Figure 2 illustrates this process. The libraries have participated in this process since 2008 and a member of the libraries' faculty has served on the UNCG Institutional Effectiveness Committee since then as well.[27] The libraries' goals and metrics for the year that specifically show change and improvement form the measures and targets for the strategic plan submitted to OAA.

Figure 2 UNCG Strategic Planning Process
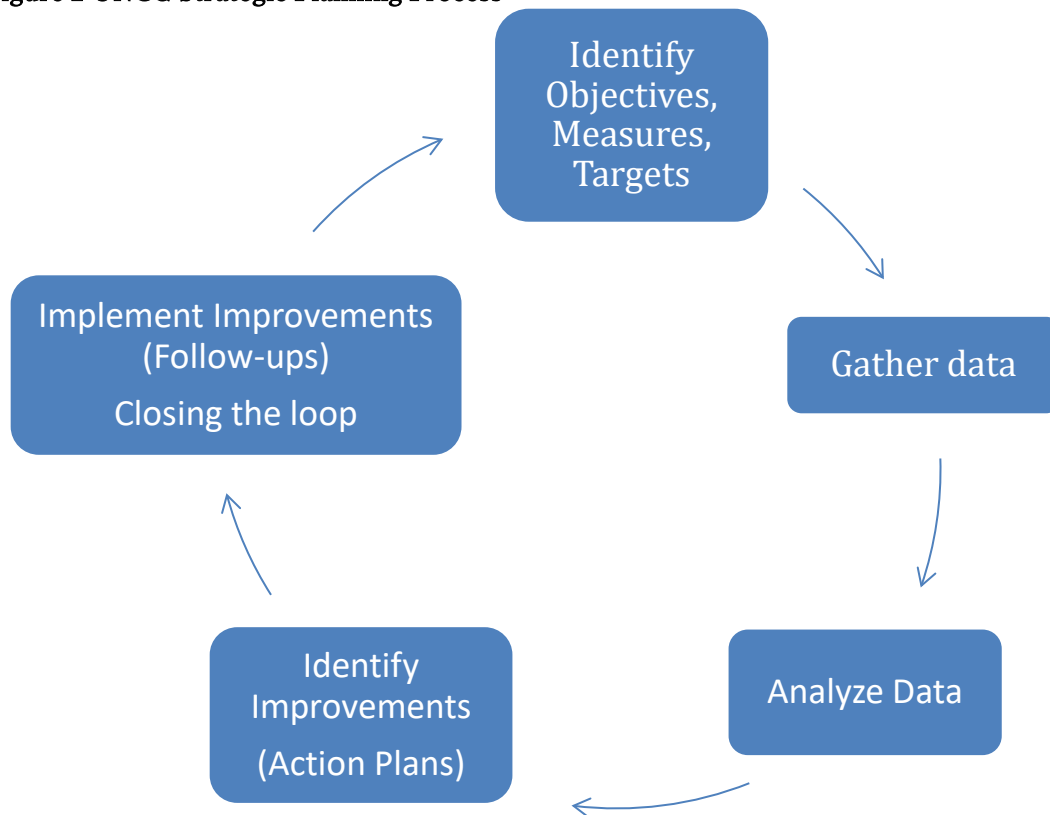
Beginning in 2016, all UNCG units were asked to link their goals to the new UNCG strategic planning framework. The libraries determined that most of our goals aligned with the student and knowledge areas of transformation and the vibrant communities focus area. The chancellor's office developed a report, ***Giant Steps: Initiatives Supporting Transformation of Students, Knowledge, and the Region.***[28] It was very gratifying that most of the libraries' initiatives were included in this campus-wide report thus showing how the libraries align with the UNCG strategic plan. This report is kept current so that unit goals continue to be showcased.

To incentivize the strategic plan, the university offered faculty seed grants in 2016–17 for teaching innovations, research, and community-engaged research.[29] The libraries' digital projects unit received a research grant in collaboration with history and library and information studies (LIS) faculty. The libraries' digital project, North Carolina Runaway Slave Advertisements, 1750–1865, was incorporated into a capstone history course and LIS students had the opportunity to learn how to digitize primary source materials.[30] This grant provided another opportunity for the libraries to integrate and align with the UNCG strategic plan.

Integrating the Libraries' Strategic Planning with the University's Plan

Moving forward, the libraries' 2017–18 strategic plan included several goals that supported the UNCG framework and demonstrated value. The following table provides an example of how the libraries' planning cycle aligned with the UNCG strategic plan:

Table 2

Selected Objectives	Measures	Targets	Findings	Link to UNCG Framework
Make UNCG an OER leader within the state in order to reduce the cost of a college education for our students	Number of adopted course textbooks freely provided online Amount of student savings if they don't purchase the text	Provide at least 200 texts Students savings of at least $200,000 if they don't purchase the text	532 course texts provided as e-books with a 55% increase from 16–17 Potential savings of $445,643	Vibrant Communities Student Transformation Knowledge Transformation Regional Transformation
Develop a master space plan for Jackson and Schiffman Libraries in order to maximize space for services, learning, and unique materials	Number of seats added	60 seats added on 5th floor by June 2018	72 new seats added	Vibrant Communities Student Transformation Knowledge Transformation
Undertake an information fluency initiative in order to expand information literacy/fluency on campus and in the community	Difference in GPA between students who receive library instruction and those that do not.	Difference in GPA between those that receive library instruction and those who do not of at least 0.25 Number of community workshops Number of faculty development stipends to restructure a course	The overall difference for all subjects was 0.27 (an average GPA of 2.87 for those who did not receive instruction and 3.14 for those who did)	Vibrant Communities Student Transformation Knowledge Transformation

Integrating Assessment with Strategic Planning

The university libraries' assessment program is coordinated by a team. This group establishes an annual plan based on current needs, goals, and initiatives from around the libraries. Team members as well as other librarians and staff engage in assessment projects. Support for the program is provided by a graduate student and staff from UNCG's Office of Assessment, Evaluation and Research Services (OAERS), a service of the School of Education's educational research methodology department. This plan is presented to libraries'

leadership for approval. Results, reports, presentations, and publications about all assessment projects are posted on a LibGuide along with a summary report at the end of each year.[31]

Several assessment studies provided data for building and future renovation plans. The Harold Schiffman Music Library, a branch in the music building, has underutilized space in its lower level. A needs assessment conducted in the School of Music in 2016–17 provided evidence that students needed more recording space. The libraries are working with the school to develop renovation plans to provide such a space that will help students' success in making recordings to submit for graduate school and performance opportunities. For the past few years, the libraries have engaged in a "rightsizing" project to reduce the stack footprint and increase seating and learning spaces. Observational studies of both technology and furniture have informed placement and purchases of both. In addition, the libraries are in the process of developing a master plan for a major renovation and addition. Building results from a general student survey in 2017 provided evidence of student needs and desires for learning spaces and technology to enhance their success. An infographic and other handouts were developed to provide brief bullet points for the project architects and university administrators. More recent assessments in the libraries' Digital Media Commons will provide useful information about how space and services will inform the master space plan.

As frequently noted in assessment literature, other studies provided evidence of the need for marketing resources and services. A 2017 survey conducted among distance learning students indicated that many are not aware of the libraries' extensive online resources and services. Similarly, a survey of students who study abroad showed that they, too, did not use the libraries' online resources or chat service while in another country. As a result, a marketing campaign is part of the libraries' plan for 2018–19.

A frequent theme in library value literature is to measure the library's impact on student success by determining if library use affects student grades or other standard criteria. The UNCG Libraries conducted a grade study in 2017–18 that compared the aggregate GPA of students in 100-level classes who attended a library instruction class to those who did not. The results were positive overall as noted in the above table. In the discussions of the findings with the OAERS consultants, however, it was determined that there are too many variables with student grades and it is very difficult to make a direct correlation to the library's influence. With this end in mind, the libraries' assessment team decided to focus on authentic assessment of student work in the future following the libraries' student learning goals based on ACRL's Information Literacy Framework.

The table below illustrates how the libraries' assessment informs strategic planning and thus aligns with the university's mission and planning:

Table 3

Assessment project	Libraries' Strategic Plan Action Item	Link to UNCG Framework
Needs assessment of Schiffman Music Library. Surveyed School of Music students & held focus groups	Renovate space to provide a recording studio needed by students	Vibrant Communities Student Transformation
Digital Media Commons assessment. Surveyed faculty and customers and held student focus groups	Informed future planning of DMC Informed Master Space Plan	Vibrant Communities Student Transformation Knowledge Transformation

Assessment project	Libraries' Strategic Plan Action Item	Link to UNCG Framework
Distance Learning survey Study Abroad survey	Developed a marketing plan to publicize remote and electronic services and resources more effectively	Vibrant Communities Student Transformation Knowledge Transformation
Technology use data and observations	Determined future technology purchases and their placement	Vibrant Communities Student Transformation Knowledge Transformation
Student surveys—building responses	Informed Master Space Plan	Vibrant Communities Student Transformation Knowledge Transformation
Furniture use observations	Provided additional seating and effective learning spaces	Vibrant Communities Student Transformation Knowledge Transformation
Student grade study	Determined decision to focus on authentic assessment of student work and conduct more robust analysis of LibInsight data	Vibrant Communities Student Transformation Knowledge Transformation

Conclusion and Recommendations

In recent years, hundreds of useful and important studies have been published that provide research and protocols for academic libraries on how they can demonstrate their value to their campuses. ACRL has led this effort and provided excellent support and guidance through funding, documents, and infrastructure. Few publications, however, focus specifically on how libraries' assessment data can match with their institutions' mission and, in turn, align and support the university's mission and strategic plan as recommended by ACRL in its *Impact* report. It is important to participate in campus planning and assessment committees and integrate with the university data system. This case study provides an example of how an academic library can demonstrate its value to the university by integrating and aligning with the campus strategic planning and assessment process. Effective assessment shows that the libraries are providing good data for planning and follow-up and are thus furthering UNCG's goals and mission. The libraries are fortunate to be fully integrated with the campus-wide planning and assessment process. Recent developments where unit accomplishments are documented in the campus data system have enhanced the libraries' profile. Over the years, the libraries have learned to merge its planning and reporting more

effectively with the university's process and are thus able to show how they support and enhance UNCG's mission.

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Endnotes

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Tracking Unicorns: A Multi-Institutional Network Analysis of Library Functional Areas

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Libraries and Library Positions in a Period of Change

Libraries have experienced a sustained period of change. Factors including globalization and technology have caused a reconsideration of the research library in terms of physical environment, services, and pervasive technology.[1] Per Barbara Dewey, the global research library must "address sweeping changes in technology transforming all aspects of creating, disseminating, and accessing scholarship in a multi-cultural world."[2] John Seely Brown advises that we are now in "an era of equilibrium to a new normal that is an era of constant dis-equilibrium."[3] Regarding technology, Lori A. Goetsch states:

> Technology has significantly influenced how students and faculty use the services and collections of academic libraries. In response, libraries are identifying new roles and responsibilities for librarians by both reinventing more traditional positions as well as creating new job roles that require different skill sets and mind sets.[4]

In response to these factors and others, library leaders are recruiting and reshaping their "workforce through creative approaches to defining and organizing roles, hiring personnel, and deploying and retraining existing staff."[5]

The work of libraries has always been complicated and a comprehensive set of technical, support, and public services must be represented and effectively delivered in order for it to effectively function. But the wave of changes in recent history, along with financial constraints faced by research libraries, has created the phenomenon of the "unicorn job," where a variety of functions and associated requisite skills and knowledge coexist, potentially unrealistically, in one position.

Position Descriptions

A position description is "an orderly record of the essential activities involved in the performance of a task that is abstracted from a job analysis and used in classifying and evaluating jobs and in the selection and placement of employees."[6] These commonplace business documents are important for academic libraries on multiple levels, as they reflect "the culture, priorities, and changes within an organization... not only to employees and their departments but also to the academic institution within which the library functions and the profession beyond."[7]

Position descriptions—and their close relative, the job advertisement—are often a basis for analysis in research, both practical and scholarly, seeking an understanding of library work types, traditional and emerging. The results of these studies appear frequently in library and information science literature.[8] Some studies focus on the evolving nature of libraries and the requisite skills for new work types: digital librarians; scholarly communication librarians; social science data librarians; instructional design librarians; and emerging technologies librarians.[9]

Therese Triumph and Penny Beile sought to examine "the current state of the academic library job market and identify emerging trends,"[10] and found that "academic library jobs are becoming increasingly specialized—and many require new job skills."[11] Lori Goetsch studied job advertisements over a 10-year period and reports:

Drawing on the core roles and responsibilities of positions such as systems librarians (high-level technological expertise), reference librarians (user assistance and education), and subject librarians (collection development and management and liaison work), a re-envisioned and interrelated set of four new core responsibilities emerges: consulting services; information lifecycle management; collaborative print and electronic collection building; and information mediation and interpretation.[12]

As new responsibilities blend with traditional library functions, the perception emerges that position descriptions are less circumscribed by narrow job functions and instead tend to describe hybrid roles. In considering these hybrid roles, studying the frequency of functional areas, like cataloging and preservation, coexisting within one position (and represented in a single position description) is a reasonable approach. An examination of the occurrences, frequencies, and relationships between these functional areas is akin to studying a social network of multiple groups with overlapping membership. As such, the application of established network analysis methods might provide insight on a field in flux. To the knowledge of the researchers, the principles of a social network analysis have yet to be applied to a large data set of position descriptions. This research could contribute to tracking the emergence of "unicorn jobs" in response to shifting roles and responsibilities in academic libraries.

ARL PD Bank: Background

In March 2012, the ARL (Association of Research Libraries) Board of Directors authorized the establishment of the ARL PD Bank.[13] ARL contributed a significant portion of the programming cost for the system, which was developed by a team at the University of Florida (UF) with broad input from other institutions, including over 20 ARL member institutions, via surveys, focus groups, and beta testing. In February 2013, the ARL PD Bank was officially launched. Initially, the PD Bank was only available to ARL members. In order to sustain the community, maximize the collection use, and create an even more comprehensive collection, access was expanded. Beginning in 2014, library consortia that included at least one ARL member institution were permitted to join the ARL PD Bank as a group and, as a result, extend access to their non-ARL members. The first consortium to join was the Association of Southeastern Research Libraries (ASERL). The Canadian Association of Research Libraries (CARL) followed suit in 2015.

The ARL PD Bank was designed as a digital collection of position descriptions and related documents, such as annual assignments and position vacancy announcements, which describe the work of library employees, interns, and other affiliates. The users of this system include library administrative staff involved in personnel management and those who rely on the documents for managerial activities and planning. As a collective work of academic and research libraries in the United States and Canada, the ARL PD Bank provides not only an aggregated source for current PDs, which shows the varied ways in which institutions organize and define functions, but also for archived documents which depict the evolution of positions and library functions and services over time.

Metadata

The ARL PD Bank was implemented based on a conceptual model of a "repository" or "archive." Its success has relied on the experiences of the UF team with longstanding digital collections. As a shared community platform, the system relies on descriptive metadata for the position records which is submitted and maintained by each institution. Position records are searchable and accessible by the following elements of metadata which the users provide:

- Full-time equivalency (FTE) level;
- Position status (filled, open, or discontinued);
- Position type (professional librarian; support or paraprofessional; other professional; or other);
- Appointment type (regular; tenure accruing or permanent; temporary/time limited; or residency/fellowship/internship);
- Library type (medical library; law library; non-university library; or all other); and
- Functional areas (see Appendix A).

When a record is initiated by an institutional user, each element of this descriptive metadata is required for submission.

For this study we are focusing on the functional areas which serve the system as classification metadata, supporting "the systematic identification and arrangement of business activities and related records into categories according to logically structured conventions, methods and procedural rules."[14] For each position record, the submitter identifies, from the controlled vocabulary, all of the functional areas that relate to the substantive duties and responsibilities of the particular position. Depending on the duties of the position, the associated ARL PD Bank record will include one or more functional areas. As a result, functional areas either appear in isolation, for a narrowly focused position, or co-occur with other functional areas. In this research, we assert that the frequency of the co-occurrence or the lack of co-occurrence of functional areas offers a unique perspective into the ways in which library work is organized and the ways in which types of work relate to each other. This capacity is enhanced because the available choices for functional areas are focused and reasonably discrete, and seemingly representative of the full range of library work types. The strength of the metadata and the number of records contained in the system creates a unique data set.

Methodology

Applying strategies used in social network analysis, we approached the data set as if each position record was an individual who belonged to various social groups. Each position record included in the analysis was associated with any number of functional areas between 1 and 37, and this attribute paralleled a network affiliation. Understanding the functional spread (i.e., how many functions were included in each position record) and measuring the frequency of job functions co-occurring (i.e., how often any two functions occurred together within one position record) was of great interest to the researchers.

Before performing the analysis, we removed any discontinued positions. Next, by using the Position Type and functional area data, we separated the remaining position records into three groups: professional positions, support positions, and management positions. This process is depicted in Table 1:

Table 1: Breakdown of position records into analysis groups

Group	Included	Excluded	Total position records included in analysis
Professional Positions	Position Type = Professional Librarians or Other Professionals	Any record with Branch/Unit/Department Management or Senior Management indicated in the functional area field	564
Support Positions	Position Type = Support or Paraprofessionals (non-exempt) or Support or Paraprofessionals (exempt only)	Any record with Branch/Unit/Department Management or Senior Management indicated in the functional area field	713
Management Positions	Functional area = Branch/Unit/ Department Management or Senior Management	Any record where Branch/Unit/ Department Management, Senior Management, or both is indicated in the functional area field	165

The data were prepared for input into Gephi using all potential functional areas as nodes and listing out each position record's connections one by one (automated with Excel). This process resulted in two files, one describing the data set's nodes (functional areas) and one describing the data set's edges (connections between functional areas). Once the nodes and edges files were uploaded to Gephi, we ran a multimode networks projection, resulting in a visualization of the functions and their relationships to each other as represented in the data.

Findings

The graphical output from Gephi shows a complicated web of relationships, in the forms of co-occurrences between job functions (ARL PD Bank functional areas). The size of the node (circle) represents the number of position records associated with that job function. The most common job functions result in the largest nodes. The thickness of the line between nodes represents the frequency of co-occurrence between any two job functions. The greater the instances of co-occurrence, the thicker the line connecting the job function nodes.

Professional Positions

Figure 1 displays the graphical representation of the network of the functional overlap among the 564 professional position records included in our analysis.

Figure 1: Gephi output of professional position records
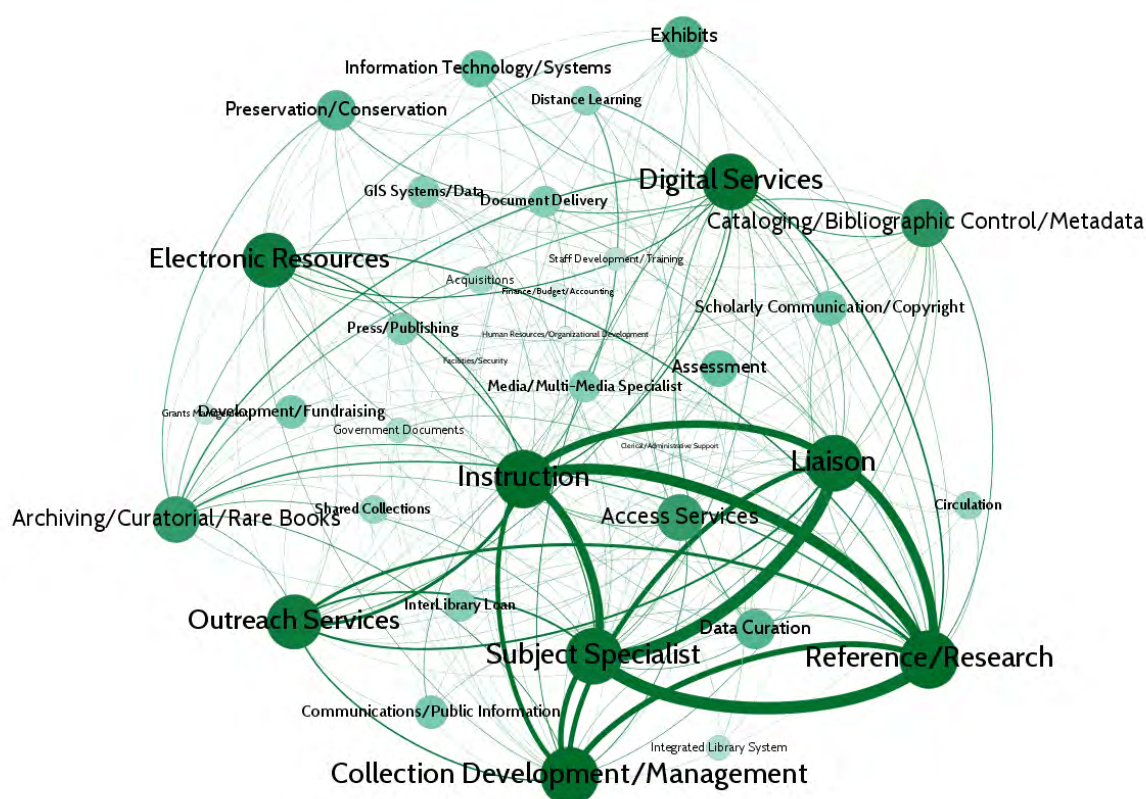
Co-occurrence is the measure of how frequently any two functions were associated within the same position record. The top 5 co-occurrences by count among all 564 professional position records were:

- **Reference/Research** and **Subject Specialist**, co-occurring in 86 positions and with this co-occurrence relationship representing 49% of reference/research positions and 48% of subject specialist positions.

- **Liaison** and **Subject Specialist**, co-occurring in 85 positions and with this co-occurrence relationship representing 79% of liaison positions and 47% of subject specialist positions.

- **Instruction** and **Reference/Research**, co-occurring in 74 positions and with this co-occurrence relationship representing 67% of instruction positions and 41% of subject specialist positions.

- **Liaison** and **Reference/Research**, co-occurring in 62 positions and with this co-occurrence relationship representing 57% of liaison positions and 35% of reference/research positions.

- **Instruction** and **Subject Specialist**, co-occurring in 59 positions and with this co-occurrence relationship representing 53% of instruction positions and 33% of subject specialist positions.

In 50% of the 564 professional position records included in our analysis, only one job function had been selected. In other words, half of the professional position records analyzed for this study had a singular job focus and half had multiple job functions coexisting (see Graph 1 below).

Graph 1: Professional functional spread
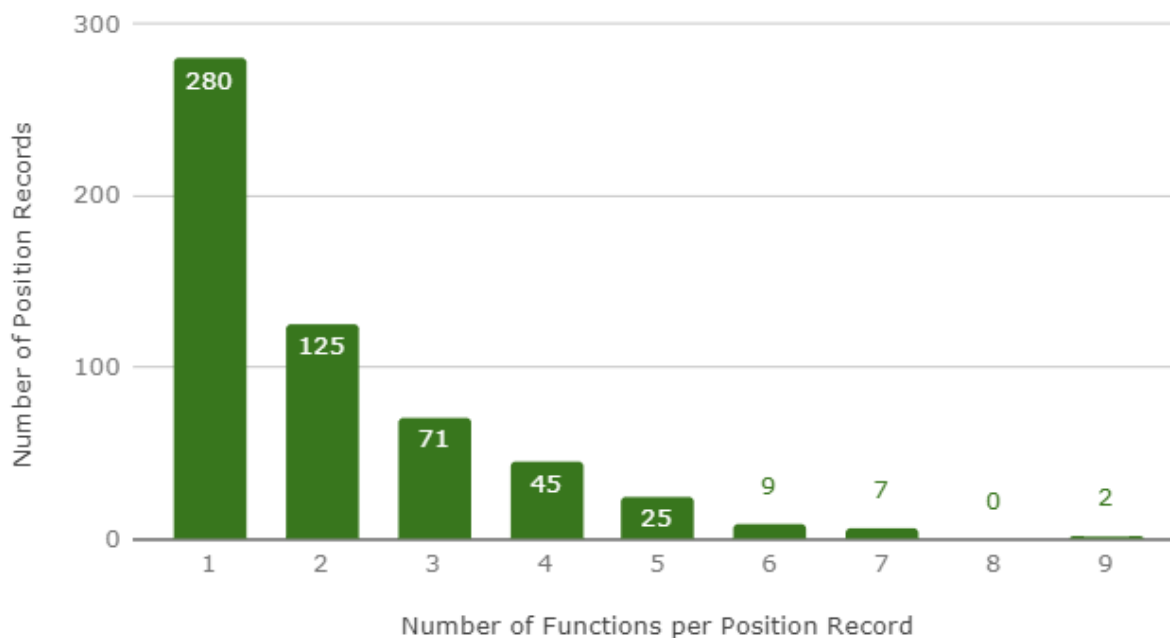
For the professional position records, the job functions in Table 2 were more likely to occur in isolation than to coexist with other functions.

Table 2: Job functions in professional positions more likely to occur in isolation

Function	% of professional positions with functional isolation	Total number of professional positions associated with function
Clerical	100%	1
Information Technology	69%	42
Cataloging	56%	61

Function	% of professional positions with functional isolation	Total number of professional positions associated with function
Assessment	54%	13
Archiving/Curatorial/Rare Books	53%	70

Notably, no professional position records were associated with the off-site storage function.

Support Positions

Figure 2 displays the graphical output of the functional overlap among the 713 support position records included in our analysis.

Figure 2: Gephi output of support position records
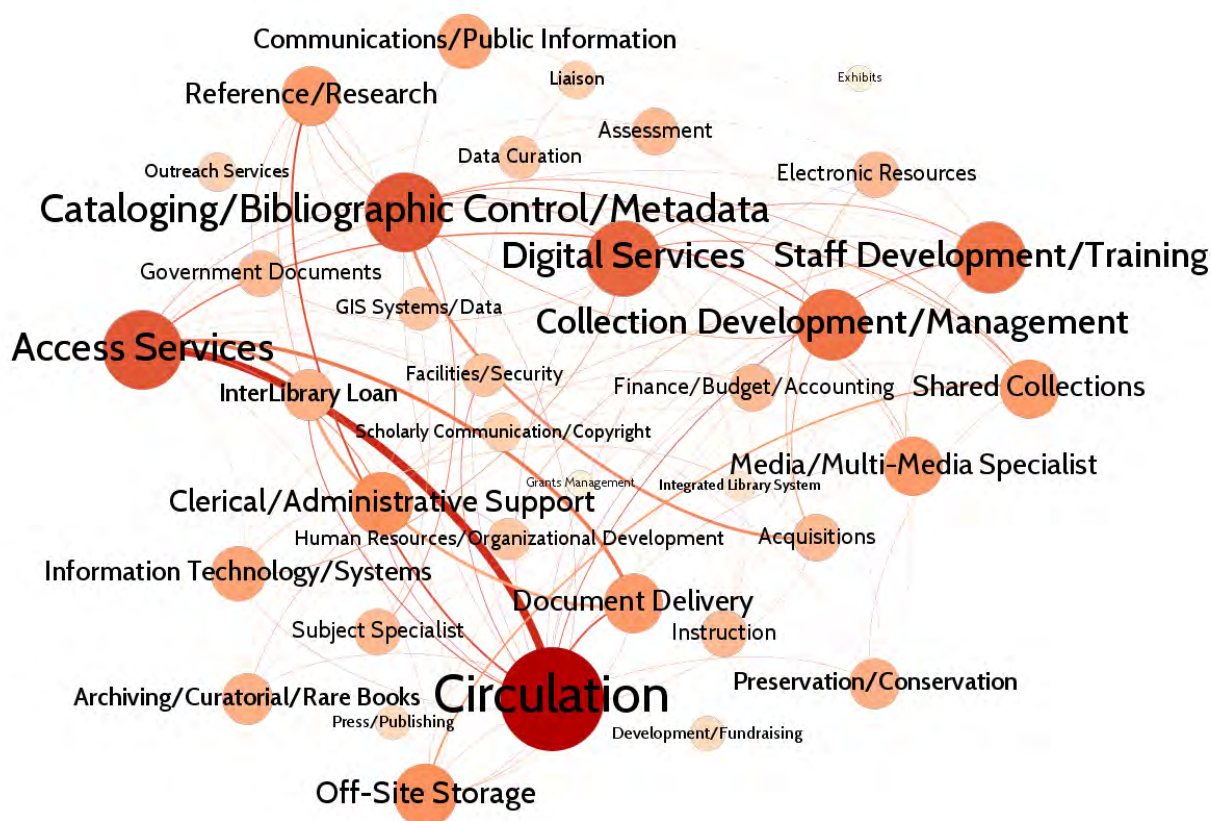
Co-occurrence is the measure of how frequently any two functions were associated with the same position record. The top 5 co-occurrences by count among all 713 support position records were:

- **Access Services** and **Circulation**, co-occurring in 32 positions and with this co-occurrence relationship representing 43% of access services positions and 31% of circulation positions.

- **Access Services** and **Document Delivery,** co-occurring in 15 positions and with this co-occurrence relationship representing 20% of access services positions and 54% of document delivery positions.

- **Access Services** and **InterLibrary Loan** co-occurring in 14 positions and with this co-occurrence relationship representing 19% of access services positions and 54% of ILL positions.

- **Acquisitions** and **Cataloging/Bibliographic Control/Metadata** co-occurring in 12 positions and with this co-occurrence relationship representing 18% of acquisitions positions and 15% of cataloguing/bibliographic control/metadata positions.

- **Document Delivery** and **InterLibrary Loan,** co-occurring in 12 positions and with this co-occurrence relationship representing 43% of document delivery positions and 25% of InterLibrary loan positions.

In 75% of the support position records included in our analysis, only one job function was indicated. In other words, three quarters of the support position records analyzed for this study had a singular job focus and one quarter had multiple functions coexisting (see Graph 2 below).

Graph 2: Support functional spread
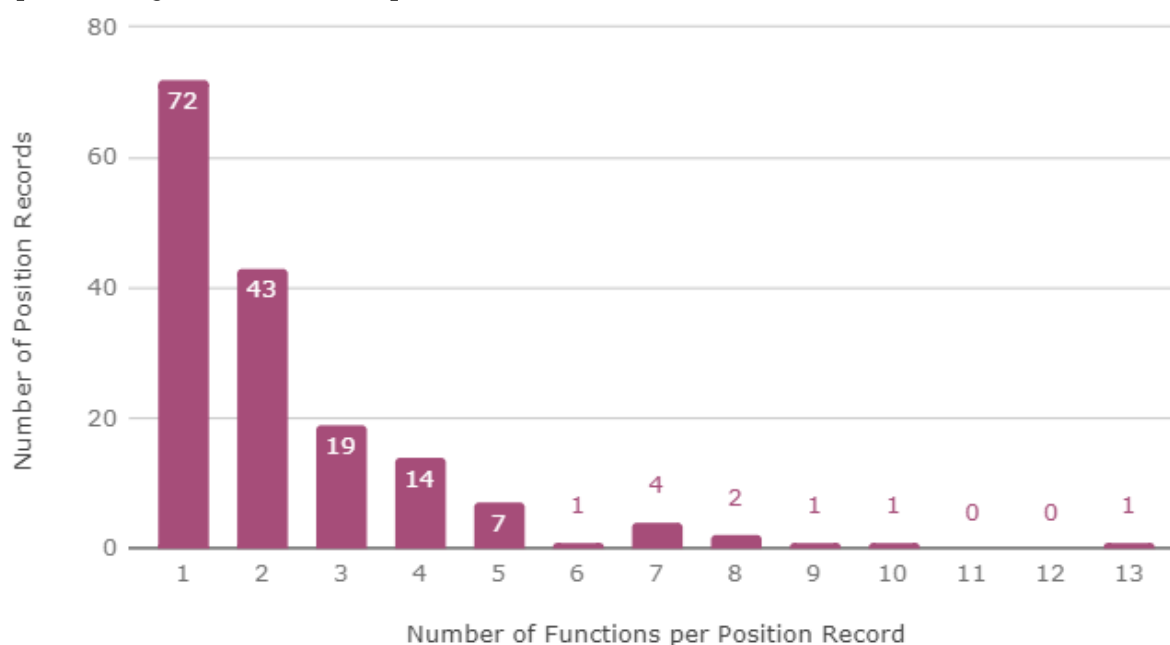

Number of Functions per Position Record
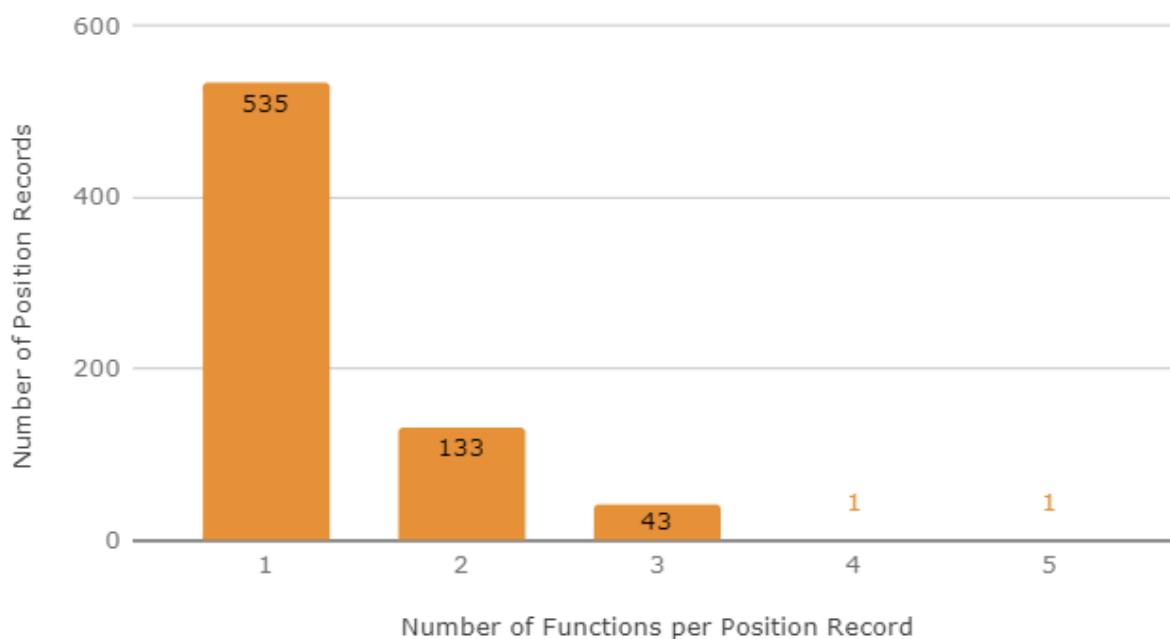
Table 3 displays the job functions that were more likely to occur in isolation than to be combined with other functions in support position records.

Table 3: Job functions in support positions more likely to occur in isolation

Function	% of support positions with functional isolation	Total number of support positions associated with function
Acquisitions	68%	66
Archiving/Curatorial/Rare Books	87%	47
Cataloging/Bibliographic Control/Metadata	65%	79

Function	% of support positions with functional isolation	Total number of support positions associated with function
Clerical/Administrative Support	61%	41
Communications/Public Information	56%	9
Development/Fundraising	75%	8
Digital Services	73%	59
Electronic Resources	71%	24
Exhibits	100%	5
Facilities/Security	84%	31
Finance/Budget/Accounting	75%	24
Grants Management	100%	1
Human Resources/Organizational Development	60%	15
Information Technology/Systems	90%	89
Media/Multi-Media Specialist	65%	20
Preservation/Conservation	76%	21
Press/Publishing	78%	9
Subject Specialist	64%	25

Notably, no support position records were associated with the distance learning function.

Management Positions

Figure 3 displays the graphical output of the functional overlap among the 165 management position records included in our analysis.

Figure 3: Gephi output of management position records
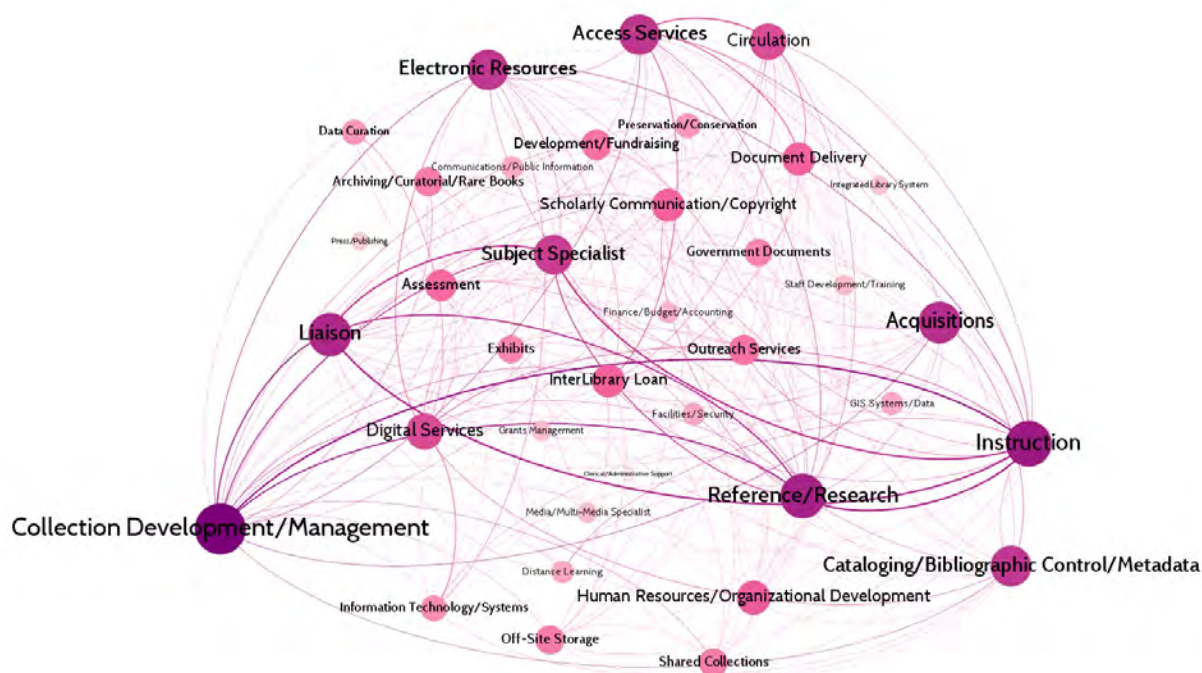
Co-occurrence is the measure of how frequently any two job functions were associated with the same position record in the PD Bank. The top 5 co-occurrences by count among all management position records were:

- **Instruction** and **Liaison**, co-occurring in 14 positions and with this co-occurrence relationship representing 54% of instruction positions and 61% of liaison positions.

- **Instruction** and **Reference/Research**, co-occurring in 14 positions and with this co-occurrence relationship representing 54% of instruction positions and 56% of reference/research positions.

- **Collection Development** and **Instruction**, co-occurring in 13 positions and with this co-occurrence relationship representing 46% of collection development positions and 50% of instruction positions.

- **Instruction** and **Subject Specialist**, co-occurring in 13 positions and with this co-occurrence relationship representing 50% of instruction positions and 45% of subject specialist positions.

- **Liaison** and **Subject Specialist**, co-occurring in 13 positions and with this co-occurrence relationship representing 57% of liaison positions and 45% of subject specialist positions.

In 44% of the 165 management position records included in our analysis, only one function was listed. In other words, 4 in 10 of the management position records analyzed for this study had a singular job focus and 6 in 10 had multiple coexisting functions (see Graph 3).

Graph 3: Management functional spread

Table 4 displays the job functions that were more likely to occur in isolation than to be combined with other functions in management position records.

Table 4: Job functions in management positions more likely to occur in isolation

Function	% of Management positions with functional isolation	Total number of Management positions associated with function
Cataloging/Bibliographic Control/Metadata	60%	20
Media/Multi-Media Specialist	71%	7

Limitations

Separating professional position records from support position records could mean splitting up functional areas that bridge both. Some functional-specific findings will only be found if we look at each functional areas separately with all the position records included.

The data set used in this analysis is limited to what was voluntarily shared in the PD Bank by users. Additionally, the metadata, critically including functional areas and position type entries for each position record, was submitted by users from various institutions. Any bias or self-selection resulting in the inclusion or exclusion of certain types of positions will limit the ability to characterize the state of library positions more broadly, based on this analysis. Similarly, any inconsistency, bias, or self-selection in regards to metadata selection will limit the generalizability of our findings.

Discussion/Implications
Functional Spread

The data suggest that the higher you climb in academic libraries, the more likely you are to be a unicorn. Management positions were associated with anywhere between 1 and 13 functions, with an average of 2.35

functions per position. Professional positions were associated with a narrower range, anywhere between 1 and 9 functions, with an average of 2.07 functions per position. Support positions were associated with the fewest functions, anywhere between 1 and 5 functions, with an average functional spread of 1.32. Further, management positions focus on just one functional area in 44% of position records, compared with professional positions where 50% of position records are associated with only one functional area. For support positions, 75% focused on just one functional area. These results are reflected in Graph 4.

Graph 4: Functional spread by position type
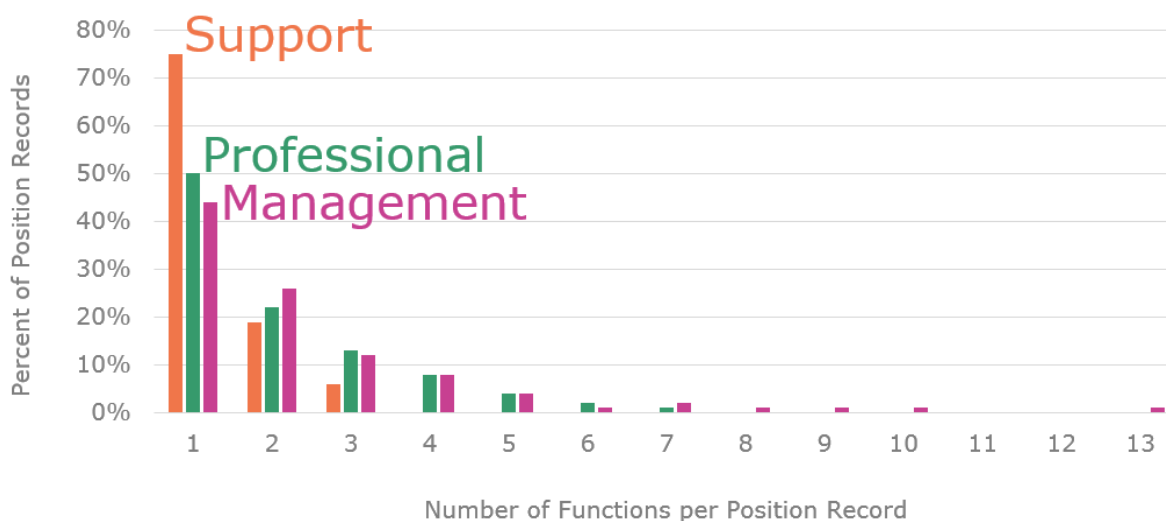
Common Co-Occurrences

Management positions, though they have the widest functional spread, are still most frequently associated with traditional librarian functions (e.g., instruction, liaison, collection development/management, subject specialist, and reference/research). For professional positions, the most common co-occurrences blended traditional librarian functions, e.g., reference/research, liaison, instruction, and subject specialist, in various combinations. For support positions, the most common co-occurrences blended traditional support functions: access services, InterLibrary loan, document delivery, acquisitions, cataloging/bibliographic control/metadata in various combinations.

Future Steps

This study relied on the data from the ARL PD Bank on February 28, 2018. As indicated above, we feel the data set was unique and potentially informative. In September 2018, a significant system enhancement was introduced where the job advertisements submitted to the ARL Job/Residency/Internship Listings website began to be ingested into the PD Bank, along with the submitted metadata. As of January 5, 2019, there are 2,119 position records in this system, including 197 that were ingested through this process. The recent enhancement will increase the size of this digital collection and the volume of associated metadata, supporting future research like that presented in this paper and other kinds, including text mining. Additionally, this automated collection process will reduce the impact of bias or self-selection resulting from the voluntary nature of active submissions to the PD Bank, discussed above.

The work presented here has generated what we feel are some interesting findings. Even if they may in some cases simply validate existing presumptions about library work, like higher level positions have broader scopes of responsibility, these presumptions may now be validated and can be built upon. Beyond the current findings, we feel that our work introduces an interesting methodological approach by applying network analysis to types of library work and using co-occurrences as the basis of analysis. We intend to expand on the work presented here. Potential future steps will include comparative analysis relying on additional PD

Bank metadata fields at the position record level, beyond position type which was used here. These potential fields include appointment type (regular; tenure accruing or permanent; temporary/time limited; or residency/fellowship/internship) and library type (medical library; law library; non-university library; or all other). Are there distinctions between the co-occurrence rates for tenure accruing positions compared to other types of appointment? Do frequencies vary between library types, medical versus others? Beyond the position record level metadata comparisons, potential comparisons of co-occurrence could be made based on institutional characteristics, like staff size or public versus private status. Beyond these comparisons, the ARL PD Bank data will afford longitudinal comparisons. In these, one might track how relationships between job functions and the prevalence of unicorn positions evolves over time.

Notes

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Appendix A

When creating a position record, institutional users are required to identify the main functional area(s) for each position. This user activity not only provides useful search criteria but also important data on the frequency and, over time, the evolution of positions within academic libraries. The following table depicts all functional areas available in the ARL PD Bank and the number of instances of records for which the functional area was selected, as of January 28, 2017.

Table 5: Functional area occurrences in the ARL PD Bank as of January 28, 2017

Functional area	Number of instances within ALL records
Reference/Research	224
Subject Specialist	221
Branch/Unit/Department Management	162
Cataloging/Bibliographic Control/Metadata	162
Information Technology/Systems	150
Digital Services	133
Circulation	130
Instruction	128
Archiving/Curatorial/Rare Books	123
Liaison	117
Collection Development/Management	116
Access Services	111
Acquisitions	94
Electronic Resources	64
Senior Management	57
Outreach Services	45
Preservation/Conservation	44
Clerical/Administrative Support	43
Document Delivery	43
InterLibrary Loan	41
Media/Multi-Media Specialist	34
Facilities/Security	32

Functional area	Number of instances within ALL records
Finance/Budget/Accounting	32
Communications/Public Information	30
Human Resources/Organizational Development	27
Data Curation	26
Shared Collections	25
Scholarly Communication/Copyright	24
Development/Fundraising	23
Assessment	22
Exhibits	19
Staff Development/Training	17
Off-Site Storage	16
Distance Learning	15
Press/Publishing	15
Government Documents	14
Integrated Library System	13
GIS Systems/Data	12
Grants Management	5

Two Years and Change: Building a Sustainable Culture of User Focused Assessment

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Abstract

As part of the transformation initiated by the current director, senior leadership at a mid-size academic library made a commitment to assessment as a tool to document success, support lean start-up operations, and inform decision-making. The strategy included hiring a two-year, term-limited librarian in the summer of 2016 to focus on assessment and act as the change champion, building capacity within the staff. In the last two years, the library assessment culture has been recast to an environment where staff uses assessment in planning and decision-making. After documenting the library's assessment environment in a status report, the assessment librarian and library administration developed a plan to stabilize the data-gathering infrastructure, implement best practices and standards, and build needed skills in survey design, data visualization, and other areas. Kotter and Schlesinger, in their 1979 landmark article, "Choosing Strategies for Change," suggested six methods for dealing with change resistance. The library administration used three of these approaches—education and communication, participation and involvement, and facilitation and support—to engage staff in assessment and build a sustainable culture of user-focused assessment. These change management approaches may be applicable to all libraries. Today supervisors and staff recognize that data and assessment are an integral part of their ongoing work and consistently use assessment in developing user-focused services.

Introduction

Since late 2012, under the leadership of the Loyola Notre Dame Library's fourth director, a transformation initiative to align the library's purpose with the educational missions of the two universities it serves and transition the library into an innovative learning center that adapts to users' changing needs for physical space, information, and technology is underway. To further support and accelerate the transformation process, in 2016, library leadership invested in a two-year, term-limited assessment and usability librarian to support the development of a culture of user-focused assessment. This approach allowed the mid-size academic library to invest in assessment and leverage Kotter and Schlesinger's strategies for change to develop infrastructure, implement best practices, and develop staff skills that are today integral to the ongoing work to support the research, teaching, and learning priories of faculty and students at Loyola University Maryland and Notre Dame of Maryland University.

Literature Review

Kotter and Schlesinger's landmark article originally published in 1979, "Choosing Strategies for Change," provided leaders with an initial framework to respond to an accelerating rate of environmental change.[1] Specifically, Kotter and Schlesinger articulate six approaches to facilitate change depending on an assessment of need relative to organization culture and context: education and communication; participation and involvement; facilitation and support; negotiation and agreement; manipulation and co-optation; and explicit and implicit coercion.[2] The article's flexible and adaptive approach to countering resistance to change is built upon in subsequent works on change by Kotter, including his Eight Stage Process of Creating Major Change outlined in the book ***Leading Change*** published in 1996. This model was developed by Kotter after years of observing change efforts at over 100 companies and the application of this model have proven successful overtime.[3]

Meredith Farkas' 2013 article, "Building and Sustaining a Culture of Assessment: Best Practices for Change Leadership," initiates the discussion of applying Kotter's work on change, specifically the Eight Stage Process of Creating Major Change, to "create a culture of assessment that is embedded in the organizational culture."[4] Importantly, Farkas defines a culture of assessment in academic libraries as follows:

1. Assessment becomes the norm and a valued part of the planning process;

2. Library staff engage with users to learn directly about preferences and needs versus making assumptions about users' interests;

3. Assessment data including direct feedback from users is used to improve customer service and experiences;

4. A culture of assessment is demonstrated by a willingness of library staff to change both behaviors and attitudes to deliver a high quality customer experience.[5]

Ultimately, Farkas challenged academic libraries to consider applying Kotter's Eight Stage Process of Creating Major Change to facilitate the development of a culture of assessment within libraries. She further challenged libraries to share their experiences with the model via case studies in literature to assess the value of this approach to change management more fully. Carter was the first to respond to Farkas' challenge and outlined Kotter's Eight Stage Process as follows:

1. Establish a sense of urgency

2. Create the guiding coalition

3. Develop a vision and strategy

4. Communicate the change vision

5. Empower employees for broad-based action

6. Generate short-term wins

7. Consolidate gains and produce more change

8. Anchor new approaches in the culture[6]

Carter applied the model to integrate information literacy assessment into Auburn University Libraries' instruction program and found it successful for facilitating change at the department level, however, noting the limitation of the departmental approach for enabling institutional change.[7] Carter also articulated an evaluation of the change in the culture of assessment, noting examples of behavior change while also articulating a more realistic picture that not everyone doing assessment will necessarily "like" it.[8] Hackman of the University of Maryland's McKeldin Library also demonstrated a case study that successfully applied Kotter's model of change on the reorganization of a Resource Sharing and Access Services Department.[9] Fox and Keisling found Kotter's model of change effective in supporting the transformation of services, staffing, and spaces at University of Louisville Libraries.[10] Wheeler and Holmes found similar success in their respective medical libraries at Will Cornell Medical College and Northwestern University Feinberg School of Medicine.[11] These case studies demonstrate a foundation of the successful application of Kotter's approach to change management in academic libraries. However, these case studies represent findings for application of Kotter's Eight Stage Process of Creating Change in large or specialized academic libraries.

This paper will examine the success of a simplified application of Kotter's work to facilitate the adoption of a culture of assessment in a mid-size independent academic library. A retrospective review of the development of a culture of assessment by the Loyola/Notre Dame Library (LNDL) reveals that Kotter and Schlesinger's landmark article originally published in 1979, "Choosing Strategies for Change," provides a simplified approach for understanding the change process that may be applicable to all libraries. Specifically, LNDL's

administration used three of Kotter and Schlesinger's approaches—education and communication, participation and involvement, and facilitation and support—to engage staff in assessment and build a sustainable culture of user-focused assessment to transform the customer experience.[12]

Background and Institutional Context

LNDL is one of two independent academic libraries in the United States and supports the educational missions of two universities located in northwestern Baltimore City: Loyola University Maryland (Loyola) and Notre Dame of Maryland University (Notre Dame). Loyola University Maryland, a member of the Association of Jesuit Colleges and Universities, is recognized for excellence in teaching and learning for the whole person in undergraduate and graduate programs rooted in the liberal arts. Notre Dame of Maryland University is a leader in the education of women and non-traditional students, including an undergraduate women's college; a college of adult undergraduate studies; and Schools of Education, Nursing and Pharmacy. The library serves a total student population of over 6,100 FTE.

In 2008, LNDL completed an extensive renovation of the library's 125,000-square-foot building. Since the arrival of the library's fourth director, Barbara Preece, in 2012, the library has been partnering with both universities to transform into an innovation learning center that responds flexibly to users' changing needs for access to space, information, and technology to support their research, teaching, and learning. Since 2015, the library joined two consortia: the Eastern Academic Scholar's Trust (EAST), a print initiative guaranteeing access to 6 million volumes through resource sharing, and the University System of Maryland and Affiliated Institutions (USMAI), which provides users access to over 9 million items through a shared integrated library system with 17 member libraries. In the fall of 2018, the library opened the doors on the newly renovated digital commons featuring access to the library's Innovation Station Makerspace, the Collaboratory in the library, an active learning classroom, a recording studio, the Copyright Information Center, and new group study spaces. Finally, adaptive technology was mainstreamed throughout the library in partnership with disability service departments from both universities, expanding access for disabled users.

A cornerstone of the success of these transformation initiatives is LNDL's growing institutional capacity to engage users through assessment to better understand their needs, interests, and preferences and use this data to inform decision-making. Library staff began by tapping into a historical commitment to deliver high-quality customer service and learned to analyze and present data in one-page proposals to recommend ideas to library administration to improve user experience. To further support staff in the development of a culture of assessment, library administration also hired a two-year, term-limited librarian in the summer of 2016 to focus on assessment and act as the change champion to continue building capacity within the staff. During this two-year assignment, the assessment and usability librarian documented the library's current assessment environment in a status report, developed a plan with library administration and staff to stabilize data gathering infrastructure, identified and implemented best practices and standards, and built needed skills in survey design and data visualization. Ultimately, LNDL's assessment culture has been recast as an environment where staff regularly uses assessment in planning and decision-making to improve the user experience.

Kotter and Schlesinger Change Methods Applied

Kotter and Schlesinger's landmark article originally published in 1979, "Choosing Strategies for Change," recommends six methods for dealing with resistance to change with method selection based on factors like urgency of change and the type of resistance anticipated.[13] When time is not an immediate factor, the first three of Kotter and Schlesinger's change approaches—education and communication, participation and involvement, and facilitation and support—can successfully be used to engage people in the process of change as follows:[14]

Change Approach	Commonly Used When	Advantages
Education / Communication	• Lack of information • Inaccurate information and analysis	• Common understanding often persuades people to help with change implementation
Participation / Involvement	• Change leaders lack information to design the change • Power to resist exists	• Important information from all levels is integrated into change plan • Participation creates buy-in and commitment to implementing change
Facilitation / Support	• Adjustment problems like fear of being unable to acquire new skills to support the change at root of resistance	• Best method to identify and address adjustment issues

A retrospective review of the development of a culture of assessment at LNDL over the past two years will be assessed by each of the three change approaches outlined above to provide other academic libraries with ideas to support their own assessment change initiatives.

Education and Communication on Assessment at LNDL

LNDL allocates funding to librarians for professional development on an annual basis. In addition, the library's director sponsors attendance at conferences, training sessions, and local programming for librarians and staff for strategic priorities as the budget permits. Developing institutional capacity for assessment is a priority of senior library leadership and a number of educational opportunities have been provided for all staff at LNDL. In 2015, LNDL hosted a workshop open to all staff members with Towson University Library and Johns Hopkins Libraries on assessment that was facilitated by OCLC's senior research scientist and director of user research, Lynn Silipigni Connaway. A user question, "If you had a magic wand," quickly became one of many assessment tips and strategies used by LNDL staff to assess users' preferences for space, information, and technology. LNDL used professional development funds to send the associate director, head of research and access services, and the new assessment and usability librarian to the 2016 Library Assessment Conference hosted in Arlington, Virginia to support the process of assessing the current state of assessment of LNDL. It was also an important resource for generating ideas for the development of LNDL data-gathering framework in use today. In 2018, LNDL sent as many librarians and staff who expressed interest to an Assessment in Action Workshop hosted by USMAI and ACRL Maryland and invited Dr. Martha Kyrillidou of Quality Metrics, LLC to present at a staff meeting on best practices in assessment as part of a larger consulting commitment to USMAI. These are but a few examples of LNDL's formal investment in education for staff of all levels on assessment. Communication and sharing of best practices around assessment is also encouraged informally in unit meetings and in regular one-on-ones with supervisors. Finally, top lessons learned from conference attendance by librarians and staff are consolidated and shared by a research and instruction librarian every few months. This has provided a low-lift, easy method to share best practices and standards in all areas of librarianship, including assessment while promoting a culture of continuous improvement.

Participation and Involvement in Assessment at LNDL

The hiring of the two-year-term assessment and usability librarian was critical for providing additional capacity for a mid-size academic library to engage staff at all levels in the development of a culture of assessment. This librarian allowed the conversation to occur on a peer-to-peer basis to gain traction. The librarian spent time speaking with librarians and staff in all units of the library to develop a deep understanding of the strengths and opportunities of the current state of assessment at LNDL in 2016. This dialog and information sharing was critical for an accurate summary of what staff needed to improve data-gathering infrastructure, clarify roles and responsibilities relative to assessment, identify opportunities to improve skills, and provide interested staff experiences with data visualization software like Tableau. The assessment and usability librarian also regularly attended department meetings to share updates on the

project's progress over the course of the two-year assignment and developed a research guide on assessment and usability. This participative process created a new data-gathering framework that the library uses today to clearly define roles and responsibilities regarding data collection and reporting. The inclusive process of developing the data-gathering framework also provided the foundation for the assessment and usability librarian to act as a partner and consultant to enact change within each unit of the library. This feedback and spot training on topics of interest like developing effective Qualtrics surveys ensures that a culture of assessment has continued to evolve despite the end of the two-year-term assessment and usability librarian position in July of 2018.

Facilitation and Support of Assessment at LNDL

Providing staff the opportunity to practice skills with effective role modeling and mentoring from senior leadership is critical to the development of a mindset of assessment. As previously mentioned, LNDL uses one-page proposals to make recommendations to the library's director and senior leaders for innovation. Staff proposals were developed to recommend the launch of the Copyright Information Center in 2016, the integrations of reference and circulations desks into a single help desk in 2017, and the purchase of a mobile visualization wall in the library's new Digital Commons in 2018. These are just a few examples of proposals developed by staff that presented data in context and informed decision-making. The proposals are often two-sided and identify the customer experience that the recommendation is seeking to address. The proposals include assessment data, including visualized usage data, preference and interest data collected from users, and best practices from other comparable institutions to help support the recommended solution. As a result, library staff have become more effective at articulating user needs, using relevant data to make a case for change, and presenting persuasive recommendations to senior library leadership. Ultimately, this continual practice allows the fundamentals for assessment to integrate into day-to-day library operations and provides staff with the confidence to articulate the value they provide in their work to support the research, teaching, and learning of the two universities LNDL serves.

Encouraging participation in location, state and national conference by librarians and staff is another way that LNDL has supported librarians and staff in the use of assessment data to tell the story of how they are creating value for their users. A good example of this approach to skill- and confidence-building is LNDL's continued involvement in Towson University Library's Conference for Academic Libraries since it started in 2016. This local conference is particularly accessible as it is open to presentations and posters from librarians and staff. In 2018, interlibrary loan, research and instruction, and acquisitions units all did presentations or posters at the conference highlighting work done in their respective areas that highlighted assessment data. As skill and confidence levels have risen, we see librarians and staff seeking out opportunities to share information and present at local and national conferences more regularly.

Conclusion: Assessing a Culture of Assessment at LNDL

Reflecting on Farkas' features of a culture of assessment previously articulated, LNDL has integrated assessment into the library's operations, regularly solicits data from users to inform decision-making about existing and future plans, and uses this data as a core element of supporting the transformation of the library into an innovative learning center that adapts to users' needs in space, information, and technology. Behavior changes relative to assessment can be attributed to LNDL's focus on education and communication, participation and involvement, and facilitation and support that was accelerated in the past two years with the addition of the two-year-term accessibility and usability librarian position. As for changes in attitudes, Carter aptly articulates that there are nuances to be considered when "liking" assessment is considered.[15] At LNDL, staff have a long-held dedication for delivering high quality customer service. A focus on assessment to support the innovation of the customer experience to allow staff to connect and engage with users and colleagues to expand on existing services is satisfying, and staff have expressed excitement in seeing users engage and benefit from changes implemented to date. This satisfaction and excitement is providing a strong foundation for a culture of assessment to continue to evolve and develop over time.

Notes

1. Kotter and Schlesinger, "Choosing Strategies for Change," 130.
2. Kotter and Schlesinger, "Choosing Strategies for Change," 136.
3. Hackman, "Leading Change in Action," 2.
4. Farkas, "Building and Sustaining a Culture of Assessment," 14.
5. Farkas, "Building and Sustaining a Culture of Assessment," 15.
6. Carter, "Assessment and Change Leadership," 149.
7. Carter, "Assessment and Change Leadership," 160.
8. Carter, "Assessment and Change Leadership," 161.
9. Hackman, "Leading Change in Action," 1–27.
10. Fox and Keisling, "Build Your Program by Building Your Team," 526–539.
11. Wheeler and Holmes, "Rapid Transformation of Two Libraries," 276–281.
12. Kotter and Schlesinger, "Choosing Strategies for Change," 136.
13. Kotter and Schlesinger, "Choosing Strategies for Change," 137.
14. Kotter and Schlesinger, "Choosing Strategies for Change," 136.

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Finding Value in Unusual Places: Transforming Collaboration Workshop Data

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Abstract

Academic and public librarians, administrators, and other information professionals will appreciate research activities that tell the stories of participants from a recent Collaborating with Strangers (CoLAB) workshop conducted for a regional multitype library cooperative (MLC). This presentation describes the facilitated workshop and resulting qualitative analysis from which the research team presented solid evidence to the MLC leadership for informing a five-year strategic planning process and for suggesting advocacy initiatives led by the MLC member libraries. The team will share the process used to elicit useful data gleaned from CoLAB workshop materials created by participants.

The method used to analyze resulting data demonstrates the efficacy of CoLAB workshops for quickly extracting substantial amounts of qualitative data and insights, some of which may result in potential long-term impacts on specific communities such as libraries and patrons. CoLABs are intentionally designed to increase comfort in speaking with strangers. Future workshops for other academic library stakeholders, such as students and faculty, offer the potential to reveal what they value within the higher education environment.

Introduction

Academic library professionals are increasingly involved with the research community to fulfill their primary objectives of expanding digital collections, web-based discovery systems, and use of social media and mobile devices in information-seeking. Public library professionals are faced with requests for social service support and for more diverse information resources from communities for which libraries serve as anchor institutions providing equitable access. These demands require dynamic professional development where experts agree that "the informal network developed through many library leadership training programs is often the most valuable and durable benefit of training."[1]

Despite the long-term positive impact of facilitating new internal and external connections, engagement provided for professional development can be costly and time-consuming. To understand the professional development capacity among regional library professionals, with a view toward informing strategic planning processes, the Northeast Florida Multitype Library Cooperative (NEFLIN) enlisted the Collaborating with Strangers (CoLAB) workshop[2] team to facilitate a 45-minute CoLAB mini-workshop during the region's 2017 annual meeting.

The conference workshop provided a structured environment where participants connected during one-on-one, three-minute speed meetings, using profile cards produced during the workshop to practice (1) conversing with others; (2) discovering untapped resources; and (3) initiating cooperative, collaborative, or mentoring partnerships. More than 100 participants generated qualitative data captured by the profile cards that included 11 demographic questions and inquiries about the participant's role in the library, passion for their work, projects or interests, and a "hidden" personal fact.

The purpose in analyzing these CoLAB responses for the NEFLIN strategic planning process was to provide (1) information about the scope of NEFLIN library stakeholders' competencies, interests, and needs, creating a stakeholder profile featuring identified individual assets; and, (2) ways in which the CoLAB participants intended to further engage with the information shared or discovered during this collaborative process. By understanding both the status of these stakeholders and their self-described future planned actions, NEFLIN leadership can better understand the scope of library professionals' current interests and improve understanding of the "assets" already available in this library community of practice.

We examined the data to answer the following key questions:

1. Who are these stakeholders?

2. What findings are meaningful for NEFLIN leadership to act on and include in their strategic plan to fully support, foster, and sustain the library professionals working in this region?

The following analysis employed a structure based on nonprofit strategic planning concepts and provides background on the appreciative inquiry framework of CoLAB workshops.

Background

CoLABs offer methods for breaking down barriers, encouraging participants to share ideas and create new connections, resulting in productive and memorable sessions experienced in a conference setting. A challenge presented by first encounters[3] is that most people avoid conversing or working with "strangers," disrupting their ability to access other people's assets, the basic ingredients necessary for innovation. However, the literature shows that discovering available individual or community-held assets in a library, classroom, or at a conference can dramatically lead to a greater sense of community and awareness of resources.

Using Bryson's work in strategic planning for public and non-profit organizations, the CoLAB data provided a narrative describing some emerging themes structured as competencies, opportunities, and community assets.[4] These findings: (1) tell a story about North Florida's regional libraries; (2) identify librarian needs and interests; and (3) suggest desired training and professional development. The CoLAB study revealed substantial characteristics and interests of NEFLIN members, useful for both strategic planning and for advocacy initiatives led by the NEFLIN staff, member libraries, and other vested stakeholders.

Selected Relevant Literature
Appreciative Inquiry

One of the guiding principles employed within CoLAB Workshops is the customization of profile-card questions to suit the anticipated participants—designing questions using appreciative inquiry (AI). AI focuses on developing awareness of knowledge and interests as elements of social innovation rather than as a method of problem-solving.[5] The goal is to pose questions that yield information readily available to participants that describe their current goals, professional passions, projects, skills, partners, or aspirations of future projects. The sharing of these answers produces appreciative inquiries during speed meetings. "What about this project excites you?" or "How have you been able to develop that skill?" are questions commonly asked during the speed meetings that point to more positive and practical information and resources that otherwise would remain hidden.

These interactions thus focus on participants' strengths. As participants meet each other, they begin to feel at ease while accumulating new sources of inspiration and resources as they focus on learning about others. Participants, as agents of their environments, experience appreciative inquiry for its potential to initiate "... collaborative change, [that] erases the winner/loser paradigm in favor of coordinated actions and closer relationships..." employing a process of "systematic discovery" to reveal untapped assets.[6] AI is a seminal framework used in action research by researchers along with community stakeholders to "actively forge co-generative relational processes and outcomes."[7]

AI facilitates communication naturally, producing asset-based collaboration, which is an effective method of eliciting information from stakeholders used in community and organizational development. CoLAB workshops present questions that evoke reflection of assets in which participants have the opportunity to reflect "on their gifts, passions and talents, rather than their deficiencies."[8] Like the asset-based community development McKnight and Kretzmann describe in the 1970s, in this study, CoLAB participants' contributions were assessed for their self-described assets and their reactions to sharing these with others,

thereby developing ways to appreciate the assets in their library community while planning to connect these assets in new ways.[9]

Strategic Planning

AI also complements strategic planning, enabling participants to be forthcoming about their knowledge, their assets, and their aspirations, as "they are the experts about their lives and communities and are aware of what is working and what is not."[10] While a strategic planning team may have its own understanding of how to judge the organization's performance, it can be "instructive and politically useful to ask stakeholders."[11] Creating a stakeholder analysis from the CoLAB data provided NEFLIN the opportunity to gain a better "understanding of the relationships—actual or potential—that help define the organization."[12] Bryson recommends that an analysis identify what is important for stakeholders, as this is a criterion by which the organization—and those stakeholders—assess how well the organization performs "from the stakeholders' point of view."[13]

Given that librarians "are notoriously poor at networking and marketing themselves"[14] and considered to be bookish and introverted,[15] the CoLAB structure and appreciative inquiry method was examined to determine its effectiveness as a method to gather stakeholders' viewpoints, especially since librarians do not typically see themselves as key stakeholders."[16] Specifically, the CoLAB process does not seek to provide answers to any particular problem but instead creates an environment in which participants self-identify assets and engage in interactions in which the shared information results in synergized, new assets with which they can interact, collaborate, connect, or appreciate as moments of self-discoveries.

Method

CoLABs typically average two hours in length, providing structured facilitation during which the centerpiece features one-on-one, three-minute speed meetings with 14 pairs of partners. The CoLAB team developed an abbreviated workshop, with an anticipated seven rounds of speed-meetings (during a 25-minute period). CoLABs aim to reduce barriers among participants, including students, faculty, administrators, and staff.

Upon arrival, participants are given a profile card that poses questions soliciting personal and professional information about the participant. To facilitate the abbreviated session, participants received orientation email messages in advance from NEFLIN, including the three questions participants would be answering on their profile cards (Appendix A):

- What is your current role and why are you passionate about this work?
- What projects or interests have you been focusing on recently?
- What is one thing most people don't know about you?

During the plenary session, participants received a brief introduction, completed any missing elements on their cards, and were given instructions of finding a partner, conversing for three minutes, and then immediately moving on to repeat the speed-meeting process. Partners could stand or sit or move to a quiet area during their speed meetings and were encouraged to capture brief notes on a checklist as a way of remembering their partners, conversation themes, or next steps to follow-up.

At the end of seven partner conversations, NEFLIN participants were guided to view three additional questions posted on Idea Boards (i.e., easel paper) at the back of the conference room. Each sheet featured a different question and participants were instructed to write and affix their completed Post-it answers to the corresponding question. This activity generated almost 400 Post-it notes.

During analysis, data was pulled from two collection points: Section One, the participants' profile cards, and; Section Two, their Idea Board responses. The profile cards identified participants' self-described competencies, the motivation for their librarian positions, and their professional and personal interests. The Idea Board posts identified synergies or connections made, lessons learned, and next steps each participant planned to take based on the CoLAB experience.

Responses on the profile card and the Idea Boards were analyzed using open and axial coding, drawing themes and categories from the data with which to review and code each response.

Findings
Profile Cards
Section One

The first section of the profile cards collected demographic information, listing 91 unique hometowns, from Algeria, Africa, to Lake City, Florida, with most respondents naming Jacksonville, Florida, as their hometown. Forty-eight unique libraries or library systems were represented, with 48 academic library participants, 60 from public libraries, four from public school libraries, two from the state library, and one from a private school, representing 31 cities throughout North Florida. Forty-two unique positions were listed, including deans, directors, branch heads, managers, coordinators, reference collections/technical services librarians, and "Person of many hats." NEFLIN's service area covers 550 libraries from 24 counties in Northeast Florida.

The median length of tenure as library employees was 14 years, with a high of 44 years and a low of less than one year. The most frequently reported length of service was 10 years; most of the participants with more than 30 years of service listed their positions as dean, director, department head, or manager. Ten participants listed themselves as current students. Thirty-one listed at least one type of social media account on various platforms including Facebook, Instagram, WordPress (blog), and most notably, Twitter.

Section Two

The profile cards presented four questions that asked participants to list their current role, description of their "passion" for their work, current projects or interests, and a detail about themselves that others did not know. Question one posed a two-part question, asking, "What is your current role?" The second question asked, "Why are you passionate about this work?" The roles indicated by participants resulted in 70 unique responses.

The category of "librarian" was unsurprisingly the most frequent description, but it was qualified by descriptions of librarian type, including coordinator, IT, reference, cataloging, ILL, research and instruction, access services, and youth services. Thirty-four participants also provided descriptions of "duties" ranging from manage (8), instruction, programs, circulation, and reference (three each), and children, outreach, marketing and promotion, and youth services, each with two responses.

Forty respondents self-reported both roles and duties as those typically found in a management or supervisory positions, with a wide range of responsibilities. When asked about "passion," this group was more likely to answer with terms that relate to interaction skills, such as "leadership," "encourage," "empower," or "impact." Over 20 individuals used the word "empower," and the terms "help/helping" were used 11 times. This indicates a focus on getting results and having an impact on others within the context of their work. More than half of the responses indicated that "variety of workplace" was a key to their devotion.

Part two of the question queried participants about their work in libraries, asking, "Why are you passionate about this work?" The most frequent terms that occurred in the responses included: love (37), library (29), students (28), libraries (19), enjoy (16), new (18), community (17), people (16), work (16), helping/help (24), and learning (13). The responses included just seven answers that mentioned books.

Not surprisingly, "library" or "libraries" were the most frequently occurring terms (48). Using collocation analysis to view the words adjacent to these terms, participants commented about library as place, the library story, as a key element in a childhood, library resources, library as living organization, a place that patrons own, a source for meeting community needs, a source for technology, and as a critical part of helping people navigate the "time of exploding information/new technology/and educational changes."

The second question asked, "What projects or interests have you been focusing on recently?" and resulted in a total of 167 codes, broken down into projects (88) and interests (79). Projects featured 17 unique categories, as displayed in Figure 1. Participants were most involved in running programs, literacy instruction, technology instruction and/or implementation, youth advisory, marketing and spaces (teen spaces, new spaces), and makerspaces, among others.
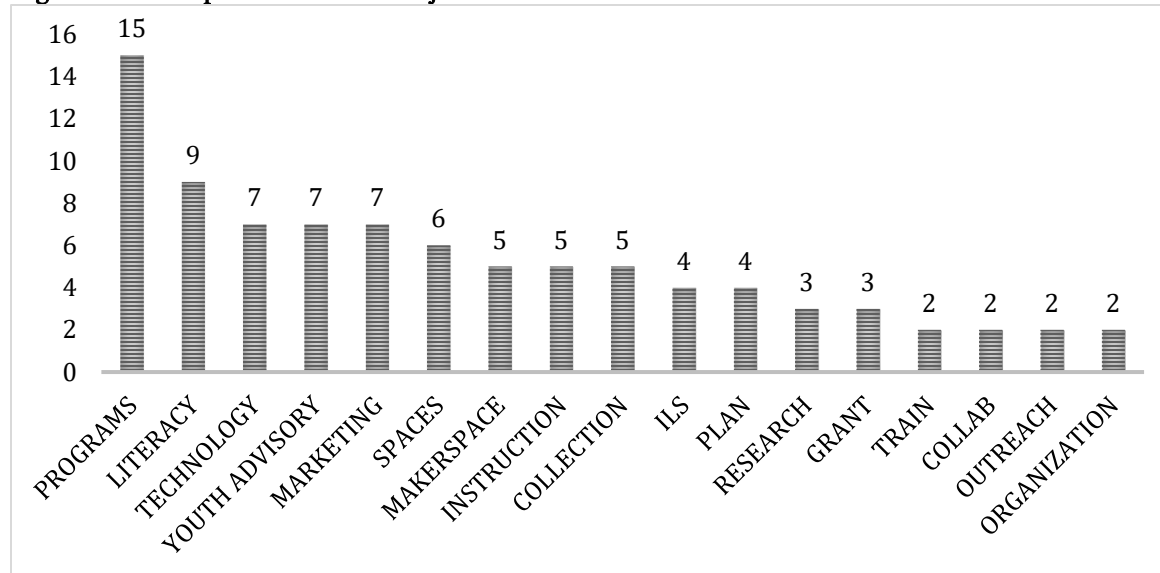
Figure 1. Participants' Current Projects.

Figure 2 breaks out the variety of current interests a participant described, demonstrating intention for future professional development. There was a great diversity in the interests and current projects of these participants, and interests offer areas for development, especially in technology, marketing and outreach, makerspace implementation, and collaborations.

Figure 2. Participants' Current Interests.
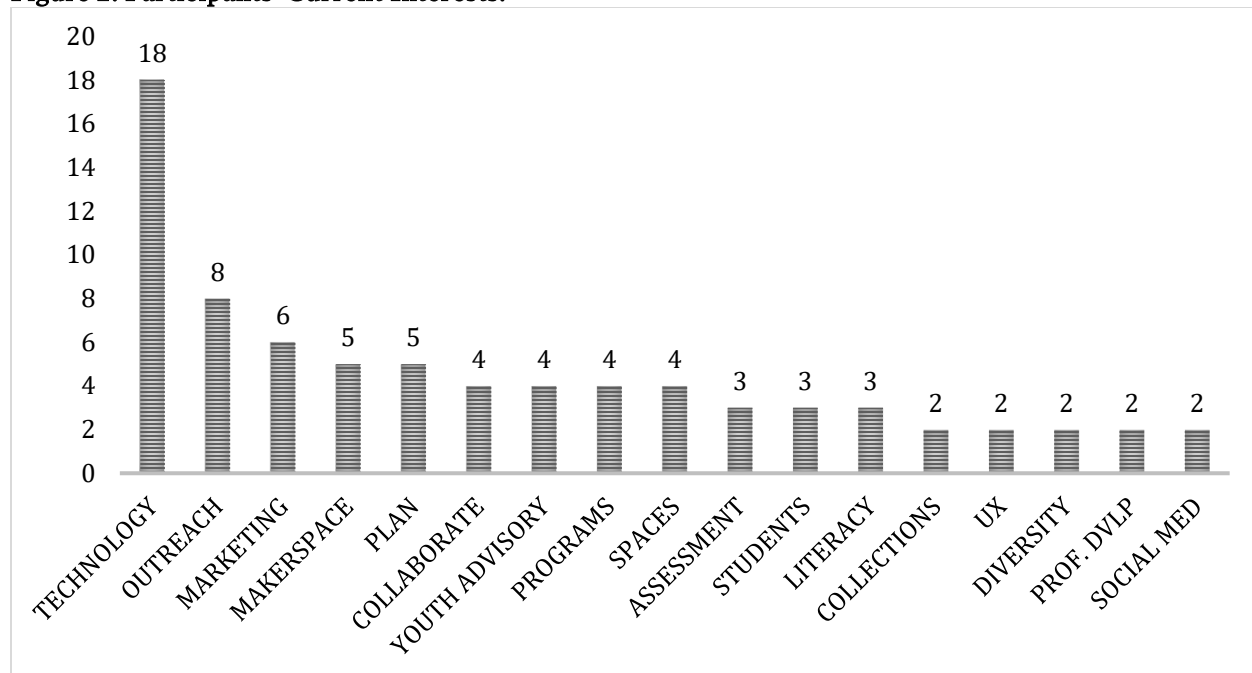
Using [Voyant](#), an open-source digital text analysis tool, the term "new" was revealed to be frequently occurring in these responses. Participants described a search for a new job, new responsibilities in completing accreditation tasks, hiring new employees, crafting a new strategic plan, developing a new makerspace, and "teaching in a new position."

The last field on the profile card asked, "What is one thing most people don't know about you?" This question yielded the greatest number of unique responses and did not lend itself to simple categorization. Participants shared personal facts that fell into seven categories, including family, career, personality, origin, education, health, and former residences. These personal facts illustrated a great amount of diversity among the participants as they described odd habits, diets, citizenship, unusual past careers (sign language interpreter, dog sledder), and physical and personal traits. Participants shared some sensitive, personal information such as family members with cancer and the intent to use the CoLAB workshop to network in search of a new job.

Section Three
Idea Board Comments
The first of the Idea Board questions asked participants to name "synergies or connections... you discover(ed)." The analysis of these comments was based on agreed-upon definitions for each—synergy, connection, and discover—and, using these three terms as frameworks, we coded 59 responses for ***synergy***; 37 responses for ***connection***, and; 45 responses as a ***discovery*** for a total of 141 responses.

Synergies: Using open and axial coding, ***group similarities*** and ***group identities*** emerged as categories used to assess each response. Thirty-nine responses referred to group similarities—skills, knowledge, abilities—that participants share; 14 responses referred to group identity—a description of a personal characteristic that all participants were said to share. Finally, five responses were positive observations of types of synergies experienced within the group. All responses were coded for sentiment—positive, negative or neutral—and most were positive or neutral; only one sentiment was coded as negative. Participants focused on the similarity of challenges, helping people, focus on innovation, love of learning, providing access and service, and most notably, passion for the type of work they do.

Connections: The responses describing connections were coded for sentiment and for the nature of the connection described. Comments were either positive (16) or neutral (21); only six responses described a personal connection, while 32 participants indicated their discovered connections were professional.

The connections focused on their service, helping people, love for libraries, the type of work they do (e.g., academic, public; administrative, service), their love for learning, and their shared experiences. These experiences ranged from travel to same locations, working in similar departments (youth services), shared hometowns, and experiences in leadership. Notably, multiple comments occurred about how close geographically some libraries are to those that consider themselves to be rural.

Discoveries: Ideas, knowledge, thoughts, and revelations characterize these comments. All comments were either positive (20) or neutral (23). Only three were personal discoveries while the remaining 42 were professionally oriented. Seven comments referred to the experience of the workshop itself, either commenting that sharing hometowns is a good conversation starter, and the revelation that "these people are interesting." Several of the comments indicated the participant was learning about rural and small libraries, both public and academic, noting, "As an academic lib, I am intrigued by the variety of interests and work being done by public libraries." Another discovered "how small-town libraries work," learning that some librarians define themselves by the multiple roles they assume, multitasking often to an extreme that contributes to poor results. Finally, several participants commented on how diverse the technology is in different libraries but how important it is to all of them.

What Participants Learned

The second Idea Board question, "What did you learn?" generated 142 responses that were analyzed for (1) Content; (2) Response Type (Personal/Professional); (3) Sentiment, and; (4) Lesson Learned (new information versus reinforcement of existing knowledge). The content of responses elicited 153 codes in three categories, including library information (74), observations about participants (58), or comments about the process of the workshop.

Content: The library information shared among the participants included 15 types of content references to technologies, diverse library types, diverse hometowns, and the challenges of rural libraries.

Response Type and Sentiment: Responses were coded for professional (104), personal (15), or both types of comments (18). The bulk of the professional comments referred to library types (rural, urban, academic, public, large, and small), programs running for children, youth, and adults, with a desire to know more about unique services. Personal comments referred to various trivia or "random details about strangers." Most expressed positive comments about their fellow participants, such as how nice people are, their interesting hobbies, and the enjoyable nature of sharing with strangers.

Lessons Learned: Most of the observations suggested that participants acquired new information (105). Some of the revelations included information about programming (for millennials, people with mental disabilities, and children), technology being used at other locations, and the diversity of hidden assets in libraries. The many comments about diverse backgrounds and skill sets suggest that these participants value this type of knowledge as a form of professional development, stating that a lesson learned was, "How other librarians found their niche—previous work experiences + MLIS degree."

Participants' Next Steps

For the final question, participants provided 121 responses to answer, "What are your next steps?" These responses were analyzed for the category of "next step"—professional action, personal action, or both—and for the type of action—collaborate, connect, learn, or implement—that participants intend to pursue.

The majority of responses were professionally related actions (105). Many respondents planned to seek technical expertise, such as implementing passport services or a "cataloging idea," learning more about another library's strategic planning process, learning more about digitization projects, or getting grant-writing help to fund makerspaces. Professionally related actions were further coded into five categories—Connect (41), Technical (30), Programs (25), Self-development (9), Makerspaces (5) and Library Visits (4)—based on the frequency of explicit statements in those categories. Responses coded as "connect" primarily indicated intent to contact a specific individual and follow up on a program or some technical detail discovered during the speed meetings, so some of these actions overlap. "Technical" responses were focused on specific details sought about library operational issues such as cataloging, specific services, staff training, social media, or makerspaces.

Type of Action—Collaborate, Connect, Learn, or Implement: The actions under Next Steps were coded for the type of action, using definitions for Collaborate (shared program or project with one or more other individuals); Connect (brief contact via phone, visit, or email, to request information); Learn (seek information), and; Implement (to carry out an idea or newly acquired information). Sixty-eight responses expressed desires to learn about something and 55 responses indicated the intent to connect with someone specific.

Discussion

The responses to both the profile card and Idea Boards provide a way to understand the characteristics of these stakeholders, how they view the things they do, and why they do them. These NEFLIN participants comprise a combination of supervisory (~30%) and non-supervisory (~70%) library positions. Thus, their needs for training, development, and support are different. Supervisors indicated that their positions require them to lead, empower, and have impact; non-supervisory positions were focused on specific department

functions and these activities require hands-on experience with technology, digital applications, social media, and, notably, makerspaces.

These results illustrate that participants in the NEFLIN CoLAB comprised early career professionals and those in higher-level positions with much greater length of service (median = 19 years). Participants' responses indicate a wide variety of professional needs that support both the demands of leadership and supervision but also personal needs such as a desire for workplace variety. Notably, the supervisory group indicated responsibilities for changing organizational structures (e.g., ILS migration, vendor changes), grant writing, and implementation.

In using these data for developing an organization's strategic plan, appreciative inquiry—inherent within the CoLAB process—generated "what is at stake" for library professionals who are generally considered to need help marketing and promoting themselves and their assets. CoLABs identify and leverage user assets (the use of extant successful knowledge and practices) rather than user needs, emphasizing the access and use of community expertise, knowledge, skills, abilities, spaces, and other resources already available but hidden to most except those who possess them. In addition, the safe environment created by both the NEFLIN conference convener and the workshop facilitator was revealed to be a hidden asset in itself, with the inclusion of the CoLAB into the annual conference producing social capital, those interactions that generate trust, reciprocity, and cooperation.

Recommended Plan for NEFLIN

Guided by the strength of common "next steps" among participants and the desired learning expressed by participants as derived from the analysis, the CoLAB research team suggested priorities for NEFLIN leadership to adopt:

Facilitated Field Visits: Many participants indicated that they plan to visit other libraries or that visiting other libraries is important and this activity could become a structured NEFLIN program. NEFLIN leaders can establish a library field visit professional development fund—micro grants—where a group of library employees could identify in their application other libraries that provide services or methods that they are interested in learning first-hand. The program could support this cross-fertilization of ideas and practices, while awarding those who seek these types of learning experiences.

Mentoring: Comments related to connections for future conversations to discuss specific programs or approaches can be interpreted to mean that participants are seeking mentoring relationships about very specific topics and expertise. For instance, a simple asset survey distributed to all members asking for information about areas of expertise will yield a menu from which members could select possible mentors. A digital map could be produced where these assets are associated with physical libraries in which the participant with the asset works. Through this virtual map, NEFLIN member libraries would expose their collective assets, inspiring others to make site visits, either as part of the newly sponsored library field visits program or independently.

Makerspaces: Fourteen comments about current implementation of makerspaces featured a focus on the challenges in implementation, the need for training, the need for train-the-trainer programs to conduct makerspace programs, and types of makerspaces that are mobile and can be used in branch libraries. These comments suggested that the programs are new, implementation is challenged by library logistics and funding, and many are in developmental stages for which the participants need greater support.

The comments made by participants cut across library types, academic or public, large and small. The research team's recommendations represent some of the notable aspects of the participants' comments but are not exhaustive of the potential uses and development of the revealed assets of the NEFLIN library community members.

CoLAB Workshops: Future Applications

The large amount of comprehensive data collected on a wide variety of participants in just 45 minutes in a CoLAB workshop was analyzed for use by a southeast regional library cooperative to inform a recent strategic planning process. While the cooperative had already engaged a consultant to conduct a traditional stakeholder needs assessment, the available data confirmed the findings that were generated by the needs assessment process. However, the CoLAB data were more detailed and much more efficiently collected in comparison to the consultant's assessment process that comprised five focus groups of three hours each, with just 32 members participating. While the CoLAB profile card can be tailored precisely for a variety of discovery purposes, this analysis was a post-hoc task.

Although the primary purpose of CoLAB workshops is to empower workshop attendees to reveal and discover information, provide opportunities to share assets, and create new collaborations, this process worked well as a stakeholder analysis that can be used in any planning process. The CoLAB workshops are an efficient way to collect a sizeable amount of data in a short timeframe. The use of appreciative inquiry within the CoLAB workshop facilitates a safe environment and promotes agency for participants to realize asset-based collaborations and experience surprising and fruitful conversations.

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1. Gates Foundation, "Cultivating global library leadership," 27.
2. De Farber, Hines, and Hood, ***Collaborating with Strangers***.
3. Talk to Me Global, ***It's Good to Talk***.
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Zero to Sixty: Implementing Outcomes Assessment for an Entire Organization

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Although assessment is becoming increasingly essential to academic libraries and to higher education in general, assessment skills and experience are not usually evenly distributed throughout organizations. While a central assessment department provides consistency and leadership to an organization's assessment practices, diffusing assessment throughout an organization takes advantage of the domain expertise of its staff. Who better to assess a program than those who know it best? This paper details the process a large academic library system undertook to transform assessment from a centralized practice to a distributed program within a relatively short timeline. This narrative is intended to serve as an example of one way to implement a major assessment initiative that involves staff across an organization.

In late 2015, the University of Texas adopted a new program for institutional assessment called the "Continuous Improvement Framework." The Framework's main purpose is to guide and systematically gather assessment efforts undertaken across the university for accreditation through the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC). The Framework was designed using feedback from faculty and staff involved in assessment and "focuses on use, utility and meaningful assessment practices that are sustainable over time."[1] The University of Texas Libraries has a long tradition of assessment, but had not formally participated in the SACSCOC-focused institutional assessment program that existed prior to the Framework. The previous program had been designed primarily with degree-granting programs in mind, but the Framework was meant to be useful to both academic and student-service units on campus. The timeline worked out so that the UT Libraries were asked to begin participating in the Framework while simultaneously undergoing a large internal reorganization. While challenging, the crossroads of the two changes offered an opportunity to build assessment practices into the new departments and units that we were forming from the very start and served as the core initiative for our new assessment unit.

The Framework uses a traditional outcomes-based structure for assessment plans consisting of goals, measurable outcomes, work strategies designed to help achieve the outcomes, assessment methods, and targets. The UT Libraries are expected to submit plans each fall for each of our programs or departments (as defined by us). Each plan must have at least one goal and at least one aligned outcome, strategy, assessment method, and target. The following fall, we submit a report detailing our findings and identifying an actionable next step for improvement for at least one outcome. At that time, we also submit updated assessment plans for the upcoming academic year that incorporated what we learned the previous year. Beyond those requirements, we are encouraged to implement the Framework in whatever way makes the most sense for our organization. As the aforementioned reorganization was being completed, I began talking with the new directors and assistant directors about assessment expectations. I encouraged our new leadership team to think about how to assign assessment plan responsibilities within their departments and launched into a formal year-long process of working with colleagues across the libraries to write our first round of assessment plans using the following steps.

Planning and Implementation Phase
Workshop for Leadership

I felt that it was important for leaders within the UT Libraries to thoroughly understand the Framework and to have an opportunity to practice thinking of their work through the structured lens of assessment planning before deciding how to assign this work within their reporting areas. I held a workshop to explain what programmatic assessment is, discuss why we were undertaking it, and detail how to get started. I walked attendees through each portion of an assessment plan and gave examples I had written for various kinds of

work units. I then talked more about different kinds of outcomes, including process outcomes and learning outcomes, and what kinds of methods might be most likely to measure them. I gave some purposefully flawed example outcomes and had the group work together to determine how they could be improved. At this point in the workshop, I asked everyone to participate in a series of active learning exercises. I had written scenarios and asked them to develop two outcomes and accompanying assessment methods for each scenario. I then asked them to devise assessment methods, targets, and timelines for outcomes I had written.

I finished the workshop by discussing strategies for deciding how many plans they wanted in their departments (with a minimum of one) and for choosing a "point person" for each plan. I detailed what kinds of support they could expect from the assessment unit and what the internal timeline would be for delivering plan drafts. By the end of the workshop, UT Libraries leadership had a thorough understanding of what assessment plans should look like and how to approach the process within their individual departments. I asked them to follow up with me by the end of the fall semester to let me know how many plans they would have for their units and who would be responsible for communicating with me about each plan.

Kick-off meetings by unit

At the beginning of the spring semester, I scheduled face-to-face meetings with colleagues who had been designated as "point people" within each department. In these hour-long meetings, I introduced the components of the Framework, discussed the timeline we would be working on, and gave brief examples of outcomes and methods. The meetings primarily served as a chance for my colleagues to ask me questions about what would be expected of them and how I would be available to offer guidance and support. I ended each meeting by encouraging attendees to participate in a larger version of the leadership workshop that I would be offering to the entire organization.

Info session and workshop

After the kick-off meetings, I invited all of my colleagues to a combination information session and workshop designed to share information about our participation in the Framework and other assessment department initiatives. The first 30 minutes consisted of a question-and-answer session in which I introduced the Framework and addressed concerns that people had about it. During the second hour, I held the same workshop detailed above for anyone who had responsibilities for writing a plan or who was just interested in learning about programmatic assessment. Library staff were asked to self-select which portion/s of the event to attend, and both had good attendance. I made sure to stress in both that the Framework was not going to be used to judge our work, but was an opportunity for us to be proactive about continuous improvement. I allayed fears about assessment data being taken out of context or used to punish individuals or teams, and generally tried to assure everyone that our participation was a chance to show our strengths rather than a threat.

Drop-in work sessions

I scheduled drop-in sessions throughout the spring semester to encourage my colleagues working on plans to brainstorm or troubleshoot with me. For these informal sessions, I simply booked a meeting room and waited for attendees to show up. While plan participants were welcomed to schedule an individual meeting with me anytime, I thought that these more casual sessions might have a lower barrier to entry. Attendance was not overwhelming, but several colleagues did drop in with questions and concerns that I was immediately able to address.

Drafts due

I requested plan drafts by early summer to give me ample time to provide feedback and ensure plans were ready to submit to administration by the end of the summer. My colleagues were generally very conscientious about making deadlines or communicating with me when they were going to miss them so that I had to spend very little time following up to ensure that I had received what I needed.

Feedback

I created a rubric that I used to organize feedback for each plan. I based the rubric off of the one used at the institutional level and for each portion, described characteristics of "excellent," "sufficient," and "developing" plans. At the end of the document, I included space for general comments and feedback. Using a formalized document to create and share feedback ensured that I gave objective consideration to each plan and clearly noted areas of excellence and opportunities for improvement. Once I had created a feedback document for each plan, I shared them with plan writers by email and told them to watch their email for a meeting request to discuss their plan.

Implementation meetings

After delivering feedback, I scheduled a short individual meeting with each plan writer to discuss any questions they might have and to talk about implementing their plan. My goal for these meetings was to make sure that plan writers had a timeframe in mind for each assessment method and that someone had been assigned responsibility for implementing the method. During these meetings, we also discussed how to work together on any methods, such as surveys, that they might want assistance with. In many cases, I needed to have a conversation to learn more details about the methods proposed in assessment plans. I found that many of my colleagues were very ambitious and I helped them think through implementation to make sure that their chosen methods would actually be feasible.

I also used these meetings to discuss any instances in which I had seen overlap between multiple plans or chances to combine methods to reduce work. For example, I discovered that two different units, one technology-focused and the other user-focused, had written similar outcomes pertaining to our computer labs. I called staff from both areas together to create one combined plan that could capture all of the information sought in both individual plans. I also wanted to make sure that methods that required user input were spaced out so that users were not inundated with requests for feedback from the libraries all at once.

By the end of each implementation meeting, I had filled in a spreadsheet with a description, date of implementation, and target date for finished analysis for each method. We also discussed who would be responsible for tool creation where applicable, implementation, and analysis. Library staff planned to use 142 different methods during the 2017–2018 assessment period, ranging from writing scripts to record software use to hanging posters to invite user feedback on spaces.

Assessment newsletters

I created an email list that includes library leadership and all staff members with assessment plan responsibilities and regularly sent newsletters with updates, deadline reminders, and timely assessment tips. I always reminded my colleagues of ways that I am available to support their assessment work.

Plan input

Assessment plans created as part of the Framework are shared with UT's Office of Institutional Assessment through proprietary assessment software called TracDat. At the advice of colleagues managing similar kinds of student support units on campus, I decided that I would enter all of the libraries' plans into TracDat rather than asking plan writers to attend trainings and enter their plans themselves. The goals were to reduce the burden on staff already being asked to learn a new skill, to avoid spending time on technical troubleshooting, and to ensure that plans were routed through the Assessment Department before being shared outside of the libraries to maintain consistency. Once my office had received all of the plans, a graduate research assistant entered them into TracDat in time to meet the university-wide October 1 deadline. At that point, the plans were ready to be implemented.

Throughout the 2017–2018 academic year, I checked in with plan writers by email and made myself available for consultation as needed. During this time period, I had little direct contact with most plan writers and assumed that this meant that the plans were running smoothly.

Reporting Phase

In spring 2018, it was time to begin talking about the reporting phase for the Framework plans. Since we had a fall deadline for our findings, next steps reports, and our plans for the 2018–2019 assessment cycle, I wanted to give plan writers plenty of time to work on their deliverables.

Workshop

I invited leadership and plan writers to attend a Findings and Next Steps Workshop. The workshop covered how to write up the results from their methods into findings and how to use findings to devise next steps for program improvement.

Report entry

Plan writers were asked to submit their findings and next steps and 2018–2019 plans to me by September 1 so that I could provide feedback and request any needed edits in time to submit them in TracDat by October 1. At this point, we had completed our first full assessment cycle and were ready to embark upon the next. Since most of the plan writers retained their responsibilities and needed only minimal updates to their plans, the second cycle has been much less labor intensive than the first, without need for workshops or mandatory individual meetings. I plan to hold a gathering to celebrate the first assessment cycle and for plan writers to share successes and best practices and discuss things they would like to improve.

Outcomes of First Cycle

I was unsure of how to set my expectations for the first assessment cycle, but overall I was pleased with the level of participation. I received a report for each plan barring some that were discontinued during the year due to further organizational changes. While effort and interest varied across departments, everyone put forth the effort to try something new and ensure that we complied with Framework standards.

Multiple areas made direct changes in operations due to either the process of enacting the Framework or as a result of assessment findings. In many areas that had not been conducting formal assessments, baselines for work have now been established that will allow us to track progress over time. For example, one of our information technology groups reviewed monitoring, ticketing, and response policies and implemented more robust monitoring as a result of the assessment plan. The data that is now being collected will eventually allow for analysis that will help improve response time.

In public service units, a common change was to update trainings and improve communication with staff. Assessment practices that we routinely used before implementing the Framework assessment plans continue to show that our users are largely satisfied with our services, but methods focused on staff preparation and confidence revealed areas where we could make slight improvements. By encouraging us to focus on continuous improvement rather than user satisfaction, the Framework led us to vary our assessment practices.

One way to improve is to stop doing things that are not having the intended impact. Assessment data helped staff decide to retire a computer lab waitlist system that was not being used. Additionally, tracking use of laptops made available for students to use when attending classes in our Learning Labs helped us realize that we could reduce the number of laptops in this inventory and repurpose some for staff use. Data also led to the decision to change or discontinue events that were not well attended or did not reach their target audience. In other cases, we decided to increase outreach for underutilized resources such as lesser used specialized software that users may not realize we provide access to.

Many of the assessment reports focused more on changing assessment methods than on changing work strategies and processes to create improvement. While in many cases this was necessary, it is not sufficient. I stressed with colleagues that I did not want them to continue using methods that proved to be irrelevant or unwieldy, but I did not expect for so many "next steps" to focus on future assessment plans rather than substantive changes to programs or processes. I addressed this in feedback and will continue to do so in future trainings.

What Worked Well

Overall it is fair to say that the first round of Framework assessment did not lead to sweeping changes, but it did teach staff how to engage in programmatic assessment and helped to engender a culture of assessment throughout the UT Libraries. I envision our Framework participation as a work in progress, and anticipate that each year will be a little better than the last. The work we did in the first year set the foundation by establishing working relationships between the assessment unit and all of the plan writers and training colleagues with diverse areas of expertise how to engage in programmatic assessment. As a result of our participation, I was asked to represent the libraries on a campus-wide working group convened to review current institutional assessment processes, make recommendations for changes, and advise the Office of Accreditation and Effectiveness on future assessment initiatives.

Flexibility and empathy were two of my most important tools in implementing programmatic assessment. I learned from the beginning that flexibility was essential. Since we were still transitioning into our reorganization when I rolled out the Framework, I made sure to let plan writers know that nothing in their plans was set in stone. Although we started the 2017–2018 cycle with 21 assessment plans, one of them became obsolete due to further reorganization, several were merged, and several more will not be continued into the 2018–2019 cycle. I consider this a result of learning what works for our organization rather than a failure. Some of my colleagues were resistant to adding assessment duties to their already full plates, and others were generally weary of assessment and had concerns that results would be used to judge them. I went to great lengths to make the process as easy as I could for my colleagues, taking on tasks such as entering their data into TracDat. I made sure to be clear about how their plans would be shared and what the institution was looking for. My goodwill went a long way in building partnerships with even my most reluctant colleagues.

Moving forward

I am confident that I learned even more than my colleagues did throughout the first year of Framework participation. Upon reflection, I will make several changes to how I manage our assessment program. First, I will set more frequent meetings with plan writers. Although meetings are time consuming, I learned that they really helped to establish a working relationship between the Assessment Unit and staff with new assessment responsibilities. Although I encouraged colleagues to reach out and schedule meetings with me as they ran into questions, I found that being proactive and setting meetings myself was a more productive approach. In the future, I will meet with every plan writer at least once during the assessment period and again before results are due to make sure everything is on track and to catch issues before it is too late to resolve them.

I will also build in more support and time for feedback on results. While I built in ample time to give feedback on assessment plans, I did not leave myself enough time to provide feedback on results before they were due to be entered into TracDat. Plan writing went so smoothly that I assumed that results would, too, but it was clear that I did not offer enough support and direction for writing up findings and devising next steps. Working more closely with plan writers during this period would have led to more actionable next steps rather than a focus on improving the assessment process itself. I will address this issue in future trainings.

Instituting large scale change in a short timeframe is not easy but can be rewarding. By distributing assessment responsibilities throughout a large library system with support from a central office, the UT Libraries are better able to leverage the expertise of our staff who are best positioned to measure success and make improvements in their own areas. Undertaking this massive project has proven beneficial to our organization both internally and in our campus relationships.

Endnote

1. "Continuous Improvement Framework and Templates," Institutional Accreditation & Effectiveness, accessed November 1, 2018, https://provost.utexas.edu/iae/assessment/continuous-improvement-framework-templates.

Toward a Culture of Inquiry: Reducing Barriers to Engagement in Assessment

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Introduction

Many library assessment professionals are charged with implementing or developing a "culture of assessment" in their organizations. Based on observations at the University of British Columbia (UBC) Library, this case study considers how terms like "assessment" and "culture of assessment" may unintentionally exclude some library employees and limit engagement with assessment activities. Drawing from the literature on inquiry-based learning, the author suggests that, in some contexts, the goals of assessment are served better by fostering a culture of ***inquiry*** rather than assessment.

The assessment program at UBC Library strives to create an environment where data is accessible to all library employees and where evidence-based decision-making is the default approach throughout the organization. An assessment team consisting of one librarian, one analyst, and a part-time project assistant works to realize UBC Library's vision for assessment. In this vision,

> Staff members at all levels collaborate with the assessment librarian to design focused assessment projects that answer specific questions about library services and user needs. Existing data is accessible, presented with clarity, and used in creative new ways. [...] Library management uses a wide range of metrics and reports, and University administrators are confident that UBC Library decisions are based on the best available evidence.[1]

As this excerpt makes clear, in UBC Library's desired state, assessment is a distributed activity. The assessment team's mandate extends beyond supporting managers and administrators to include developing the data literacy skills and evidence-based practices of a wide range of library employees.

UBC Library assessment: the current state

Despite this commitment and vision, the overall assessment culture at UBC Library is arguably superficial. There is plenty of support for the assessment program and a widespread belief that assessment is important, but the focus is often the ***act*** of assessment (e.g., surveys, focus groups, collecting statistics) rather than on its ***purpose***, to improve library services. While some library units do a good job integrating assessment into their planning and decision-making processes, as a system, UBC Library has room to grow.

To explore how we might improve, I facilitated a focus group with eight UBC library administrators and managers whom I consider some of the library's assessment champions—individuals who support assessment initiatives, understand their practical value, and integrate the findings into their work. The discussion topic was evidence-based practice, and participants were invited to answer two questions: "What are the characteristics of our organization that facilitate evidence based practice?" and "What are the characteristics that inhibit or undermine it?" Participants identified several barriers and enablers that helped me better understand the roles of trust, responsibility, accountability, skills development, and resource availability as they apply to UBC Library.

Important as these themes are, something I had not expected stood out to me during that conversation. Throughout the meeting, some people focused almost exclusively on the "nuts and bolts" of assessment and evidence-based practice, including definitions, methods, and concerns about being sufficiently rigorous. For these participants, the emphasis on ***how*** we do assessment work seemed to overshadow the ***why***. This emphasis, along with other questions that arose during the conversation, points to anxiety or uncertainty

about what counts as measurement, assessment, and evidence-based practice. My experience with assessment consultations at UBC Library also suggests this is a more widespread anxiety in our workplace, not something limited to the focus group participants.

Definitions of measurement and assessment

Reflecting on this aspect of the conversation, I began to wonder whether the term assessment itself might be a barrier to implementing a healthy "culture of assessment" at UBC Library. The anxiety about what counts as measurement observed in the initial focus group seems due in part to an outsider's misunderstanding. To the degree assessment exists as an area of specialization within the library profession—with its own language, librarians, conferences, and competencies—it also runs the risk of becoming exclusive. If that happens, it should not surprise us when those who consider themselves outsiders turn first to the relative safety of definitions, toolkits, and "best practices" when approaching assessment.

One of the challenges at UBC Library is that by relying on actual or perceived "best practices," some employees have set the bar for assessment so high—in my view, much higher than it needs to be—that to conduct what they consider *real* assessment would require skills and time they do not have. Similarly, the bar is often set too high for what counts as measurement or evidence itself. Here, again, misunderstanding what constitutes *real* measurement or *real* evidence can lead to paralysis, getting in the way of practical day-to-day assessment that we could learn from and act on.

The anxiety about what counts as measurement is something Douglas Hubbard addresses in his book ***How to Measure Anything: Finding the Value of "Intangibles" in Business***. Commonly expressed definitions of measurement imply "that measurement is certainty—an exact quantity with no room for error." Hubbard argues that these definitions are too restrictive, and that if we "incorrectly think that measurement means meeting some nearly unachievable standard of certainty, then few things will seem measurable."[2] Some of the challenges we face in library assessment come from this misunderstanding about measurement: for someone who maintains such a high bar for measurement, few things will seem able to be assessed.

To counter this misunderstanding, Hubbard draws on practice in the sciences: "For all practical purposes, the scientific crowd treats measurement as a result of ***observations that quantitatively reduce uncertainty***. A mere reduction, not necessarily elimination, of uncertainty will suffice for measurement."[3] If we accept this definition, a measurement does not need to be perfect to count, it just needs to reduce uncertainty. Does the measurement get you closer than you were to understanding something? Does it reduce the risk of making a costly mistake? If yes, then it counts.

Hubbard's definition is reassuring, possibly even liberating. Why, then, when it has the potential to be liberating, do I sometimes encounter anxiety about embracing Hubbard's definition of measurement when designing assessment projects with UBC colleagues? Or to put the question in more specific terms, why, when I ask colleagues who they need to consult about a project, is the answer so often "everyone"? On one level this should not be surprising: it is in keeping with the perfectionism, attention to detail, and comprehensiveness often identified with the library profession. But to achieve an effective, practical assessment program, it is important to stop striving for completeness in every activity.

A culture of inquiry

Simply informing people of Hubbard's definition is not enough to change the default trend toward completeness in measurement. Commonly held notions of measurement are too widespread to be dislodged by a simple education campaign. Instead of focusing on the definitions, I started imagining the behaviours I would like to see in our library. What workplace behaviours will contribute most to developing a truly collective culture of assessment at UBC Library?

As I reflected on this question, I realized that I do not care very much whether most of my colleagues are assessing things in their workplace. An assessment that is primarily about the act of assessment—not about making decisions or improving services—has limited value. What I care about deeply is that people

throughout UBC Library are ***asking good questions.*** What I really care about is that they are curious, engaged, and wondering about the environment they work in and the users they serve. If employees are invested in and excited about their questions, the assessment team can harness that curiosity and help them explore the topic and find answers.

The emphasis on asking questions changes the focus from developing a culture of assessment to developing a culture of inquiry. Where the former is specialized and potentially exclusive, the latter taps into experiences of wonder and curiosity that almost anyone can relate to. In the last half of 2018, I hosted a workshop and facilitated several conversations with UBC Library staff about this shift in focus from assessment to inquiry. The idea resonates with many people, but it is too soon to tell what impact—and what unintended consequences—a wholesale effort may have on assessment culture at UBC Library. Even so, there is reason to believe that emphasis on inquiry may motivate people in ways that assessment has not.

When learning about cultures of inquiry, I borrowed heavily from the literature about developing such a culture in the classroom. Like definitions of assessment, definitions of inquiry vary widely and emphasize different aspects of the concept. A relatively straightforward definition from Sharon Friesen's ***Focus on Inquiry*** defines it as "a systematic investigation into a problem, issue, topic or idea."[4] There is considerable overlap with assessment in this definition, but for the purpose of motivating my colleagues and sparking curiosity in the workplace, I favour another definition of inquiry: "a dynamic process of being open to wonder and puzzlement and coming to know and understand the world."[5]

It is that second definition, with its emphasis on wonder, puzzlement, and sense-making, that I am calling upon to bring more balance to UBC Library's assessment culture. Terms like assessment and evidence-based practice can be just foreign enough and specialized enough that they become hard for others to relate to unless they are part of the assessment "in crowd." In contrast, terms like wonder and puzzlement might sound unruly, but they suggest an energy that most people can relate to.

Inquiry and motivation

From another perspective, the conscious shift from assessment to inquiry represents a shift from extrinsic to intrinsic motivation for assessment-related activities. I am not confident that we can develop a sustainable assessment culture at UBC Library if assessment is something we do because we are told to, or just because we know it is good for us. This kind of extrinsic motivation has some value and may be important in the early stages of developing an assessment program, but it can also lead to environments where assessment becomes a formality, lacking the transformative energy and risk that comes from deeper questioning. If the motivation is primarily extrinsic, assessment can easily become a required process that is routine and unrewarding. Emphasizing the role of engaged inquiry, on the other hand, has the potential to tap into intrinsic motivation that is more likely to sustain interest in assessment-related projects.

Drawing once again from the literature about motivation in classroom settings, the concepts of ***ego involvement*** and ***task involvement*** are also relevant to this discussion. Students who are ego involved "are concerned about demonstrating to others that they have high rather than low ability." As a result, they "tend to opt for tasks that are either too easy (thus ensuring success) or too hard (thus enabling the student to save face)."[6] For those of us who work in assessment, this behaviour may sound familiar. Replace "students demonstrating high ability" with "libraries demonstrating high return on investment" and you will see why it might be tempting for some libraries to focus their assessment efforts on activities that are likely to have positive outcomes. The way libraries sometimes engage with performance measures and rankings also suggests something akin to ego involvement. One problem with this approach, however, is that we miss out on opportunities to learn.

In contrast to ego involvement is task involvement. Moving back to the classroom model, students who are task-involved tend to prefer realistic challenges, and this is more likely to lead to learning. Success for the task-involved student depends on their own interest, effort, and persistence.[7] It is hard to imagine library staff engaging in assessment with the same interest and persistence as a task-involved student unless they

are deeply connected to the question they are exploring. Just knowing you are supposed to measure something is not enough; we need to encourage everyone to ask good questions, and we need to create an environment where it is safe to do so.

Conclusion

Earlier in this paper, I briefly mentioned the importance of trust in fostering evidence-based practice in our organizations. In the last sections, I have also talked about the energy we might be able to tap into if at least some of our assessment activities are fueled by the intrinsic motivations of wonder and puzzlement. But the wonder in this scenario cannot be artificially planted; it needs to arise from those who are deeply engaged in their work and who are intrinsically motivated to learn more. And we cannot expect energizing, transformative questions to arise unless we collectively create environments where it is safe to ask questions, even if those questions challenge the status quo. In closing, I ask you to consider how you, personally, can help make it safer to question in your own workplace. What power do you have in this regard?

Finally, in addition to being safe to ask questions, it also needs to be rewarding so we do not deplete ourselves in endless questions without the occasional reward of answers. That is where library assessment professionals can step in with their expertise in assessment design: to help identify which questions to pursue at any given time, and to channel the energy of inquiry into methods that are likely to reward the asking.

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Engaging Graduate Students in Research and Scholarly Life Cycle Practices: Localized Modeling of Scholarly Communication for Alignment with Strategic Initiatives

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Introduction

Librarians have for some time been vocal about the fact that the scholarly communication business cycle, essential as it is to the function of an academic library, is not economically sustainable. Academic and research libraries have been quick to rise to the challenge of integrating scholarly communication into library operations and connecting these efforts to broader institutional goals. As we surpass more than a decade of effort, significant problems continue to reshape the landscape of scholarly communication. Developing scholarly research skills continues to be of paramount need and remains strongly related to success as a research scholar. Reexamining areas of need and identifying likely paths for collaboration can be beneficial to determining value and impact in this ever-changing environment. As academic institutions struggle to adapt, librarians should leverage their expertise to advocate for positive change. This paper examines the graduate student's place in the campus research and scholarly lifecycle expectations and practices to identify gaps, form partnerships, and find solutions.

The research and scholarship life cycle is "the creation, publication, discovery and dissemination of scholarly research." Managing this scholarly record requires conducting effective literature searches, managing reference information, understanding modes of publication, and demonstrating productivity as a researcher.[1] In support of these goals, Andrea Ketchum suggests that a more effective approach would be for libraries to focus not on the product of scholarly communication but rather on its process.[2] This localized model will identify not only needs but also institutional stakeholders positioned to fill those needs, which in turn will assist the library to "demonstrate alignment with and impact on institutional outcomes."[3] Resources and services can be mapped to research tasks and institutional needs, and librarians can engage with faculty and graduate students alike to build collaborative relationships across departments. In this paper we outline the process of designing a strategic plan, the elements of that plan, its implementation, and the results. The steps include reviewing the institution's latest strategic plan, research class syllabi, and library statistical data, as well as consultations with the graduate school, a citation analysis of recent theses and dissertations, and outreach to the various departments and individual advisors. We identified three burning questions to address:

1. What skills, tools, and guidance do students need to conduct effective literature searches that are expected by their academic disciplines?

2. How can students efficiently and effectively manage data and other information reducing preparation time?

3. What do our students need to understand about copyright, both as consumers and creators of knowledge?

Through planning strategically, libraries can demonstrate value to the community and institution they serve as being able to support all aspects of the scholarly research life cycle and research community needs.

Literature Review

The levels of adoption have significantly varied by institution.[4] Traditional scholarly communication services include information access, hosting and managing content, outreach and educational activities.[5] Carpenter, Graybill, Offord and Piorun describe the role of the library as proactive in the life cycle of scholarly

publishing maintaining relationships with external publishers and peer review institutions to manage the scholarly output of the research community.[6] Outreach and education are ongoing with librarians customizing skills to each academic area.[7] Tancheva, Gessner, Tang, Eldermire, Furnas, Branchini, Steinhart, and Foster make the distinction between information searching and research (i.e., asking questions, synthesizing, and creative problem solving). They state the importance of self-management and recognizing the fluid nature of research activity—the broader context that requires moving from one activity to another often non-linear in nature.[8] Vaughan et al., call attention to the ubiquity of information, constant connectivity, and the availability of a variety of media that allow multiple points of entry in the research process and the growing need for creative ways of support.[9] Fowler, Stemper, and Persily (2005) offer a framework for planning and starting a scholarly communication program. They identify five phases: establish structure, build knowledge, scan environment, go public, and evaluate program. Planning and implementation, generic tools to adapt locally with Creative Commons Licensing, and implementation examples guide direction.[10] Building a culture of scholarly communication and readiness of stakeholders to adopt measures are common challenges and viewed as the first step towards adapting scholarly communication with a need to keep efforts ongoing.[11]

Statement of Need

The Graduate School has undertaken a strategic mission to improve the quality of graduate student scholarly writing. At the same time, the university has identified a need to reduce the length of time it takes graduate students to complete their studies and receive their degree. The library is a key stakeholder in both of these efforts. However, the library is currently understaffed, having undergone over a 50% reduction in professional librarians in the past five years. This is the most significant drop in the workforce since World War II. When coupled with the increase in online learning as well as ongoing budgetary cuts, finding more effective and efficient methods of meeting students' research needs is critical. Through an analysis of recent scholarly output and collaboration with colleagues across campus, we can first identify problems, gaps, and objectives that need attention, and secondly, we can determine how to target our efforts and maximize our results.

History of Institution

Texas A&M University-Commerce was founded by William L. Mayo in 1889 as East Texas Normal College and functioned as a private teachers' college until 1917, when it was acquired by the State of Texas and was renamed East Texas State Teachers College. In 1935, master's programs were inaugurated, prompting a name change to East Texas State Teachers College. This was followed by the first doctoral program in 1962, at which time the university was renamed East Texas State University. In 1996, the university joined the Texas A&M system and acquired its current name.

TAMUC is located in a rural community sixty miles northeast of the DFW metropolis and has an enrollment of just over 12,000 students, approximately 38% of which are graduate students. Graduate programs are offered in 24 academic departments with more than 40 major areas of study. In addition to 38 master's degree programs, six doctoral degrees are offered, including Counseling (PhD); Educational Psychology (PhD); Educational Administration (EdD); English (PhD); Higher Education (EdD); and Supervision, Curriculum, and Instruction (EdD).

Over the last 20 years, the library at TAMUC has continued to shift from print to electronic resources and communication. In 2006, the library instituted its first digital collection, and in 2008, a digital collections librarian was hired. In 2013, the Faculty Pub was initiated to give faculty the opportunity to share their research and publications with each other as well as graduate students. A proposal was submitted at the end of 2013 to establish a scholarly communication initiative, noting that the nature of scholarly communication was undergoing significant change, that students as well as faculty required new skills to adapt to this change, and that the library was in a unique position to fill this void. For various reasons, library administration did not feel we could move forward with a comprehensive approach. Since that time, efforts have been focused toward identifying and building campus-wide support for scholarly communication needs. Most recently, a series of citation analyses have been conducted on TAMUC theses and dissertations

to determine strengths and weaknesses. The results have been useful both for the library in terms of research instruction and collection development as well as for the graduate school.

One of the purposes of an academic library is to teach students information literacy through the utilization of various library resources. Traditionally, this has been done through library instruction. During these sessions, students are shown how to use library databases or print resources. Instruction librarians at James G. Gee Library have provided library instructions through the years to educate students in the use of library resources, including identifying, locating, and utilizing information. Librarians generally got verbal or written feedback from instructors and students, which indicated the effectiveness of the library instruction. Beginning in 2003, instruction librarians measured the success of library instruction using various statistical tools, including a pre-test/post-test, online survey, and individual outreach to classroom faculty. In 2010, the library began using an online reporting tool to keep track of interactions, including reference queries. In 2012, the reference librarians began using an online tool to field queries via email and text messaging. Approximately 50% of all interactions since electronic data began to be collected in 2010 have emanated from graduate students, with 20% from undergraduates, 10% from faculty, staff, alumni, and the community, and 20% unassigned.

University Strategic Plan + Library Strategic Plan

The university's strategic plan addresses goals in seven domains: Student Success, Scholarship, Service, Stewardship, Diversity, Globalization, and Communication. The library currently analyzes its effectiveness through alignment with the university strategic plan in the areas of collections, facilities, instruction, outreach, and services. In regard to scholarly communication, the library focuses on collections and instruction as its foundational contributions.

This project seeks to make a more quantifiable connection to another goal in the strategic plan in the area of student success: "The university will recruit, admit, and assist academically qualified undergraduate and graduate students who are capable of graduating on time by 2020." A strategy outlined to reach this goal is: "Reduce average time to graduation by 2% by 2020, by increasing average student credit hour enrollments each semester and establishing time-to-graduation targets by college, department, and program."

The identification of problems, gaps, and objectives, leading into our collaboration with the various departments and with the graduate school, is expected to meet this relatively modest goal of a 2% reduction in time to graduation. These efforts will start in a select department and then branch out to other academic departments.

Methodology

To better understand graduate students' needs, a purposeful and targeted approach was seen as useful. Given the history of the university and its long-standing roots in teacher education, a single department from the College of Education and Human Services was deemed appropriate and a natural starting point. Over 90% of students enrolled in a doctoral program are in the COEHS, and the selected department has a mid-level graduation rate. This will allow a focus on improvement that builds on existing successes before moving on to slower-moving departments. Programs include one undergraduate, four masters, and one doctoral program (one of the largest and the first doctorate offered by the university in 1962). An initial review was conducted of citation analysis of theses and dissertations, reference questions and graduate student consultations to understand issues they are seeking help in, and faculty authorship and research output to determine what topics faculty are writing about. From this analysis, questions were created for a scholarly communication reference interview to be disseminated to faculty of the department. The importance of developing scholarly communication skills that match what faculty expect of themselves and from each other can prove to be helpful in identifying scholarly expectations and graduate student needs.

The Process: Review & Analysis

Data were drawn from four citation analysis projects conducted over the past few years, providing direction for review and analysis. These studies involved:
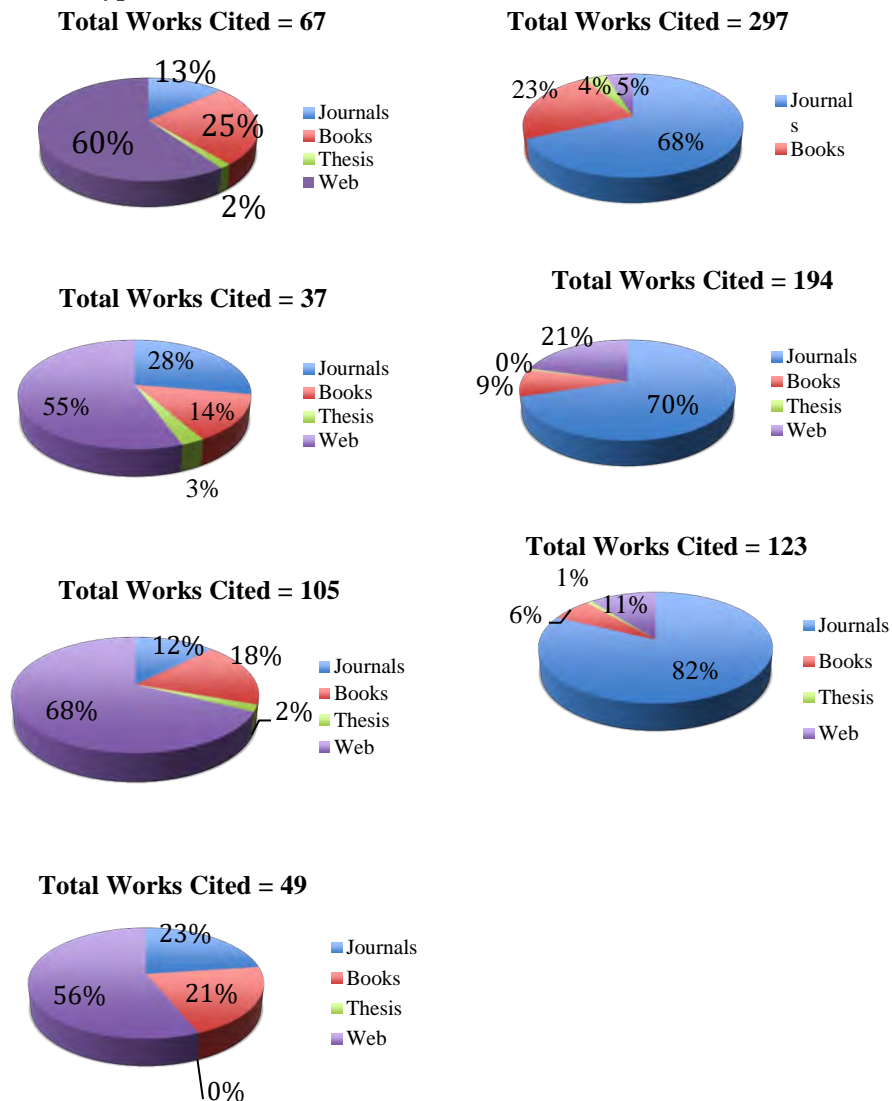
- The 1,852 Internet sources cited in the 100 dissertations in all disciplines completed in the 2013 calendar year at TAMUC. This figure represents 19% of the total number of citations.

- All 1,613 sources cited in the 38 STEM master's theses completed in the 2015 to 2016 calendar years at TAMUC. Computer science was the only discipline that did not have a majority of cited sources from journals. Computer science sources were more evenly drawn from journals, the World Wide Web, and conference reports. Mathematics, along with computer science, showed a higher rate of citations from books than did the other three disciplines.

- The 1,210 sources, including dissertations, theses, monographs, and peer-reviewed journals, that cited 451 ETSU and TAMUC theses and dissertations completed between 1967 and 2017. Cited theses and dissertations represent 15% of the overall total produced by students at the institution over the 50-year period, with 74% of the citations coming from the education disciplines, 12% from counseling, 7% from counseling, 3% from English, and the remainder from other disciplines.

- The 4,806 sources cited in the 59 theses and dissertations completed in the 2016–2017 academic year at TAMUC.

These citation analysis projects identified several areas of concern involving the writers of theses and dissertations that should be addressed. These include evidence of a growing acceptance and use of sources from the World Wide Web, a pattern of errors in citation formatting, the occasional use of inappropriate or otherwise questionable sources, and the recognition that TAMUC theses and dissertations were being accessed, read, and cited by an ever-widening array of scholars. The latter was seen as a way to elicit faculty and administration support for developing scholarly communication efforts. Findings from these projects helped identify the direction for review and analysis.

Theses and Dissertations Written

At the department level, review of theses and dissertations written and completed in 2017–2018 revealed what graduate students in the discipline were writing about, and the sources they were using to cite their work. Notably, more than half of the seven dissertations used peer-reviewed scholarly journals as a reference resource. Three out of the seven dissertations relied heavily (50% or more) on web resources, two of the seven dissertations utilized less than 10% of books to support their research work, while the use of thesis and dissertations were 3% or lower across all seven dissertations. The frequent use of web resources, compared to the minimal use of books and theses/dissertations to support research, identify areas that graduate students could greatly benefit with significant and more targeted support. Figure 1 below provides an overview.

Figure 1 - Types of Works Cited Per Dissertation 2017–2018

Total Works Cited = 67

13%
25%
60%
2%

- Journals
- Books
- Thesis
- Web

Total Works Cited = 297

23% 4% 5%
68%

- Journals
- Books

Total Works Cited = 37

28%
55%
14%
3%

- Journals
- Books
- Thesis
- Web

Total Works Cited = 194

21%
0%
9%
70%

- Journals
- Books
- Thesis
- Web

Total Works Cited = 105

12%
18%
68%
2%

- Journals
- Books
- Thesis
- Web

Total Works Cited = 123

1%
11%
6%
82%

- Journals
- Books
- Thesis
- Web

Total Works Cited = 49

23%
56%
21%
0%

- Journals
- Books
- Thesis
- Web

Reference Questions and Graduate Student Consultations

Looking at questions graduate students ask via the "Ask-a-Librarian" widget, telephone queries, and face-to-face consultations—especially when they are working on their thesis or dissertation—will identify problem areas and help to pinpoint areas of further need. A review of 500 questions for the year 2017–2018 showed 48% of student queries were about peer review articles and 25% were on "research information." These included finding material on a research topic, finding information about research designs, and information on IRB protocol. Literature searches (8%), thesis and dissertations (7%), and reference and citation assistance (8%) were areas requiring further attention given that questions about these resources were less than 10%. Questions on plagiarism (0.7%) and writing (1%) were few, indicating this was an area that knowing more about could greatly benefit graduate students and the quality of their research work. Figure 2 and Figure 3 below present details on graduate students' reference questions. Appendix 1 presents a sample of reference questions asked.

Figure 2 - Word Cloud based on Term Size and Frequency

Figure 3 - Reference Questions and Consultations
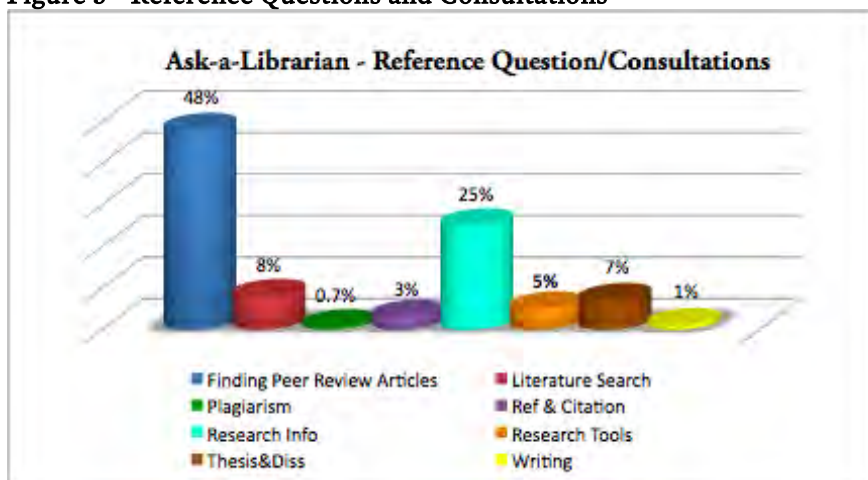
Faculty Authorship and Scholarly Research

Similarly, a review of authorship and the scholarly research output of the department may prove to be worthwhile to understand what faculty are writing about and the kinds of research output generated. A descriptive bibliography developed at the department level would seem to be a useful tool. While a bibliography can reveal the work of a given author and provide information on the scholarly communication history, the organizing principle becomes the area of research (topic) and discipline rather than the writer, title, and works authored included, as well as publication date and distribution information (i.e., number of copies available by the library or digital archives).[12] Thus, a search was started with a review of faculty research publications from the department's web page, followed by a search using the library catalog and other finding aids (by author or title), as well as a look at journal article indices to determine rigor and quality of the publication. If the written work showed up in the catalog, it was included in the data set. Google Scholar and Research Gate were consulted to understand the impact of scholarly output beyond the university. Figure 4 presents faculty research and publications.

Figure 4 - Faculty Research Publications

Research focus is on educational research, community college learning, educational technology, human resource development, and performance training. These areas are representative of the key research interests in the discipline. Basic citation statistics provide insight on article readership and impact; however, a more detailed review is required and is in progress. The library provides access to 80% of these preferred journal publications.

Implementation
The Scholarly Communication Reference Interview

To obtain feedback from faculty to understand expectations for graduate students' scholarly lifecycle practices, questions were created for the scholarly communication reference interview from the analysis of the above areas and disseminated via email to junior and senior faculty members in the department (see Appendix B). The option for a follow-up visit with a member of the research team to validate responses was offered; however, not all faculty saw the need to meet for a follow-up interview (two out of the seven faculty did not request to meet). A constant-comparative process established by Glaser and Strauss (1967) was followed to discover salient categories and patterns in these responses. Findings were triangulated and then sorted into relevant categories to identify emerging themes.[13]

Faculty responses were unanimous about the importance of having skills to conduct effective searches listing strategies according to the content of classes taught. Most emphasized the need to know the difference between credible and non-credible sources and having the patience and self-determination to pursue information. Several mentioned the structure of courses being designed for students to learn many of these skills at the same time they acknowledged "synthesis" was not an easy skill to teach. They suggested strategies that they found helpful to manage their own research. All emphasized in no uncertain terms the need to understand copyright and plagiarism and for graduate students to know when they would be in violation, and the penalty that came with the violation. There was recognition of the need to develop effective skills such as self-reliance, dedication, determination, and the importance of understanding the cultural implications of being a scholar. One faculty member summed it up well—"stewardship of the discipline, learn the language and stay up to date"—as skills perceived to be critical for graduate student success. Table 1 provides a summary of faculty responses.

Table 1 - Scholarly Communication Reference Interview - Faculty Responses

Questions	Responses
Conducting Effective Searches?	Identify scholarly research, journals and articles; what search engines to use Know when they have found good solid research (a) Identify keywords, (b) Use the keywords for database search, and (c) integrate the searched publications Patience and motivation to locate good, reliable literature
Skills graduate students' lack or have difficulty with?	Limited Internet search skills Identify scholarly research journals and articles Keyword search, used for database search can learn from classes Integrate with publication is a tacit skill difficult to teach Synthesizing literature, write focused literature review paper Determine value of readings acquired Graduate level writing skills Adherence to APA standards Design credible research Integrity, self-reliance, dedication and determination
Manage information, reduce preparation time for research	Plan; Timeliness Take advantage of resources such as writing center Adhere to APA standards Keep a running annotated bibliography Begin research NOW Aim for conference level proceedings Have strategies and a system to keep references Categorize topics of research Depends on the student

Questions	Responses
Evaluate impact of research?	Propose and write a final research proposal involving extensive searches for scholarly peer reviewed sources related to their chosen research topic
	Critique articles using a rubric with questions; clear research methods used, implications of the research, clear representation of any included samples and populations used, etc.
	Explain characteristics of important papers; citations
	Find appropriate literature first to identify big picture of your topic
	Reputation of journal that the research article is published
	Look at currently published research article's reference list
	Search for frequently cited articles and journals published in those articles
	Challenge their use of weak or irrelevant sources
	Is it relevant to the discipline?
	In sum: stewardship of the discipline; learn the language, read the news, and newsletters
Understand Copyright and Plagiarism?	Use quote marks ("") and cite for word-for-word content from published sources
	Know disciplinary actions by the University can be taken against a student for plagiarism
	Know Copyright material from a published source cannot be used without prior written permission from the author(s).
	To have a strong foundation and background regarding plagiarism including unintentional plagiarism.
	To know how to appropriately and professionally cite others' works
	To understand that plagiarism and copyright infringement is theft, which can end their careers; what constitutes plagiarism; what constitutes copyright infringement; and how to guard against both
	To understand using someone else's ideas and not giving proper credit is not allowable. Also self-plagiarism is also not allowed.
	APA style formatting and source-based writing are part of learning how to write any academic papers (including the dissertation) as well as orienting one to the community of scholars. These two exist to help the student become a scholar and doctor.

Questions	Responses
	Many resources and tutorials are available. The information below can prevent unintended mistakes and errors resulting in major consequences.
Criteria used to select a research journal for publication?	Does the content contain in text citations and a list of reference sources at the end of the article or study? Must be Higher Ed, all articles etc must be within 10 years of publication I suggest the SSCI journal list Impact in their field of study, right fit between the topic of the paper and what they look for I usually issue a blanket statement that they should not depend solely on resources that they can access online. Typically, our students will publish with their adviser before venturing on their own to publish original research. *The list of journals below are those we guide students to
Academic Journals to publish in?	I do not limit students to specific academic journals; refer to library Community College Journal of Research and Practice Community College Research and Journal of Blacks in Higher Ed Human Resource Development Quarterly Human Resource Development Review Adult Education Quarterly Journal of College Student Development Review of Higher Education Journal of Higher Education Journal of Diversity in Higher Education College Student Journal Thought and Action (the NEA Higher Education Journal) Review of Higher Education Community College Journal *Review of Research in Education (Publisher—Sage/Affiliation—AERA)

Questions	Responses
	*Research in Higher Education (Springer/AIR)
	*The Review of Higher Education (The Johns Hopkins University Press/ASHE)
	*Journal of Student Affairs Research and Practice (Taylor & Francis /NASPA)
	*Journal of College Student Development (The Johns Hopkins University Press /ACPA)
	*The Journal of Higher Education (The Ohio State University Press)
	*Higher Education Research & Development (Taylor & Francis)
	*Journal of College Student Retention: Research, Theory, & Practice (Sage)
	*Community College Review (Sage)
Other Comments?	It would be helpful to record a video clip from searching database to integrating searched articles
	The more we read well-written articles, the more we know which journals are good
	Graduate students: every graduate class as a test of their research skills and an opportunity to demonstrate these skills
	Doctoral students: every class as an opportunity to practice the skills they will use in conducting their dissertation research and writing the dissertation

Gaps, Partnerships, and Proposed Solutions

Our research uncovered several gaps that should be addressed in order to meet the needs of the students as well as accomplish the goals set by the university. Some of these were already apparent and continue to be integral in the library's work: an understanding of keyword searching, awareness of what resources the library has, how to manage the various database interfaces to access content, and how to adhere to copyright laws and avoid plagiarism. Other issues were less obvious: an increased acceptance and use of Internet sources requires more attention to information literacy skills needed to evaluate resources falling outside the library's collections. The effectiveness of existing instruction and outreach should also be assessed and improved in light of the number of doctoral students who are currently writing their dissertations asking very basic questions about research that they should have mastered much earlier in their studies. Faculty mirror many of these same issues and concerns.

There are also areas of concern that the library is not directly responsible for but for which the library can provide support. Faculty frequently report that doctoral students are not ready and equipped for academic writing. While the library cannot provide writing instruction, librarians can point students to academic writing that is on par with what they are expected to produce. As the graduate school pushes for greater attention to writing quality, there has been some pushback from faculty. Information from the citation

analysis project showing how widely our students are being cited has provided a valuable talking point in working with any reluctance toward what is seen as more institutional oversight. These needs have led to the library seeking out partnerships with the graduate school, the Writing Center, the Office of Academic Technology, and the individual colleges and departments. Solutions are found in a multi-prong approach, including LibGuides, Dissertation Boot Camps, embedding librarians in online courses, and targeted reports to faculty and departments.

Conclusion

Changes in scholarly communication practices in academic and research libraries are moving fast with all participants engaged in defining the library's role in scholarly communication. A key factor that impacts the success of scholarly communication programs is the skill of bringing together diverse stakeholders to collaborate, an essential skill for libraries that hope to have a role in future scholarly communication practices. While results from the citation analysis studies and the pilot highlight strengths and weaknesses of graduate students' research skills as well as faculty expectations of a single department, it serves to shed light on broader issues areas in need of attention outside library collections (i.e., attention to information literacy, existing instruction and outreach, readiness of stakeholders, and building a culture of scholarly communication). Many of the issues are complex and cannot be fixed with just a one-shot approach, but instead require ongoing effort. While funding and budget constraints will remain, it is vital for librarians to be willing to collaborate and partner with their constituents to identify areas of acute need, target efforts, and maximize results. Only then will they be able to continue to support and meet the needs of their faculty and graduate students to shape a place for themselves in the changing scholarly communication environment.

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Appendix A
Reference Questions and Graduate Student Consultations (Sample)

- Is there an easier way to determine if a peer reviewed article in our database is qualitative quantitative or a research review?

- I am an online graduate student of Curriculum and Instruction program. While searching, how do I know that article is peer reviewed?

- I am in the Education Leadership Program and I need to find peer reviewed articles. I have no idea where to even begin.

- I'm in the process of completing my doctoral comps in EDAD. Professor Borgemenke said that we needed to check our work for plagiarism before submission. He said to check with the library on a plagiarism checker like turnitin. Can we get access to this through the library?

- Is there an application or website that I can go to check a paper I am writing for plagiarism?

- I am attempting to search for research articles that are qualitative with a pragmatism approach. Can you give me a starting point because I'm getting stuck?

- Is this peer reviewed article considered a co-relational research?

- Can I access academic journals through the university, even though I am an online student? I'm finding a lot of articles are behind pay walls.

- What are the best databases to research information on Gothic Literature?

- How do I obtain the DOI for articles located in the databases that do not include the DOI?

- How do I cite this source in APA format?

- When I have gathered information from a lit review paper, how do I cite? The original or the lit review?

- I am a doctoral student enrolled for the second semester in EDAD 718. I need help with changing my dissertation topic from qualitative to quantitative. I have written chapter 1 and part of 2 and my information is quantitative but I am having trouble finding a focus for a quantitative topic title. What is the process from the research and instruction center so that I can have assistance. My dissertation chair is very helpful but I wanted some more insight before I submit my chapters and title again.

- I found this title in the online TAMUC card catalog; however, I am unable locate the article itself. How do I go about obtaining this?

- How can I get the most recent 50 dissertations in the area of education leadership/educational administration from TAMUC?

- I am in the process of writing my dissertation and my adviser suggested that I look in the Book, Handbook of Educational Theories for Theoretical Frameworks by Irby, Brown, and Jackson. I live two hours away and am restrained on time. Do you have any suggestions for how I might view this book for a few hours?

- I am at the "treatment of the data' portion of my dissertation and know what I want to do but am not sure how to approach it statistically. Is there someone at the Mesquite campus that can help me figure this out and help me write this portion of the dissertation?

- I need help with APA style. I need to know how to cite an atlas, almanac, and dictionary. Do I write group author if there are 4 authors listed or write all of their names? World Book has no author listed. Is World Book considered to be the author?

- I need assistance finding the percentage of individuals who have a depressive disorder in inpatient psychiatric hospitals. It must be a relatively recent figure.

- I would like help finding info for a Literature Review. I am looking for peer reviewed articles pertaining to public school students internet access at home. Basically I would like to see the impact of schools moving to online textbooks and e-books on their students.

- I am doing a literature review on ways to recruit, keep and motivate volunteers but I am not finding anything. I have tried using words such has volunteer retention, volunteer recruitment and volunteered based agencies. Do you know other phrases I could use or other database I can use?

- I have several questions regarding a Literature Review assignment. I need more understanding of what sources are acceptable and why. Also, I need help on the formatting of the literature review.

- What are some keywords that I can use to find resources in the database regarding my topic? I am conducting a research for a class and I do not know where to start. I would like to study the inclusion of minorities groups in higher education, especially males. I live in Fort Worth and it is complicated to go to Commerce.

- I am hoping to find something about how cell phones have changed reading habits and have impacted the reading stamina of students. I'm hoping you can suggest some keywords that I haven't already used.

Appendix B:
Scholarly Communication Reference Interview

1. What skills do graduate students need to conduct effective searches in your discipline or area of expertise?

2. What are some of the skills graduate students lack or have difficulty with in the research classes you teach?

3. How can students effectively manage information reducing preparation time for research?

4. How do you teach your students to evaluate the impact of the research they find?

5. What do students need to understand about copyright and plagiarism?

6. What criteria do you ask students to look for when selecting a journal for research publication?

7. Name 3–5 academic journals in your discipline that you would point your students towards for research or publication?

8. Other Comments

Choose Your Adventure: A Library Reorganization Case Study

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Abstract

In 2013, after extensive learning, scanning, and planning, and armed with a new vision, the UT Arlington Libraries underwent a comprehensive reorganization. In order to facilitate this, the leadership team had to determine what kind of roles would be required to achieve the new vision and accomplish the new objectives, and what skills and characteristics would be necessary in those roles. The entire staff was then asked to engage with the reorganization process by participating in two surveys that would allow them to self-evaluate and reflect on their skills and desired roles. All positions were structurally agnostic and nearly every position was on the table.

After individual interviews with the dean of libraries, staff at all levels were notified of their new roles. Although a great deal of communication and preparation had gone into the work beforehand, the transition itself was not without difficulty. This paper will discuss the process that was used and some of the resulting lessons learned.

Introduction

In 2012, a new dean of libraries was hired at UT Arlington, with innovation and change being her watchwords. The search committee, which included five library staff, sought out candidates who had a perspective on user needs, both current and future, and who were committed to doing the work to make the libraries more relevant to our community. The new dean brought a strong user focus as well as a future-oriented perspective. The 2012 Association of College and Research Libraries (ACRL) Research Planning and Review Committee report, required reading for the leadership team after the dean's arrival, revealed the top 10 trends common to academic libraries, based upon the current literature. While all of them struck a chord, the three most immediately relevant were communicating value, prioritizing user behaviors and expectations, and patron-driven acquisition. Our need to communicate value was clear, as the libraries were experiencing some ill effects to changes made by the university that were made without our input (e.g., the dramatic increase in student enrollment in an exclusively online evidence-based RN to BSN degree program). When designing the fee structure for the program, no library fees were included, so enrollment-based database subscription prices increased with no additional income to the libraries. A comprehensive evaluation of print collection use for purchases made in the previous 10 years, combined with rising inflation in e-resource subscription costs that had been affecting academic libraries across the country, necessitated a change in our monographic acquisition policy from "just in case" to "just in time," driving us to adopt a completely patron-driven monographic acquisition model. The changing priorities and unspoken needs of our users drove extensive exploration and reprioritization of library assets. Soon after her arrival, the dean created charges for nine task forces, which more than 80% of the library staff volunteered for, to accomplish activities that ranged from environmental scans for best practices in academic libraries to extensive ethnographic studies to learn more about student research needs. Not only would this information provide context and a framework for the changes to come, it also helped staff to develop a broad understanding of the needs of our community and the importance of pursuing a new direction. Using all of the information gathered from the task force work, a list was developed that was locally titled, "What we know, and what we think." This list identified some broad themes about user needs and expectations, allowing us to think differently about our services. Combined with data provided from external sources such as the National Survey of Student Engagement and the annual Student Experience Survey administered by the university's institutional planning office, a new vision was defined for the libraries: Creation, Collaboration, Exploration and Innovation (C2XI). The initial plan was to complete the process of reorganization in three months and allow for staff transition during the summer semester, in order to minimize impact on our users.

Planning

After identification of the vision, the leadership team developed a list of the kinds of knowledge and skills that staff would need in order to accomplish the goals of the new vision. Guiding questions were, "If we want to accomplish X, what are the components of that activity? What do staff need to know how to do?" We also asked, "What kind of preferences might a person have who might be good at a particular task or role, even if they don't currently have the skill?" This was not an inventory of skills held by current staff, but rather a brainstormed list of what would be required in order to complete potential actions and activities as part of the new vision. For example, proficiency with Geospatial Information Systems and open source programming were listed, as well as web design skills and use of analytic tools. Along with proficiencies, a list of preferences was also developed. Examples of this include working with certain types of constituents and communication preferences. Would the staff member say that they preferred or avoided working with undergraduate students, or that they loved doing number crunching or creating marketing materials? After a day of brainstorming skills and preferences, the team began to combine these skills into groups that would be critical in the performance of certain functions, and then group the functions into roles. Along with the role, workloads were described and defined based upon immediate priorities and, in some cases, the need for multiple staff in certain roles was clarified. The resulting list of 283 KSAPs—knowledge, skills, abilities and preferences—was combined into a total of 63 specific roles, which all staff would have an opportunity to engage with in the days to come.

Once the vision had been identified and the KSAP process defined within the leadership group, department coordinators (heads) began to have meetings with their staff to discuss the planning process and next step for the organization. While it had been generally understood by the staff that a reorganization was the most likely result of the work of the previous year, there was still a great deal of trepidation about how that would take place. A decade prior, a reorganization that had very little transparency had had long lasting negative effects on the culture of the libraries. Because of this, there were still lingering fears on the part of staff who remained at the current time, so communication was paramount to the success of the process. Throughout the previous year, the dean had been sharing weekly email updates about what was happening with the various task forces and what was being learned, as well as providing resources for staff to engage with to help them see the bigger picture and have more clarity about the general direction that the libraries would be taking. All library staff were encouraged to read Jim Collins' book ***Good to Great*** to understand the approach that we were taking, along with Brian Mathews' white paper "Think Like a Startup." During the planning retreat, the dean sent daily emails documenting the progress and explaining and celebrating the new vision of C2XI. Once the roles and the process were defined, it was the job of department heads to answer questions and provide support during the time leading up to and through the transition.

Once the KSAP was completed and the roles defined, surveys were created and then sent to all staff in order to give them a chance to indicate their skills and preferences, as well as to choose desired roles. Figures 1 and 2 provide samples of the survey questions that staff responded to.

Figure 1. KSAP Preferences

KSAP Skills and Workstyles Preferences Self-Assessment

Workstyles Preferences Self-Assessment

This is a section where you say what your preferences are for a wide variety of situations and aspects of work here in the library. It focuses on what you enjoy rather than what you know.

REMEMBER: there are NO RIGHT OR WRONG ANSWERS. Please be honest! Nobody enjoys everything, and that's ok!

*PR1 Communicating via email

  1 Dislike   2 Enjoy a little   3 Enjoy a lot   4 Love this!   0 Not Sure

*PR2 Communicating via IM/txt

  1 Dislike   2 Enjoy a little   3 Enjoy a lot   4 Love this!   0 Not Sure

*PR3 Communicating by phone

  1 Dislike   2 Enjoy a little   3 Enjoy a lot   4 Love this!   0 Not Sure

Figure 2. KSAP Preferences

*PR107 Analyzing large amounts of data

  1 Dislike   2 Enjoy a little   3 Enjoy a lot   4 Love this!   0 Not Sure

*PR108 Teaching information literacy skills

  1 Dislike   2 Enjoy a little   3 Enjoy a lot   4 Love this!   0 Not Sure

*PR109 In-depth faculty and PhD student research

  1 Dislike   2 Enjoy a little   3 Enjoy a lot   4 Love this!   0 Not Sure

*PR110 Answering statistics, data, or GIS questions

  1 Dislike   2 Enjoy a little   3 Enjoy a lot   4 Love this!   0 Not Sure

After completing the KSAP survey, staff were provided a list of all 63 roles available, along with a description of each role, and asked to list their top 7 choices and their bottom 5 choices. The dean had committed to all staff that they would not be given a role in their bottom 5, so this was an opportunity for all to indicate roles that they felt were not a fit for their skills and preferences. Staff completed the surveys over a two-week period, and once they were all submitted, the dean began meeting with each staff member individually. This individual discussion of their preferences and role choices allowed each person to have an opportunity to articulate their ideas about why they selected or did not select a particular role and to give them an opportunity to reprioritize the order of choices, if they so desired. In some cases, there was additional discussion about the specifics of a role that provided additional context to the staff member, which resulted in a change in their choices. These meetings took a total of four weeks to complete. After the interview process, the dean assigned staff to the newly created, or revised, roles. Figures 3 and 4 show examples of the results of the role selection survey.

Figure 3. Top 7 job choices sample.

RespondentID	First Question: Choose your TOP 7 choices for jobs. These are jobs that you will love doing and that will make you happy. Copy the job position numbers and titles from the list and paste into the textboxes below.							
2654255176	Administrative Assistant	Budget, Accounting Clerk	Human Resources Specialist I	Human Resource Specialist III	Staff Development	Budget Officer	Facilities Assistant	
2659549536	Archivist/Liaison	2. Disciplinary Liaison: Arts & Humanities	3. Book Repair and Conservation Assistant	4. Grant Writer	5. Metadata Specialist	6. Photographic Access Assistant	7. Interdisciplinary Liaison: K-12	
2658321305	Archivist/Liaison	Department Head: Special Collections & Archives	Data Management & Curation	Digital Projects Librarian	Interdisciplinary Liaison: Digital Humanities	Interdisciplinary Liaison: Government Documents		

Figure 4. Bottom 5 job choices sample.

Second Question: Choose your BOTTOM 5 choices for jobs. These are jobs that you absolutely do NOT want to do and that will make you very unhappy. Copy the job position numbers and titles from the list and paste into the textboxes below. These 5 are in no particular order.				
5 Jobs I Do Not Want				
1. I don't want to do:	2. I don't want to do:	3.I don't want to do:	4. I don't want to do:	5. I don't want to do:
Archivist/Liaison	Liaison	Programmer/Analyst	Serials Acquisitions Assistant	LCD Management
Events Specialist	Communications Assistant	Marketing Coordinator	Exhibits Designer I	Web & Digital Specialist

The Result

Two months later, all staff were notified about their future roles via email, with the leadership team being notified on Friday and the remainder of the staff notified the following Monday. In the end, 87 percent of staff got a role that was in their top three, with 63 percent getting their top choice, and no one was permanently assigned to a role that was in their bottom five. Because the timeline had been delayed a bit, transitions for staff into new departments would have to take place in the few weeks prior to the beginning of the new semester. There were many staff who underwent significant change, moving from library assistant positions to librarian or archivist roles, or from one functional area to a completely different one

during the reorganization. Additionally, a number of staff chose and were placed into roles that did not previously exist in the organization, such as marketing and graphic design.

The new leadership team created by the reorganization had its first meeting the day after all staff received their notifications, in the form of a two-day leadership development retreat. The overall organizational structure was revealed to the leadership team at the retreat. After clarification and discussion about how the structure would support the achievement of C2XI, the structure was released to all staff at the end of that week. After the two-day training, previous department coordinators then met with the staff in their old departments individually to facilitate the transition by explaining roles and answering transition-related questions. One of the key elements that the dean wanted the leadership team to convey to staff was that the change was not an indictment of the past, but a need to focus on the future.

Over the course of the next month, staff began transitioning to new departments as spaces were redefined and supervisory relationships were clarified. While it would seem that there would be plenty of time for organizational transitions, several issues arose that complicated the process for both staff and library users.

Lessons Learned

One lesson learned after the process was complete was that it is critically important to manage expectations in a time of transition. There were some service challenges inherent in such dramatic change that were exacerbated by the perception of some staff that the transition was as simple as stepping from one role into another, without consideration for the needs of library users. For example, there had previously been five open librarian positions prior to the reorganization. Likewise, there were 10 department coordinators. In the new organization, there were 15 directors or department heads, with many of the new leaders coming from the liaison ranks. The combination of these promotions with preexisting empty positions meant that there was a significant lack of librarians to act as department liaisons once the fall semester began. In an effort to ameliorate this, the dean temporarily assigned liaison duties to four librarians who had indicated that this role was in their bottom five choices. While this was only a temporary measure, the expectations of those four staff were significantly disappointed. Likewise, because of the way that public services were restructured (from four departments into one, with previous access services department functions such as ILL, stacks management, and reserves and resource delivery services being moved to a non-public services department, access and discovery), staff who had had a 20% assignment to a service desk no longer had that responsibility in their new role. Along with the combination of the four service points into three desks run by a single department, it was necessary for staff to continue to support public services in their new roles, in spite of their expectations and their new job descriptions. In addition to staffing needs, new assignments also meant that there was a significant amount of training required in order for staff to be proficient in their new roles. In some cases, staff have chosen to move or been moved involuntarily to different roles for a better fit, and departments have been created, shifted, or realigned to move strategic priorities forward. While every effort was made to honor a staff member's passions in the initial assignments, in some cases, the staff did not have, and could not learn, the necessary skills or abilities, requiring additional role changes and adding personal stress to staff who were struggling to adapt to the new priorities.

Additionally, while there was great attention paid to the need for communication in the planning process, once the organizational change actually happened, the libraries' 24/5 operational needs took priority and progress in some areas stalled. In order to overcome many of the transitional issues in the short term, it was necessary to communicate more frequently. When that did not happen, organizational stress increased and productivity decreased.

Conclusion

One of the guiding principles for the libraries is "perpetual beta," and the organization itself has continued to change and develop as staff have since chosen different roles for a better fit in some cases, or as new departments have been formed to move strategic priorities forward. While the design and execution of the reorganization process was as transparent and inclusive as it could possibly be, with every attempt made to be data driven, the human element must not be forgotten in the execution of the plan. As the dean of libraries

recently said in a staff meeting, "All of the data in the world doesn't make change easier." Even change that is welcomed and accepted is not without its challenges, and there continue to be difficulties in hiring and staff retention. The new organization is dramatically changed and its focus has changed to reflect new priorities. Rather than information literacy, the new priority is experiential learning and maker literacies. The monographic collection is built on demand, rather than speculatively, with a bias toward e-books. Team compositions changed, leadership changed, and 90% of the staff have roles that were not imagined in the prior organization. Most staff, including management, needed to develop new skills, and this caused a high level of uncertainty across the organization. With a focus on innovation and perpetual beta, expectations frequently shift, creating additional communications challenges. New programs and services have been developed and implemented and some increase in staff engagement and support is evident. The innovative approach to role design and staff participation was key to a strong beginning. Ongoing change management continues to be a work in progress.

Diffusing Organizational Change through Service Design and Iterative Assessment

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Purpose

In 2016, the University of Michigan Library (U-M Library) began the process of transforming physical and virtual spaces to serve the emerging needs of our research community and taking care to ensure that, whatever form our buildings and web presence take, it will follow the function and intent of our services.

The U-M Library is a large, complex library with nearly 500 staff and librarians, millions of collections, and hundreds of unique services. Although the library has a decentralized organizational structure, the benefits of such a structure include the ability for departments to be nimble, responsive, and find creative solutions that are more personalized and that take advantage of unique expertise. However, when each division, department, and unit can act independently, it can be a real challenge to move forward large, important, library-wide initiatives. Implementing large-scale change that directly impacts the culture and physical space, as well as conducting meaningful assessment, becomes a complicated endeavor.

The library established three intersecting goals to frame this process. The first goal is to take a strategic approach to physical space planning. The second is to strive toward making our buildings and services welcoming, accessible, and safe. The third goal is to transform our organizational culture, including developing skills and capacity within our organization to become more user-centered and service-centered. In order to effectively implement these goals, the library has begun to apply a service design approach and an assessment-driven mindset across our organization.
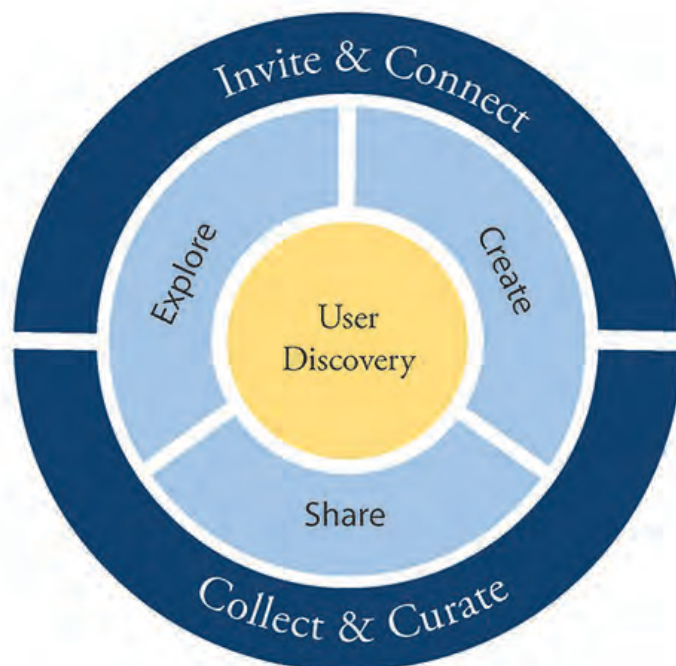
The U-M Library Service Philosophy drives organizational change, encourages continual assessment, and transforms spaces to improve user experiences.

In 2016, when the library began this work in earnest, we collaborated with brightspot strategy to develop a set of guiding service and space principles based on our existing mission, vision, and guiding principles. Our initial engagement with brightspot strategy spanned six months and included designing and implementing a series of focus groups, holding workshops, gathering and reviewing existing data from our organization, and developing a campus-wide survey.

Three key principles emerged from this effort that drive our work forward and help to align our intentions with our previous strategic efforts.

1. **Enhance the Platform for Discovery** through foundational changes to physical and digital space usability, access, and navigation.
2. **Accelerate Partnerships in Scholarship** by engaging with library users and working them throughout the service experience.
3. **Deliver as One Library** with a shared service philosophy and improved library staff workspace.

Introducing change in a large, complex, decentralized library is challenging, and fostering a new service philosophy and framework in the library is a big task. Brightspot strategy delivered to us their "Hatcher-Shapiro Library Service and Space Strategy Playbook," a report that provided a vision for the library services and spaces central to the scholarship of our campus community as well as a how-to for the library organization to explore future scenarios and pilot implementation.

Library administration appointed the three of us—Emily Puckett Rodgers, Meghan Sitar, and Rachel Vacek—as a team to co-lead the effort to put into action the recommendations and frameworks from the Hatcher-Shapiro Library Service and Space Strategy Playbook. Called the Service Design Task Force, our team recognizes that three people alone cannot change the culture.

We knew early on that we needed champions across the library who embraced the concepts and wanted to start using the service framework. By committing to evaluation throughout the service design process, we (as well as identified champions for this process) begin to gain confidence in our efforts to change the way we approached vastly redeveloping a space, service, or feature based on intentional and iterative user-focused design. It has been easier to think about larger and more out-of-the-box solutions within a context where we are empowered to take risks and recognize that we are regularly evaluating our ideas, concepts, and designs in supportive environments.

Library staff engage with recommendations from the Hatcher-Shapiro Library Service and Space Strategy Playbook at a Champions Workshop in fall 2017.

Since 2016, we have made strategic hires in this area, including positioning librarians whose responsibilities cover assessment across our operations, learning and teaching, collections, and deans' divisions. We created new tools and resources to help library staff and librarians engage with the new service design approach and integrate assessment into routine practices. We established new types of service-based teams to focus on the needs of the user and let that drive the service as opposed to using budget, technology, or tradition drive the direction. Developing champions, from the grassroots to library administration, was also essential for helping to shape the organizational culture and shift to a user- and service-focused environment.

Methods and Approach
Methods
This work hinges on adaptations and alignment of three major methods—from service design, design thinking, and user experience design and research—that all place emphasis on designing for and with our users and on iterative development of work based on feedback and testing. We combined and adapted elements from these methods to realize the three key principles and associated service strategies. Each of the key methods we have adopted for this work provide a distinct set of benefits to our organization and provide us with a structure in which to deploy continuous evaluation and alignment in this effort. Our work is not an assessment program in itself but a service design initiative with assessment integrated into the process through these methods.

Service design enables us to pull together our work across departments and divisions in different ways than we have done in the past and enables us to review, develop, change, or strengthen processes that are designed to provide value to our users in the form of integrated and connected services. Based on developing artifacts or theories to test with colleagues or users in real-world settings in quick, tight feedback loops, we were able to create opportunities for reflection, reprioritization, and learning throughout this work. Two key resources used to guide this work included the ***This is Service Design Thinking*** by Marc Stickdorn and Jakob Schneider (2012) and ***The Service Innovation Handbook*** by Lucy Kimbell (2015).

Design thinking strengthens our ability to create feedback loops and take an action-oriented approach to this work, shifting our work away from theorizing or researching a topic but not actually generating something that we can actually test with real people or against existing processes. It enables us to build capacity and experience in creative problem-solving that is structured to yield a tangible result that we can then adopt or learn from. Key resources associated with our design thinking approach include the Design Thinking for Libraries toolkit (http://designthinkingforlibraries.com/), IBM's Enterprise Design Thinking (https://www.ibm.com/design/thinking/), and IDEO's Design Thinking (https://www.ideou.com/pages/design-thinking) resources.

User-centered design provides methods and tools for us to use that continue to place our users (our faculty, staff, students, and researchers) at the center of our work throughout the design process and helps us hold ourselves accountable to our designs and our intentions. Key resources associated with this approach include Luma Institute's ***Innovating for People Handbook*** (2012) and our existing expertise from our design and discovery and our library environments departments.

Approach
In order to begin adopting these methods and the service and space philosophy and design principles, the Service Design Task Force created a series of six service design teams to experiment with, adopt, and review these new ways of working. The topics of the teams are: consultation, staff innovation, digital scholarship, library as research lab, citation management, and the library lifecycle. We applied a continuous evaluation approach to this work, providing opportunities for reflection at many points along the process. As we launched this work, we communicated back to our colleagues that this effort itself was an experiment and we committed to evaluating both the process (how well do the methods and tools work?) and assessing the outcome of the effort (what impact does it have?).
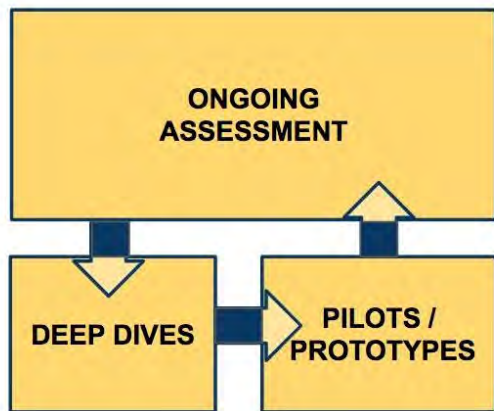
We applied a continuous evaluation approach to our service design work as we conducted user research and planned for pilots and prototypes of the ideas.

Teams included two co-chairs who partnered with one member of the Service Design Task force—acting as a design partner—to plan, execute, and organize the work produced from the teams. Team members were chosen from across the organization based on their expertise, experience, or perspective rather than from where they sat within the organization chart or administrative structure of the organization.

Three teams developed service designs for some of our library's more complex and value-driven aspirations, which included designing a locally relevant, impactful approach to digital scholarship on our campus, developing an approach to fostering staff innovation throughout our organization, and creating a distributed but aligned model for consultation across our various departments and libraries. Other teams associated with this work were dedicated to applying or exploring facets of these methods in other contexts. For example, one team approached citation management from a service-driven perspective and conducted additional user research and developed a local toolkit to build capacity for user-centered design. This work was conducted by staff within our organization and explored research services for graduate students through a grant-funded project with the University of Michigan's School of Information.

Drawing from the research brightspot had already delivered to us, and using methods like focus groups, immersive and analogous experiences, and user-centered tools such as journey mapping and persona development, teams began their "deep dives" to design services and deliver a service blueprint over a period of six months. Teams followed the four cycles of service innovation, framed as "Exploring Issues" (exploring context, history, and influencers surrounding the issue and gathering information to better understand user needs), "Analysis" (understanding the issue in context and identifying the target audience), "Generating and Exploring Ideas" (generating multiple potential solutions and prototyping these), and "Synthesis" (determining the next steps and creating pilots). Members of the Service Design Task Force helped facilitate the design workshops and activities over the course of the semester and prompted times for reflection. We met as a team ourselves to support each other's work, provide input, and make adjustments along the way.
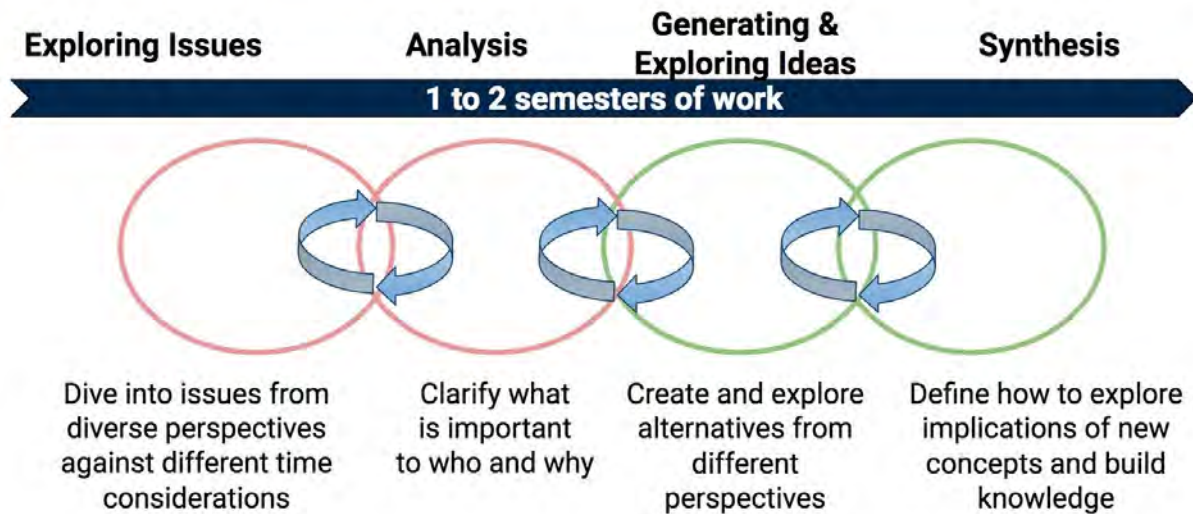
The service design process we used at the U-M Library had four cycles: Exploring Issues, Analysis, Generating and Exploring Ideas, and Synthesis.

We also created an additional cycle, not represented in the above diagram, at the beginning of the process for team formation. This was an important step in team formation and in introducing the team to each other, the charge, and the approach they were being asked to learn and to apply to this process. During this cycle, teams engaged in a self-reflection exercise and a values exercise that generated unique design principles for each team based on the capacities, perspective, experience, and values each individual brought to the project. This resulted in team contracts that were used to guide work and maintain integrity through the process. In subsequent cycles, this document was referred back to during evaluation to review and understand how teams progressed through this work.

Each cycle applied a set of methods to support the service design of each team based on their charge. These methods generated a set of artifacts designed to assist the teams in moving through the cycles of the work and as guiding resources for future stages of work. Each team received the same "binder" of resources—tied to the four cycles of work— we developed based on a set of shared exercises and methods from the three approaches we have adapted to this work. With this structure, we aimed to help set expectations, provide enough structure for the teams to create rich, impactful work, and help to facilitate training and skill-building for these design methods within our organization.

As part of their work, each team designed at least two stakeholder engagement activities to better understand their users and inform their designs or to present portions of their service design for feedback. Teams gathered feedback through brief intercept interviews, conducted workshops, or designed feedback mechanisms to have portions of their designs evaluated for relevancy or accuracy in representation. These engagements happened during cycles two and cycles four of the work.

The service design team charged with staff innovation defined an opportunity for our organization to deeply consider what staff innovation looks like for us from a service and a culture perspective through engagements with our staff and managers. The team organized a feedback session to engage staff across the organization in discussing these three questions:

- What does "innovation" mean to our organization?
- What could a culture of innovation look like at U-M Library?
- How does this impact the ways in which we invest in our staff and managers?

From notes from the session, the team qualitatively analyzed the results to find themes and review results against their personas, stories, and draft service designs.

The team charged with reviewing and conducting additional user research to inform the development of a toolkit gathered existing research from library activities, including collections assessments, teaching and learning evaluations, and user research. This team, the library lifecycle team, qualitatively analyzed this existing body of data. From this, the team generated a series of interview questions to gain more insight into the academic experience at U-M for graduates, undergraduates, and faculty. Over the course of the winter 2018 term, they conducted 30 in-person interviews and qualitatively analyzed this information using the same coding structure from the existing research. This research informed the development of artifacts, including a game and set of personas, aimed at supporting the application of user research across the library for staff at any level within the organization through a user experience toolkit.

A personality trait wheel used to begin conversations with campus users as part of the 30 one-hour interviews for the Library Lifecycle Project Team. Adapted from: Gardenswartz, L., & Rowe, A. (2008).

We incorporated self and team reflections at the end of each design thinking cycle for teams. Teams used this time to reflect on the experiences, output, and impact of each cycle's set of activities. Since every aspect of this work, from the team structure and formation, to the charge, and the approach, was new to the organization, it was important to include evaluation along the entire process. The team contract served as a rubric against which teams could evaluate their progress based on their own values and personal contributions. At the end of each cycle, teams reflected on their comfort with moving through to the next stages of the work and on the utility of the methods and exercises employed along the way.

At the end of July 2018, Denise Leyton, Larissa Stenzel, Kat King (all from the library environments department), and Craig Smith (assessment specialist) developed and conducted five, one-hour in-person feedback sessions for the members and chairs of four of the six service teams: digital scholarship, staff innovation, citation management, and consultation. We also provided an option for members and chairs to respond through a Qualtrics form if they were not able to make an in-person session. All chairs and fourteen of the eighteen members participated either in-person or through the Qualtrics form and provided feedback on team formation, methods used, and overall impressions.

Findings

Our intentions for this effort were manyfold. For library staff, we intended this work to be tangible and immediately useful to our service design teams in their work. We aim to teach people about the tools and make them usable to anyone in our organization, whether they are creating new services or evaluating existing services. These tools can be used to inform both large-scale and more localized decisions about workflow changes, service changes, etc., so that we begin to use the same tools across our organization to approach our work. Again, with such a large and decentralized library, sharing similar tools and workflows can help with our One Library service philosophy.

Our goal for organizational change was to create a process that was adaptive and facilitates iterative design. As the library moves from a resource-focused environment to a more user-focused and feedback-focused one, embracing a more iterative design approach will help service design teams or service providers to more frequently check to ensure our services are aligned with user needs. Also, one of our goals for the organization was to recognize both front- and back-of-house needs and workflows so everyone across the library could connect with the service design approach whether or not they directly worked with users.

As for team formation, while some participants had prior experience with user-centered design, several of those without that experience mentioned a lack of clarity on learning these new types of exercises. They found it took some getting used to the different way of working in service design. Although many felt their co-chairs and/or design partner explained the exercises well, they were unsure of the next steps after this phase. This involved confusion over how they would hand off their work to the next team. Many members had an understanding of how they could contribute their knowledge and experience, but some members were not as sure of the specifics of their role. Some teams discussed their roles/why they were on the team at the very beginning, while others never discussed it or came to an understanding at the end. Team members generally saw the design partner as someone to help them get "unstuck," move forward, and look at things a different way.

Participants and chairs also provided feedback on the various methods and exercises used throughout the time the service teams did their work. Some thought a lot of time was spent learning the process of the activity rather than doing it because of those who were less familiar.

There was a general sense that there were too many activities in too short of time and that the less helpful, repetitive ones could be cut out. Some members mentioned that these types of deep dives will not be necessary for some projects due to their time-consuming nature.

Overall, time and scheduling came up as the two biggest challenges from almost all team members, and especially the chairs. Some expected this but did not realize how much it would take them away from their other work. Some felt they were not prepared up front and if they had known the amount of time they would spend on the team, they might not have said yes. Despite overall sense that the time commitment was extensive, most team members expressed a general appreciation for and personal investment in the work. Additionally, they would have liked better administrative management to balance their other obligations with this project.

In reflecting on this work, we also recognized that user-centered methods are already in use elsewhere within the library and that service design should not necessarily replace those other methods. However, with

this process, we can better describe and test our own assumptions and identify and move forward on ideas with more concrete steps, using tools like the service blueprint.

Value and Practical Implications
Thus far, we have seen positive impact in our organization in three major ways: service team dynamics and team formation, capacity building, and evidence-based service design. By taking an evidence-based approach to our work, we are proving the value of testing service models in systematic ways. The initial investment for this type of work is intense and time-consuming.

Service Teams
The concept of service teams is one we are starting to employ across other areas of the organization. Rather than approach our work from a traditional committee-based perspective, we are beginning to intentionally develop service teams to address other known issues in the library for which a service design approach is applicable and relevant. These teams have specific charges, a dedicated timeframe, and are expected to produce different types of outputs and apply user-centered methods to their work. Their formation also includes generative discussion sessions to identify values and understand team dynamics as a way to build trust within the team and a cohesiveness not always present in committee work. Members of service teams are identified and participate based on their expertise or experience, not where they sit within our organization.

We are beginning to employ the service team approach in our website and web presence redesign efforts and other large-scale efforts that impact the organization. In addition to the structure of these teams, the user research conducted by the library lifecycle team is being used to create personas to inform our design and testing of new content structures for the library website. In this way, we are seeing the efforts of our work become embedded in processes that exist outside of our original charge and teams and become embedded in other areas of work and effort.

Resources and Capacity Building
Overall, if we are to continue to adopt this approach in our organization, we need to understand how to embrace this approach as one of many that we employ based on the challenge at hand. We also need to learn how to diffuse this work across the organization from the perspective of understanding the guiding principles, frameworks, and methods, but also from a capacity-building perspective so that this expertise or approach does not sit within one small group of individuals or projects but can be applied at different scales with different configurations of teams and capacities.

Much of this work hinges on providing staff with additional resources, expertise, and support to do their work in different ways. Without this, we cannot expect our organization to change in habit and behavior. Based on staff input and tests, we are developing higher fidelity versions of the user-experience game for our user experience toolkit with staff who are participating in the staff innovation pilots and in other areas of the library. We aim for this toolkit to be useful to staff across all departments and divisions within the library so that they are able to more easily and confidently employ design thinking, service design, and user-centered design approaches into their daily work routines. After another round of testing the game and artifacts of the toolkit, we can begin building guides, resources, and training into the toolkit.

Internal consultations as a model of capacity building and expertise-exchange are becoming more widely integrated into the organization. In order to test facets of the staff innovation service blueprint, our library's program manager and assessment specialist are providing consultation hours and evaluating their impact across the organization. This will help us better understand how expertise-sharing through peer-to-peer networks translates into new approaches to work, process improvement, or our ability to develop solutions to complex challenges. As a next phase of the Service Design Task Force, we are developing an intake process through which colleagues can connect to the experiences we have gained through this process to better understand how, when, and in what ways elements of service design might benefit their work or projects.

Communication remains a key component of the success of this work. It has not always been clear to our service design teams, our colleagues, or even to administration, what we aim to accomplish, test, or learn from this work. It is hard to communicate the piloting and testing components of the service design and to build confidence in this process. We continue to learn how to effectively communicate this work to our organization and colleagues. We have learned that it is extremely important to have colleagues with an existing confidence and deeper understanding of the methods we are applying to this work, how to use them, and when to adapt them. Because of the size and scale of our library, we should be considerate of the scope of the opportunities we put through service design.

Evidence Based Service Design

In some cases, it has been confusing to colleagues to be presented with a hypothesis that needs further testing to understand across contexts, scale, and complexity rather than a finished product or service that is "ready to launch." In the past, our organization has not engaged in purposeful testing at various scales, preferring to pursue a phased rollout of new services and programs. This has, in some cases, resulted in gaps in efficiencies across teams, departments, or staff who have a responsibility in service delivery, and sometimes even confusion as to what the services are to our users.

We have benefited greatly from building in evaluation along the way through this work. While it can be easy to put off until the end of a project, building evaluation into the structure of the work enables us to create strong opportunities for reflection and learning. When we are ready to test this work "in the open," we can be confident that what we launch has quality and integrity even if we change aspects of it based on what we learn to suit context, scale, or user need.

Over the course of the summer and into the fall 2018, as the service design teams wrapped up their work and the next phases of these efforts got underway, the organization has seen a variety of approaches to begin testing the service designs and service blueprints presented by each of the original service design teams. We have benefitted as well from the expertise of our assessment specialist in supporting effective ways to evaluate our pilots and prototypes moving forward. For example, we are developing a series of three pilots to test facets of the consultation service blueprint before launching a pilot of the full service. This includes: creating physical prototypes to test, piloting new software used to manage information flow and communications, and testing the model with a subset of specialists who can review and refine portions of the service based on their existing expertise.

By creating opportunities for evaluation, both internally and externally facing, within the process, we are able to more systematically evaluate the work we are engaged in and determine its efficacy toward achieving mission-driven goals. We have framed this work consistently as culture change and much of the current and future impact of this work stems from changes in habit and behavior. This approach, based on putting users in the center of our service designs, flips the way we have managed our work in many ways. In years past, our organization has relied heavily on administrative structures to guide our internal collaboration, service development, and representation on cross-divisional efforts. Service design provides structures to enable staff to flip their approach to work by providing consistent and aligned frameworks, principles, and methods to use and in ways that empower staff and engage users in meaningful ways.

The results are services that continue to remain user-centered, maintain integrity to the original design principles and services that guided the initial work, and are built on tested models that were either proven to support the service or were changed based on feedback from stakeholders and users alike. By building in evaluations throughout this process, we learned both from our users and from our colleagues in how to scale and implement a program such as this. While our organization is still working through adopting all facets of this work, in big and small ways, we have already witnessed impacts throughout the organization. We are still in the early stages of creating this process, but we are confident that we will continue to see system-wide changes based on our approaches and on our learnings.

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Testing Assumptions—Does Enhancing Subject Terms Increase Use?

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In modern library systems, access to the digital content is heavily dependent on effective metadata. The University of Florida (UF) Digital Collections (UFDC) are an actively growing, open access, digital library comprising over 500,000 records. As with any large-scale digital library project, a well-known challenge is the varying quality and quantity of legacy metadata available for each title. Inconsistent metadata makes digitized materials harder to find. If users cannot find the content they are looking for, a great deal of human effort has been wasted and the investment in digital collections is not being realized. Subject terms can be one of the most efficient methods for accessing desired materials, and subject terms created from controlled vocabularies deliver the most consistent results. To date, applying and editing subject metadata has been a record-by-record, labor-intensive process, making the prospect of retrospective projects cost-prohibitive. The UF team is investigating the capacity of research library staff to implement a Machine Assisted Indexing (MAI) system to automate the process of selecting and applying subject terms, based on the use of a rule set combined with controlled vocabularies, to the metadata of a body of already digitized content. To execute the project, the Smathers Libraries team at UF is collaborating with Access Innovations (AI) consultants to implement a machine-assisted indexing system to mitigate the challenges discussed above.

Two collections in the UFDC were selected to test the MAI process on and then assessments were developed to determine if the process was functional and if it met the stated need to improve access. The first pilot focused on enhancing subject metadata across the Electronic Thesis and Dissertations (ETDs) collection. A second pilot assessment effort focused on a long run of a journal with strong historical ties to agriculture in Florida. Random issues of the title were selected for machine assisted indexing and the use of those issues will be measures against the use of the other issues in the series.

This paper addresses our methods and outcomes of these two pilot projects. Next steps and more in-depth assessment methodologies will also be discussed. Through this assessment, we look to improve and streamline our workflows and determine if our enhancements have increased access and discovery of these pilot digital collections.

Machine Aided Indexing—Overview

In a world that is now dominated by non-library based web search engines, with hidden search algorithms and full-text searching, many researchers rely on only the first page of results to find what they are looking for.[1]

This approach has also been adopted in the world of searching through library resources where a single discovery layer will search across the multitude of catalogs, digital library platforms, journal databases, and other subject-specific indexes. As our access to full-text resources grows, the ability to hone in on specific and relevant information becomes increasingly more important. The increased volume of information that is now accessible has caused many to recognize that "current search engines yield good results for specific search tasks but are unsuited to the conceptual or subject-based searches requiring high precision and recall, common in academic research or serious public inquiry."[2]

Indexing has been a part of the library world since before the electronic age and is defined, "according to the British indexing standard (BS3700:1988), [as] a systematic arrangement of entries designed to enable users to locate information in a document."[3] This process of manually assigning indexing terms has been taking place with limited changes as libraries moved from print indexing systems to electronic indexing systems.

Reason to Use Machine Aided Indexing

Within the context of the library catalogs/OPACs and library digital collections, the cataloging and indexing of these collections has been a manual process completed by catalogers, or in the case of theses or

dissertations, this may have been completed by the researcher's submission to the institutional repository. Library indexes are developed using both the cataloging record of these items and may possibly include the full-text of items, allowing for a wide discrepancy of the level and precision of the indexing available for our discovery systems to aid researchers finding relevant materials. Although cataloging and indexing within libraries has historically been a manual process, there has been a limited history of using an automated or computer-aided indexing method. NASA, for instance, has been using machine-aided indexing for a number of decades to index scientific and technical reports. This work was largely done to speed up the indexing and provide catalogers with a set of terms to review.[4] Other efforts have also focused on extracting subject indexing through keyword or key phrase analysis.[5] These efforts, however, have been limited and have not found their way into mainstream library-based cataloging and indexing practices.

The impetus to find more effective ways to generate and maintain current subject metadata at the University of Florida came from a proposal to build a digital collection around materials about Florida. This unexpectedly represented a significant challenge, since a term like "Florida" is both a location and found in the name of our institution, the University of Florida. Additionally, the terms "University" and "Florida" are found in the names of at least ten more institutions within the State University System of Florida. Given these challenges, a more precise method of updating geographic and other more general subject metadata was needed.

These metadata enhancement efforts were supported and championed by the library dean, who stated, "Recent large scale initiatives have focused on the need for significantly expanded and enhanced metadata for our digital collections, both retrospective and prospective."[6] In looking for possible solutions to our needs, we engaged Access Innovations, a company that provides thesaurus construction and database management tools to publishers and other entities. Using their Data Harmony software, the University of Florida undertook two pilot projects to enhance our digital library metadata.

Two Pilot Projects Overview
Electronic Thesis and Dissertations (ETDs)

The initial pilot focused on an effort to apply MAI to enhance subject metadata across the Electronic Thesis and Dissertations (ETDs) collection. This collection has been populated by researchers at the University of Florida; broad subject terms (often supplied by the authors) have not provided precision findings. The objective of this pilot was to apply enhanced subject metadata generated—using a controlled vocabulary provided by JSTOR—to each of the 29,000 publications in the collection and test for improved findability. Using the Access Innovations software MAIstro™, the enhanced subject terms were extracted from the full text of the UF theses and dissertations before being added to the metadata records of the ETDs from the UF digital collections.

Example of ETDs' Enhanced Subject Metadata
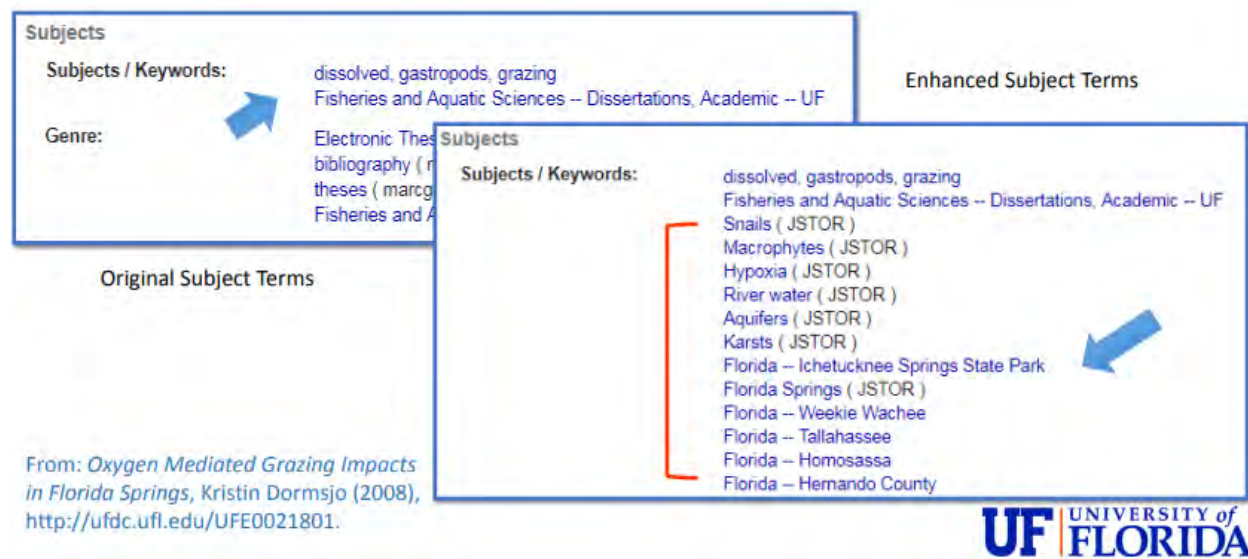
To assess changes in findability, a series of simple and complex searches were run against the original UFDC set of materials (LCSH and author-submitted keywords). The same searches were run on just the MAI JSTOR supplied subject terms, held in the Access Innovations XML database (XIS). Searches were run looking at just subject terms, subject terms and titles, and finally, subjects and full-text in both systems. Once these numbers were obtained, the JSTOR terms were added to the UFDC records and the searches were run again, allowing the UF team to compare result rates of the ETDs collection before and after enhancing the subject metadata.

Results of Different Search Types
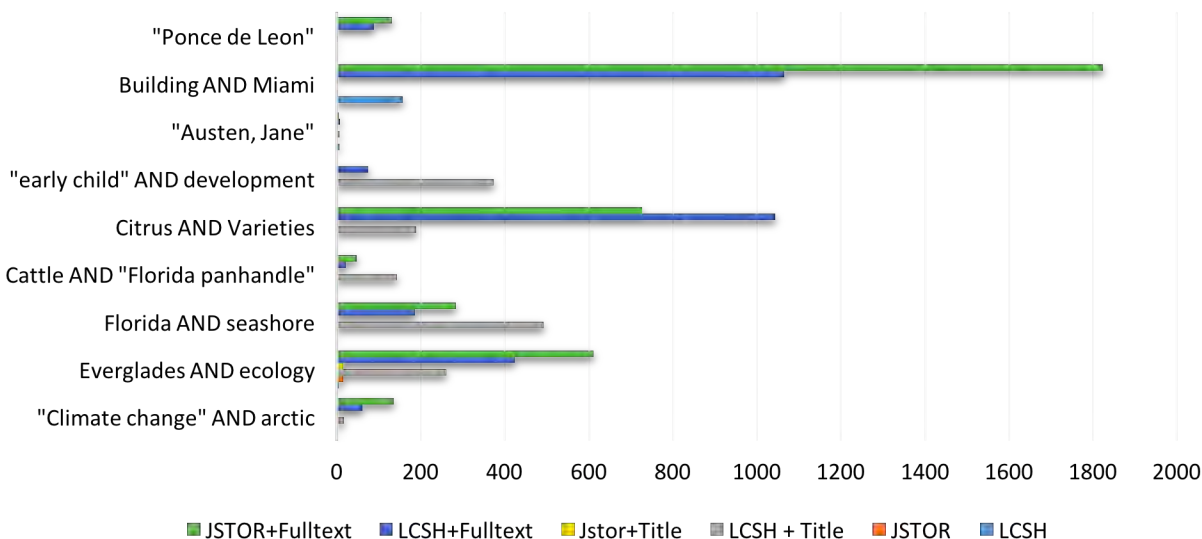
Number of Search Results before and after JSTOR added
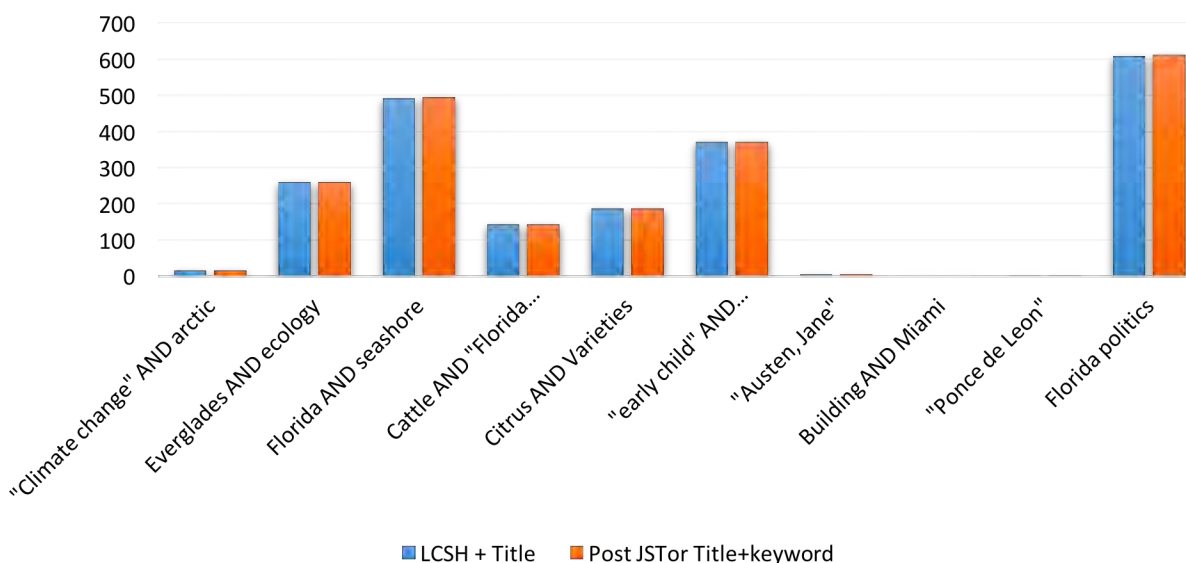
Results were limited on this study. It was determined that the XIS system was not well-suited to performing complex searches. Additionally, the JSTOR terms were added to the UFDC metadata records, but there was a problem with the system when it came to reindexing such a large batch of updated records, so the combined subject results did not reflect full findability on the new terms. It was decided that, in addition to correcting the indexing barrier, a qualitative research study is needed to truly assess the value of the added terms.

Cattleman's Pilot

A second pilot assessment effort focused on a long run of a journal with strong historical ties to agriculture in Florida. Randomized issues of the title were selected for machine-assisted indexing and the rate of use of those issues were measured against the use of the other issues in the series. This pilot used the same MAI system and process as the ETD project.

Assessing the impact of this project was initially scoped out to examine access rates between the MAI-enhanced article serial records compared to those issues where the MAI was not performed. In the process of implementing this project, there were issues identified within our article level searching capabilities in our digital library system that were not going to allow for the enhanced MAI records to be searchable in the ways that were initially envisioned. We are currently examining additional ways to assess the impact of these changes to the metadata of article level items.

Conclusion—Next Steps

The initial goal of our overall project was to enhance the metadata to improve accessibility, findability, and, by extension, use of the impacted content. At the beginning of these projects, we believed that this assessment on our two pilot projects was something that was going to be relatively straightforward and give us results that could guide us in future decisions to extend the use of MAI and extend this process to additional digital collections housed by the library. Our assessment as originally conducted has resulted in findings that we did not anticipate. We found that current indexing and searching abilities within our collections had deficiencies which affected our study results. Although these searching deficiencies impacted our ability to gather and assess how our updated metadata can be searched, they have guided us in

planning for modifications and future system development that can be done to provide a more effective search system for accessing our digital collections. For example, this will include modifications to our SOLR indexing system. To get additional usage data, it will be necessary to rework our study and we may select other collections and material types—for instance not a serials collection—to get better usage and findability data. Finally, as we look to the future, we will implement the MAI process to more of our retrospective collections in addition to incorporating it into our regular digital collections workflows.

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Assessing Transformation: Findings from the Measuring Reuse Project

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Introduction

Cultural heritage and knowledge organizations (CHKOs) have been digitizing analog content and acquiring born-digital materials for decades. Large, complex digital repositories and aggregated websites now make countless historic images, manuscripts, audio/video, research datasets, and other kinds of resources more widely available than ever before. Over time institutions have found multiple benefits for expanding access to rare and unique materials, including enhancing scholarship, promoting preservation, and increasing usage.

While the profession continues to develop extensive workflows and tools to facilitate online access to content, the assessment of these practices and the digital collections they yield has been inconsistent and incomplete. Researchers interested in refining digital repository software have spent significant time on user experience studies; others have also tried to understand, standardize, and quantify general usage practices among patron audiences. Another specific evaluation criteria—the ability to measure and assess how digital objects are reused by various user groups—has also emerged in the professional conversation and literature. Refining how practitioners evaluate reuse, or how a digital object is utilized or repurposed, offers an opportunity to identify and standardize techniques that can improve the ways that CHKOs measure and define impact.[1]

The authors of this paper viewed these assessment gaps as barriers for CHKOs that needed to be addressed. They believe that the development of a reuse assessment toolkit would be a valuable resource for digital library practitioners. Relying on feedback from a wide range of digital library practitioners, the authors spent one year compiling data from survey results and focus group interviews to identify the needs and ideal functionality of a future digital object reuse assessment toolkit. This project, titled "Developing a Framework for Measuring Reuse of Digital Objects," (hereafter "Measuring Reuse") was made possible by an Institute of Museum and Library Services (IMLS) National Leadership/National Forum grant.

This paper addresses the findings of the needs assessment. Specifically, it outlines the results and implications of a community follow-up survey that rated and prioritized use cases and functional

requirements for the future assessment toolkit. Drawing upon data generated by the grant project, the authors ask two questions:

1. What are the prioritized use cases for a future reuse assessment toolkit?

2. What are the prioritized functional requirements for a future reuse assessment toolkit that would meet practitioner needs?

The results of this paper compliment a previous publication that outlined the results of other grant-related data collecting efforts, "Barriers and solutions to assessing digital library reuse: preliminary findings" (hereafter "Barriers and solutions").[2] Combined, these publications provide one of the profession's first in-depth investigations of digital repository reuse assessment frameworks.

Background

Members of the Measuring Reuse project team are also members of the Content Reuse Working Group (CRWG),[3] which is part of a larger, organized assessment effort: the Digital Library Federation (DLF) Assessment Interest Group (AIG).[4] Founded in 2014, the DLF AIG aims to collaborate with CHKO communities to develop best practices and guidelines for various kinds of digital repository assessment. As part of the larger AIG, the CRWG has been focused on understanding the current state of digital library reuse assessment and developing tools and strategies to assist practitioners in their assessment efforts.

In 2015, members of the CRWG released "Surveying the Landscape: Use and Usability Assessment of Digital Libraries" (hereafter "Surveying the Landscape").[5] This white paper outlined the challenges institutions face in assessing digital repository content reuse. It discussed how library analytics focus almost entirely on simple access metrics. These types of statistics do not provide a nuanced picture of how users consume or transform unique materials from digital collections hosted by CHKOs. This lack of distinction, combined with a lack of standardized assessment approaches, makes it difficult for institutions to develop user-responsive collections or highlight the value of these materials. This in turn presents significant challenges for developing the appropriate staffing, system infrastructure, and long-term funding models needed to support digital collections.[6]

Definitions

As part of the project, the authors developed working definitions for both use and reuse. They generated this information to help participants understand the parameters of reuse as well as to distinguish the differences between digital object use and reuse. They situated use as the process of accessing particular content. Measuring use does not necessarily require a practitioner to have a nuanced understanding of how a user engages with any particular object. Often knowing that a user has "visited" or "downloaded" an object satisfies evaluation criteria for this category. On the other hand, reuse draws upon a nuanced understanding of how an object is repurposed or transformed. While these concepts, definitions, and examples are in a state of flux, the authors draw upon these terms for the purposes of this paper. The authors intend to expand upon and refine these definitions during future research.

Function	Definition	Examples
Use	Discovering and browsing objects in a digital library, often described as "clicks" or "downloads," ***without*** knowing the specific context for this use.	Basic web usage analytics such as number of downloads (unmediated), web traffic information, IP address location, referrals from specific sites, etc.
Reuse	How often and in what ways digital library materials are utilized and repurposed. In this definition, a practitioner ***does*** know the context of the use.	Log requests for images, reverse image lookup information, citation metrics of data and/or digital collection materials, inclusion of digital collection materials in an external dataset (e.g., HTRC datasets or curated Internet Archive user collections), remixing songs, mashups of two or more songs, creating memes, sharing content on social media.

Literature Review

The authors' first article on this grant project addressed many of the current case studies and developments related to digital library use and reuse assessment.[7] Consequently, this literature review will only briefly review some of the contributions highlighted in "Barriers and solutions" as well as focus on three recently published articles that address broad aspects of digital repository and content reuse assessment frameworks.

"Barriers and solutions" drew upon the major findings from the 2015 white paper, "Surveying the Landscape," to provide an overview of content reuse assessment between 2011 and 2015. "Surveying the Landscape" suggested that increased attention was being paid to reuse assessment for targeted audiences and disciplines, specifically humanities and the arts.[8] However, the white paper also pointed out deficiencies—including difficulties tracking reuse through hyperlinking and measuring reuse from virtual to analog environments.[9] Subsequent efforts further refined the profession's understanding of reuse assessment. "Barriers and solutions" reviews the movement within the digital library community to establish and implement "standards that demonstrate the impact of repositories," including Jisc's Institutional Repository Usage Statistics (IRUS) UK program and Montana State University's Repository Analytics & Metrics Portal (RAMP).[10] It also mentions recent practices used by information professionals to track and measure reuse over the web, including the use of reverse image lookup technology, Wikipedia citations, Google alerts, and embedded metadata.[11]

Beyond these advancements, several recent articles have tackled the challenge of formulating analytical frameworks for assessing reuse. "Barriers and solutions" reviewed qualitative measures articulated in "Beyond Clicks, Likes, and Downloads: Identifying Meaningful Impacts for Digitized Ethnographic Archives." Researchers in this study devised a framework for "documenting, demonstrating, and assessing the impact of digitized ethnographic collections."[12] They formulated six topical areas of potential impact, including: knowledge, professional discourse, attitudes, institutional capacity, policy, and relationships. They note that these areas can assist how "institutions and communities articulate and assess major sorts of impact that are most relevant to institutional projects to digitize and share knowledge."[13]

In "Multifaceted Evaluation Criteria of Digital Libraries in Academic Settings: Similarities and Differences from Different Stakeholders," Iris Xie, Soohyung Joo, and Krystyna K. Matusiak seek to understand which digital library assessment criteria and frameworks are important to three different stakeholders: digital library (DL) scholars, practitioners, and users. While the researchers hypothesized that there would be "no

significant difference in rating each evaluation criterion of each DL evaluation dimension among the three group of stakeholders,"[14] they found that significant differences did exist. The practitioner group ranked preservation assessment criteria as the most important, while DL scholars and users ranked nearly all categories as important.[15] Xie et al.'s work suggests that assessment criteria and frameworks still remain under considerable flux among the stakeholders who study, interact with, and manage repositories.

Finally, the authors' own article, "Barriers and solutions," details one of the most comprehensive analyses of content reuse assessment frameworks. The article recounts the multiple approaches included in the authors' needs assessment and emphasized results from two data collection activities: an initial survey and focus groups.[16] Analyzing the results of these activities suggested to the authors that an emergent need "is looking for field-wide approaches for assessing the impact of reuse in order to better understand, and tell the story of, what has been learned or gained by a user when they repurpose a digital object."[17] However, "Barriers and solutions" was published before the authors could analyze another key data collection method—the results of a follow-up survey—which asked DL practitioners to prioritize emerging use cases and functional requirements. "Assessing Transformation" incorporates the prioritized use cases and functional requirements, providing a fuller picture of the authors' results, as well as providing the profession with a more nuanced view of emerging needs for a content reuse assessment framework.

Methodology

As outlined in the project grant proposal, the purpose of this research study was to "conduct a robust digital cultural heritage community needs assessment focused on developing use cases and functional requirements for a future digital content reuse assessment toolkit."[18] The project team's approach for assessing the community's needs for a toolkit was constructed around two surveys (a pre- and post-survey) and a series of focus groups. The initial survey, administered September through October 2017, queried the community about their use and reuse assessment practices as well as investigated barriers and complications for conducting assessment of digital repository content. The results of this survey fed into the structure and questions for ten focus groups, which were designed around three primary topics: exploratory information gathering, technology and standards, and cultural issues and privacy. Focus groups were conducted from December 2017 through June 2018. Also during June 2018, the final follow-up survey was conducted. This survey pulled together use cases identified from the focus groups and asked the CHKO community to prioritize both the use cases and also the functional requirements of a reuse assessment toolkit.

Administration and Analysis

Both surveys were built and distributed using the Qualtrics survey platform. They were shared on 25 email lists and multiple social media platforms for digital repository practitioners. Responses were analyzed primarily using the Qualtrics platform analytics, but also included the analytics available in Google Sheets and Microsoft Excel. The survey analyses were compiled into reports that reflected the aggregated responses to each question as well as cross-tabulations to show patterns. Each report included a detailed summary and a set of recommendations. The survey instruments, datasets, and analytical reports for both surveys can be found on the project team's OSF repository.[19]

As previously mentioned, the focus groups were organized around the three topics of information gathering, technology and standards, and cultural and privacy issues. Focus groups were conducted both in-person and virtually for each topic and averaged about four people per session. For the information gathering and the technology and standards focus groups, two sessions of in-person meetings and two sessions of virtual meetings were held. Due to time and budget constraints, only one in-person session and one virtual session were held to explore cultural and privacy issues, although these concerns were also discussed in the first two topical sessions. In total, 40 participants took part in the focus groups.

Focus Group	Type	Sessions	When	Participants	Topic
Group 1	In-person	2	October 2017	9	Information Gathering
Group 1	Virtual	2	December 2017	7	Information Gathering
Group 2	In-person	2	February 2018	8	Technology & Standards
Group 2	Virtual	2	March 2018	7	Technology & Standards
Group 3	In-person	1	April 2018	5	Cultural & Privacy
Group 3	Virtual	1	June 2018	4	Cultural & Privacy

In-person focus group sessions were held in three locations where prominent conferences were taking place, including the Digital Library Federation Forum which took place in Pittsburgh, Pennsylvania, in October 2017,[20] the Code4Lib conference which took place in Washington, DC, in February 2018,[21] and the Personal Digital Archiving Conference which took place in Houston, Texas, in April 2018.[22] The virtual sessions were arranged through Zoom, an online conferencing system maintained by the Digital Library Federation.

All focus group sessions were conducted by two project team members, with one serving as facilitator and the other as the note-taker. Prior to each focus group, participants were sent the discussion questions to consider. All sessions were recorded in order to review and verify the content of the notes that were taken, with the audio recording destroyed after 48 hours to preserve the anonymity of the participants. No personally identifiable information was retained in focus group notes.

Results from all 10 sessions were analyzed using Dedoose,[23] a qualitative data analysis tool, and an open coding process which was broken into three distinct phases: initial coding built from tagging central discussion topics, focused coding where tags and related excerpts from notes were categorized into broader themes, and finally the development of use cases from those themes. Use cases were grouped into three topics: (1) Data Collection, Analysis and Reporting, (2) Collection Development, and (3) Privacy, Rights Management, and Ethics, and were presented to the CHKO community in a follow-up survey.

Respondents to the survey were asked to rank and prioritize the use cases in each functional group. They were also asked to identify the most desirable functional requirements for a toolkit. The responses from the survey were analyzed to cull out the most important use cases to the CHKO community as well as the most useful toolkit functional requirements. Additional cross-tabulations were done to isolate which functional requirements supported the most highly ranked use cases in general, as well as which use cases and functional requirements best met the needs of institutions supporting underserved populations.

Results

The results of the first survey were analyzed in detail and published in the article "Barriers and solutions,"[24] as well as in "Measuring Reuse of Digital Objects: Preliminary Findings from the IMLS-funded project" as part of the 2018 conference proceedings for the ***Joint Conference on Digital Libraries (JCDL)***.[25] Therefore, this paper will only summarize the results of those findings[26] and concentrate the bulk of this analysis on the findings from the focus groups and follow-up survey.

The foundational survey found that most respondents (80%) were engaging in some form of use assessment and tended to use tools such as Google Analytics or the statistics provided by their content management system platform. They gathered information on the number of visitors, downloads, and clicks. Only a minority of respondents (40%) were actively gathering reuse data and they reported using tools and techniques such as social media metrics, alert services, and reverse image lookup. The two most commonly gathered data points were the number of citations and objects cited in scholarship as well as the number of published or reposted digital objects in digital media (such as online websites, digital exhibits, films or online videos, and subject-specific repositories). Respondents reported that they were generally very interested in assessment but would need support such as documented standards and recommended practices, more personnel, online tutorials, open source tools, and money. They also noted that they were interested in understanding more about the demographics of their users and how to turn assessment data into impact statements.[27]

Focus Groups

Following some of the comments and free text answers presented in the survey, the themes for the focus groups were established to collect more detailed information. Each focus group built on the body of response data that came before it in order to develop an iterative and dynamic understanding of practitioner needs.

Information-Gathering Focus Groups

During the first set of focus groups, participants explored current practices for assessment of use or access and how it differed from reuse assessment; which stakeholders were important to consider for assessment data; barriers to both use and reuse assessment; types of use and reuse assessment data; technological issues with assessment; organizational and administrative support of assessment; use cases for showing impact, and; potential ways that reuse assessment could be controversial.

The themes that emerged from this first, exploratory focus group included the heavy reliance of participants on use assessment without investigating reuse. Participants felt that understanding how a digital object was reused played an important part in knowing the context and impact of that digital object. Relying on use statistics exclusively showed that an item could be discovered, but did not imply any additional meaning or significance. Participants felt that long-term use cases for collecting reuse data included better arguments for funding and justifying expense, more robust data to make digitization priorities, and increased ability to demonstrate outreach and community impact. Participants also noted concerns with privacy issues and cultural appropriation of digital objects.

Technology and Standards Focus Groups

The second round of focus groups, which took place in February and March of 2018, concentrated on the technology and standards needed to develop reuse assessment practices. Participants discussed the types of standards that should be implemented for measuring reuse, functional requirements of content management and repository systems to standardize or support reuse assessment, and new technologies needed to make cross-platform assessment feasible. They also discussed ethical and cultural implications of assessment and motivations for tracking reuse data.

One of the key outcomes of this discussion was the agreement that a single set of standards would not be effective. Participants recommended that a series of methodologies be created to meet specific key institutional goals. For instance, if there is a common desire within higher education for libraries to measure the impact of digital objects on learning outcomes, then a common methodology should be developed so that

a library could (1) look to a recommended practice for learning outcomes assessment without having to reinvent the process and (2) be able to measure data in a standardized method across institutions. Likewise, if community archives were interested in citing how often their material was shared on disparate social media platforms in order to demonstrate community engagement, a potential reuse toolkit could include a common methodology for capturing and giving meaning to the impact of social media sharing. The key takeaway from this discussion was that assessment without purpose would simply add work but not value. Outcome-based assessment, driven by the goals of institutions, is the most effective use of time for CHKOs.

Additionally, these focus groups discussed the need to have data collection and analytics software that could work with content from multiple repositories and across multiple platforms (such as various social media venues), as well as integrate data from aggregators. They noted that the ability to build in reports and notification systems that acted in real time would allow them to engage with users. They also expressed concern at the use of third party analytics platforms that tracked user behavior and did not allow CHKOs more choice in protecting user privacy.

Cultural and Privacy Implications Focus Groups

The third set of in-person and virtual focus groups discussed questions about patron privacy and cultural issues from reuse of digital objects. Participants were asked what kinds of assessment data would not adversely impact privacy, local policies for protecting patron privacy, legal concerns, communities that would not benefit from assessment practices, how they approached culturally sensitive topics in their library, and the general ethical implications that are faced when doing assessment.

Participants reported a range of privacy policies in their institutions and the fact that these policies most often addressed in-person use of materials. They noted that reuse provides a different nuance than use statistics because the action is intentionally public and initiated by patrons, rather than by the institution. For instance, social media reuse of a digital object, by its nature, exposes personally identifiable information as it is a public-facing interaction, whereas initial use data is not intentionally public, and therefore comes with different expectations from the user. However, they felt that adhering to their institutions' current patron privacy policies, which prescribe destroying any personally identifiable information that is collected, would be advisable. They also noted that primarily utilizing aggregated reuse data could help alleviate some concern about the exposure of patron information. Participants felt that further examination and the development of conscientious standards would be a valuable tool. In addition, a toolkit with methods for negotiating privacy language in contracts with third party software vendors would be helpful.

When discussing ethical and cultural implications of reuse, participants were most concerned about reuse of collections by people, groups, or entities whose intentions were to malign the originating creators or subjects of collections. They felt that developing institutional policies around content reuse would be useful, and particularly that a potential toolkit could help provide examples that could be adopted or adapted as needed. With these kinds of policies in place, monitoring reuse would be less daunting when instances of sensitive cultural or ethical issues arose.

Use Cases and Follow-up Survey

Following the in-person and virtual focus groups, the results of the conversations were coded and analyzed for potential use cases. Three categories emerged. Data collection, analysis, and reporting use cases addressed how reuse data is being assembled, interpreted, and communicated to various audiences and stakeholders. Collection development use cases centered on how to assess aspects of a digital collection based on reuse data. Privacy, rights management, and ethics use cases focused on the assessment of reuse through legal, ethical, and culturally aware perspectives. Listed below are the use cases for each category.[28]

Data Collection, Analysis, and Reporting:

- Practitioner assesses quality and quantity of items reused from peer institutions for benchmarking
- Practitioner wants to tell stories of impact with the reuse data they have captured and tailor them to various audiences/stakeholders

- Practitioner generates reports of collection item reuse for analysis
- Practitioner employs qualitative and quantitative methods to collect reuse data
- Practitioner understands how content is being reused in a variety of contexts by various audiences; contexts can include reuses on social media, in classrooms, in scholarly works, or through non-academic avenues by audiences such as genealogists, digital humanists, teachers, and students
- Practitioner can find best practice documentation for collecting, analyzing, and reporting re-use data
- Practitioner is able to articulate the similarities and differences between use and reuse

Collection Development:
- Practitioner assesses quality and quantity of items reused to identify strengths and gaps in digital collections
- Practitioner assesses quality and quantity of items reused to inform digitization projects and priorities
- Practitioner updates existing access records with value-added content made by re-users, with attribution
- Practitioner develops new outreach services based on reuse data
- Practitioner implements DAMS/DLS with specific functionality for enabling reuse

Privacy, Rights Management, and Ethics:
- Practitioner wants to know who their users are without violating user privacy
- Practitioner can identify appropriative reuses of materials from marginalized communities
- Practitioner can identify platforms/venues where reuse content is occurring for commercial or marketing gain
- Practitioner wants to enable/encourage attribution of materials from their collection in various reuse contexts, including sharing and reposting on social media, integrating into classroom instruction, citing in scholarly works, or through non-academic avenues
- Practitioner provides ability for marginalized communities to report incidents of reuse that the community perceives as culturally exploitive
- Practitioner uses a code of ethics/conduct for assessing the reuse of content from diverse communities

The use cases outlined above were presented to the CHKO community via a follow-up survey[29] conducted May 30 through June 15, 2018. Participants in the survey were asked to rank the use cases for each category in order to establish which use cases were the highest priority for practitioners. Along with these rankings, participants were also asked to prioritize 20 possible functional requirements for a toolkit, which would help determine the features a toolkit should include for greatest impact and utility. These functionalities were gathered from analyzing the focus group data as well as through a survey of existing toolkits. The options were: asynchronous training modules, best practices, blogs, examples of places or institutions implementing specific practices, an expertise or contact list, FAQs, forums, glossary of terminology, in-person trainings, links to outside resources, lists or links to tools and technologies, list or calendar of training opportunities, listserv, quick start guides and tutorials, resource library or list of readings, samples or templates (such as for reports or marketing), Slack channel integration, text-based guides or tutorials, video guides or tutorials, and webinars. The results from the 229 analyzed responses to the survey were finalized and reported in September 2018 and will provide the foundation for future development of a reuse assessment toolkit.[30]

Practical Implications
Prioritized Use Cases

The follow-up survey results indicate that CHKO practitioners prefer resources, guidance, and tools that address increasing the awareness of assessment results and developing strategies for communicating these results to various stakeholders. The top five prioritized use cases were:

1. Understand how content is being reused in a variety of contexts by various audiences (social media, classrooms, scholarly works, genealogy, digital humanities, etc.)

2. Tell stories of impact with the reuse data that has been captured and tailor it to specific audiences/stakeholders

3. Assess quality and quantity of items reused to inform digitization projects and priorities

4. Enable/encourage attribution of materials in various reuse contexts, including through sharing and reposting on social media, integration into classroom instruction, citing in scholarly works, or through non-academic avenues

5. Know and understand digital repository users without violating user privacy

Secondary use cases, while not as highly ranked by the community but still considered important, were:

1. Generate reports of collection item reuse for analysis

2. Employ qualitative and quantitative methods to collect reuse data

3. Assess quality and quantity of item reuse to identify strengths and gaps in digital collections

4. Provide ability for marginalized communities to report incidents of reuse that the community perceives as culturally exploitative

Collectively, these use cases suggest that any future toolkit should provide targeted content that emphasizes outcome-based assessment techniques, tools, and strategies. The prioritized use cases also indicate that the toolkit would not be complete without information that helps practitioners navigate privacy and cultural issues that are intertwined with better understanding and assessing content reuse.

Prioritized Functional Requirements

Overall, respondents to the survey indicated that they preferred best practices and quick start guides or tutorials above all other functional requirements. Following that, participants were also interested in samples or templates and examples of places or institutions implementing specific practices. Participants were least interested in features such as Slack channel integration, blogs, and email lists. This pointed to a noticeable professional interest in developing the theory and standards around reuse assessment first before engaging in practical discussions about how to employ those standards. These preferences might change in future years as reuse and assessment practices become more standardized. A future survey might be useful to pinpoint evolving preferences of the practitioner community.

When analyzing which functionalities best supported specific use cases, the high demand for the best practices, quick start guides, samples, templates, and example functionalities was consistently correlated across all use cases, with the exception of those participants who were highly interested in developing methods for encouraging attribution; they were more likely to request in-person trainings. Additionally, the responses from participants who reported being from institutions supporting underserved populations were examined independently from the general responses in order to determine what concrete steps could be taken to provide support for practitioners at these institutions. While they were also primarily interested in best practices, samples, and templates, they showed a significantly higher interest for in-person trainings and webinars. This was particularly true for tribal institutions (archives, libraries, museums, and research organizations) as well as institutions supporting Hispanic communities. In concert with the development of a reuse assessment toolkit, future efforts of the project team will also include an emphasis on in-person trainings and webinars to support these practitioners.

Conclusion

Existing literature and the authors' anecdotal experiences both indicate that practitioners are seeking better standards, methods, and tools to understand who uses digital repository content and for what reasons.

CHKOs' participation in this project, through focus groups and surveys, suggest that a future toolkit, grounded in recommended assessment practices, should better prepare information professionals both for broad objectives (such as having access to strategies to tell impact stories about the reuse of collections) as well as for important cultural and privacy considerations.

Drawing upon the data presented in this paper, as well as content from "Barriers and solutions," the authors will continue the work of building a formalized content reuse assessment toolkit. The group has submitted a new grant application to IMLS, which, if awarded, would fund the development of the Digital Content Reuse Assessment Framework Toolkit (D-CRAFT). Should D-CRAFT not be funded, the authors will reevaluate the data and form a new plan for moving forward. As this paper indicates, there are numerous opportunities to improve the content reuse assessment landscape for practitioners and the authors are excited to be engaging CHKOs in this pursuit.

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Endnotes

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Building the Measuring Stick: A Model for Continuous Review and Improvement of Institutional Repository Policies

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Abstract

The institutional repository at the University of Florida (IR@UF) was founded in 2006, and the policies have not been substantially reviewed or updated since that time. As the new institutional repository (IR) manager, I set out to create a list of current IR best practices and policies from peer institutions. Once collected, this list would serve as a guide to identify needed updates that would allow the IR@UF to best address the needs of the UF community within the current scholarly publishing environment.

The first step was a literature review to identify policies necessary for a thriving IR. I then compared current IR@UF policies, both public and internal, to identify where there were missing or weak policies. Evaluating the size of their IRs, years they were founded, and the types of objects collected, we identified 25 peer institutions. I did an environmental scan of these IRs by visiting their websites, searching for documentation of policies and practices.

With the help of our assessment librarian, Laura Spears, I created a Qualtrics survey, drawing from the environmental scan to craft focused questions about policies in four areas: administration, submissions, collections, and other (e.g., theses and dissertations, how related items are treated, etc.). I invited the 25 peer institutions to participate in the survey as a pilot; 15 replied. Using these results and feedback from peers, I updated the survey and sent it to a broader audience, yielding 94 domestic and international participants.

Some trends were easily identifiable, such as a majority of IRs being hosted on the DSpace or Digital Commons platforms, and spikes in creation of IRs in 2006, 2011, and 2015. Also present were general trends of how metadata was collected to describe items within the IR, and who set and maintained policies. Initial policies were developed mostly by advisory boards or a library department, while maintenance was primarily handled by a library department or an individual.

This qualitative analysis began as a way to measure the IR@UF policies and suggest policy revisions. The results of this research speak to broader implications. It is clear the state of institutional repositories within the scope of scholarly communication is currently under scrutiny, as evidenced by recent articles such as Clifford Lynch's 2017 article, "Updating the Agenda for Academic Libraries and Scholarly Communications,"[1] and "The Evolving Institutional Repository Landscape, a Choice White Paper" by Judy Luther,[2] released earlier this year. Recent surveys of the current landscape of IRs look at topics from metadata collection to the creation and maintenance of IRs in Canada, as well as the use of Family Educational Rights and Privacy Act (FERPA) regulations for student works in IRs. Within this focus on IRs, understanding the policies of peer institutions is an important factor. My survey provides results from 94 participants, and serves as a case study other institutions can review based on their needs in comparison to peer institutions. The results of the survey also suggest further research opportunities into the relationship between IR platform and policies.

Introduction

Upon becoming manager of the institutional repository at the University of Florida (IR@UF), it became apparent to me that the corpus of related policies, procedures, and documentation had not undergone substantive review since its initial creation for the 2006 launch. Over the following decade, expectations for the role of institutional repositories (IRs) in general, and more specifically the needs of the UF community, shifted. Additionally, SobekCM, the platform used to host our institutional repository, changed and saw improvements as well as new challenges. In this fluctuating environment, the existing policies and

procedures needed to be reviewed for current relevance and application. This process would serve as a guideline to establish a recurring review of the IR@UF policies, procedures, and documentation.

Starting with a list of questions about the role and limitations of the IR@UF that I had collected through both patron interactions and from my own experience with the IR@UF, I sought current resources that addressed best practices for IR policies and procedures. Although my research uncovered articles addressing the shifting role of institutional repositories and their relation to the Open Access movement, [3] I was unable to find anything that specifically addressed either IR policies or procedures.

In the absence of current writings, I determined that, in order to compare IR@UF practices to the community best practices, I would have to reach out to the community to define those best practices. I began by creating a list of policies needed to support an institutional repository, from which I could then define best practices.

Instrumental in compiling my final list of policy requirements were **"**Documentation for institutional repositories,"[4] ***Starting, strengthening and managing institutional repositories,***[5] projects I wanted to undertake within the IR@UF, and requests I had received from the UF community in my role as IR manager. The resulting list of policies that should be in place can be found in Appendix A. Next, I reviewed all the local/ internal documentation I could find regarding the creation of the IR@UF, as well as its policies, both public and internal, to identify missing or weak policies as compared to the list of policy guidelines.

Process
Once I had identified areas where the IR@UF policies needed further scrutiny and update, I began an environmental scan to determine what our peer institutions were doing with regard to IR policies.

Identify Peers
Library administration provided a list of other Association of Research Libraries (ARL) member institutions who had a similar ratio of library expenditures to university expenditures from their 2013 budget calculations. The list broke the institutions into three peer groups. Working with the director of digital production services, Chelsea Dinsmore, I started with all members from the group with the least deviation from our expenditure ratio and added three institutions from Group B. Next, we reviewed the ARL Institutional Repository Review for institutions that had similar founding dates, size, and collected object types as the IR@UF, bringing our final number up to 25 identified peer institutions (Appendix B).

Environmental Scan
Next, I created a series of questions I wanted answered about the policies and management of the institutional repositories at the peer institutions, based on the policy guidelines. The questions were broken up into four categories: administration (5), submissions (7), collections (4), and oOther policies (10). Using these questions, I reviewed the institutional repositories and related web pages at the identified institutions and recorded my results in a Microsoft Access database, including links to the main IR page, the name of the IR, and which platform the repository used.

Follow Up with Targeted Questions
Once the website scan was completed, I compiled the list of eight questions where fewer than five of the 25 institutions addressed the policy in question on their website. I emailed the questions to the primary contact for the 25 IRs, as identified in my website search. Fifteen institutions responded.

1. Who set(s) the policies for your institutional repository? Is it handled by an individual or a committee?

2. Are there any fees associated with posting any of the material into your institutional repository?

3. Are there minimum quality standards that must be met for submitted items? If so, what are they?

4. Is material in your institutional repository ever weeded or checked for duplicates? How do you handle identified duplicates?

5. How do you handle items that are related? (E.g., link items; put items on the same record; create collections; etc.)

6. How do you handle materials that have been vetted through a different office (e.g., ETDs through the graduate school)? Does this impact policies on acceptance, changes to items, take-down, etc.? Does the vetting office have any say on items after they are submitted to the repository

If your institution hosts ETDs in your repository, I have two additional questions.

1. Do you host supplemental materials for ETDs? If so, how do these items refer back to the ETD? (Same or different way than question 5 above)

2. How full of a catalog record do you create for ETDs, and by what mechanism do you collect the metadata? (E.g., generated by person reviewing item, metadata self-submitted from student, metadata provided by graduate school, etc.)

Build Survey

Once I had collected and recorded the email responses, I worked with the assessment librarian, Laura Spears, to use the results of my website-based environmental scan to craft survey questions. Where I was able, I crafted control lists of responses to questions, which were informed by the results of the informal questions and the information gathered during my website search. Once we were happy with the wording, answer options, and question order, I created the survey in Qualtrics. Given my background with theses and dissertations, I included questions about ETDs under the "other policies" portion, as well as questions about metadata and collection clean-up.

Survey to Peers

After securing the IRB, I sent an invitation to the survey to representatives from the 25 peer institutions in April 2016. Fifteen completed the survey.

- Basic demographics (4 questions)
- Administration of the IR (4–5 questions)
- Submission process and policies (7 questions)
- IR collections (4 questions)
- Other IR policies, including policies surrounding metadata standards and ETDs (9–10 questions)

View the survey tool at: http://ufdc.ufl.edu/AA00039807/00001 (initial/pilot).

Open Survey to Broader Group

Based on feedback from peers, I expanded the question set by five questions, and clarified some questions where the initial replies indicated that doing so would facilitate more meaningful results. I sent out an invitation to the broader scholarly community to take the survey in October 2016. Overall, the survey had 94 participants from various domestic and international institutions.

- Basic demographics (6 questions)
- Administration of the IR (4–6 questions)
- Submission process and policies (7 questions)
- IR collections (4 questions)
- Other IR policies, including metadata standards and policies surrounding ETDs (9–12 questions)

View the survey tool at: http://ufdc.ufl.edu/AA00039807/00002 (revised/broader group).

Big Trends

While institutions varied in responses across the survey, there were a few big trends that I was able to identify from the results. Looking at the demographics portion of the survey, these trends appear in the platforms used to host the IR and which unit at an institution handles the IR administration. The two most common platforms across the 68 respondents to the question were Digital Commons, with 47%, and DSpace at 34%. The next highest platform usage appeared under the "other, please describe" category, with Hydra and Hydra plus another system coming to 6% of the total. The remaining platforms each represented 1% of the responses. Since the survey, Elsevier acquired Digital Commons, a hosted service available through bepress. Anecdotally, this has led to some institutions migrating their IRs to other platforms. The full impact is yet to be determined, but I expect a shift in the distribution of platforms when the IR Policy Survey is reissued in 2019.

Figure 1: What platform/technology do you use for your IR?
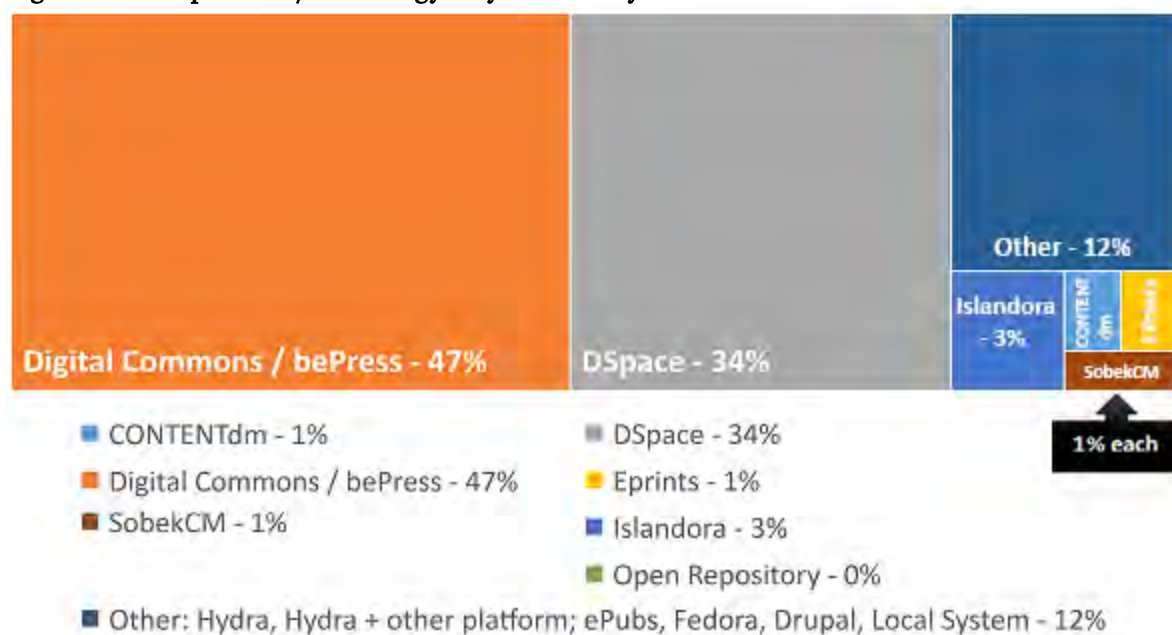
Sixty-eight participants responded to this demographics question. Two platforms, Digital Commons and DSpace, make up 81% of responses. Responses from the 2016 issuance of the Institutional Repository Policy Survey.

One question where there was near uniform response was "Which department administers the IR at your institution?" The library administered the IR at all responding institutions, with 4% sharing administration with another department on campus.

Respondents also varied in which members from their community were allowed to submit items into their IR. Of the 65 institutions that responded to this question, 95% allow submissions from faculty members, 92% allow submissions from graduate students, and 83% allow submissions from staff. Other institutions also allow submissions from undergraduate students, emeritus faculty, and researchers affiliated with the institution, at 74%, 71%, and 69% respectively.

In addition to looking at who could submit items for inclusion in the IR, I also asked whether institutions had a gatekeeper for materials loaded into the IR. Out of the 66 respondents, 12 institutions (11%) did not have a gatekeeper, and approved individuals could load anything into the IR. In institutions where there is a gatekeeper, 52 (or 79% of respondents for this question) indicated that this role falls to "IR Manager / Repository Curator."

Beyond policies addressing who manages the administrative functions of an IR, there are commonalities in terms of how institutions present the items within their collection. Sixty-four institutions responded to the question, "Please identify the distinct sub-collections contained in your IR (select all that apply)." The two most common sub-collections utilized by respondents were theses and dissertations at 88%, and department-based collections (83%). Community-based collections were utilized by 63% of respondents. Those institutions that were hosted on either DSpace or Digital Commons were more likely to have both community-based and department-based collections. This is just one example of possible future research—exploring whether the platform informs form, vice versa, or if no significant correlation exists between the two.

Figure 2: Sub-collections utilized by respondents' institutional repositories

Please identify the distinct sub-collections contained in your IR
64 respondents
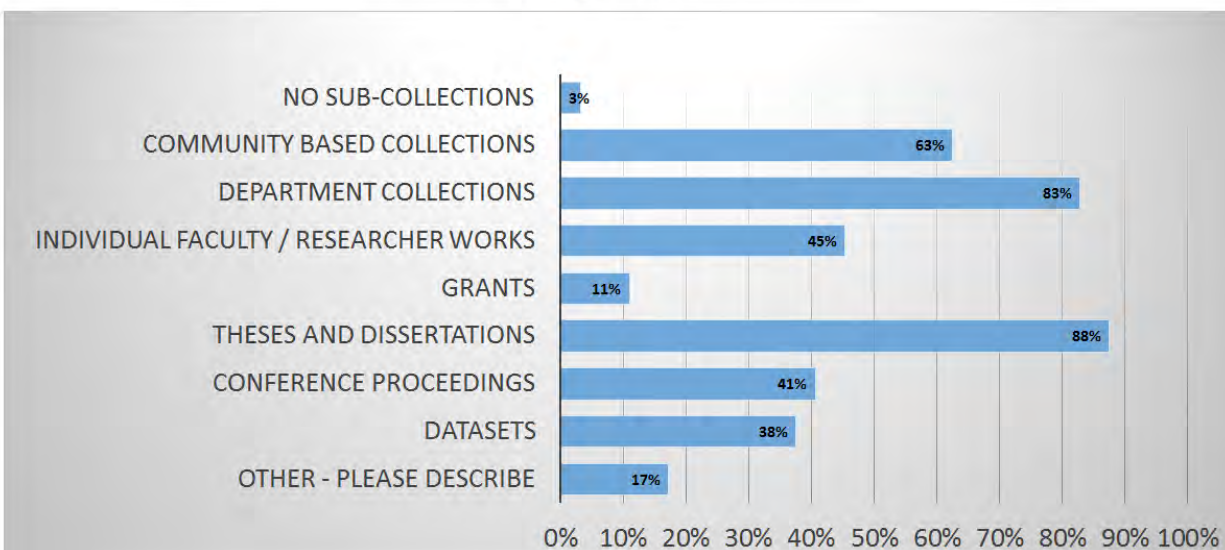
Sixty-four participants responded to this collection policy question. The most frequently utilized sub-collections were "theses and dissertations," used by 88% of respondents, and "department collections," representing 83% of respondents.

Another area where I observed commonalities was in the collection of metadata to describe submitted works. This metadata could be collected from the submitter as either required, strongly preferred, or optional. Title, author, and date were most frequently identified as required. Abstract was most commonly a strongly preferred field, and examples of optional fields include citation, temporal coverage, and peer review status. Other metadata was most commonly added by staff, such as subject keywords, rights management statements, and type/format of the works. The complete dataset about metadata collection can be found in Appendix C.

Figure 3: How metadata is collected, most common methods[6]

What metadata is available for items in your IR, and how is it collected / assigned? Most common answers

Provided by Submitter – Required
Title
Author
Date

Provided by Submitter – Strongly Preferred
Abstract

Provided by Submitter – Optional
Citation
Other Version
Peer Review
Publication Status
Sponsors/ Funding
Temporal Coverage
Spatial Coverage
URL to related items*
Language*
Number (hierarchy info)*
Comments*

Added by Staff
Subject Keywords
Type/ Format
Rights
Discipline
Identifiers (e.g. DOI, ARK, etc)
URL to related items*
Language*
Number (hierarchy info)*

Collection varies by institution
Subject Keywords
Contributors
Publisher

System doesn't support
Comments*

*These items were split almost equally in how they were handled

Results of the question addressing how metadata is collected for items submitted to the participants' institutional repositories. This box highlights the most common method of collection for the identified metadata fields. Each metadata field had between 59 and 64 respondents.

Using survey results to update policies/procedures

Using the survey results, I was able to identify best practices as defined by the most prevalent practices, though I do acknowledge that, simply because a method is most widely used, it is not necessarily the "best" practice, just the most common. Having a baseline of what other institutions were doing around policies and procedures, however, gave me something by which to measure our own. Not all of the identified best, or common, practices fit in with our institution's needs or platform, but understanding the trends has set us up for better positioning for possible future developments.

One key change in practices regarding the IR@UF is establishing a two-year review cycle for policies and procedures. This review is being set up along the guidelines of the Trustworthy Repositories Audit and Certification: Criteria and Checklist (TRAC) tool (http://www.crl.edu/archiving-preservation/digital-archives/metrics-assessing-and-certifying/trac), which UF had already begun working with to evaluate our digital collections. Additionally, a regular review of registered users will be conducted to remove any individuals who are no longer associated with the University of Florida.

Another large change was to the structure of the IR@UF's collections and sub-collections. I reached out to our library liaisons to identify obsolete legacy collections that could be removed (many of which had a landing page, but contained no items). I also identified which liaison was the relevant subject specialist for each collection. This not only allowed us to provide a secondary contact for patrons, but also to bring the

liaisons' knowledge of their fields to bear when considering future development and updates to these collections.

Collection of metadata was another area identified for improvement. Based on the trends (Appendix C), I am working with the metadata librarian and library IT to update our user self-submission form to include more metadata fields than the eight currently collected (only two of which are required), increasing the collected information to six required fields, five strongly encouraged fields, and at least two, but possibly up to eleven, optional fields. We are still weighing the pros and cons of including nine of the optional fields in the initial submission rather than as fields that can be updated after submission.

The only major policy that our previous policies did not address in any way was how to handle duplicate items loaded into the IR. Looking at the answers from our peers, I am writing this policy and accompanying workflow for implementation in 2019.

Conclusion

In a time when the scholarly community is looking closely at the role of institutional repositories within the broader scholarly communications environment, it is important for an institution to have touchstones to measure the relevance of their own institutional repository in this changing landscape. A major defining feature of institutional repositories are their policies and procedures surrounding what items are collected, who is able to submit items, and how submissions are handled throughout the submission process and beyond.

While current literature addresses the changes around the role of IRs since the early days of open access publishing, the only resources that look at policies for institutional repositories were dated. In the absence of a set of best practices for IR policies and procedures, I set out to create my own, based on the activities at peer institutions. The resulting survey helped identify common standards and practices which I have subsequently shared with the broader scholarly communications community (see Appendix D). Since this field experiences constant growth, so too should identification of best practices and conversations around the role of institutional repositories. With the creation of the IR Managers' Forum in early 2017, seeking respondents when the survey is reissued in 2019 should yield a broader variety and volume of respondents.

The results of the initial issuance of the IR Policy Survey not only have provided a road map for improvement of the policies and procedures for the IR@UF, but can also serve as a template for other institutions who are undertaking a similar policy review. While the survey identified some interesting trends, it also raised questions that could benefit from further research, such as an exploration of correlation between IR policies and platforms used to host institutional repositories, as well as a regular update of the survey so trends can be tracked over time.

Endnotes

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2. Judy Luther, "The Evolving Institutional Repository Landscape," ***Copyright, Fair Use, Scholarly Communication, etc***. no.70, https://digitalcommons.unl.edu/scholcom/70.
3. Lynch, "Updating the Agenda"; Richard Poynder, "Q&A with CNI's Clifford Lynch: Time to Re-Think the Institutional Repository?" ***Open and Shut?*** (blog), September 22, 2016, http://poynder.blogspot.com/; Eric Van de Velde, "Let IR RIP," ***ScieTechSociety*** (blog), July 24, 2016, http://scitechsociety.blogspot.com/2016/07/let-ir-rip.html.
4. Steve Probets and Jenkins, Celia. "Documentation for institutional repositories." ***Learned Publishing*** Volume 19 Number 1 (January 2006): 57–71. https://doi.org/10.1087/095315106775122556.
5. Jonathan A. Nabe, ***Starting, strengthening and managing institutional repositories: a how-to-do-it-manual*** (New York: Neal-Schuman Publishers, 2010).
6. Nabe, ***Starting, strengthening and managing***.

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Appendix A
I.   **Probets Documentation**

      A.   ***Overview of IR/advocacy materials***

      B.   ***Collections policy***

            1.   Withdrawal policy

            2.   Quality requirements

            3.   Status requirements

      C.   ***Metadata***

            1.   Metadata schemes used

            2.   Level of metadata quality expected

            3.   Process of metadata creation

      D.   ***IR and Copyright (including © guidance and deposit license)***

            1.   Copyright guidance

            2.   Deposit License

                  a)   Non-exclusive right to store and distribute authors' work

                  b)   Non-exclusive right to make copies for backup and preservation

                  c)   Legal rights and responsibilities of each of the stakeholders

                  d)   Statement identifying © owner of resources in IR

                  e)   Statement identifying © owner of metadata in IR

      E.   Submission / deposit procedures

      F.   Details of submission workflows

      G.   Step-by-step instructions

      H.   Preservation policy

      I.   User policy

II.   Nabe Book

      A.   Establishing communities and collections

      B.   Administering the IR communities

C. Contributors

D. Content

    1. Content types

    2. File formats

    3. Versioning

E. Use of content

F. Submission Agreements

G. Submission Process

H. Collections Policy

    1. Withdrawal

    2. Retention

I. Preservation Efforts

J. Additional considered

    1. Fees for Space

    2. Commercial Uses

    3. Privacy

    4. Quality Control

III. IR Plan Policies

A. Minimum metadata requirements

    1. Include best practices/ lexicons for where available

B. Take down of items (user's request)

C. Content revision

    1. Versioning

    2. Update of materials

D. Embargos

    1. Terminal projects

    2. Other items

E.   Collections and keywords

    1.   Procedures on how to

    2.   Include best practices

F.   Archiving materials

    1.   Self-submitted items

    2.   OJS journals

G.   Mediated submissions

    1.   Harvesting (?)

H.   Who can upload materials

    1.   Workflow for how permission granted

I.   What is appropriate materials for IR

    1.   Link and metadata vs. item hosted in IR

    2.   If not, where it goes. Types to look at in particular

        a)   Library Training in IR

        b)   Other course material

        c)   Student organizations

        d)   Departmental materials, etc.

        e)   Use as portal (e.g. Hebblethwaite)

J.   Copyright and rights statements

K.   Works with multiple authors

L.   Duplicate materials in IR

M.   Sub-collections within IR

Appendix B

Peer institutions as identified using a list of Association of Research Libraries (ARL) member institutions who had a similar ratio of library expenditures to university expenditures from their 2013 budget calculations. I started with all 11 members in the group with the least deviation from our expenditure ratio [1], and added three institutions from the next closest group [2]. Finally, we reviewed the ARL Institutional Repository Review for institutions that had similar founding dates, size, and collected object types as the IR@UF. We identified 11 additional institutions [3], bringing our final number up to 25 identified peer institutions (Appendix B).

- Columbia University [3]
- Cornell University [3]
- Duke University [3]
- Indiana University-Bloomington [1]
- Massachusetts Institute of Technology [3]
- Ohio State University [1]
- Penn State University [3]
- Purdue University [3]
- Southern Illinois University-Carbondale [3]
- Texas A&M [1]
- University of Arizona [3]
- University of California at Berkeley [1]
- University of Illinois at Urbana-Champaign [1]
- University of Michigan-Ann Arbor [1]
- University of Minnesota [2]
- University of Nebraska-Lincoln [3]
- University of North Carolina at Chapel Hill [1]
- University of North Texas [3]
- University of Pittsburgh [2]
- University of Rochester [3]
- University of Texas at Austin [3]
- University of Utah [3]
- University of Virginia [1]
- University of Washington [2]
- University of Wisconsin-Madison [1]

Appendix C

What metadata is available for items in your IR, and how is it collected / assigned? *64 respondents, with not all respondents answering all questions.* Most common collection method appears in bold and italicized.

Metadata Item	Required— provided by submitter		Preferred / strongly encouraged —provided by submitter		Optional— provided by submitter		Assigned by system		Added by staff		System does not support / no place to collect	
Author / Creator	*71.88%*	*46*	9.38%	6	3.13%	2	0.00%	0	15.63%	10	0.00%	0
Title	*81.25%*	*52*	1.56%	1	1.56%	1	0.00%	0	15.63%	10	0.00%	0
Date (of this version)	*56.25%*	*36*	17.19%	11	1.56%	1	4.69%	3	20.31%	13	0.00%	0
Publisher	12.90%	8	22.58%	14	29.03%	18	3.23%	2	*32.26%*	*20*	0.00%	0
Citation	4.76%	3	15.87%	10	*26.98%*	*17*	*26.98%*	*17*	19.05%	12	6.35%	4
URL to related items	3.17%	2	11.11%	7	*39.68%*	*25*	1.59%	1	*38.10%*	*24*	6.35%	4
Other location (URL to other online location of item)	0.00%	0	14.52%	9	*41.94%*	*26*	3.23%	2	32.26%	20	8.06%	5
Other version	0.00%	0	8.33%	5	*46.67%*	*28*	3.33%	2	26.67%	16	15.00%	9
Identifiers (e.g. DOI, ARK, OCLC, ISBN, ISSN, URI, etc.)	7.94%	5	17.46%	11	*25.40%*	*16*	11.11%	7	33.33%	21	4.76%	3

Metadata Item	Required—provided by submitter		Preferred / strongly encouraged—provided by submitter		Optional—provided by submitter		Assigned by system		Added by staff		System does not support / no place to collect	
Language	4.76%	3	12.70%	8	*28.57%*	*18*	11.11%	7	*28.57%*	*18*	14.29%	9
Type / Format	20.63%	13	12.70%	8	14.29%	9	15.87%	10	31.75%	20	4.76%	3
Peer Review	1.67%	1	11.67%	7	*30.00%*	*18*	5.00%	3	25.00%	15	*26.67%*	*16*
Comments	0.00%	0	1.61%	1	*33.87%*	*21*	1.61%	1	25.81%	16	*37.10%*	*23*
Abstract	12.70%	8	42.86%	27	20.63%	13	0.00%	0	23.81%	15	0.00%	0
Publication status	6.56%	4	19.67%	12	*32.79%*	*20*	3.28%	2	26.23%	16	11.48%	7
Subject keywords	12.90%	8	*27.42%*	*17*	*27.42%*	*17*	0.00%	0	*30.65%*	*19*	1.61%	1
Discipline	14.29%	9	12.70%	8	23.81%	15	4.76%	3	*34.92%*	*22*	9.52%	6
Series / Number (hierarchy info)	1.69%	1	11.86%	7	*32.20%*	*19*	8.47%	5	*32.20%*	*19*	13.56%	8
Sponsors / Funding	1.61%	1	16.13%	10	*45.16%*	*28*	0.00%	0	16.13%	10	20.97%	13
Rights	20.63%	13	12.70%	8	17.46%	11	4.76%	3	*36.51%*	*23*	7.94%	5
Contributors	9.84%	6	*27.87%*	*17*	24.59%	15	0.00%	0	*29.51%*	*18*	8.20%	5
Temporal coverage	3.28%	2	4.92%	3	*47.54%*	*29*	0.00%	0	11.48%	7	32.79%	20

Metadata Item	Required—provided by submitter		Preferred / strongly encouraged—provided by submitter		Optional—provided by submitter		Assigned by system		Added by staff		System does not support / no place to collect	
Spatial coverage	1.64%	1	3.28%	2	*42.62%*	*26*	0.00%	0	18.03%	11	34.43%	21

Appendix D

Previous works I created to disseminate information about the IR policy pilot and full survey process and results.

"Mapping the Landscape of ETDs and IRs: Results from the Institutional Repository Policy Survey." Refereed poster with G.W. Swicord for the 20th annual International Symposium on Electronic Thesis and Dissertation, Washington, DC, Aug. 8, 2017 (http://ufdc.ufl.edu/IR00010029/00001).

"Identifying Policy Trends: Institutional Repository Policy Survey Results." Refereed poster for the Southern Mississippi Institutional Repository Conference (SMIRC), Apr. 12, 2017 (http://ufdc.ufl.edu/l/IR00009690/00001).

"There's a Policy for That? Results from an informal survey of institutional repository practices." Refereed poster for the American Library Association (ALA) 2016 annual conference 2016, Orlando, FL, June 25, 2016, (http://ufdc.ufl.edu/IR00007436/00001).

"There's a policy for that? Results from an informal survey of IR practices." Refereed presentation for Institutional Repository (IR) Day at University of Southern Mississippi, Hattiesburg, MS, Apr. 28, 2016 (http://ufdc.ufl.edu/IR00007430/00001).

Bringing IRUS to the USA: International Collaborations

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Introduction

The value of open access (OA) in supporting effective research through enhanced visibility, discoverability, and access is widely recognized. Institutional repositories perform a critical role in this respect, facilitating knowledge sharing and enabling academic institutions to share their research outputs with a global audience. Within this context, measuring the reach of research is key. Tracking, monitoring, and benchmarking usage of scholarly resources supports the understanding of an institution's research, identifies emerging trends within local, national and international contexts, and informs both policy and process for a wide range of stakeholders. The increasing use of data to support decision-making in these areas requires effective tools to access comparable data, to calculate return on investment, and to demonstrate value and impact.

Although most institutional repository (IR) products provide statistics indicating usage of that institution's research, making comparisons that situate an institution's research within a broader context are often difficult or impossible as different repository products process raw usage data in different ways. The IRUS-UK (Institutional Repository Usage Statistics) service,[1] developed by Jisc[2] in the UK, addresses this problem by enabling repositories to share and compare usage data conforming to the COUNTER[3] standard for counting usage of electronic resources. IRUS-UK is used by virtually all IRs in the UK and supports national comparison and benchmarking to offer a UK-wide view of IR usage.

The lack of an existing standards-conformant solution for measuring and benchmarking repository usage statistics among US higher education institutions led to the formation and development of IRUS-USA,[4] a pilot project to measure usage in a consistent and comparable way and to evaluate the resulting impact for participants.

This paper provides an overview of the IRUS-USA pilot project and reviews the results of a project assessment. Specifically, this paper will explore the following two research questions:

What are the primary repository usage assessment needs, barriers, and opportunities for IRUS-USA pilot participants?

II. What is the perceived value of international measurement and benchmarking among IRUS-USA pilot participants?

Literature Review

Analytics assessment for online resources, including digital repositories, has a rich and growing literature—too vast for a comprehensive review in this paper.[5] Since the IRUS-USA pilot project surfaces themes around collecting to ensure standardized metrics, to analyze usage statistics among partner organizations, and to offer cross-institutional comparisons, the authors will focus this literature review on two broad areas: identifying the barriers to assessing usage statistics and the attempts to standardize usage assessment practices. This focus situates the IRUS-USA pilot project in a larger landscape of cultural heritage usage statistic assessment.

Researchers have been paying a growing amount of attention to identifying and confronting barriers to assessing usage statistics—both broadly in the information profession and specifically within conversations of IRs. Within the information profession, the literature indicates that a lack of data standardization and insufficient skills at interpreting usage data are significant hurdles. Voorbij analyzed survey results, interviews, and annual reports from 100 institutions in the Netherlands.[6] The author found that most institutions gather some form of web statistics for "practical purposes," including modifying websites and determining digitization selection priorities.[7] Although many are collecting this data, most institutions are not including contextual information that would help others understand, interpret, and benchmark new data collected with existing caches of data.[8] Arendt and Wagner conducted a case study to collect data on redesigning their library's website.[9] The authors wrote, "The usage statistics enabled the Virtual Library Group to make better decisions by providing factual information about the site."[10] However, they also identified three barriers to incorporating usage statistics as part of their overall redesign: wading through large amounts of irrelevant assessment data, addressing difficulties in interpreting results, and "balancing competing interests within the library."[11]

Within the repository landscape, barriers to usage assessment are numerous and diverse. Early scholarship sought to understand the scope and components of digital repository evaluation criteria. In 2004, Saracevic reviewed existing literature on evaluating digital libraries.[12] While Saracevic found that existing studies focused on a variety of aspects, including tools, services, and user behavior, he noted that there was an overall lack of evaluation occurring among digital library practitioners.[13] Hong Xie conducted a survey asking respondents to compile and apply evaluation criteria for digital libraries.[14] The author found that "usability," "collection quality," "service quality," and "system performance" were among the most important evaluation criteria.[15] These criteria surface a host of barriers for evaluation, including confusing or poorly designed user interfaces, a lack of contextual information on a collection, non-existent community service, and limited accuracy in search results.[16]

Later scholarship focuses more directly on the assessment of digital repository usage data. In 2008, Khoo et al. reviewed the web metrics among four digital libraries and identified several "practical web metrics issues."[17] Their analysis suggests that more expertise, skills, and community-shared norms are needed across the spectrum of usage assessment, from collecting, compiling, and analyzing data to the definitions and lack of agreed-upon standards.[18] Khoo et al. also discussed the limitations of usage data itself, emphasizing that "no firm inferences regarding users' intentions can be made solely from web metrics."[19] Noting the absence of "public data on usage of digitized library collections," Schlosser and Stamper conducted a case study to understand what impact posting IR content in Flickr would have on repository usage statistics.[20] While the authors ultimately found that their approach to promoting collections in Flickr did not necessarily increase usage, they believe their study exposed the complexities of usage assessment and the need for more organizations to "share their [usage data] methods and their results with others to help foster an environment where such data are collected and used."[21] Perrin et al. focused on five specific repository usage

problems, including "difficulty of distinguishing different kinds of internet traffic," a "lack of direct correlation of a digital item to its multiple URLs," "the analytics tools' inherent bias in statistics that are counted only in the positive way," "the different interaction between digital collections with search engine indexing," and "evaluator's bias toward simple growing statistics over time for surmising a positive use assessment."[22] To overcome these issues, Perrin et al. advocate for institutions to evaluate usage data through the lens of the "sessions or user perspective."[23]

As noted by multiple studies, standardizing practices is a current gap in digital repository usage assessment. However, some groups are beginning to address this problem. For example, members of the National Science Digital Library Metrics Working Group articulate metrics, including web analytics, which they find "useful for assessing digital library activities."[24] They also advocate for more sophisticated ways to compile and analyze web analytics data, through incorporating code into their Google Analytics account to allow for "roll-up reporting."[25] Other projects are attempting to build tools and services around usage data standardization. The Repository Analytics and Metrics Portal (RAMP) project at Montana State University (in collaboration with the Institute of Museum and Library Services and partners) is developing a framework "that classifies IR page views and download activity into three categories that communicate metrics about user activity related to the research process."[26] When completed, this framework and associated platform will help IR practitioners confront the problem of the current "deficiencies of log file analytics reporting methods."[27] Finally, the UK-based Publisher and Institutional Repository Usage Statistics (PIRUS) Project aimed to establish platforms and infrastructure that allows institutions to generate IR usage reports based on COUNTER-compliant standards, communicate the results out through appropriate venues, and aggregate usage data for global comparisons across organizations.[28]

This paper contributes to this evolving body of literature by providing a concrete example of a collaborative effort to bring a standardized usage assessment approach to US institutions. While this project is not the first attempt to do so in the US, it does offer a rare additional case study. It also allows for future comparisons between the IRUS-USA approach and other programs and models, such as RAMP. Finally, with the expansion of the IRUS program into the US, the results of this paper establish comparable international benchmarks with other IRUS-related programs.

Background

Jisc, an organization that provides digital solutions for education and research, delivers various library analytics services that aim to save time, increase efficiencies, improve data quality, and support comparison and benchmarking. Part of Jisc's OA[29] offer, IRUS-UK enables IRs to share and compare usage data based on the COUNTER standard. The service provides access to authoritative, standards-based statistics enabling universities to gain a better understanding of the breakdown and usage of their institution's research.

IRUS-UK built on the work of the PIRUS2 project,[30] which demonstrated that COUNTER-conformant article-level usage statistics could be collected and consolidated from publishers and institutional repositories. Through its prototype, PIRUS2 demonstrated that such a service was technically possible. In practice, however, the majority of publishers were not ready or able to participate in such a service, primarily for economic reasons. Nevertheless, PIRUS2 indicated the value of a standardized approach to measuring repository usage. IRUS-UK was formed when Jisc decided to support development of a service for items hosted by institutional and subject repositories.

The IRUS program of services collect and then process raw usage data from repositories and consolidate those data into COUNTER-conformant statistics by following the rules of the COUNTER Code of Practice. This enables participating repositories to provide consistent, comparable, and trustworthy usage data as well as benchmarking usage of their repository against other institutions. COUNTER provides an infrastructure to support publishers, libraries, and third parties who wish to create or access statistics or build services to support access. One of the first standards organizations to focus on usage statistics, COUNTER has been instrumental in bringing together publishers, vendors, and librarians to develop and maintain a standard for

counting usage of networked e-resources. Collaboration is key to the development and maintenance of an effective standard intended for global adoption and use.

IRUS services work by adding a small piece of code to repository software which employ the "Tracker Protocol." This was developed in conjunction with and endorsed by COUNTER. Tracker functionality is currently available and in operation for a variety of platforms including DSpace, EPrints, Pure Portal, Worktribe, Haplo, Figshare, and Samvera applications. In keeping with the ethos of openness, IRUS requests that participants commit to data sharing, enabling institutions to access data from other repositories in order to support comparison and benchmarking. Data from IRUS services can be shared with key stakeholders as well as used for management reporting, usage monitoring, and external reporting such as annual statistics. Data can be viewed within the online portal, downloaded for further analysis, or harvested for reuse in alternative applications.

Overview of statistical modules and reports

IRUS-UK presents statistics through a portal via a series of charts and data visualizations that enable users to easily understand, interpret, and communicate data. A survey of UK institutions indicates that IRUS-UK primarily offers value by improving statistical reporting, enabling new forms of reporting, saving time collecting statistics, and increasing knowledge to support better decision-making.

The IRUS-USA pilot replicated the UK approach but provided a limited subset of reports and, therefore, functionality. These reports provided a general indication of features available in the production service and enabled the pilot group to assess value. The following table outlines reports made available to pilot participants.

Table 1: Reports in IRUS-USA

Report	Description
Summary of all data in IRUS-USA	Provides summaries of data in IRUS-USA including: number of participating repositories, number of items downloaded from these repositories since they joined, numbers of downloads (in total, to the end of the previous month, and during the current month)
Book Report 1	Indicates the number of successful book downloads by month for a selected repository
Book Report 2	Indicates the number of successful book section downloads by month for a selected repository
ETD (electronic thesis or dissertation) Report 1	Indicates the number of successful thesis or dissertation download requests by month and repository identifier for a selected repository
Item Report 1	Indicates the number of successful item download requests by month and repository identifier for a selected repository. It indicates the item URL, title, author(s), item type, and total downloads by both month and for the period selected.

Report	Description
Item Report 1 Daily	Indicates the number of successful item download requests by day and repository identifier for a selected repository
Item Report 2	Indicates the number of successful item download requests by month and item type for a selected repository. For each item type it indicates the total downloads by month and for the period selected.
Repository Report 1	Indicates the number of successful item downloads by month for all participating repositories
Repository 1 Daily	Indicates the number of successful item downloads by day for all participating repositories
DOI Duplicates Report	Provides a view of the items with duplicate DOIs in a selected repository

Branching out beyond the UK

The standards-based approach that IRUS-UK pioneered is easily replicable and has been broadly adopted. As such, IRUS-UK is now part of a family of services that include instances for CORE,[31] OpenAIRE,[32] the University of Amsterdam,[33] and OAPEN,[34] in addition to pilot instances with limited functionality (for the purposes of the pilot) in Australia, New Zealand,[35] and the US.

Formation of the IRUS-USA pilot project

The benefits of IRUS-UK, particularly the ability to access standards-compliant usage data so that participating institutions can run complex reports, perform cross-institutional comparisons, and better visualize and benchmark their own usage statistics, was an attractive feature for members of the Digital Library Federation (DLF).[36] In March 2017, Jisc, DLF, and the Council on Library and Information Resources (CLIR),[37] DLF's parent organization, announced an intent to collaborate around a number of issues of mutual interest. Stakeholders in the Jisc and CLIR/DLF community selected IRUS as the first collaborative effort between the two organizations. President of CLIR Chuck Henry indicated that, "building on a series of conversations over the last few months between our staff members, Jisc's IRUS-UK program seems especially appealing. The IRUS aggregation service is fundamentally important. In addition, the attendant benefits are equally pertinent, including giving participating institutions the ability to plan and make strategic decisions based on their, and other institutions', data; building a user community of shared standards; the inherent, collateral goal of national and international coherence at scale in support of higher and continuing education; and the promotion of OA. IRUS has thus compelling behavioral, intellectual, technical, and strategic value."

To facilitate this collaboration, the two groups developed a pilot project to bring IRUS-UK to the United States (branded as IRUS-USA). The group was composed of individuals from both organizations, including representatives from DLF's Assessment Interest Group (AIG).[38] Together, the pilot project organizers devised a three-phased approach to the project, including pilot recruitment and platform configuration, information sharing on IRUS-USA, and pilot assessment.

The group brainstormed potential pilot participants based on a variety of factors, including the type of institution (public and private academic, government), the type of IR software (e.g., DSpace, Eprints, Samvera), and the type of repository administration (hosted locally vs. consortially). Through DLF's executive director, the team recruited nine institutions during the summer of 2017 to participate in the IRUS-USA pilot project. After recruitment, Jisc established an instance of the IRUS-USA portal and made it available to 11 pilot IR participants, with access provided throughout 2018.

Pilot organizers held a webinar on IRUS-USA in March 2018 for pilot participants. The webinar introduced pilot participants to the portal and outlined key features and functionality. The intention of the pilot was to provide IRUS-USA access and assess the portal's use and value to participants.

Organizers devised and administered an evaluation in August and September 2018, with a view to establishing a longer-term vision and sustainability plan subject to evaluation outcomes. The program of communications and dissemination activities underway throughout 2018 will culminate in a presentation and paper at the Library Assessment Conference in the US in December 2018.

Methodology

Two methodologies were used to assess the IRUS-USA pilot: a survey and a focus group. The survey questions appear in Appendix A. These questions were edited from a previous IRUS-UK assessment survey[39] with some revisions for the current pilot. The survey was sent to the 11 institutions that were participants (Caltech, Indiana University, Montana State University, Smithsonian Institution, Swarthmore, University of Arizona, University of Houston, University of Maryland, University of Michigan, University of Pittsburgh, and University of Virginia) with a response rate of 72% (ten starting the survey and eight finishing). In the survey, participants were asked if they would be willing to participate in a focus group. This pool of self-selected individuals were used for the focus group. Four of the survey participants agreed to be a part of the focus group and three participated in the focus group. The prompts for the focus group are included in Appendix B.

Findings
Survey
Report Usefulness
The reports were scored on how many responses they got to the usefulness scale. One score point was awarded for "Somewhat useful," two for "Useful," and three for "Very useful."

Table 2: Usefulness of IRUS-USA Reports

Report	Score	Usefulness
Summary of all data in IRUS-USA	4	Do not use (n5); Not useful (n0); Somewhat useful (n2); Useful (n1); Very useful (n0)
Book Report 1	5	Do not use (n5); Not useful (n1); Somewhat useful (n0); Useful (n1); Very useful (n1)
Book Report 2	5	Do not use (n5); Not useful (n0); Somewhat useful (n0); Useful (n1); Very useful (n1)

Report	Score	Usefulness
ETD (electronic thesis or dissertation) Report 1	8	Do not use (n4); Not useful (n0); Somewhat useful (n0); Useful (n1); Very useful (n2)
Item Report 1	9	Do not use (n4); Not useful (n0); Somewhat useful (n1); Useful (n1); Very useful (n2)
Item Report 1 Daily	4	Do not use (n4); Not useful (n0); Somewhat useful (n2); Useful (n1); Very useful (n0)
Item Report 2	10	Do not use (n4); Not useful (n0); Somewhat useful (n0); Useful (n2); Very useful (n2)
Repository Report 1	6	Do not use (n4); Not useful (n1); Somewhat useful (n1); Useful (n1); Very useful (n1)
Repository 1 Daily	4	Do not use (n5); Not useful (n1); Somewhat useful (n1); Useful (n0); Very useful (n1)
DOI Duplicates Report	3	Do not use (n6); Not useful (n0); Somewhat useful (n1); Useful (n1); Very useful (n0)

The reports that scored the highest on usefulness are the "Item Report 2," "ETD (electronic thesis or dissertation) Report 1," and "Item Report 1." Many of the reports received "Do not use" from four to six institutions. These results were further investigated in the focus group.

Use of repository statistics
Table 3: Use of Repository Statistics

Use	Number
Identifying trends and patterns in usage	7
Regular reporting to management	6
Benchmarking	3

Use	Number
To provide evidence related to the impact of institutional outputs	6
Identifying trends and patterns in deposit	2
Raising awareness and advertising services with users	5
Checking and maintaining records	2
Contributing to statistics	6
Sharing results via social media	4
Advocacy with researchers	6
Other	None

The responses indicated that most participants use IRUS-USA to identify trends and patterns in usage to contribute to statistics, with five responses each. With four responses each are "regular reporting to management," "to provide evidence related to the impact of institutional outputs," and "advocacy with researchers."

Barriers or challenges

When asked if there were barriers to using IRUS-USA, three said "no," two said "maybe/unsure," and three said "yes." This shows an even split between those who felt there were no barriers and those who experienced some barriers to use. When the participants were asked to list barriers, they listed unclear report names, unclear report formatting, unclear definitions of terms in the reports, lack of full integration with existing systems due to IRUS-USA's status as a pilot instance, and lack of alignment between IRUS-USA item types and local item types. One organization said their major barrier was that they were never able to set up the IRUS instance due to lack of local technical support. Another said that the ETD report did not function for them.

How can IRUS-USA provide value?

One point was awarded for "Somewhat valuable," two points for "Valuable," and three points for "Very valuable."

Table 4: Value of IRUS-USA

Value	Score	Responses for value
Improving statistical reporting	20	Not valuable (n0), Somewhat valuable(n0), Valuable (n4), Very Valuable (n4)
Saving time collecting statistics	21	Not valuable (n0), Somewhat valuable(n1), Valuable (n1), Very Valuable (n6)
Enabling reporting previously unable to do	21	Not valuable (n0), Somewhat valuable(n1), Valuable (n1), Very Valuable (n6)
Increasing knowledge to support better decision-making	15	Not valuable (n2), Somewhat valuable(n0), Valuable (n3), Very Valuable (n3)
Saving money	5	Not valuable (n3), Somewhat valuable(n5), Valuable (n0), Very Valuable (n0)
Enhancing productivity	8	Not valuable (n1), Somewhat valuable(n6), Valuable (n1), Very Valuable (n0)

This shows that participants found that IRUS-USA is best at saving them time in collecting statistics and enabling reporting previously unavailable. To a lesser extent, they found that it improved statistical reporting and increased knowledge to support better decision-making.

Support better decision-making
The majority (n7) of participants noted that IRUS-USA was useful for supporting better decision-making, with one negative response. Participants added that, in order to provide more value to repository management, it could compare statistics to other institutions to provide context (n1), identify areas of sustained growth (n1), include an API with real-time display of statistics (n1), break down the downloads by domain (n1), merge reports with IR stats and sorting (n1), produce more visualizations of data (n2), enlist more institutions to make more standardized statistics and reporting (n1), and provide more detailed statistics (n1).

Current Functionality Clear to Understand
When asked if the current functionality of the system was easy to understand, four said "Yes," three said "Maybe/unsure," and one said "No." This suggests that the functionality of the system could be made clearer. The participants offered suggestions for enhancements such as making the tool faster, showing top downloads/views, sorting reports by academic departments, viewing statistics in the browser, including date as a filter, providing author-level download reports, breaking downloads down by country by institution, and running special reports like the ETD Report across all institutions. The authors anticipate that many of the functionality barriers identified during the assessment will be mitigated by an expanded service, comparable to the increased functionality found in the full-scale IRUS-UK platform.

Overall, most were satisfied, with two saying "Very satisfied," five saying "Satisfied," and one saying "Somewhat satisfied." When asked how likely participants were to recommend IRUS-USA to a colleague or peer, three indicated they were very likely to recommend it, four were near neutral, and one was not as likely to recommend it.

Fee-based pricing model
When participants were asked if they would support a fee-based pricing model, five indicated they would, while three indicated they would not. Those not willing to support a fee-based model did not address how much they anticipated their institution would pay. Of those that did answer, one suggested up to $500, two suggested between $501 and $1,000, and two suggested $1,001 to $1,500. This indicates a price range around $1,000 (an average of the high ranges) is a reasonable amount. In the final open-ended question, one participant suggested that the pricing model should be dependent on the "bells and whistles offered," with a higher price, meaning a tool with more functionality.

Participation in Community Support
When participants were asked if they would be willing to participate in community support, five said "Yes" and three said "No."

Focus Group

Three of the survey participants agreed to a focus group, and the prompts of the focus group were created after the survey to clarify some results and get further detail. Even though there were only three participants, the level of agreement among them suggests that others in similar situations would have similar answers.

When asked why the participant's institutions joined the pilot project, two said their institution joined because of the value of reliable, verifiable, standardized statistics. The statistics were seen as necessary to demonstrate value. One respondent expressed that they have very specific statistics needs that IRUS-USA does not fully meet, but that it does provide verifiable statistics that are not easy to obtain otherwise. The added benefit of being able to compare to other institutions was considered potentially interesting, but reliable statistics were more important for the foreseeable future.

Regarding why some of the built-in reports were not used, all participants agreed that it was not always clear how the reports worked or what they were trying to show. They agreed that there is a need for more documentation and more education regarding how the statistics are gathered and displayed. One reported inconsistencies between their expectations and what the reports showed, which indicated a need to investigate more deeply to see if the anomalies are a problem on the repository end or a problem interpreting the report.

Respondents expressed varying needs when asked about how IRUS-USA could be better. One said graphical representation of data would make it easier to share results and facilitate integration with altmetrics (n2). Another respondent noted that they needed usage data by academic department, a national roll out to generate a larger pool of comparison data, and more automated actions to save on time and labor in preparing statistics for others as well as aligning item type with types in the repository. The third respondent added that anything that helps them turn the data into a story to report back on the success of their OA policy would be useful.

Some cited several challenges. One respondent said they would love to be able to refine report searches instead of having to start a new search in order to edit their search. Another suggested that the real barriers for them were aligning the tool's data retention policies with their own internal policies.

When asked about what data was needed to make a case for IR value, all participants agreed that geographical usage data was most valuable. People want to know where their users are. For some groups, very specific regional data are important.

Regarding continuing education, all three participants said that documentation explaining how IRUS-USA works is most needed. They also noted that working with a group interested in developing policies and standards would be very valuable. It should be noted that many of the feature requests and enhancements suggested during the focus group are already provided through IRUS-UK and its program of services. Resource constraints, however, necessitated that IRUS-USA offered reduced functionality for the purposes of the pilot.

When asked about the service models and the possibility of a membership cost, the answers were cautious. Many questions asked how the service is funded in the UK. One of the participants suggested a collaboration with the DuraSpace community might provide some mutual benefit for both groups (e.g., giving IRUS-USA a home and community and giving the DSpace community options for more consistent and standardized statistics). The participants were worried that a membership model could price out smaller institutions and proposed a tiered pricing structure. They indicated interest in a nominal fee structure paired with community driven engagement.

Practical Implications
Research Questions
The assessment of IRUS-USA started with two broad research questions:

1. What are the primary repository usage assessment needs, barriers, and opportunities for IRUS-USA pilot participants?

2. What is the perceived value of international measurement and benchmarking among IRUS-USA pilot participants?

In response to question one, the authors believe that institutions have a strong need for reliable and standardized statistics and for a tool with transparent functionality. Of the stats that are needed, there was interest in geographic usage data and the ability to share statistics in various ways with different groups. For some, their local system impeded implementation. For a majority of participants, a significant barrier was a lack of understanding report content and meaning. Increased education on what the reports do and measure, how they are compiled, and how items are mapped from the local repository to IRUS-USA would greatly increase their value to participating institutions. Finally, many participants saw the value in having reliable statistics and could think of local uses for these statistics, such as demonstrating value and telling stories of the usage of collections. Finding and highlighting successful examples of useful collections, and better communicating to stakeholders that the statistics use an internationally-recognized standard (COUNTER), would add validity to their results.

In response to question two, the authors believe that many of the participants thought international benchmarking would be interesting but was not currently a top priority. The need for reliable, internal, standards-based statistics comes first. That said, many of the participants acknowledged it would be useful to compare their statistics with similar institutions and collections.

Broad Implications
Beyond the research questions, the results of the IRUS-USA pilot project speak to broader implications for IR usage statistic assessment. The pilot project serves as an important use case for a full-scale IRUS-USA service. According to this survey and focus group, it is likely that most institutions in the US would find the service valuable and would support a fee-based model. A few institutions will find more value in the service when it is more widely adopted nationally. There was additional interest and curiosity among pilot participants in IRUS-USA's international benchmarking capabilities. Based on this assessment, however, the international collaboration opportunities are secondary to reliable intra-organizational statistics at this point. As a result, the authors of this paper recommend that the project first focus on widespread US adoption, which will provide institutions with the means, over time, to benchmark against local peers.

Limitations

Because of the small size of the pilot group, it is difficult to extrapolate results to new institutions that may adopt IRUS-USA. In fact, from this limited sample, it seems there may be a divide in institutions who find the tool very useful and those who do not. Because of this, the authors consider these results exploratory in nature; they are intended to inform the next steps for IRUS-USA.

Conclusion

Overall, the pilot can be considered a success with most of the participants responding favorably to the idea, the need for the service, and sharing a general agreement that they were happy with the pilot. The assessment revealed that institutions want more documentation surrounding use of the service, more functionality and granularity available in the reports, and more visual and easy-to-share statistics. Much of the desired platform functionality and system documentation already exists with full-scale service deployments of the IRUS program and these more robust statistical repositories will address many of the needs expressed by IRUS-USA pilot participants. Where organizations are contributing towards service support, such as in the UK and elsewhere, these features are already provided. The service is designed to address the local needs for generating reports and creating stories of value from the data, but the use of open standards and full disclosure means international benchmarking is viable, which was interesting to some.

The IRUS-USA pilot will consider these assessment results as it aims to identify next steps and, ultimately, expand the scope to a full-fledged usage statistic platform. As a first step, they will draft recommendations for Jisc and CLIR/DLF focused on enhancing functionality through access to the production service, increasing awareness and an understanding of IRUS-USA benefits, and sharing potential collaborative models for community support. These recommendations, in conjunction with the cooperative spirit established by multiple parties who make up the pilot project, will fuel this much-needed assessment resource moving forward.

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Launching the Resource Repository for Assessment Librarians: From Needs Assessment to Pilot and Beyond

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Introduction and Setting the Stage

Building and sustaining a digital repository for sharing resources has great potential in support of a growing community of practice for assessment librarians. Starting in 2015, Jessame Ferguson and committees of the Library Leadership and Management Association[1] hosted discussions and focus groups to gather input on such an initiative. The idea had traction, although early documents suggest there were wide-ranging thoughts about the scope, procedural policies, and technical infrastructure for such an endeavor.

For instance, an early requirements document describes the concept as an "easy-to-use system for organizing and accessing library assessment examples, products and findings. This will allow librarians to share any type of assessment method and resulting findings, including those that are often never published, such as inconclusive or negative results. Through well-organized searching options, it will allow all librarians to find evidence based assessment models to begin their projects and then compare their findings with the results of others."[2]

The LLAMA Executive Board was behind the idea and provided funds for a consultant to explore and make recommendations for a path forward. Martha Kyrillidou served in that role; her report provided us with a potential design. But there were practical realities, including limited budgetary resources, lack of institutional sponsorship, and limited experience with building a repository like the one envisioned. We reached out to the larger librarian community in order to prioritize and perhaps recalibrate the community needs.

Needs Assessment

The Needs Assessment Survey was conducted in the spring of 2017 and yielded 379 responses. While primarily academic librarians responded (86%), we also heard from public librarians (7.7%) and a variety of special librarians.

We asked respondents to "indicate all of the options that describe how you might use a freely available, online Library Assessment Repository." As indicated in the table below, the highest number (N=360) would look for instruments, and far fewer would use the space for sharing their own findings (N=247).

Figure 1: Use for repository

Answer Options	Response Percent	Response Count
Search the repository for examples of instruments or tools to use	95.5%	360

Answer Options	Response Percent	Response Count
Review results, reports or case studies as examples of best practice	85.1%	321
Deposit instruments (surveys, rubrics, questionnaires) or tools created by my library or organization to share with others	82.2%	310
Locate peers or colleagues doing similar work as me	77.2%	291
Review findings from similar studies to compare to my own findings	76.4%	288
Find answers to commonly asked questions	70.3%	265
Share assessment results or findings from studies done by my library or organization	65.5%	247
Find other repositories that include assessment-related resources in my area of interest	59.9%	226
Other (please specify)	3.4%	13

Related to this question, we asked how likely respondents would be to use various types of resources. By a large margin, assessment instruments and reviews of assessment tools would be used. Least likely to be used are raw data.

Figure 2: Likely used resource types
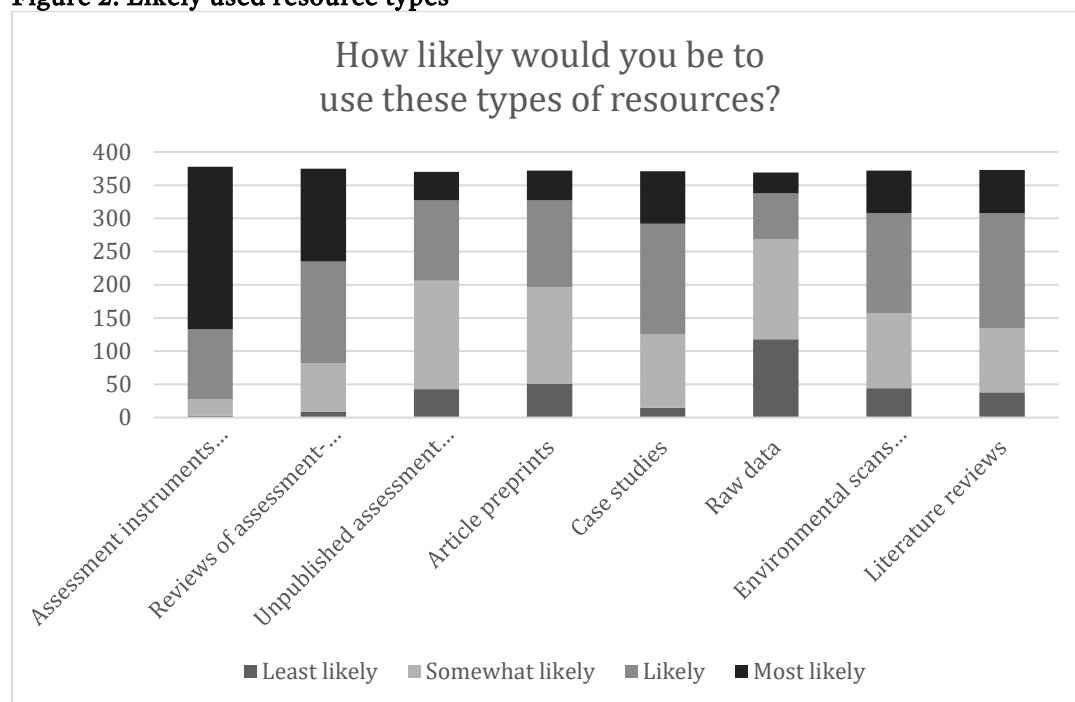
In open-ended comments, survey participants expressed a need for ease of access to the repository and resources that were freely available. They wanted robust searchability, good organization, and metadata. Some representative comments as to what factors would lead to likely use include:

- Easy to navigate and find resources
- Quality of resources
- Alignment of resources available to current assessment project need
- Ease of use
- Overall quality control

The survey included a set of parallel questions about factors contributing to a willingness to share resources. Again, the ease of deposit and accessibility were considered primary.

A repository is only as good as its comprehensiveness, and populating the repository with quality resources is critical. Users need to feel that their work is worth sharing and is of value to others. Concerns were expressed about the sharing of raw data because the context in which it is collected is essential to its understanding, or reanalysis. Privacy concerns, as well as permissions from administration and institutional review boards for sharing/publishing data were also considered barriers to depositing data sets.

And yet, we felt that the high response rate to the survey was an indicator that a tool for sharing assessment resources would have real potential benefit to the community. Many respondents used the survey comments section as an opportunity to express interest in the project.

While the results were somewhat helpful in prioritizing our requirements, they also established high expectations for the repository. Many questions, even contradictions, were raised from the start:

- How do we provide a seamless process for sharing resources, while also providing for quality materials?
- Would a peer review process be perceived as a disincentive to sharing assessment projects?
- In evaluating quality, how do we balance assessments that are designed for local decision-making with research findings of more generalizable use?
- What would that standard for "quality" be? Accurate metadata? Statistical validity?
- If the repository is meant for use by librarians from all types of libraries, can we develop standards that can be broadly applied?
- What incentives must be in place to encourage participation in the project?

Managing the Pilot

Balancing limited financial resources with continued support from the LLAMA Board, we requested funds to license Omeka.net[3] for one year. This allowed us to get a better understanding of the time and expertise required for launching and maintaining an open-access site for deposit of resources related to library assessment. Omeka.net has limited customization options, but offers an array of tools for controlling metadata and includes plug-in applications to enhance functionality such as authority control and export of records. It allows for creation of "collections" for browsing and filtering of content. In addition to understanding the user interface for Omeka.net, the pilot helped us to learn more about its technical capacities and how various workflows and policies for submission would work with the platform.

Eighty respondents to the Needs Assessment Survey expressed interest in learning more about the repository. We reached out to these as potential volunteers for the project. Based on interest and experience, project coordinator Kirsten Kinsley organized the volunteers into three groups: Technology (led by Nancy Turner), Policies (led by Anne Moore), and Usability (led by Melissa Becher). Our total cohort of volunteers in Phase I of the pilot, conducted in winter/spring of 2017/18, was 15 people.

Given the size of the group and the structure of three separate committees, documentation and clear communication about who was doing what was essential. There were times when questions that one group was wrestling with overlapped with the concerns and questions of the other groups. The project coordinator tried to be present in each of the groups' meetings to make sure that information was not accidently siloed into one group, but schedules sometimes got in the way of that approach. We improved our communication flow by implementing a more direct approach, with each project's meeting minutes shared across the leadership group via email.

Another challenge was populating the repository, even for the purposes of testing workflow and usability. Each group wrestled with minimizing user barriers to submission while also providing quality items and implementing sustainable administration of the repository. At this time, the repository contains 18 items of various types, organized into seven collections: Assessment Instruments, Datasets, Documentation, Journal Articles and Book Chapters, Reports, Web Resources, and Miscellaneous.

Usability Testing

The Library Assessment Repository Needs Survey found that participants considered ease of use to be a factor in whether they would use or contribute resources to a library assessment repository. Ease of use also figured prominently in the requirements proposed in Martha Kyrillidou's Library Assessment Repository Concept, Research, and Specifications document of 2016. In response, the User Experience group[4] set a goal to find out whether Omeka.net and the item submission process fulfilled user expectations for usability. The group developed a usability test, conducted in May 2018, of the major tasks associated with use of the repository. Tasks included:

- submitting a document to the repository
- choosing collection, assessment method, and item type for the submission
- searching using the Omeka search bar
- browsing items using the Omeka Browse Items feature
- browsing collections using the Omeka Browse Collections feature
- downloading an item from the repository

The test included a post-task interview to reveal barriers or sticking points and to gauge how likely participants would be to use the repository and what other functionalities they might want.

Figure 3: Home page of Library Assessment Repository Pilot Site
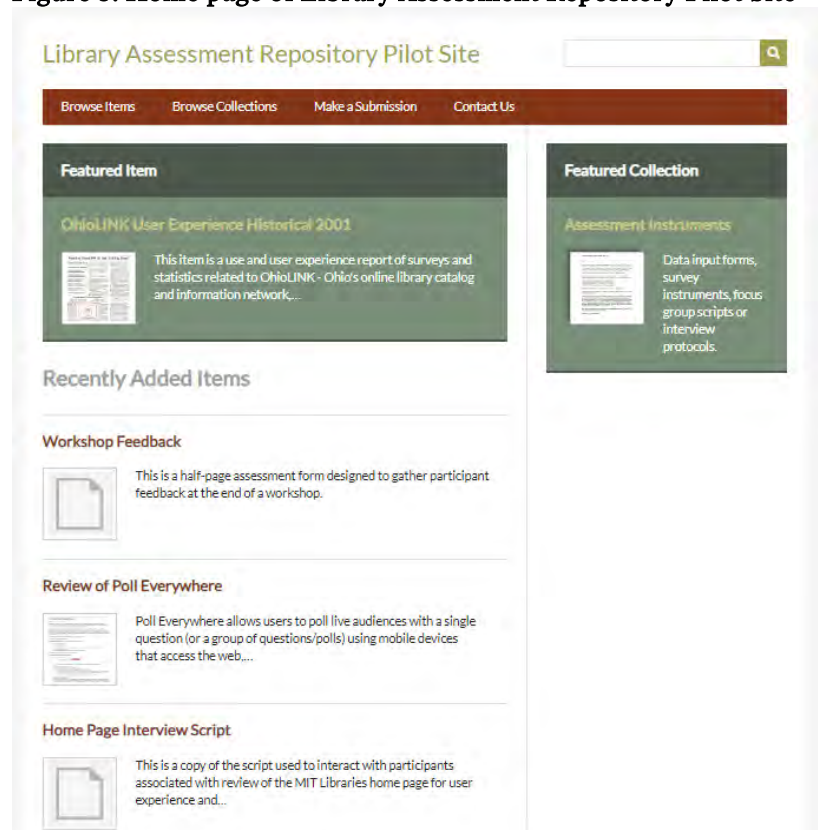
Methodology

Usability test best practices recommend testing five participants, as long as there are not distinct groups using a site in different ways.[5] For this test, group members recruited seven librarians from various types of institutions representative of potential users of the repository. The breakdown of institution types was three academic, two public, one special, and one school. Two of the participants said that they had contributed to a repository before.

Some of the participants were located near members of the User Experience Group, but some were not. The group used a combination of in-person tests and remote tests using Zoom to reach all participants. A few of the tests were hybrids with a member of the group on-site with the participant and another member joining via Zoom. Tests went more smoothly when the participant shared their computer screen with the testers after navigating to the Omeka.net site. Activity on the shared screen was easily recorded using Zoom's recording feature for later analysis. Because of the minimal-risk nature of the tests, group members were able to streamline the informed consent process by taking consent verbally as part of the recorded session after distributing information about the project to the participant beforehand and providing an off-tape opportunity to ask questions.

IRB approval for the collaborative testing posed challenges. The initial proposal was approved by American University's IRB, but we wanted other members of the team to be able to run tests so that the work could divided more evenly. In order to take this approach, other group members had to get approval from their institutions' IRBs to participate as researchers under the oversight of American University. The group discovered that we had not left enough time for this part of the process and we were unable to get two IRB offices to fully understand the project and make deferral arrangements for their respective group members. With testing deadlines approaching, our solution for those who had not gotten a deferral from their

institution's IRB was to work with a member who had. In these cases, the IRB-approved member took the lead on interacting with the participant.

Results

Participants rated the ease of each of the six usability tasks on a 5-point scale with 1 being difficult and 5 being easy. Figure 1 shows the ratings for all tasks. "Using the search bar" was the easiest task, followed by "Browsing collections," "Submitting an item," and "Choosing the collection, assessment method, and item type" on the submission form. "Browsing items" and "Downloading an item" were tasks rated difficult or somewhat difficult by one participant.

Figure 4: Participants' Ratings of Tasks
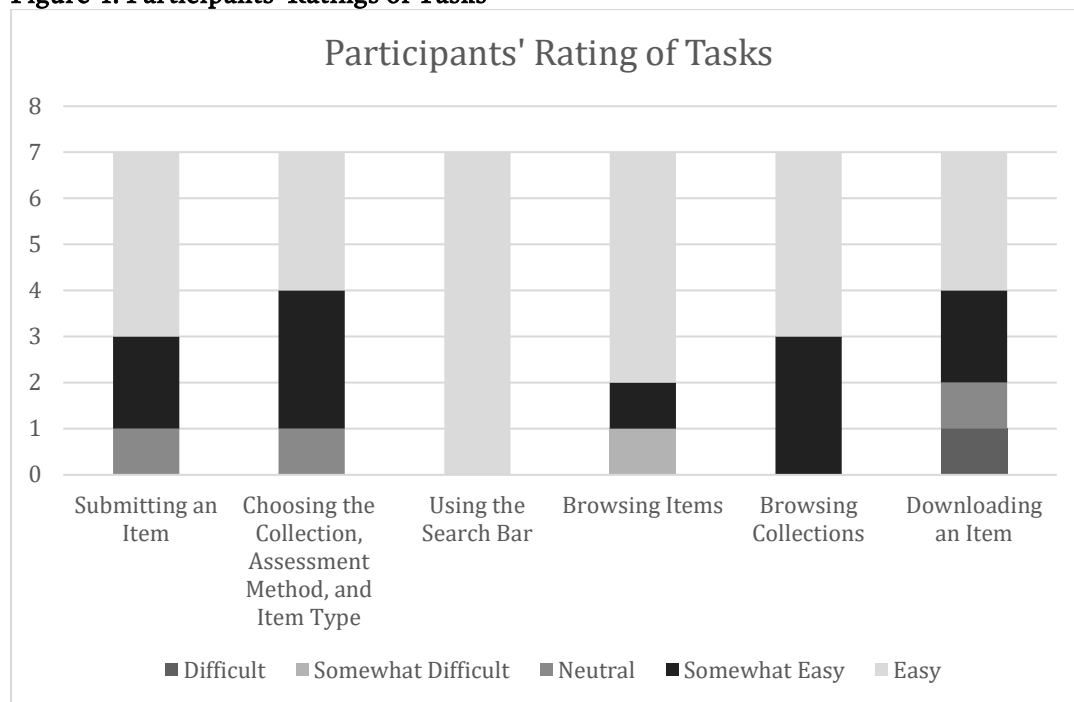
Participants commented that the Omeka search bar and browsing options worked well and thought the repository interface was clean and easy to read. Other comments noted that the collections were intuitive and that submitting and downloading documents was easy.

There were some sticking points in the submission process. Multiple participants had difficulty choosing Library of Congress subject terms and use rights for the test document they submitted. This may be in part because the test document, while relatively straightforward, was not one familiar to participants. However, the difficulties also point to the fact that there are complexities to submitting documents to a repository that may require previous external knowledge.

Another sticking point for multiple users was the Browse Collections feature. Omeka displays results of a Browse Collections search in an unexpected place—in the right hand column of the page rather than in the central area of the page. It also sorts in an unexpected way, putting "Miscellaneous" at the top instead of listing collections in alphabetical order. The group could change the sort order of collections to title but could not change the page template. Fortunately, the most prominent way to search—the Omeka search bar— was rated "easy" by all participants.

Finally, one sticking point mentioned by a public librarian participant was the lack of a method to filter searches by type of institution. This participant said that the assessment public librarians typically do is less

formal than academic studies and that public librarians find the rigor and statistical analysis of academic assessment off-putting. In order to encourage public librarian participation and use of the site, this participant felt there should be a way to separate out public library contributions to the repository. This functionality, unfortunately, is not available in Omeka.net. The closest users could come would be to search "public" in the Omeka search bar. The issue of possible public librarian frustration with academic assessment revealed by this test deserves further consideration by the leaders of the LAR project, which was envisioned as a resource "that will support the entire membership of American Library Association (ALA) across all library types and functions and also non-ALA members interested in library assessment."[6] It may be an argument for an overlaying website that all types of librarians would find welcoming.

Other functionality desired by individual participants that was not technically possible in the Omeka.net platform included the ability to submit files by dragging and dropping them, the ability to change the number of search results displayed, a download button, and the ability to link to multiple document records, particularly if they related to the same project. These requests illustrate the challenges of using a platform intended for the storage and display of visual materials from a single entity to store text documents from a large number of separate entities. The larger scale of the LAR with the resulting greater demand for uploading, downloading, and linking related documents will need to be weighed against Omeka.net's easy navigation and searching when coming to an ultimate decision about the repository platform.

Lessons Learned

From our original needs survey leading to Phase I of the pilot project and testing the user experience for the platform, we have been learning as we go. Each of these assessments has provided us lessons:

The needs assessment survey pointed to the community's desire for a tool for sharing resources related to library assessment. The survey results helped us to advocate for support from the LLAMA Board to host a pilot site. In retrospect, asking respondents to rank their choices or choose the top three desired types of materials would have provided more actionable information towards prioritizing our repository requirements and its scope.

Usability testing contributed to the success of the Library Assessment Repository pilot in several ways. The group learned much about remote testing with Zoom and Institutional Review Board (IRB) processes that will be useful for future testing of the repository and/or a related website. Test results revealed that the Omeka.net platform meets requirements for ease of use as stated in the initial repository concept and emphasized by participants in the needs assessment survey. Finally, the interview portion of the test gathered important qualitative data regarding audience and platform that will inform future decision-making regarding the repository.

Pilot Project Process

While the survey and the usability testing of the site provided examples, and findings of assessment practice, our project process itself continues to be a learning experience to ensure that the repository project incorporates a process of continuous improvement and overall sustainability.

The primary goals of the pilot were described in the first volunteer meeting in January 2018. Prior to the meeting, a LAR Basics document was created to introduce volunteers to the project goals, audience, scope, and use of Omeka.net as a proof of concept. For this orientation meeting, the projected outcome of the project was clearly laid out at the beginning: "Decide whether or not to recommend to LLAMA (our primary stakeholder) whether we should use this version of Omeka (Omeka.net) for a LAR." The choice was made to focus on the goals of the Omeka.net pilot rather than get bogged down in the minutiae of project history.

For the complex project, it made sense to divide the tasks as we did, and the project coordination was handled with diligence. The challenge was each group saw the project from their own perspectives. Additionally, working as virtual groups can exacerbate barriers in communication towards establishing

shared purpose and addressing questions together. In Phase II of the project, we have formed a single team that works together, although each volunteer brings particular interests.

We learned that establishing a cohesive team is also difficult when membership changes each year. In the future, we will recommend a longer term commitment from our volunteers. As people came and went, it might have been helpful to reiterate the goals and projected outcome of the pilot.

Testing software based on a grassroots, volunteer-based approach is not easy, but it provided librarians from varying backgrounds an opportunity to come together and share their expertise. Our challenge was to balance valuing fresh ideas from a developing team with not reinventing the wheel or rehashing past decisions. Additionally, we wanted to provide opportunities for new librarians to network and publish/present about the project.

Next Steps

The original vision for the repository was compelling, but challenged our decision-making even within the context of exploring Omeka.net. In retrospect, it is difficult to separate out policy, procedures, or usability from technical functionality.

As we move into the next phase of the project, we must address and resolve the following questions:

- How best do we prioritize the desired purposes for the repository?
  - Resource Sharing
  - Preservation
  - Resource for comparative research
  - Networking
  - Community Building
- Should we focus on one type of resource only and if we focus our efforts too early in the process, would we limit our understanding of the platforms' capacity?
- Should we establish and commit to these requirements and wait until an appropriate platform and resources are available to meet the need?
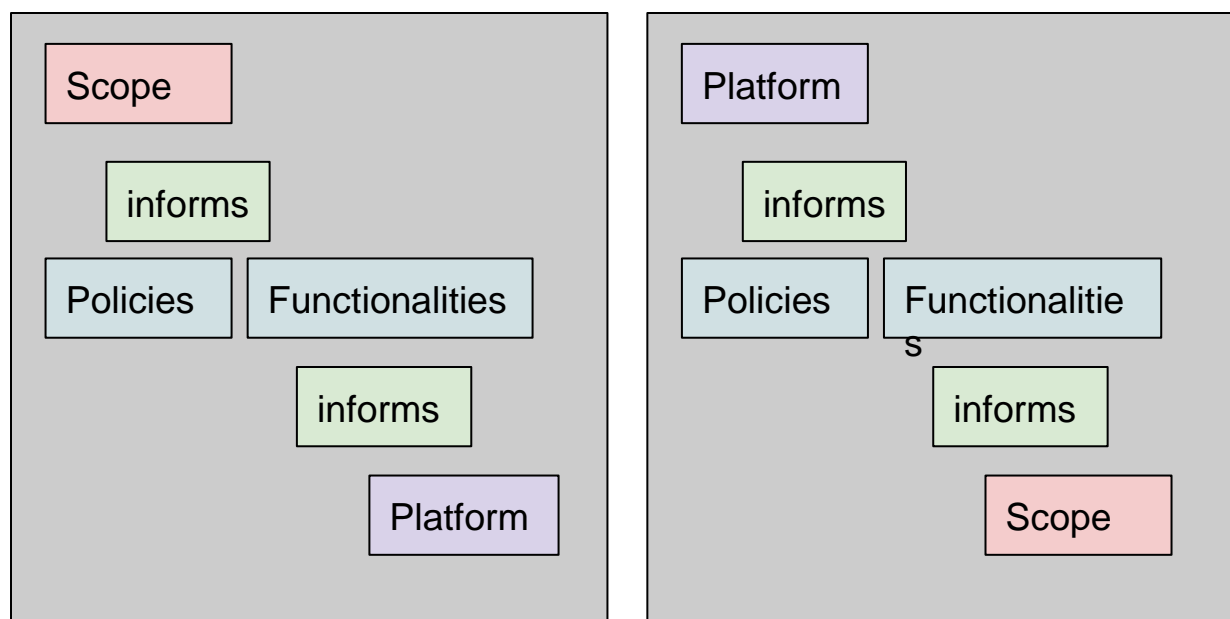
Adding on to this complexity, we are presented with limits on financial resources, time, and expertise, particularly technical expertise. We layer onto this the substantial effort of volunteer recruitment and building and marketing a sustainable space. On top of that, issues of preservation and building community need to be addressed.

As we move into Phase II of the pilot, we are in a position to tweak the process of developing and managing the project. The platform, Omeka.net, has many advantages in terms of ease of use, cost, and administration. But it is designed for digital projects much smaller than ours, and with fewer potential contributors. While it continues to be frustrating to work within the technical limitations of Omeka.net, establishing an actual site has allowed us to explore, on a very small scale, issues of access, discovery, metadata standards, policies, and workflow. If the project were to grow, we have identified some key areas that would need to be addressed.

In Phase II, we will continue to test alternative workflows for the repository. We now have a product and knowledge to share with the assessment community and look forward to continuing efforts to recruit resources and solicit ideas for a path forward. The Library Assessment Conference (December 2018) provided a perfect venue with which to do this.

As an iterative process that incorporates assessment at many levels, the Library Assessment Repository Pilot project is illustrative. It provides a story of persistence and flexibility, as our expectations for what we build

with the resources available to us are limited. Finally, it is a story of collaboration and teamwork, of many, many volunteers who were willing to share the work of having the goal realized.

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Endnotes

1. Data Collection for Library Managers, Measurement and Evaluation Section and Planning & Evaluation of Library Services, Library Organization and Management Section.
2. From Assessment Repository Consultant RFP Year 1 at https://drive.google.com/open?id=0B69TM0_YtEHoVVhiNFQxd1lLbFA0ZEpyNnBfVW1CaGhsNFB3.
3. It should be noted that Omeka.net and Omeka are two separate products. Omeka.net, as an inexpensive "hosted" option for the repository, has fewer customization options, but allows us to design and explore various workflows.
4. Members of the group were Melissa Becher (Associate Director of Research, Teaching, and Learning, American U), Team Lead; Tricia Boucher (User Experience Librarian/Psychology Librarian, Texas State U); Kristina Clement (Graduate Student, University of Tennessee Knoxville); Brianne Dosch (Graduate Student, University of Tennessee, Knoxville); Laura Spears (Assessment Librarian, University of Florida); and Krystal Wyatt-Baxter (Head of Assessment, University of Texas at Austin).
5. Nielsen, Jakob. "Why You Only Need to Test with 5 Users," Nielsen Norman Group, 2000, https://www.nngroup.com/articles/why-you-only-need-to-test-with-5-users/.
6. Martha Kyrillidou, Library Assessment Repository Concept, Research, and Specifications, Quality Metrics, LLC, 2016, https://docs.google.com/document/d/12T9Wzcrmy1zPZTP2MxmTpABec0d82Qq6cKsCuhAvwaQ/edit.

Appendix: Submission Form

Pilot Library Assessment Repository Submission Form

Please complete this form when you submit an item for deposit in the Pilot Repository. This will allow us to test out our workflow for submissions, provide for consistent metadata to describe resources, and facilitate robust search and browse for our users. Note: Items received for deposit in the Assessment Repository will be public.

The name and photo associated with your Google account will be recorded when you upload files and submit this form. Not tuf56901@temple.edu? Switch account

* Required

Email address *

Your email

Collection *
Each repository item will be placed in a collection. An item may belong to just one collection

○ Assessment Instrument or Tool

○ Dataset

○ Documentation

○ Journal Article or Book Chapter

○ Report (Internal to Library)

○ Web Resources (Website, Repository, Blog)

○ Other:

Title of Resource *

Your answer

Creator or Author *
Name of person responsible for creating the resource. [Smith, John L.] If multiple authors have responsibility, please use the description field to include those names.

Your answer

Creation Date *

Date
mm/dd/yyyy

Brief Description of Resource *

Your answer

Keywords and Phrases *
Provide a list of keywords that describe item. Examples might be space study, website usability testing, learning outcomes for library instruction. Separate words and phrases with comma.

Your answer

LC Subject Headings
Optional. For reference to LC Subject Headings: http://authorities.loc.gov/

Your answer

Submitted by: *

Your answer

Assessment Method *

Taking AIM: Integrating Organization Development into the Creation of a Diversity, Equity, and Inclusion Audit

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Introduction

Assessing diversity, equity, and inclusion (DEI) in US academic libraries is currently a non-standardized process. Often, efforts to assess DEI have focused on counting the number of librarians or staff of color working in the library, an artificial and limited measure that narrowly equates DEI with staffing. In 2012, the Association of College & Research Libraries (ACRL) published a list of "Diversity Standards" that expanded the idea of what DEI entailed in libraries, while also increasing the complexity of measuring DEI.[1] ACRL's "Standards" suggested that, in addition to the diversity of the workforce, DEI competency in libraries also included areas such as delivery of services, organizational dynamics, the development of collections, professional development, and research.[2] In a similar vein, the American Library Association (ALA) included DEI as one of eight "Key Action Areas" for the Association.[3] While workforce diversity remained prominent within the goals and strategies of this strategic area, there was also recognition of the importance of DEI within LIS education, professional development, and research endeavors.[4]

But recognizing that DEI is multi-faceted and actually assessing those facets are two very different things. One well-known method for assessing DEI within LIS is ClimateQUAL®, a survey offered by the Association of Research Libraries (ARL) to assess "library staff perceptions concerning (a) their library's commitment to the principles of diversity, (b) organizational policies and procedures, and (c) staff attitudes."[5] While ClimateQUAL offers libraries valuable insight into their DEI workplace and organizational climate from the view of those working in that environment, the focus on employee perceptions limits libraries' ability to assess DEI efforts at a more organizational level. It was one library's need to understand not only their current status in terms of integrating DEI into their organization, but also an interest in assessing their progress from year to year that lead to the initial development of a DEI audit by an independent consultant.

The audit development process identified a need to establish a solid framework for the audit, one based on the principles of Organization Development (OD). The final product drew a high level of interest and initiated a pilot investigation into the usefulness of the audit not only as an assessment tool, but also as a guideline for libraries interested in applying OD to their DEI efforts. This paper briefly details the development of the audit, including the integration of OD, the result of the pilot study of eight academic libraries that helped to test the audit's viability for more wide-spread use, and next steps for those interested in the possibilities that a DEI audit and OD principles have for their library's DEI efforts.

Initial Audit Development

The development of the first iteration of the audit followed a process of instrument creation similar to that identified for scale development by DeVellis.[6] Specifically, the process included:

- Conducting a series of interviews with key members of the requesting library to determine their needs and how the audit would be used;
- Reviewing relevant documents including the library's mission, vision, and strategic plans; Diversity Committee meeting minutes; and both library and institutional websites;
- Literature review and identification of supporting frameworks;[7]
- Creation of audit statements and determination of rating system;
- Expert review of audit draft by librarians and researchers engaged with DEI topics; and

- Initial pilot of the audit by the requesting library.

Both the expert review and the initial pilot identified small adjustments to statement wording and total number of items, as some items were removed while others were added. But the most important outcome of the expert review phase was the suggestion to frame the audit around OD principles, specifically the Galbraith Star Model.[8] The importance of integrating OD principles into the audit will be discussed in the next section.

History of Organization Development

The professional practice of OD has been in existence for well over 70 years. It is an interdisciplinary field built upon the thinking and research from business, industrial/organizational psychology, human resources management, communication, and sociology, which makes up the practice that is OD. The most commonly agreed upon definition of OD among its practitioners is from Richard Beckhard, a pioneer in the field of OD:

> Organization Development is an effort (1) planned, (2) organization-wide, and (3) managed from the top to (4) increase organization effectiveness and health through (5) planned interventions in the organization's "processes," using behavioral-science knowledge.[9]

A more current definition by Donald L. Anderson states that OD "is the process of increasing organizational effectiveness...through the use of interventions driven by social and behavioral science knowledge."[10]

Because of its interdisciplinary nature along with years of research and practice, the OD field has grown and changed significantly over the decades. Anderson writes that there are eight elements of the OD field. The first is laboratory training or T-groups, which is based upon the work of Kurt Lewin, a key contributor to the field. As a social psychologist, Lewin's work contributed to the development of the National Training Lab (NTL) where they studied "patterns of group behavior, social problems, and the influence of leadership on groups."[11] The next is a trio of models including Lewin's Action Research, Likert's Survey Feedback, and Sociotechnical Systems.[12] All three of these models contributed significantly to the understanding of groups, their participation, processes, and challenges in making group decisions. The remaining six elements of OD are (1) management practices, (2) quality and employee involvement, (3) organizational culture, (4) change management, strategic change, and reengineering, (5) organizational learning, and (6) organizational effectiveness and employee engagement. The above list does not show the depth and complexities that make up the field of OD.[13] Barbara Bunker created a visualization of the subfields within OD that covers the depth and growth of the field over the last sixty-plus years.[14]

OD as an Assessment Tool

Planned change through OD is carried out by OD consultants who engage with the client system to understand what the presenting concerns or problems are from the leadership of an organization. The work of planned change is process-oriented and most OD consultants utilize the Action Research Cycle process to collect data on a system. There are roughly five points to the Action Research Cycle, which begins with identifying the problem, gathering data, interpreting data, acting on evidence, evaluating results, and next steps.[15] In academia and library science this would be called assessment. The difference is that these change processes are managed by an OD consultant with the goal of helping the organization with finding solutions to the identified problem. Process consulting as a theory and methodology of helping is what Edgar Schein calls "the creation of a relationship with a client that permits the client to perceive, understand, and act on the process events that occur in the client's internal and external environments..."[16] Process consulting engages a client system in "double-loop, or generative learning," with the goal of learning how to learn so that the organization is capable of seeing and creating solutions to their own problems.[17]

An OD consultant will work with the client system and will engage in the Action Research Cycle to collect data. To understand the data gathered, models, theories, or frameworks are utilized to organize and subsequently see what is clearly visible, what was previously unclear, and what could be. There are thousands of models in the field of OD including change management models, models on culture, diversity

and inclusion, team development models, interpersonal theories, large group interventions, strategic planning, leadership and conflict management, coaching, and more. The best analogy that explains the purpose of OD models is an empty bookshelf: The data collected by an OD consultant will be organized onto this organization system (bookshelf) based on the model's parameters. With the data from these models, OD consultants are able to take the next steps of supporting an organization through a change process.

OD and the DEI Audit Development

When the second author reviewed the audit, a pattern became visible that aligned with the existing structure of the Galbraith Star Model. The Star Model is not a model for diversity and inclusion, but rather a diagnostic model that can support an OD consultant's efforts to identify, analyze, and interpret data for the purpose of identifying needs. In the field of OD consulting, a diagnostic model collects data on the whole organization— this is appropriate since DEI efforts ideally affect the whole organization. In this case, the needs were related to DEI in a workplace and organizational climate, so the audit was restructured to reflect the model. The Star Model has five points: Strategy (vision, direction, competitive advantage), Structure (power and authority, reporting relationships, organizational roles), Processes[18] (networks, processes, teams, integrative roles, matrix structures), Rewards[19] (goals, scorecards and metrics, values and behaviors, compensation), and People[20] (staffing and selection, performance feedback, learning and development). The sixth point, External DEI Efforts,[21] is the final factor for consideration.[22] The restructured audit made viewing the results clearer and allowed the organization to see the current state of their system and helped them to identify the gaps or areas of concern to address. Two sections of the audit (Strategy and People) and the scoring interpretation for those sections are included as Appendix A and B.

Audit Pilot

Due to the interest in the audit as a tool that could be used by other academic libraries, a pilot study was scheduled to test the audit across a variety of academic library settings. The purpose of the pilot was to identify issues or concerns with the wording or structure of the audit or the scoring system, to identify aspects of DEI assessment in academic libraries that may not be included in the current audit, and to measure aspects of the audit's reliability and validity. Following a brief presentation about the audit at the 2018 ARL Symposium for Strategic Leadership in Diversity, Equity, and Inclusion, 10 libraries showed initial interest in participating in the pilot. Of those ten libraries, eight officially agreed to participate. Basic information about the piloting libraries is provided in Table 1.

Table 1. Piloting libraries general information

Library	Carnegie Classification
Pilot Library #1 (PL1)	Baccalaureate Colleges: Arts & Sciences Focus; Private, Not-For-Profit
Pilot Library #2 (PL2)	Doctoral Universities: Higher Research Activity; Public
Pilot Library #3 (PL3)	Doctoral Universities: Highest Research Activity; Private, Not-For-Profit
Pilot Library #4 (PL4)	Master's Colleges & Universities: Larger Programs; Public
Pilot Library #5 (PL5)	Doctoral Universities: Highest Research Activity; Public
Pilot Library #6 (PL6)	Master's Colleges & Universities: Medium Programs; Public
Pilot Library #7 (PL7)	Master's Colleges & Universities: Larger Programs; Public
Pilot Library #8 (PL8)	Master's Colleges & Universities: Larger Programs; Public

Pilot Process

Libraries that participated in the pilot were asked to first identify two to three volunteers from their organization to complete the audit. Having multiple volunteers from one organization would allow for the

assessment of interrater reliability. Organizations were given the following suggestions for ideal candidates to complete the audit on behalf of the organization:

- A member of the library's administration who has been involved with previous DEI efforts and/or has good knowledge of all the library's work and endeavors.
- A library HR staff member who also participates in other library-wide activities.
- A library assessment officer who collects, analyzes, and produces data on various library activities. Work does not have to be diversity-focused, but it is best if work is not limited to only one department (a library-wide assessment person rather than an instruction assessment person).
- A chair or member of a library diversity committee, if the library diversity committee's efforts are library-wide.
- Any library employee highly involved in the library's DEI efforts regardless of position within the library and who holds a high level of knowledge about the library's inner workings.

Once volunteers were identified, they were asked to complete two phases of the audit. In the first phase, volunteers were able to complete the audit as they normally would—responding to each statement based on their knowledge of the organization. In the second phase, volunteers were asked to provide evaluative feedback about all aspects of the audit including clarity of the instructions, statement wording and difficulty to respond, and clarity of the audit scoring system. Each volunteer then participated in a short (20-minute) Zoom interview to discuss their phase II feedback with the audit developer.

Audit Pilot Results

The results of the pilot revealed some aspects of the audit that could be altered to improve its usefulness for many academic libraries while also identifying aspects that were seen as beneficial. The following section details the suggested alterations and benefits found across the libraries that piloted the audit, as well as the results of the interrater reliability analysis.

Institutional barriers. Some of the smaller libraries that completed the audit indicated an inability to respond to select statements due to the structure of their institution. For example, respondents from PL#1 noted they felt unable to rate the libraries' status or progress for the statements related to salary:

- The library has completed a salary study to determine that employees of all backgrounds are paid equitably;
- The library has defined policies in place for tenure (if applicable), salary raises, and/or bonuses.

As these two areas are controlled by the institution, the library would not be able to indicate status or progress. In response to this, the audit structure is being re-evaluated to determine a way for libraries to "de-select" items of this nature so that they do not appear in the audit and negatively impact the library's audit score.

Scoring instructions and interpretation. In general, participants felt the scoring instructions were easy to follow and made sense for rating the audit statements. However, some individuals did question the difference between scoring an item based on Status versus Progress. Two respondents also indicated a sense that Status and Progress were often correlated, making it feel odd to rate items on Progress at a level that was distinctly different from the Status rating. As one of the respondents from PL#8 shared:

> Ranking for both Status and Progress felt difficult sometimes. Separately, I understand the difference between Status and Progress. However, conceptually, it didn't seem like the two should be ranked very differently (i.e., how could you have expert Status, but initiating Progress?).

In response to this, the instructions for scoring Status and Progress will be reviewed to ensure that they are measuring distinctly different aspects of DEI and can logically be rated separately.

Examples and definitions. While most statements were clearly understood, a few piloting libraries asked for examples and definitions to help them clarify what the audit was asking for. Items that were most flagged as needing examples or definitions included:

- DEI are explicitly addressed in the library's ***policies***.
- The library employs a ***decision-making process*** that explicitly includes and addresses DEI.
- The library has created and adopted DEI ***indicators*** for the library and all employees.

For these specific items, there was a desire for examples of the types of policies that this could include, and a definition of what was meant by "decision-making process" and "indicators." The review helped to identify jargon that did not necessarily translate from institution to institution. In response to this, the audit will be re-evaluated to determine which statements would benefit from examples (including those identified above), and examples will be developed and included in future audit iterations.

Differentiating between the organization and individuals. While the audit is clearly designed to assess the DEI activities of the whole library, a number of respondents struggled to rate some statements based on their view of whether the library was doing the work, or just a few key individuals. As one respondent from PL#8 shared in response to the statement ***The Library has taken DEI related actions that have resulted in an increase in DEI collection development***, "Individuals have taken more action on this than the Library as a whole." The other respondent from PL#8 indicated similar thoughts related to whether they needed to consider the whole library or the actions of one individual when rating a statement: "How concrete/formal must this step be to qualify? Some might include the informal thoughts and actions of a single library employee, others might only include a formal, well documented effort." These comments indicate a need to provide additional guidance for those rating items so that consistency in responses can be maintained.

Reliability and Validity Properties

While checking the interrater reliability of the audit, it was found that two of the libraries had completed the audit as a pair or group, so there was only one set of ratings for those libraries. Intraclass correlation (ICC) estimates for both Status and Progress and their 95% confidence intervals were calculated for the remaining six libraries using SPSS statistical package version 24[23] based on a mean-rating (k = 2 or k = 4), absolute-agreement, 2-way mixed-effects model. Results are presented in Table 2. The analysis revealed poor interrater reliability for three of the libraries on both Status and Progress scores, including one library with negative ICC scores.[24] The three remaining libraries showed moderate interrater reliability for both Status and Progress. Even for libraries with moderate ICC scores, the wide range of the confidence intervals indicate poor interrater reliability for the respondents.

The negative ICC indicated possible issues with the wording of some of the statements. A review of individual items and item correlations indicated approximately eight statements where rewording would likely improve respondents' ability to rate the item; however, none of these statements was worded in a way that would indicate a need to reverse code the ratings. Most items did not appear to be problematically worded, leading to the need to further investigate the poor interrater reliability scores. During the follow-up interviews with participants, a potential cause of the low ratings was found in the form of individual perspectives.

Table 2. Interrater reliability results for six out of eight piloting libraries

Participant Code	Number of Raters	Status ICC	95% Confidence Interval		Progress ICC	95% Confidence Interval	
PL1	2	.07	-.43	.45	.08	-.35	.44
PL2	2	-.60	-1.92	.16	-.40	-1.40	.24
PL3	4	.58	.30	.77	.50	.19	.71

Participant Code	Number of Raters	Status ICC	95% Confidence Interval		Progress ICC	95% Confidence Interval	
PL6	2	.33	-.17	.64	.02	-.33	.37
PL7	2	.51	.07	.75	.48	.03	.73
PL8	2	.67	.34	.83	.66	.32	.83

Individual perspectives. Within the evaluation comments and during the follow-up interviews, it was determined that, while most of the statements on the audit were not difficult to respond to, how each respondent approached the statement varied due to a number of factors. Two of the more salient factors were position within the organization and time at the institution.

Whether a respondent was in an administrative (leadership) position or not appeared to impact their approach to responding to audit statements, with those in leadership positions more likely to rate items more positively (optimistically) than those in lower positions. Similarly, those who had been at their institution for a longer period of time tended to rate statements less optimistically. During follow-up interviews, these respondents often cited prior issues related to DEI at the institution as something they considered when rating the library's current level of DEI involvement. A number of respondents outwardly wondered whether others in their organization would rate items the same way that they did. As one of the respondents from PL#7 shared:

> I thought the questions were purposeful and thought provoking, but I found myself wondering if other people in my library would have had the same/similar responses to the prompts. For instance, would they have rated the library higher in certain areas[?] Would their idea of some, good, and exceptional progress be similar to my perspective[?]

Additional support for the impact of individual perspectives on the ratings of different statements was found in follow-up interviews with the two libraries that completed the audit together. For both institutions, having conversations with someone else often revealed an aspect of DEI work that had not been considered by the other. Each respondent tended to bring a different level of knowledge about DEI efforts to the rating process and having the ability to talk to someone else about that knowledge allowed the library to rate an item more clearly. The respondents at PL#7 especially noted the value of first completing the audit individually and then meeting as a group to discuss the ratings and come to a consensus about the final score. Based on the results of the interrater reliability analysis and the follow-up interviews, it has been determined that completing the audit as a team will be recommended as a best practice approach.

Conclusion and Next Steps

This conclusion outlines the next steps being considered and what that will mean for the use of the audit for other libraries.

Addressing wording issues. Primary among the next steps is a need to address the concerns identified with the wording of some items in the audit. One known issue was the use of DEI as one concept. As the respondents from PL#5 shared:

> It's difficult to answer these questions because they assume diversity, equity and inclusion strategies and procedures are one and the same thing while in reality they are different. We may have strengths in equity—such as an equitable pay structure and procedures for raises—but may not have strengths in diversity where representation in the top echelons of the organization is not at all diverse.

Combining these concepts into one worked for the initial library that the audit was designed for due to their nascent approach to DEI. However, it was expected that other libraries might struggle with this combination

depending on their level of engagement with DEI work. Efforts to separate these concepts will be explored for the next iteration of the audit. Additionally, changes will be made to clarify other items identified as unclear or problematic in wording, including the addition of definitions and examples throughout the audit.

Along with wording changes, some functionality issues will be addressed. This will include providing access to the scoring information throughout the audit; allowing those who are completing the audit to access, save, and make changes to their submissions; and providing a more detailed report of audit results that ties more directly to the rated statements. One item that some libraries wanted was a way to collect information on the DEI activities they were engaged in that matched the different sections of the audit. With this in mind, the ability to create an inventory of activities will be added to the audit. This will allow libraries to not only indicate what efforts are in place to address each statement, but also assist in tracking activities from year to year. This information will also assist libraries with scoring Status and Progress from year to year, as they can assess specific efforts identified during the previous year's inventory.

Also within the considerations for next steps is how to best support libraries that utilize the audit and identify a need for a more in-depth and intensive review of their organizational structure in relation to their DEI efforts. The audit provides organizations with a picture of their current state regarding DEI efforts—only one level of knowledge. Knowing what actions to take to help transition to an inclusive organization is ideally done with the support of an OD consultant. Utilizing process consulting, OD consultants work to create a relationship with the client that permits them to perceive, understand, and act on the process of events that occur and to improve upon the current state. It is recommended that those who utilize the audit also consider the value of working with an OD consultant.

The issues related to DEI are complex and not always clearly seen or quickly solved. Creating inclusive organizations takes intentional work and understanding. We must recognize that libraries are built on whiteness. Before the Civil Rights Act of 1964, black and brown people were intentionally excluded from accessing the knowledge housed in libraries. Whether we are aware of it or not, this exclusion continues in many different forms today. We need to look at ourselves as a field and our organizational cultures without continuing to see DEI as a separate and not equal aspect of the work we do. This audit is one step towards that integration.

Endnotes

1. ACRL, "Diversity Standards."
2. ACRL, "Diversity Standards."
3. ALA, "American Library Association Strategic Directions."
4. ALA, "American Library Association Strategic Directions."
5. ARL, "About: What is ClimateQUAL?"
6. DeVellis, ***Scale Development***.
7. The Social Inclusion Audit created by the Canadian Urban Libraries Council served as an initial guide for development of the audit in terms of structure. Canadian Urban Libraries Council, "Social Inclusion Audit."
8. Galbraith, "The Star Model."
9. Beckhard, ***Organization Development***, 9.
10. Anderson, ***Organization Development***, 3.
11. Anderson, ***Organization Development***, 19.
12. Anderson, ***Organization Development***, 22–24.
13. Anderson, ***Organization Development***, 18–19.
14. Bunker, "A Short History of OD."
15. French and Bell, Jr., ***Organization Development***.
16. Schein, ***Process Consultation Revisited***, 20.
17. Schein, ***Process Consultation Revisited,*** 19.
18. Known as Processes & Lateral Capabilities in the Galbraith Model. Anderson, ***Organization Development***, 304.
19. Known as Reward Systems in the Galbraith Model. Galbraith, Anderson, ***Organization Development***, 304.
20. Known as People Practices in the Galbraith Model. Anderson, ***Organization Development***, 304.
21. Known as external environment in the Galbraith Model. Anderson, ***Organization Development***, 304.
22. Galbraith, ***Designing Organizations***.
23. IBM, IBM SPSS Statistics for Windows.
24. The classification of ICC scores as "poor" or "moderate" are based on the recommendations offered by Koo and Li. Koo and Li, "A Guideline of Selecting," 158.

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Appendix A: Audit "Strategy" Section and Scoring Interpretation

	Status					Progress				
	Non-Existent	Novice	Intermediate	Advanced	Expert	Non-Existent	Initiating	Improving	Stable	Evolving
DEI are explicitly addressed in the Library's strategic plan	○	○	○	○	○	○	○	○	○	○
DEI are explicitly addressed in the Library's mission, vision, and values' statement	○	○	○	○	○	○	○	○	○	○
DEI are explicitly addressed in the Library's policies	○	○	○	○	○	○	○	○	○	○
A DEI plan of action to address identified gaps and needs has been developed	○	○	○	○	○	○	○	○	○	○

Score Range	Status Interpretation	Progress Interpretation
0–4	Little to no work has been done to integrate DEI into strategic planning efforts.	Little progress has been made towards integrating DEI into the Library's strategic planning efforts.
5–8	Some work is being done to integrate DEI into strategic planning efforts, but mostly in the form of discussion and planning.	Some progress has been made towards integrating DEI into the Library's strategic planning efforts.
9–12	Demonstrable work is being done to integrate DEI into strategic planning efforts, though most activities are very recently implemented.	Moderate progress has been made towards integrating DEI into the Library's strategic planning efforts.
13–16	Significant work is being done to integrate DEI into strategic planning efforts. Most outcomes have been fully addressed and activities fully implemented.	Significant progress has been made towards integrating DEI into the Library's strategic planning efforts.

Appendix B: Audit "People" Section and Scoring Interpretation

	Status					Progress				
	Non-Existent	Novice	Intermediate	Advanced	Expert	Non-Existent	Initiating	Improving	Stable	Evolving
The Library has assessed the demographic profile of its internal community and determined employee diversity levels	O	O	O	O	O	O	O	O	O	O
The Library understands the DEI needs of its internal community's different cultural groups	O	O	O	O	O	O	O	O	O	O
The Library has developed strategies to increase employee diversity	O	O	O	O	O	O	O	O	O	O
The Library has taken DEI related actions that have resulted in increased employee diversity	O	O	O	O	O	O	O	O	O	O
The Library has created and adopted DEI indicators for the Library and all employees	O	O	O	O	O	O	O	O	O	O

Score Range	Status Interpretation	Progress Interpretation
5	Little to no work has been done to address issues related to the DEI of library employees.	Little progress has been made towards addressing issues related to the DEI of library employees.
6–10	Some work is being done to address issues related to the DEI of library employees, but mostly in the form of discussion and planning.	Some progress has been made towards addressing issues related to the DEI of library employees.
11–15	Demonstrable work is being done to address issues related to the DEI of library employees, though most activities are very recently implemented.	Moderate progress has been made towards addressing issues related to the DEI of library employees.
16–20	Significant work is being done to address issues related to the DEI of library employees. Most outcomes have been fully addressed and activities fully implemented.	Significant progress has been made towards addressing issues related to the DEI of library employees.

A Consideration of Power Structures (and the Tensions They Create) in Library Assessment Activities

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Introduction

The aim of this paper is to explore some of the sites of tension in our assessment work, in particular what it means to engage in "practical" assessment and the potential challenges of an (over)emphasis on this way of approaching assessment. Our goal is not to argue for a singular view of how we should undertake assessment activities, or the kinds of assessment we should undertake: we acknowledge that the organizations, institutions, and the wider educational, social, political, and cultural landscapes in which we operate are complex. Assessment in higher education is motivated by varied purposes, stakeholders, and approaches, many of which may be outside a library's power to influence. Our goal instead is to pose questions that we have been using to reflect more critically on our work. We are not calling for the Library Assessment Conference to be reframed in terms of impractical and unsustainable assessment: the opposite of practical is not an impractical assessment. Rather, our paper focuses on how we have been making efforts to engage in a more reflective practice, specifically in order to think about the ways in which assessment may or may not be aligned with social justice goals and how we might better connect our work with values of equity and inclusion.

To this end, we will begin by sharing some of the tensions we have come to feel in our work. We will highlight some of the motivating factors that brought us to our current state of questioning, including wider conversations about library assessment in the library and information science field. We will draw on Lise Doucette's qualitative analysis of Library Assessment Conference proceedings from 2006–2014 and, specifically, her discussion of motivations for assessment projects. We will then turn to a discussion of what David James Hudson calls the "practicality imperative" in librarianship and how critically exploring this imperative can open up productive approaches to our assessment work. We will close with some examples of the kinds of questions we have been asking ourselves, which are drawn from a variety of fields and perspectives, including recent work on assessment and social justice in the fields of institutional research and student affairs assessment.

Sites of tension

In our assessment work, we employ approaches which emphasize partnership and co-creation with users. While these methods lend themselves to a model of power-sharing with participants, we found it all too easy to bind the limits of the project to our own understanding of what is useful to the library. Our desire to do useful, actionable assessment work compels us to focus on questions with clearly articulated answers, on activities by which we can easily measure "use" or "impact." While we know many of us consider matters of equity and inclusion in our work, the three of us have—through challenging discussion and generous discomfort—come to realize that the extent to which a critical ethos permeates assessment work is limited, and we hope that by asking questions and exposing some of our own tensions and struggles around critical assessment work, we can challenge this status quo in meaningful and authentic ways.

We hope to open up space to imagine ways of embedding a critical perspective in all aspects of the assessment cycle: from deciding which projects to undertake, formulating questions and selecting participants, to how we analyze and communicate data. This is not easy or comfortable work, and in doing it, we must surface our assumptions and question precisely how we arrived at them.

When we recruit participants, for example, we must ask ourselves what assumptions we enact when we seek to replicate professional norms. Who is excluded from a deceptively neutral representative sample? How does bias influence who we select—or who is available—to participate in studies?[1] A critical or inclusive approach to recruitment asks us to recognize that our assessments live within systems and environments in which white cultural norms and values dominate.[2] In a recent space assessment survey the authors conducted, responses were limited to those who already occupied the space of the library in order to describe current space use. This kind of assessment has value to our institution and to our stakeholders; however, if our recruitment is always limited to those who are already connected to the library, our sample populations will fail to incorporate those whose identities, experiences, or ways of knowing are already alienated by or excluded from the spaces (physical and otherwise) of the library.

But we also want to caution against turning an assessment lens exclusively toward members of marginalized communities without interrogating, first, how we frame the data that are collected and subsequently acting upon said data in ways that respond to or reduce found disparities. A critical perspective on data collection and analysis would rely on a perception of data not as objective truth but as subjective, situated, constructed, partial, and political. Acknowledging that data are not immune to the influence of systemic inequity and the ways in which our data collection and analysis practices reinscribe a hegemony of white normativity opens up space for us to re-examine outliers, reinterpret trends and redefine what we consider "evidence" or "research."[3] We find ourselves and our colleagues wanting to advocate for change and propose projects that aim to better understand non-users or particular user groups. However, as a researcher in higher education assessment notes, "[I]t is not enough to demonstrate differences and inequality—we have plenty of studies that show disparities…but many of these studies fail to engender changes in society or higher education."[4]

Critical librarianship and assessment

As we have been considering assumptions inherent in our daily work, we have also been exploring how assessment is discussed and framed in professional conversations. In recent years, there has been a growing interest in taking critical and theoretical perspectives on all aspects of library work. Critical librarianship seeks to place library work "within a critical theorist framework that is epistemological, self-reflective, and activist in nature… [L]ibrarians that practice critical librarianship strive to communicate the ways in which libraries and librarians consciously and unconsciously support systems of oppression. Critical librarianship seeks to be transformative, empowering, and a direct challenge to power and privilege."[5] Critiques of assessment from this perspective often focus on the alignment of library assessment with a culture of compliance, efficiency, and consumerism and an over-reliance on quantitative measures.[6] While we are not going to spend time unpacking these critiques in detail here, and we do not have space to do full justice to them, we admit to finding some aspects of this work challenging. While one does not have to be a regular attendee at the Library Assessment Conference, Canadian Library Assessment Workshop, or LibPMC (International Conference on Performance Measurement in Libraries) in order to ask meaningful and important questions about assessment, we feel that the ways in which we as assessment practitioners are wrestling with the nuances and complexity of our work are not fully reflected in these arguments.

At the same time, we also wonder why assessment-focused conference papers and publications, often written by and for those whose primary professional role involves assessment, do not seem to engage in the same way with the valuable critical and theoretical perspectives that are being embraced by any number of sub-fields of LIS: from archival studies;[7] cataloguing and classification;[8] spaces;[9] and reference and instruction, including instructional assessment.[10] So prominent has this strand of work become in the area of information literacy instruction and assessment that, in 2015, an entire article could be devoted to a review of a decade of literature about critical information literacy.[11] In addition to specific areas of our work viewed through this critical lens, there is also a significant body of literature exploring issues of social justice, whiteness, inclusion, and equity in relation to library services, spaces, and resources.[12]

With the exception of critical instruction assessment, a great deal of assessment-focused literature continues to concentrate primarily on practical aspects of assessment, such as discussions of specific methods, techniques, or studies. Lise Doucette's bibliometric analysis of Library Assessment Conference (LAC)

proceedings from 2006 to 2014 highlights the focus of the majority of papers on particular methods, competencies, and topics such as assessment of collections, spaces, and teaching and learning.[13] She notes that the dominant purposes for assessment work articulated in the proceedings fell into two categories: improving the library and/or proving something about the library.[14] In our own brief search of the 2016 LAC proceedings, the word "critical" comes up over 100 times, primarily in the context of critical thinking for students, what is critical for users in a space, and what is critical to demonstrate to our stakeholders, rather than in relation to reflective approaches to our own practices. We draw attention to this not with negative intention, but rather to highlight the opportunity before us to be more reflective of our practice as assessment librarians.

The practical is a necessary and important aspect of our work: we have given papers on specific case studies that aimed to provide conference attendees with practical takeaways and we have learned much from the community that we have taken back to our own institutions to help serve our faculty and students. However, we also feel the need to ask more questions about the ways in which systems of power and privilege might shape assessment and what that means for us, the profession, and our user communities.[15] We ask ourselves, "How do we create space for the critical and reflective, in addition to the practical, and what sort of questions might we pose to get there?" In David James Hudson's work on practicality, we find one frame by which to challenge our assumption of, and adherence to, the power of the practical.

Reflecting on the "practicality imperative" (or, Practice makes perfect)

In "The Whiteness of Practicality," Hudson makes clear, he does not question "our commitment to prioritizing user needs"; rather he interrogates how, in librarianship, practicality operates as a dominant value and a prescription that exerts influence, often unexamined, on our work.[16] In the same way that whiteness "resides, in crucial part, in its occupation of a space of unmarked normativity" against which all "other" is measured and held relationally, practicality exists as a commonsensical foundation on which we produce and reproduce work and product in librarianship.[17] Practicality is positioned as uncomplicated reality—the takeaways, toolkits, and "practical implications" on which we rely—while the nature of its manufacturing within an "environment...governed by expectations of efficiency, directness, brevity, speed" exists largely under the surface of its frequent deployment.[18] Echoing Doucette's findings, Hudson lists the various outputs of our field: "case studies, standards, best practices, how-to guides and 'cookbooks,' and the like—work, in other words, that might be described as drawing on the tangible, on-the-ground realities as subject matter and moving beyond questions to providing tangible, actionable answers."[19]

With his examination of the language of practicality that dominates the submission guidelines for LIS publications and conferences, Hudson establishes that the practical is privileged to occupy the space of reality in our field, while "the theoretical is definitionally disconnected from [it]."[20] The dualism that he surfaces positions "practice [as] action, solutions, efficiency, the everyday, concreteness, reality; and theory [as] thinking, reflection, abstraction, problems, inapplicability, inefficiency."[21] Yet for Hudson, theory is in fact a type of action that opens up the possibility of questioning the hegemony of the practical that provides us an entry point for challenging our devotion to a particular way of knowing and working that has long lived unchallenged.

We do not set out here to suggest there is no value in the practical; but rather, the practical's erasure of value in foundational critiques is problematic to assessment work that we do in service of our constituents. Our affinity for practicality is easily understood; we work in service of our communities and for said communities to see the benefits—"the results"—of our work, we must "take action." Libraries provide access; they afford convenience for the people who visit them and make use of their services. It is no wonder, then, that we would cleave to those same imperatives when discussing the basis of motivations for our work. Access is practical; the elimination of barriers is practical. However, "from another angle, the mobilization of shared conceptual frameworks that underpins our professional imperative to practicality can be read as a foundational reliance on existing ways of knowing, on received languages..."[22] It is precisely through stepping back and questioning the way we have always done things that we begin to consider the ways in

which our work has the potential to uphold inequities—in the questions we ask, the populations we survey, and the analyses we conduct.

To Hudson, as a profession, we are often engaged in "research without friction," research that will produce easily digestible answers or "lead to improved productivity and measurable successes."[23] Our work at once facilitates and is motivated by the practicality imperative; and yet, as Doucette points out, "there is a lack of critical reflection and research about motivations for undertaking assessment work."[24] She highlights the fact that in the LAC proceedings, motivations are vaguely articulated, if at all. Without a clear understanding of our own motivations, we cannot begin to critically interrogate the power structures and inequities that may underlie our assessment practices.

In Doucette and Hudson, we find a somewhat unlikely pair: one taking a systematic and practical approach to analysing the tangible outputs of the Library Assessment Conference, and the other centering the whiteness and domination of practicality as a hegemonic force in the work of librarianship. But in their work, we identify that which drives our current state of questioning—from Doucette, making more explicit the motivations of our work and the demands under which they are informed, and from Hudson, interrogating the position (accepted as normative and neutral) that practicality equals reality equals value.

Taking a more critical lens to our work, as Hudson and Doucette suggest, can open up important questions about why we are doing our work, how our own positions of power (institutional and personal) shape what we see as fitting topics for assessment, whose interests are being served, whether our work is excluding or further marginalizing already marginalized user groups, and the potential for doing our work meaningfully *with* users, not just about them.

Critical questions for assessment practitioners

In this spirit, we want to provide some semblance of a "takeaway"—a series of questions about how we do our work and what is at stake in our decisions. These questions were drawn from work on assessment and social justice in the fields of institutional research, student affairs assessment, and critical data studies. In our own work, we found it comforting to realize library assessment is not unique in grappling with these issues and complexities, and found these questions generative in beginning to move us forward.[25]

- How do our own identities, institutional positions, and perspectives shape our work?
- What is the purpose of the assessment, who decides what to assess, and who benefits from the work?
- Are we doing our work in ways that enable power sharing and engagement with user communities at all stages of the assessment cycle?
- What is considered "evidence" and who decides?
- What are the histories and contexts of the methods we choose, and how do these shape our work? Do these methods risk alienating or silencing voices?
- Whose voices are privileged in our recruitment practices? How do we avoiding "essentializing" communities at the margins?
- Are we engaging in data analysis and interpretation as a collaborative and social practice?
- How are the most vulnerable on our campuses being served by our assessment practice?

We are trying to create (or at least bring light to) a reality in which we hold awareness of the structures of power informing and motivating our work alongside our decisions about assessment activities, participant recruitment, or data analysis; and we acknowledge the difficulty (perhaps, impossibility) in achieving a balance in every project we undertake. It may, in fact, be impractical; but, for us, the value in asking difficult questions and challenging our assumptions is the hope that we move toward a more mindful and inclusive assessment practice.

Endnotes

1. Karine Larose and Simon Barron, "How white is your UX practice?: inclusion and diversity in critical UX research," ***User Experience in Libraries: Yearbook 2017*** (2017).
2. Brook, Ellenwood, and Lazzaro, "In pursuit of antiracist social justice."
3. Berg, "Quantitative Researchers"; Fernández, "Critical assessment,"
4. Hurtado, "The transformative paradigm," 290.
5. Garcia, "Keeping up with."
6. Lilburn, "Ideology and audit culture"; Nicholson, "The McDonaldization of academic libraries"; Quinn, "The McDonaldization of academic libraries?"
7. Cifor and Lee, "Towards an Archival Critique"; Cifor and Wood, "Critical Feminism in the Archives."
8. Drabinski, "Queering the catalog"; Roberto, ***Radical cataloging***.
9. Drabinski, "Queering library space"; Elmborg, "Libraries as the spaces between us."
10. Accardi, "The feminist reference desk"; Maria Accardi, "Feminist Pedagogy for Library Instruction"; Accardi, Drabinski, and Kumbier, Critical library instruction; Pagowsky and McElroy, Critical library pedagogy handbook.
11. Tewell, "A Decade of Critical Information Literacy."
12. Brook, Ellenwood, and Lazzaro, "In pursuit of antiracist social justice"; Morales, Knowles, and Bourg, "Diversity, social justice, and the future of libraries"; Mathuews, "Moving beyond diversity to social justice."
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Adopting an Institutional Approach to Developing Social Justice Metrics for Libraries

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One way to approach the creation of social justice metrics for academic libraries is to start at the institutional level. Assessment planning best practices generally include working from broader institutional goals to the more specific goals of the program you are trying to assess so that everything aligns. For academic libraries, this often means focusing on campus-wide initiatives and aligning library goals to them. By starting with institutional goals to devise academic library social justice measures, we can ensure that we are communicating our efforts to local audiences in a meaningful way. In this mini-paper I will discuss the very preliminary steps I have taken as part of the social justice metrics discussion group to investigate how these kinds of measures might best be developed at my own library. This top-down approach to devising library metrics at the local level focuses more on investigating how to operationalize social justice metrics than on the theory behind them.

In the case of the University of Texas at Austin, a logical starting point is the University Diversity and Inclusion Action Plan. Adopted in spring 2017, the plan is intended to lead colleges, schools, and units on campus in "making changes and embracing best practices to foster an open, positive and inclusive learning environment for all."[1] The plan is divided into focus areas based on communities such as University Leadership, Campus Climate and Culture, Students, Faculty, and Staff. Reading through the focus areas reveals that multiple areas are relevant to the mission and vision of the UT Libraries. For example, campus climate action items that include pedagogy recommendations are relevant to librarians working to support faculty to integrate information and digital literacy into courses, and staff action items that address diversity and inclusion training are relevant to the entire library organization.

One challenge with assessing library contributions to social justice is that this work typically does not fall within the purview of a specific program or area of the library. While some aspects of social justice have a natural home, such as critical information literacy within library instruction programs, others, such as staff cultural competence, are infused throughout the organization. This creates challenges in mapping library intersections with larger campus initiatives since it is difficult for any one person to have the operational-level knowledge about individual work groups that would be necessary to identify all the pieces of the campus action plan relevant to library work. I determined that trying to do so myself would be impractical and would leave out the expertise of the library staff who would ultimately be responsible for assessing and driving improvement within social justice issues as they intersect with their work. Since most operational-level assessment work is designed and implemented within individual units in my organization, it makes sense to approach social justice metrics in this way as well.

I determined that the next step in implementing social justice assessment would be to partner with the UT Libraries Diversity Action Committee (DAC) to identify current group initiatives and areas of focus that align with the university action plan. DAC was started in 2014 as a staff interest group devoted to social justice issues and was eventually transformed into a permanent volunteer-based committee.[2] Incorporating this group into the identification of social justice assessment opportunities offers a natural way to engage colleagues from across the libraries in this work. I plan to approach DAC leadership and ask them to partner with me to pilot an assessment plan designed to measure success in their social justice initiatives in addition to a campaign to encourage staff to incorporate social justice assessment into their yearly unit assessment plans. With this approach, cross-library initiatives (such as trainings) as well as operational functions that intersect with social justice (such as hiring) will be represented in the assessment work we do that feeds into institutional assessment at the campus level.

Through my attempt at devising social justice metrics that would be meaningful for my organization, I learned that there is not a "one size fits all" solution or process that I can recommend. While I had hoped to have specific measures and metrics in mind by this point, I feel that encouraging staff to use their specific areas of expertise to build social justice assessment into our existing assessment cycle will be more beneficial in the long run. In general, I suggest using the following approach for determining how to identify data points in your organization:

1. Start at the campus level to see what social justice efforts might already be underway or how social justice fits into the mission and vision of your university.

2. Look for pathways between places where social justice efforts are being enacted and places where assessment work is operationally situated at your library.

3. Partner with colleagues invested in social justice work to build social justice metrics into their existing assessment practices.

With enough local level examples from specific libraries, perhaps a larger library-centric bottom-up approach could then be taken to devise common metrics that could be applied across institutions. I hope that as academic libraries become more intentional about assessing social justice contributions and begin to discuss our local efforts, we can identify commonalities among our practices and areas of focus.

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Social Justice Metrics for Libraries: Considerations for an Emerging Framework

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The mission of the academic institution to support student learning and success has embedded within it the need to attend to issues of equity, inclusion, and justice. By providing a shared collection for access by all members of a community, the academic library seeks to establish a shared level of access to information. At one level, this seems to create equality inherently; however, it is obvious that not everyone is equally able to avail themselves of this access. Differences in resources, preparation, and experiences mean that equal access does not guarantee equitable access. If an academic library turns its attention to equity, it will develop additional services and offer further resources, likely targeted to particular segments of its community.

While much work has been done to identify library operations and activity metrics as well as metrics of impact on student learning and success, little attention has been given to identifying potential metrics for library contribution to social justice efforts. Moreover, academic institutions likely have as part of their mission community engagement and social development, and libraries will also contribute to this public effort. This paper seeks to begin to fill the gap in the assessment practice relative to social justice by offering approaches to thinking about potential metrics for consideration as well as ideas for methods and strategies for gathering and analyzing data as evidence related to those metrics.

Frameworks for Metrics

The most common frameworks for identifying metrics for academic libraries are:

- IPEDS: Integrated Postsecondary Education Data System (http://nces.ed.gov/ipeds)—The Academic Library component of this service from the US Department of Education's National Center for Education Statistics reports data on library resources, services, and expenditures at degree-granting postsecondary institutions.

- ACRL Trends & Statistics Survey (http://acrl.libguides.com/stats/surveyhelp)—Data from this annual survey are published through ACRL Metrics (https://www.acrlmetrics.com/) and cover expenditures, expenses, staffing, collections, and services. The survey includes current IPEDS data points, as well as data points that were previously collected by IPEDS but have been discontinued and annual questions to probe into current trends.

- ARL Statistics & Salary Surveys (https://www.arl.org/arl-statistics-salary-survey/)—Annual data on collections, expenditures, staffing, and services of the members of the Association of Research Libraries.

- The **Standards for Libraries in Higher Education** (http://www.ala.org/acrl/standards /standardslibraries)—Appendix 2: Benchmarking and Peer Comparison of this document from the Association of College and Research Libraries identifies potential metrics for each of the standards.

In addition, the AiA findings provide a framework for considering library metrics related to library impact on student learning and success. Specifically, an academic library can document its activities and connect them to the findings from AiA that:

1. Students benefit from library instruction in their initial coursework.

2. Library use is related to student success.

3. Collaborative academic programs and services involving the library enhance student learning.

4. Information literacy instruction strengthens general education outcomes.

5. Library research consultations boost student learning.[1]

In addition to these frameworks from the library sector, two additional projects can also inform thinking about social justice metrics from libraries:

- HuMetricSSS: Humane Metrics Initiative (https://humetricshss.org/)—This project focused on examining humane indicators of excellence in academia, with particular attention to the humanities and social sciences, in order to develop a values-based framework for assessing scholars. The values identified are collegiality, quality, equity, openness, and community.

- Carnegie Foundation's Classification for Community Engagement (https://www.brown.edu/swearer/carnegie)—This voluntary classification identifies data points for documenting an institution's collaboration with its larger communities in knowledge and resource exchange.

Towards a Social Justice Metrics for Libraries Framework

Over the past year, a small group has been holding monthly discussions about the possibility of developing a framework for social justice metrics. The small group came together under the leadership of Sarah Pickle, director of organizational planning and assessment at the Claremont Colleges library, who solicited interest through a post to the ARL-ASSESS email list, and has pursued the discussion through a democratic and non-hierarchical dialogue, as befitting the conversation topic.

A consensus has emerged that social justice metrics are possible to identify and articulate; however, doing so in local context has proven a more achievable approach for now than developing a universal framework.[2] The community discussion has also demonstrated that there is great interest in and enthusiasm for identifying social justice metrics in libraries and a shared view that a more formal (and perhaps funded) process is needed to attain the envisioned social justice metrics framework. If a social justice metrics framework is developed, it could be used for reflection/examination of current practices, inspiration for library development, planning, diagnosing challenges and problems, and organizational benchmarking. It is open to debate whether such a framework could—or should—be used for ranking.

Conclusion

This paper does not present a definite approach to social justice metrics for academic libraries nor does it claim to fully detail the considerations. Instead, it seeks to begin to suggest a framework for how this task of identifying social justice metrics might be approached and offers an invitation for additional partners in this community conversation. To join the dialogue, contact Sarah Pickle (sarah.pickle@claremont.edu).

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Setting our Cites on Gender: Toward Development of Inclusive Scholarly Support Services for All Faculty

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Abstract

Understanding gendered practices and biases in scholarly communication can help librarians develop the right mix of relevant faculty support to encourage diversity, equity, and inclusion on our campuses, while contributing to broader work in strengthening equity in research practices. A number of recent studies explore gender differences and biases in peer-review[1] and citation practices,[2] which are key issues for librarians to consider when providing services in these areas. This work reports on a study to understand gender-specific faculty practices throughout the research and scholarly lifecycle, with particular focus on awareness of and attitudes toward online research profile development, open access, and citation metrics and practices. We completed brief structured interviews with 20 faculty across disciplines and at varied points on the career trajectory, divided evenly by gender identification, in order to understand the following: Are there differences by gender in what scholarly profiles and social media accounts faculty wish to maintain? Which impact measures are prioritized, and how and why are these profiles and measures used? What motivates faculty to participate in open access publishing, or what are the deterrents? Considering the answers to these questions, how do librarians best market and deliver the appropriate services as we struggle for funding and time? Results showed that our male subjects were more active in the areas we explored while several women indicated hesitancy to engage in scholarly online profile building due to personal security and privacy issues based on being female. Female subjects had direct examples of gender biases they or their colleagues had experienced, whereas several male subjects acknowledged biases but were not aware of particular examples in their disciplines. Few subjects of either gender deemed traditional impact measures as an accurate reflection of the importance of their work, and most subjects suggested measures that would be more meaningful and more customized to illustrate real-world value. This study has illustrated the array of faculty needs on our campus as well as the array of mindsets and gendered experiences that we must consider when providing faculty research services; future work exploring gendered practices by discipline and faculty rank will further elucidate these considerations.

1. Introduction

This study focuses on exploring gendered issues related to scholarly communication practices, including attitudes toward development of an online professional and scholarly identity, open access, and measures of professional and scholarly impact. As university librarians, we are in a unique position to understand the needs and practices of scholars on our campuses. Indeed, through many decades, librarians have built liaison relationships and supported a plethora of services cutting across disciplines and built through cross-disciplinary collaborations and feedback. As emerging research indicates gender inequities in publication, citation, and impact measures, it behooves the library community to take a closer look at the practices of female, male, non-binary, and transgendered scholars in our communities. When the library has a better understanding of gendered scholarly practices, we can build more effective services better tailored to individual needs, rather than driven by the pressures of information providers promoting specific services or products. Developing services that address existing biases has the potential to improve the professional prospects of researchers and promote equity within the scholarly communications system. More broadly, increased diversity in teams, including gender diversity, can result in better science or problem solving on both small and large scales, as evidenced by many compelling studies.[3]

2. Literature Review

2.1 Online Presence

There is considerable literature reviewing gendered behavior online but little when it comes to online presence for faculty branding and profile building. With the prevalence of Academia.edu and ResearchGate,

despite copyright concerns, as well as the importance of commercial profile systems such as Google Scholar and Elsevier's Scopus IDs, online presence or "Professorial Branding"[4] is becoming a standard part of academic life. Kendall, Yee, and Hardy's 2017 article title declares "We should be just a number and we should embrace it," and discusses potential benefits of universal adoption of tools such as ORCID.[5] ORCID is important for name-disambiguation, and is being embedded or required in various places throughout the scholarly lifecycle.[6] However, there is little discussion of how gender plays a role in ORCID or any of the profile systems described above. Meier and Tunger's 2018 study of scientists' opinions and usage of ResearchGate concluded that, of the factors of origin, age, discipline, and gender, gender had the least influence on respondents' reported attitudes.[7] They found that women thought ResearchGate required less effort to use and made more sense as a scientist than did men. Additionally, prior to beginning our research, we were aware through our practices that female academics often spend considerable time trying to correct their online presence, due to name changes through marriage or divorce, particularly when they submit tenure, promotion, grant, and other applications. Little research addresses this issue.

2.2 Open Access

While there have been multiple studies surveying scholars' attitudes toward open access, there has been very little research examining gendered behavior in approaches to open access.[8] One study by Zhu in 2017 examined a variety of demographic factors, including gender, associated with open access practices among United Kingdom academics, finding that men were slightly more likely to have participated in gold and green open access publishing than were women.[9] Segado-Boj, Martín-Quevedo, and Prieto-Gutiérrez's 2018 study surveying contributors to Spanish academic journals found that age and years of career experience had more of an influence than gender on attitudes towards open access.[10]

2.3 Impact Measures and Citation Practices

A variety of studies have established that female and male researchers publish at different rates and are cited at different rates, with the advantage in most reported cases being on the side of male researchers.[11] A number of researchers have explored gender bias in publication, peer review, and citation, and have completed in-depth analyses of trends in these areas, with some showing cautious optimism that equity may be possible in the coming years. Van den Besselaar and Sandstrom, in their 2017 study of scholarly productivity and impact differences between men and women at Swedish universities, found that higher productivity classes of researchers are generally dominated by men and that women tend to have lower academic rank and are more likely to be middle authors rather than first authors on publications, thereby creating what the authors refer to as "vicious circles of gender bias, lower positions, and lower performance."[12]

There have been a number of studies exploring gender bias in peer-review. For example, Kaatz, Gutierrez, and Carnes' 2014 work, "Threats to objectivity in peer-review: the case of gender," cites a body of work going as far back as 1968 that explores bias against women in various areas of society and particularly in academic life and scholarly communication.[13] Helmer, Schottdorf, Neef, and Demian's 2017 study of gender bias in the peer-review process presents same-gender preference as a human pattern at work and states that even after there is equity among the genders, other efforts will be needed to challenge partisanship and discrimination in the scientific community.[14]

Self-citation is also an area where gender plays a role. King, Bergstrom, Correll, Jacquet, and West found, in their 2017 study, that male authors of papers they examined over a 20-year period were 70% more likely to cite their own work than were women. They were, however, unable to determine whether the self-citation gap is a cause or a consequence of gender imbalances in academia.[15]

2.4 Library Services to Faculty

While there is extensive literature about academic library liaison service models to faculty, there is little research exploring gender differences in this area. One study of universities in Bangladesh found that there was no difference in satisfaction with online library subscription resources between male and female

faculty.[16] However, there have been a number of studies exploring mentorship of female faculty in an attempt to increase the number of females in senior faculty positions.[17]

3. Methods

Our study subjects were chosen from a pool of faculty respondents who had completed a library services survey during the academic year of 2017–2018 and who responded to that survey indicating willingness to provide further feedback on library-related issues. We sought a full picture of faculty at our institution, so we invited faculty at all ranks, including non-tenure track, and across disciplines. We invited faculty to 30-minute interviews to be held between June and September of 2018. We sought 10 male and 10 female subjects. We had no faculty subjects who identified as non-binary or transgender from the original pool of possible subjects. Eighteen subjects completed the interview in person while two responded by phone. Both researchers completed 18 of the 20 interviews, while two were completed by only one of the researchers. Notes from both researchers were consolidated and analyzed using Qualtrics. The intention of our study was to view each subject as a case study, so the analysis through Qualtrics was intended to identify trends on our campus rather than statistically significant results.

Interview questions were as follows:

Scholarly Profiles/Online Presence

1. What scholarly profiles do you maintain?

2. What scholarly profiles have you heard of?

3. Why do you maintain these profiles?

4. What deters you from creating these profiles?

Social Media Practices

5. What social media do you use for your personal life?

6. What social media do you use for your professional life?

7. What social media do you use to share news or updates about your work, or to find news or updates related to your research area?

Impact Measurement

8. Which impact measures, if any, do you check frequently?

9. Which impact measures are important to you professionally?

10. If you could tell your own story of the impact of your work, what kinds of data would be the most meaningful to you?

Open Access

11. Have you made any of your works available open access, and how?

12. Why do you make your works publicly available?

13. What deters you from making your works publicly available?

Library Support

14. How do you currently learn about the above services/topics?

15. What types of support would you want in the above?

16. What formats of support would you prefer?

Gender

17. What, if any, impact does gender have on the above practices, in your experience?

At the completion of all interviews we determined to omit analysis for questions 2 and 5 due to ambiguity in how the questions were phrased.

4. Results
4.1 Online Presence

Understanding if and how faculty across genders value online profile building systems, such as ORCID, ResearcherID, and LinkedIn, is key to marketing these services on our campuses. The most common reasons our subjects cited for not maintaining profiles were lack of time and lack of understanding of the value of some of the tools.

Our female subjects maintain a total of 18 profiles online, averaging about two profiles each, while male respondents maintain a total of 29 profiles, or about three profiles each. One possible reason for this difference in adoption rates is that four of the five people who cited privacy concerns as a deterrent to creating profiles were female. Two of our female subjects described situations where they or a close friend were targeted online due to opinions expressed through or about their academic work. One female respondent also expressed concern about whether a university has protections in place if she were to be threatened online. Two other females shared that cultural norms had taught them that it was not appropriate to put themselves forward as experts. In contrast, two male respondents indicated that creating profiles online and making themselves highly findable was, without question, part of the job of being an academic.

Despite its reputation as a professional rather than an academic tool, LinkedIn was the most commonly used platform, with 11 (six male, five female) of the 20 respondents maintaining profiles there. Respondents indicated that LinkedIn is a good way to recruit postdoctoral scholars and part-time faculty, and to develop industry connections for project collaborations and job and internship contacts for their undergraduates. Because of these practical outcomes, respondents were able to see the clear return on their time investment for developing a LinkedIn account.

Six faculty maintain ResearchGate profiles, but only one of the six is female. Two males and three females maintain Academia.edu profiles, and only four respondents maintain a Google Scholar or ORCID profile (three male, one female for each profile). Other types of online profiles that are maintained less frequently by male and female respondents are ResearcherID, Scopus ID, Bepress Expert Gallery, Twitter, and personal and lab websites, though two (one male and one female) curate their lab websites extensively and use them as one of their primary places to attract collaborators, share research, and promote their work to a broader audience. See Figure 1 for a complete breakdown by gender.

Figure 1: Online Profiles Maintained, by Gender

ONLINE PROFILES MAINTAINED, BY GENDER
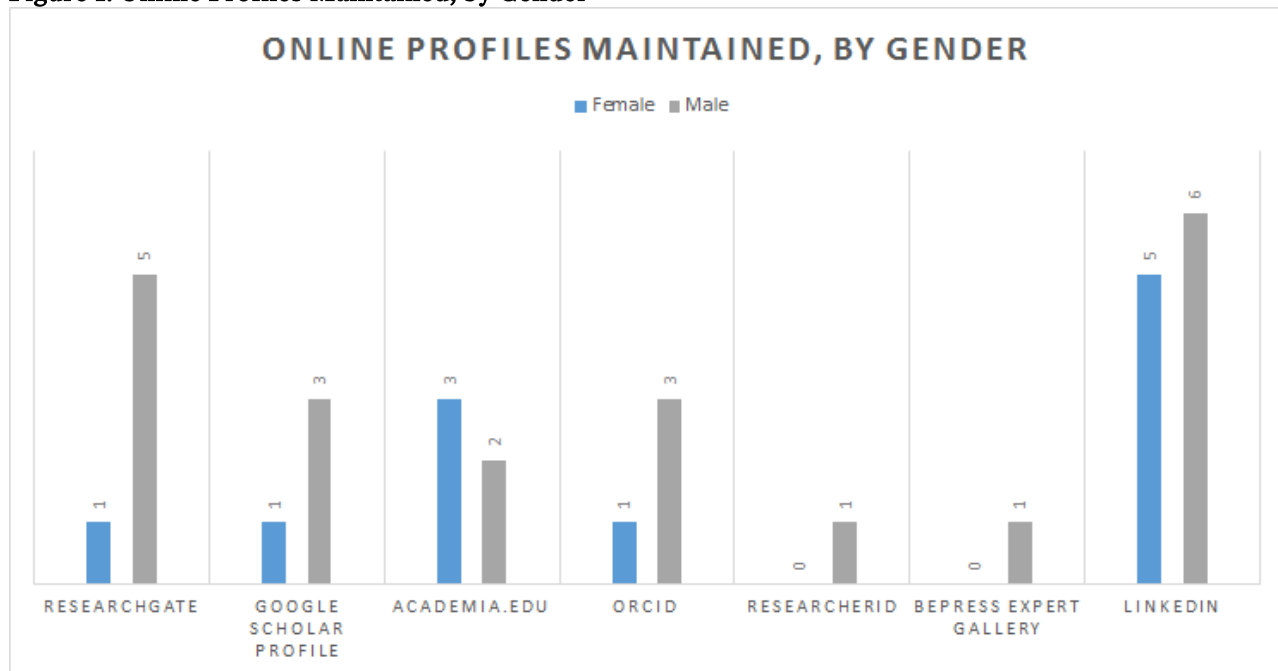
One male subject reported that his Google Scholar profile is how people find him and that he had a "very low opinion" of a researcher if they did not maintain a Google Scholar profile. In contrast, another male subject with high publication rates did not rate highly the quality of the Google Scholar search for his discipline and therefore was unwilling to consider having a profile there.

One female subject stated that her lab website was her personal website, even though the website highlighted both her own work and the work of others in her lab. However, there seem to be benefits for individuals in creating their own academic brand, so this may be a reason to encourage those with only lab websites to consider further online profile development.

Reasons that cut across gender in favor of maintaining profiles were unsurprisingly about finding academic positions and achieving tenure. Two male respondents cited their online presence as a way to attract the attention of grant reviewers. Interestingly, three males mentioned maintaining profiles in order to connect with former students, track former students' success in the workplace, or to help their students find jobs.

4.2 Open Access

Male and female subjects reported similar types of open access activity, but the subjects who were most actively engaged in making their work openly available were male. Individual male subjects reported (1) paying as many article processing charges (APCs) to publish his work open access as his funding would support; (2) uploading all his work to an institutional repository; and (3) posting all his work on his lab website.

Female subjects described more cautious approaches to sharing their work publicly, characterized by isolated activity, rather than sustained efforts. Individual female subjects reported (1) sharing raw files when others asked for them; (2) sharing only her teaching materials on her personal website; (3) posting one article on a scholarly profile after being "cajoled" by a colleague; and (4) posting a couple of photos of her work on her personal website. The most active female subject shared that open access was mandated by her funders so all of her articles were openly available.

There were also differences in the factors that male and female subjects reported as deterring them from making their work publicly available. Male subjects attributed their lack of open access activity to reasons relating to the mechanics of gold or green open access: copyright concerns, concerns about journal quality, lack of time and knowledge, not wanting earlier versions to be distributed, and limitations due to publisher policy.

While some female subjects expressed similar concerns, many subjects reported reasons relating to the concept of open access in general. Several subjects could not see a reason why others outside of a targeted group, such as WPI students or professional society members, would benefit from reading their work.

Several female subjects used words expressing a lack of confidence in their work when asked about it being made available openly. One subject characterized her work as "not original" and did not consider that wider audiences would find it beneficial. Another subject expressed extreme reticence for others to read her work. She related a story about meeting a distinguished scholar who was reading one of her books. She instantly said to him, "Please don't read my book!" She stated that her goal is not to be an "academic superstar," so she did not see how open access would benefit her. One female respondent claimed that her work was not good enough to be open access, while, in contrast, another claimed her work was not good enough to be behind a publisher pay wall.

Female subjects were also more likely than male subjects to express concerns about copyright and the security of their work. Four out of the ten females interviewed expressed concerns about copyright as limiting what they make openly available. One subject only shares her teaching materials because those are the materials of which she is certain she holds the copyright. In contrast, male subjects acknowledged concerns about copyright, but were more comfortable overall in making judgments about how they could share their published work.

Three female subjects expressed concern for the security of their work. One subject shared that she does not put her course syllabus in WPI's course management system because the system could be hacked and her syllabus stolen and sold. Another subject shared that someone once posted her lesson plan online, and her department head contacted this person to ask them to take it down. A third subject expressed concern that her work would be misrepresented or misquoted if she made it openly available. Of the male subjects, only one mentioned security concerns as a deterrent from open access, as his work is proprietary.

4.3 Impact Measurement

There were low to medium levels of use for standard impact measurements, such as impact factor, citation counts, and h-index, among the 20 subjects. Figure 2 shows the number of subjects, by gender, who considered a particular metric important to them professionally:

Figure 2: Impact measures considered important to subjects, by gender.
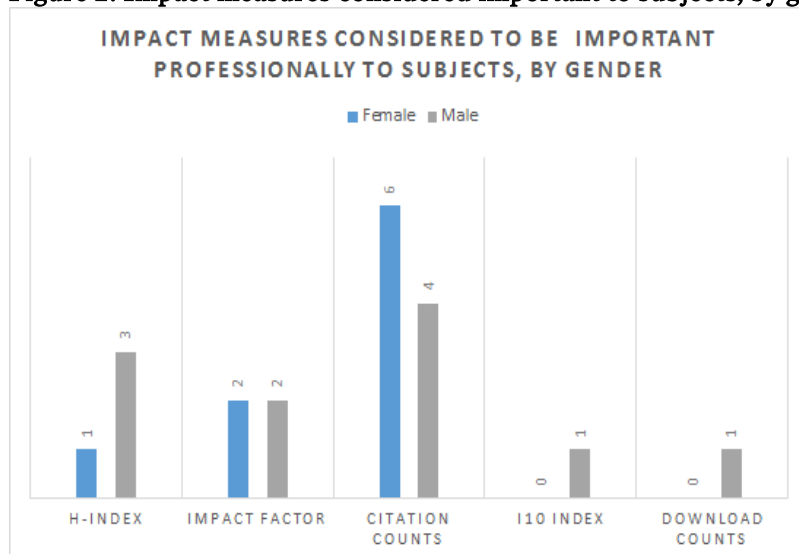
While these questions may seem most applicable to tenured or tenure track faculty, libraries must adapt to the fact that tenure-eligible positions are no longer the majority of faculty positions in academia in the United States. A 2013 report by Kezar and Maxey points out that, while in 1969, only 21.7% of faculty were non-tenure track, in 2009 in the United States, 66.5% of faculty are in academic positions where they are *ineligible* for tenure.[18] While traditional impact metrics, such as citation counts, are still important to those on the tenure track or aspiring to be so, there are many faculty on our campuses who are working to make a difference through research and teaching, even though they may not receive the privileges of tenure. These tenure-ineligible faculty may be the drivers of new ways to measure impact that are not dependent on the tenure cycle, so it behooves librarians and all in higher education to pay attention to their needs.

To get to the heart of what our diverse subjects, both on and off the tenure track, cared about in terms of impact, we asked them to respond to the following question and received compelling and complex answers: "If you could tell your own story of the impact of your work, what kinds of data would be the most meaningful to you?" Table 1 provides a list of summarized responses, not for the purpose of quantifying whether males or females are more interested in which types of data, but to show the diversity of ways that faculty across gender consider impact.

Table 1: Responses by gender to the question: If you could tell your own story of the impact of your work, what kinds of data would be the most meaningful to you?

Responses from Female Subjects	Responses from Male Subjects
• Evidence of positive impact on society • Downloads of her teaching materials by other educators	• Student learning outcomes metrics • Positive learning outcomes for disadvantaged or underrepresented students
• Evidence of positive impact on society • Evidence of students' post-graduation success	• Citations • Invited conference presentations
• Evidence of positive student learning outcomes	• Evidence of being acknowledged as expert by those in field • Data indicating other experts understand his work
• Citations	• Positive peer reviews and book reviews

Responses from Female Subjects	Responses from Male Subjects
• Evidence of being acknowledged as expert by those in field	• Appearances in the media • Count of times his work is mentioned by scholars and non-scholars
• Evidence of libraries collecting her work	• Invitations to speak in academic departments • Positive reviews by grant reviewers
• Evidence of impact on policy makers • Speaker invitations to conference and group events both in and outside her professional circles • Evidence of teaching enabling her students to question their own perspectives	• Evidence of work resulting in useful standards or products
• Evidence of impact on policy makers	• Student learning outcomes
• Number of publications • Impact Factor of journals • Citation counts	• Program accreditation • Students' professional success • Whether students keep in touch past graduation
• Evidence of exposure among non-scholars, especially disadvantaged communities who could benefit from her work • Web page download analytics	• Evidence of positive impact on communities and society
• Number of publications • Evidence of impact on society	• Invitations to edit works in area of expertise • Evidence of students being able to think and write better as a result of his teaching

The responses above generally reflect four categories of desirable data: those reflecting (a) success in student outcomes both during college and after graduation, (b) academic productivity or personal prestige, (c) societal impact, and (d) impact on other educators. While no patterns are discernable based on gender, this set of answers gives a sense of how limiting citation metrics are when it comes to the important work our faculty are doing, and that while citation metrics may be required, other measures of impact are more highly valued by the majority of our respondents. This is a keen reminder that, as librarians, we should avoid assumptions about how our faculty measure their own impact. Hearing stories from 20 diverse faculty voices showed us that creative services to faculty may indeed be most welcomed as many in academia work to change the discourse around the definition of impact.

4.4 Library Services to Faculty

When asked about the format of services that faculty would most appreciate for learning about the topics discussed, nine of the 20 respondents were enthusiastic about personalized one-on-one support, with one mentioning a desire for an "annual check-up," with customized recommendations of services. Few respondents were interested in other specific types of support. Only four were interested in workshops and suggested that they would be interested if the workshops were truly hands-on (e.g., come to this workshop and leave with your ORCID) or customized for affinity groups (e.g. women, social scientists, etc.). Four subjects were interested in online tutorials either as stand-alone resources or in conjunction with personalized help. Unsurprisingly, the overarching message from faculty was that individual contact and personalization were highly valued; there was no apparent difference based on gender.

4.5 Gender

The final question we asked of our subjects was, "What, if any, impact does gender have on the above practices, in your experience?" Three males and one female responded that they did not feel gender impacted any of the topics discussed, with one male asking, "What could gender possibly have to do with it?" Four respondents (one male and three females) stated that they did not know if it had an impact.

Six out of the ten female subjects believed that gender had a definite impact on the topics they were interviewed about. Online harassment was evoked by four female subjects, who mentioned how women were more likely than men to experience online harassment, especially if they create a public profile. One subject said, "I worry [about having a public profile] more than a male colleague who's just doing research." She mentioned research showing that women are more likely to be attacked, bullied, or targeted online and stated that she believes that universities are unprepared to deal with these consequences. Another subject mentioned that social media has a "bad reputation" and that women need training on how they can keep their information secure. A third subject observed that men in her field were more active and less cautious on social media, particularly when it came to sharing news about their accomplishments.

Female subjects mentioned imposter syndrome and issues of confidence several times as factors that discourage women from promoting themselves and their work using online profiles and social media. One subject stated that since women report higher rates of imposter syndrome, online profiling systems, which she viewed as more masculine, are more off-putting to women.

Two male subjects acknowledged that there was probably gender bias in scholarship, but could not give specific examples. One noted, "I'm confident there is gender bias in everything." Another acknowledged that he probably gets some male privilege, although he could not identify how gender would impact scholarly communications practices.

Two male respondents referred to "Rock Star" and "Famous" women in their fields or departments—who are referred to by their first name only and were frequently invited to serve on panels—as examples of women who are successful in academia. It is unclear though, whether women being referred to by their first name is a sign of prestige or a detriment to it. Along with many other articles and online buzz on the topic, a 2018 article in the **_Wall Street Journal_** discussed the potential implications of famous women being referred to by their first names while men are often referred to by their surnames.[19] The context of the article was primarily politics, but the concept may apply in academia as well.

A third male referred to a time when, in his department, women needed to be 30% "better" than men in order to receive tenure, but that there was more equity now.

5. Conclusions

Of the faculty we interviewed, there was a wide range of understanding of the topics we discussed, from faculty who use online faculty profile systems, take advantage of open access, and use a range of citation metrics to those who were generally unfamiliar with the topics we discussed. We chose to interview subjects across disciplines and in varying types of faculty positions (tenured and tenure-track as well as tenure-ineligible) in order to gain a broad picture of what our faculty are considering in terms of these issues and the types of library support they would prefer.

Overall, our male subjects were more active in building their online presence and engaging in open access; our female subjects expressed more concerns about copyright and security online. LinkedIn was the most popular place for our faculty to be building profiles online, in order to recruit for their institutions and to keep connected with former students. Other scholarly profile systems were less universally used due to lack of time or lack of understanding of the reasons to maintain a presence in one site over another.

Our research highlighted what many others have found, that we must consider a broader range of impact data and criteria when telling the story of what our faculty have accomplished and contributed to the greater

good. Faculty measured their success based on the success of their students both during and after college, their academic productivity or personal prestige, their societal impact, and their positive impact on educational practices.

When it comes to library services, female and male faculty highly value personalized and customized services, such as office visits and personal emails informing them of relevant services. A small number indicated interest in online generalized support as well, and perhaps some interactive or cohort-focused workshops. Most rejected the idea of attending general workshops or relying solely on online tutorials and guides.

In general, there was broad agreement among the faculty interviewed that gender comes into play in a variety of ways in academia; female subjects had an easier time describing specific examples of gender bias, but most male subjects also articulated awareness that gender issues have been detrimental to women in some way and that those issues should be addressed.

This study has shown us the need to develop a menu of services to support a broad range of faculty needs, one that takes into consideration their varied impact goals and work styles, as well as the confidence, privacy, and security concerns most strongly communicated by some of our female subjects.

6. Future Work

While this work has provided ideas for better serving our male and female faculty in the areas that we explored, a broader study will be developed to explore discipline and rank in addition to gender. The questions we will ask are similar to our interview questions, but elaborated upon in a fashion that will allow for deployment to a larger audience, as well as analysis through commonly available data tools.

Acknowledgements

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Assessing the Social Value of Library Services at Drake University

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One of the goals of the ACRL's report, "Value of Academic Libraries,"[1] is to provide librarians with the evidence necessary to tell the story of their library's value. Given the importance of this goal, little has been written on the mechanics for accomplishing this task.[2] Part of the challenge in telling the story is that many of our instruments are taken from the private sector and as such, are ill-fitted for assessing the social value of higher education and academic libraries. Subsequent reflection by Oakleaf and Kryillidou[3] suggest that one solution to this problem is for libraries to set the scope of their assessment on contextually based institutional priorities. Building upon this suggestion, we propose that the framing of value in terms of organizational theories of legitimacy provides one with the means of addressing this challenge of assessment and communication of library social value.

Organization theory proposes that legitimacy is one means through which non-profits sustain themselves as durable social institutions.[4] The concept of legitimacy is particularly well suited for communicating the value of social institutions, such as libraries, in that it conceptualizes value from a community, rather than an individual perspective. This approach supports our efforts by aligning with Oakleaf and Kryillidou's suggested contextually based institutional approach. To begin telling this story of library social value, we will introduce a narrative framework based upon the following three elements of legitimacy: (a) the cultural-cognitive; (b) the normative; and (c) the regulative. The goal of using these three narrative elements as the basis for our story is to create the impression of the library as a legitimate means for realizing the general will of our stakeholders.[5]

Drawing upon institutional theories of legitimacy, this paper will present a framework for communicating the story of the social value of libraries in terms of three institutional elements. Given the practical nature of assessment, and librarians in general, we will support the development and application of our model through examples drawn from the author's home institution. The structure of the paper is broken into two sections; the first section defines key assumptions and concepts, and the second section of the paper will introduce the individual elements of legitimacy in terms of our narrative framework.

Value

The story of library assessment is the story of value, or as we shall see, values. As such, before we begin to compose this story, we should develop some understanding of the value around which the story is based. Within our legitimacy based framework, we begin with the assumption that value is created through the act of a patron consuming some form of library service. This act of consumption creates two types of value. The first concerns the value that accrues to the individual through the act of finding a desired book, or having a reference inquiry resolved. To a large degree, many of our private-sector-based instruments focus on this type of value through the assessment of actions, such as circulation or reference counts. The second form of value created is the value that accrues to the patron's community. For example, a library service that benefits a first-generation student or a LGBTQ student provides value to not only the individual student, but also the community to whom that patron belongs. For-profit measures have difficulty capturing this form of value, which is one of the reasons we turn to a concept of legitimacy as a means of conceptualizing social value in terms of its contribution to the chosen values of our institutes or communities.[6] Our next step in telling the story of the social value of library services is to define the communities of import within our story of library assessment.

The assessment and communication of library social value centers around two communities; the first is the community that benefits from the library service and forms the target of our assessment. The second community is the stakeholders to whom we are communicating our assessment efforts. In terms of our communicating our story of value, the patron community serves as the subject of our story, the stakeholders

the audience. For example, within a university, we would form communities around individuals with common characteristics of interest to our stakeholders, such as first generation students or students of color. In a similar manner, if we start with faculty and staff as our basic building block, then the audience for our story includes not only administrative communities such as the Office of the President or Dean's Councils, but also line level communities, such as an Office of Community Engagement. The advantage in this approach is that it accommodates both the constructed nature of social value[7] and Oakleaf and Kryillidou's suggested contextually based institutional approach. Having identified the subject and audience of our story, we will now turn to the value of that story to the library.

In terms of our legitimacy based storytelling framework, we need to take into account that the value that the library receives through its delivery of social based services is accrued indirectly through our stakeholders, rather than directly from the patrons or their communities. To account for this indirect form of payment, we will assess the value in terms of social capital, a form of resource that a library uses in order to have its views accounted for in decision-making.[8] One of the advantages of using social capital as a measure of value is that it broadens the types of resources accounted for when considering the success of our story of social value. For example, in assessing the success of a service, we can take into account whether the delivery of that service leads to an increase in library influence on external committees that can provide resources to support the delivery of that service. With this concept of value in hand, we can begin to think about the composition of our story concerning the social value of the library by first defining the value or values of our story in terms of the value that accrues to a community, rather than to an individual patron. We next establish our unit of analysis in terms of the subjects of our story being student communities, and university units being the audience. Lastly, in defining the goal of our story in terms of social capital, we have established the means for determining the success of our story. Given these assumptions, let us now turn to the legitimacy based framework through which we will tell our story of library social value.

Storytelling & Legitimacy

For libraries, legitimacy is one of the primary means through which we justify the material resources required to sustain ourselves as durable social institutions. Legitimacy represents an organization's "social acceptability and credibility within their communities."[9] A more formal definition of legitimacy concerns "… [a] generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions."[10] Given this definition, the question at hand regards composing the story of the social value of library services, such that they are perceived to be desirable, proper, or appropriate. The answer lies in framing this story to align our internal normative value and services with the external cultural-cognitive ideals and beliefs and regulative principles and standards of our community.

The mechanism through which the social value of library services are connected to social capital is through the development of shared meaning, congruent values, and common goals and vision between the library and its community.[11] Storytelling, as Wikipedia notes, is a social and cultural activity for educating, preserving culture, and instilling moral values, and is a powerful means for critically realizing this mechanism. Using legitimacy as our mechanism for realizing social capital, we can begin to compose our cultural story of library social value in terms of three elements: (a) the cultural-cognitive; (b) regulative; and (c) normative. Each of these elements work at different units of analysis. The cultural-cognitive represents the **ideals** and **beliefs** of the community as a whole. The regulative element represents the **principles** and **standards** of the individual sub-communities within the larger community. Lastly, the normative element represents the **values** and **practices** of the sub-community, whose services are assessed and communicated. In terms of our storytelling analogy, the culture-cognitive element represents the plot, the regulative element the characters, and the normative element our protagonist. To relate this story to our audience, we need to further recognize that each of these elements has two aspects, an aspirational aspect and a realized aspect.

Legitimating the Story of Library Social Value

	Normative	Cultural Cognitive	Regulative	
Aspirational	Values	Ideals	Principles	Aspirational
Realized	Practices	Beliefs	Standards	Realized

Fit = Social Capital
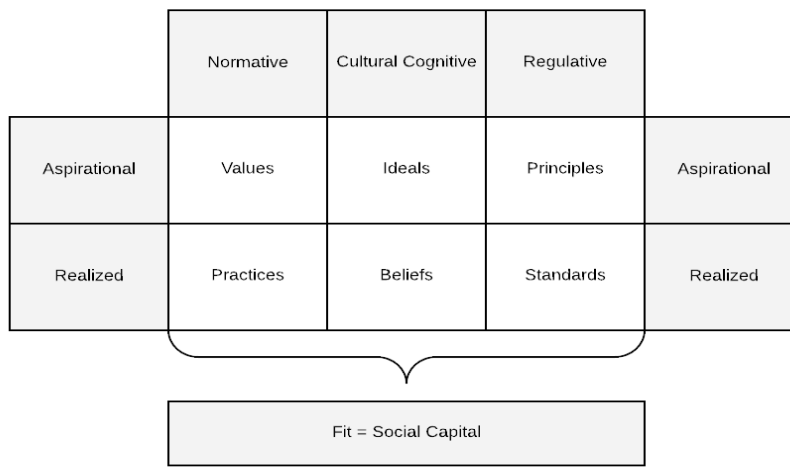
Defining our elements of legitimacy in terms of these two aspects, we can relate the story of these elements in the following manner: the cultural-cognitive element represents the larger aspirational ideals of the community and the beliefs through which those ideals are to be realized. The regulative elements are the aspirational principles through which sub-communities express larger community ideals and the standards through which those principles are to be assessed. Turning to the library, the normative element represents our professional **values** as shaped by community ideals, and the normative **practices** for realizing those values. Given these definitions, we can state a positive relation between the degree to which these elements of legitimacy align or fit together and the creation of legitimacy:

$$\text{Legitimacy} = F_{+\text{fit}} \left[\textbf{\textit{normative, cultural-cognitive, regulative}} \right]$$

Let us now turn to a closer examination of the elements of legitimacy and the assessment and communication of social value, beginning with the cultural-cognitive ideals and beliefs of our community.

The Elements of Legitimacy: Cultural-Cognitive Ideals and Beliefs

Scott defines the cultural-cognitive element as "the shared conceptions that constitute the nature of social reality and the frames through which meaning is made."[12] As culture is a socially constructed phenomenon, we use the concept of cognition to indicate a perception of culture rather than a truth. Our strategy in using the cultural-cognitive element in creating legitimacy is to both identify and communicate the social value of library services in terms that are perceived to be, as Suchman[13] notes, "culturally desirable, proper or appropriate." Applying the cultural-cognitive element into our story of social value requires that we create the cognitive perception that not only do our professional values align with the cultural ideals of our community, but that the services through which those values are also realized are appropriate within our community's system of beliefs. Let us turn to our case study to illustrate the relationship between the cultural-cognitive and the normative elements of legitimacy.

Drake University Cowles Library identified the cultural-cognitive story of its community's ideals and beliefs in three steps: (a) documenting the university's ideals of its social mission; (b) capturing the beliefs through which those ideals were to be realized; and (c) describing those ideals in beliefs in terms of a community-based vocabulary. Combined, these three steps formed a toolkit of symbols, stories, rituals, and world views,[14] through which we could begin to construct a story that connected library social values and services to our community's ideals and beliefs. To begin this process, we first drew upon administrative-level documents as our key indicators of cultural ideals and beliefs. In particular, we reviewed university strategic

documents, administrative and unit level assessment and reporting documents—which in this case were associated with the balanced scorecard—and documents created for external stakeholders, such as alumni, the board of trustees, or the public. A review of these documents along with the committee's knowledge of university gossip, rumors, and stories formed the bulk of the cultural artifacts used to identify the university's ideals and beliefs. Through an iterative process, the committee quickly settled upon and constructed a rich understanding of the university's ideals as encapsulated within the university vision statement, "Together we transform lives and strengthen communities."

Having defined the university community's ideals in terms of its vision statement, "Together we transform lives and strengthen communities," our next step was to capture the beliefs through which these ideals were to be realized. Drawing upon our review of the university's strategic document and our knowledge of the university grapevine, we identified an initial pool of beliefs. To winnow this pool down to the beliefs that not only best fit with the library's normative values and practices, but would also likely produce the most amount of social capital, the library needed to identify those beliefs with high levels of legitimacy within the library context. Our approach to this challenge was to rank the import of a belief in terms of the resources allocated for realizing those beliefs. For example, we targeted diversity, equity, and inclusion as a belief through which the university sought to realize its social ideals due to the new funding lines associated with the creation of an associate provost for equity and inclusion. Similarly, we also identified significant resources being directed towards units associated with global and intercultural learning, and lastly community engagement. By reviewing university strategic documents, we confirmed the legitimacy of these beliefs in two ways. First, these beliefs figured prominently in the story the university was telling to its external stakeholders. For example, in the public version of the university's balanced scorecard, it cites that, "64% of seniors have a community-based project as part of one or more of their courses."[15] The second way we confirmed the import of these beliefs was the degree to which units, other than the units primarily charged with these ideals, referred to these ideals within their own strategic documents. With the identification of the community ideal of "transforming lives and strengthening communities" and the belief in equity, inclusion, and diversity, global and intercultural learning, and community engagement as the means for realizing these ideals, the library had a definition of its community's cultural-cognitive ideals and beliefs in hand.

The cultural-cognitive element is a powerful factor in developing legitimacy as it informs both the normative and regulative elements. Institutional theory often describes the cultural-cognitive element in terms of the legitimacy that an organization accrues by having its place within a community as being "taken-for-granted."[16] An example of this could be the ideals and beliefs associated with the library being the "heart of the university." To sustain and grow this cultural-cognitive legitimacy, especially in times of change, requires active steps to align normative values and practices with community ideals and beliefs. As we turn to the regulative element of legitimacy, we are moving away from the larger community ideals and beliefs and turning to the smaller communities who are bound together through a common will to realize those ideals and beliefs.

The Elements of Legitimacy: Regulative Principles and Standards

The regulative element of legitimacy refers to the aspirational principles and the realized standards of the individual sub-communities within the community as a whole. The difference between the regulative element and the normative element is one of perspective. For the regulative elements, we take the perspective of a unit examining the principles and standards of an external unit. Conversely, the normative element is taken from the perspective of a unit's internal values and practices. Suchman[17] conceptualizes this element as a pragmatic means through which community members assess the degree to which others are supporting community ideals and beliefs. In terms of our story of the social value of libraries, the regulative element is the means through which external university units determine the degree to which the library supports the university and the individual units themselves. The regulative element forms a pragmatic means for translating the normative values of library services into the principles and standards held by others within the community. This translation allows the library to overcome the significant challenge of effectively communicating the causal relationship between library services and university ideals. Part of this challenge is that connecting library social value to university ideals requires some understanding of library

values. For example, assessing the social value of instructional services requires that community members possess some understanding of the values associated with information literacy. As such, the effectiveness in communicating library social value is dependent upon the willingness of the community to learn about these values. The advantage in applying the regulative element to tell this story is that it places the educational burden on the librarian. In other words, rather than the community learning about library values, the librarians adapt and communicate those values in terms of an external units' principles and standards.[18] Let us turn to our case study efforts to communicate library services in terms of the regulative element to see how this works.

The library began its efforts to compose the regulative element of its story of social value by identifying the services whose values and practices best aligned with the cultural-cognitive ideals and beliefs that we had previously identified. To begin to link these services to university ideals, we reached out to the units associated with these ideals and beliefs. Do not be shy in reaching out to these units, as we found them to be more than happy to work with the library as the outcome of our efforts support both units' strategic goals. To illustrate, let us look at the library's efforts to communicate the social value of its services in terms of diversity and inclusion.

The library identified the university's ideals concerning diversity and inclusion in terms of "Redressing historic injustices that result in the continued marginalization of members of specific groups..."[19] One of the beliefs through which the university sought to realize this goal was through the efforts of the Office of Equity and Inclusion. In working with this unit, one of the core principles through which they sought to realize the university's ideals was through "supporting and embracing all identities on campus and working towards systemic change that combats bias."[20] To determine the degree to which this principle was being realized, the office established four standards: (a) equitable and respectful treatment of all; (b) recruitment and retention of diversity; (c) recognition and addressment of discrimination and oppression; and (d) nurturing of differences and unique identities, with each standard being assessed in terms of good, better, and best. With this documentation of the principles and standards of equity and inclusion, it was now possible to communicate the value of library services in terms that could be both understood and valued by the university. For example, the library began to assess and communicate one aspect of library instruction in terms of the degree to which it supported the instructor's efforts to include diversity and inclusion content.

The regulative element is the means through which identified cultural-cognitive ideals and beliefs are translated into the principles and standards of the community. The advantage of applying this element is that it provides the librarian with greater control in translating the social value of our services into a story that makes sense of the often ambiguous link between library social value and community ideals and beliefs. With the cultural-cognitive and regulative elements in place, we now turn to the internal element concerning the normative values and practices of the library.

The Elements of Legitimacy: Normative Values and Practices

The normative element defines the goals of the service and the appropriate means of pursuing them.[21] Another way of thinking of the normative element is in terms of moral legitimacy, a legitimacy that accrues to an organization when the community believes that the organization's actions, "effectively promote societal welfare, as defined by the audience's socially constructed value system."[22] In thinking about the effective communication of moral legitimacy, the challenge revolves around aligning normative values and practices in a manner that fits with the moral norms of the community. Within our legitimacy based framework, we can identify community morals in terms of our previously defined cultural-cognitive ideals and beliefs and regulative principles and standards. To identify normative values and practices, we can draw upon professional codes of ethics and values, such as the ALA Core Values of Librarianship,[23] which itself notes that the foundation of modern librarianship rests on the essential set of values which reflect the history and ongoing development of the profession. Within this document, values such as those dealing with "social responsibility" are of particular interest in terms of communicating our story of social value. The ALA defines this value in the following terms:

> ... ameliorating or solving the critical problems of society by informing or educating the community of these critical problems, encouraging the examination of multiple views and facts, and a willingness to take a position on current critical issues.

Given these values concerning the library's social responsibility, our next step is to identify the normative practices through which they are realized. Normative practices specify how things should be done or the legitimate means of value creation.[24] As a profession, we are defined in terms of our values, and as such most professional practices will necessarily, though not always explicitly reflect these values. To conceptualize the link between normative values and practices, we can look at practices such as instructional services. For example, the Framework for Information Literacy for Higher Education[25] frames the information literacy concerning "Authority is Constructed and Contextual" in terms of social responsibility, by describing an information literate person's understanding of the biases "...[that] privilege some sources of authority over others, especially in terms of others' worldviews, gender, sexual orientation, and cultural orientation."[26] Given this normative value and practice, legitimacy is created, through the degree to which the perception of these values and practice fit community morals. We will turn to our case study to see an example of the role of the normative element in creating legitimacy.

The goal of our case study was to communicate the social value of library services in terms that would be understood and valued by our community. One element of our story was drawn from our cultural-cognitive analysis in which we identified our community's ideals of "transforming lives and strengthening community," and its beliefs in diversity and inclusiveness, community engagement, and global and intercultural learning for realizing those ideals. The second element of our story concerned the principles through which other units aligned themselves to the university's ideals, and the standards through which they assessed the degree to which others supported those principles. The last element of our story involves writing the narrative of the library's normative values and practices in terms that aligned with community morals. A simple example of this story was the documenting of our one-shot instruction in terms of the use of diversity-oriented resources such as LGBTQ, African-American, or Native American databases, and whether issues of social justice were discussed. The story of these instructional sessions was told in two manners. Firstly, it was framed in terms of the library's larger efforts to communicate its normative values and practices in terms of supporting the university's commitment to transforming lives and strengthening community through its belief in diversity and equity. More specifically, we reported these instructional efforts in terms of meeting the Office of Inclusion and Equity principles concerning the recognition and nurturing of different and unique identities through meeting the standard associated with the integration of information on marginalized communities within course work.

The communication of the normative values and practices becomes the story of the library through its alignment of the morals of our community. The success of that story is dependent upon the degree to which those normative values and practices fit with both the cultural-cognitive ideals and beliefs of the university and external community members' regulative principles and standards. The role of the normative element is, as Drabinsky and Walter[27] suggest, to balance the values that define our profession against the concepts of value through which our communities assess the worth of our practices.

Conclusion

The concept of legitimacy provides a rigorous theoretical framework for communicating the story of social value created through library services. To tell this story requires the inclusion of three elements: (a) the cultural-cognitive; (b) the regulative; and (c) the normative. The cultural-cognitive element is concerned with our community ideals and the beliefs. The regulative elements are the principles and standards through which community ideals and beliefs are assessed. Lastly, the normative element represents the values of the library. The goal of our story is to align the internal normative elements of our services with community cultural-cognitive and regulative elements. The greater the alignment, the greater social capital that will be allocated to sustain the library as a durable social institution.

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Assessing and Improving the Experience of Underrepresented Populations: A Participatory Design Approach

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Introduction
Assessment practices provide essential data for informing evidence-based decision-making in libraries. In an effort to better understand library user communities and to assess library services from the perspective of specific groups, the user-centered methodology of participatory design offers a promising path forward. Participatory design is a socially active, values-driven approach to co-creation that seeks to give voice to those who have been traditionally unheard. This paper describes a parallel participatory design process undertaken by Pennsylvania State University (PSU) and Montana State University (MSU). Each project team facilitated a series of 10 workshops with student participants from distinct populations: PSU worked with first-generation students; MSU worked with Native American students. In this paper, we present a brief background of participatory design, case study overviews, and recommendations for practicing participatory assessment.

Context and Literature Review
Library user communities are multifaceted and diverse. In order to adapt and improve library services for the diversity of library users, the library assessment community has become increasingly attuned to the experiences of traditionally underrepresented populations. In an extensive literature review, however, Neurohr[1] notes that only a few assessment studies address underrepresented students and academic libraries. These relatively few studies include rural and tribal library communities,[2] international students,[3] Latino students,[4] first-generation students,[5] Indigenous peoples,[6] and transfer students.[7] Taken together, these studies demonstrate a motivation towards assessing and improving the library experiences of diverse communities. This shift toward critically assessing the needs of multicultural users is significant for our field,[8] as it requires an empathetic appreciation of the individual journey of users.[9] The relative scarcity of such studies, however, also demonstrates the significant and continued need to better understand our users' diverse and unique experiences, and to design library services with and for specific populations. The present study is motivated by these needs and adds to a growing body of critical assessment literature by proposing participatory design as a culturally-attuned method for library assessment with traditionally underrepresented populations.

Participatory design is a socially active, values-driven approach for co-creating mutually-desired outcomes across multiple stakeholder groups.[10] As a socially active approach, participatory design attends to matters of power, working to identify and rebalance material and social inequality.[11] As a values-driven approach, participatory design adheres to a set of design principles that include mutual learning, power sharing, and the equal recognition of expertise among all participants.[12] Since it was developed in the mid-1970s, participatory design has been applied across disciplines to co-create new, mutually-beneficial products and services within a diverse range of communities.[13]

Participatory design has also been applied in libraries as a methodology for co-designing services with users. Wood and Kompare, for example, applied a range of participatory design tools and techniques for assessing and improving a library website in collaboration with student participants.[14] A report by the Council on Library and Information Resources presents a diverse series of case studies showing that participatory design can enable diverse stakeholder groups to communicate and co-create in a library environment.[15]

As a method for assessing and improving the experience of library users, participatory design can be empowering for participants, responsive to diverse cultural identities, and effective for generating and evaluating new ideas.[16] The case studies and discussion below presents the details of participatory design in practice.

Case Study Introduction

To better understand and apply participatory design, PSU and MSU followed a parallel design process. With a parallel design technique, multiple teams follow the same set of processes and requirements, but work independently to complete the project.[17] Parallel design allows a single process to produce different results and insights, which can then be shared and combined in refining the final design process. For this project, assessment teams at PSU and MSU applied participatory design as an approach for engaging underrepresented student groups in the assessment lifecycle. Each team followed a similar process and worked with different populations, MSU with Native American students during the spring 2017 semester and PSU with first-generation students during the spring 2018 semester. During the fall 2017 semester, the MSU team led a series of train-the-trainer sessions with the PSU team that provided a practice space for the facilitators that proved valuable for the success of the projects. Details of our process are outlined below through case study descriptions, followed by a discussion of lessons learned and recommendations for practice.

Participatory Design Activities, Sequencing, and Staging

Participatory design seeks to engage participants in a process of creative and critical thinking. Activities created for this purpose serve to help structure dialogue and guide conversation towards productive, community-based insight. For our process, activities were selected from four sources:

- Brand Deck[18]
- Intuiti Creative Cards[19]
- 75 Tools for Creative Thinking[20]
- Gamestorming[21]

Activities from these resources were sequenced through three primary design stages:

1. **Exploration.** In this stage, participants get to know each other and begin to explore the problem area. The goal of the exploration stage is to identify key issues that affect participants within the scope of the problem space. In our case, our "problem space" was framed within the students' library experience.

2. **Generation**. In this stage, participants work together to generate new ideas and strategies for addressing the key problems identified in the exploration stage. The goal of the generation stage is to create multiple options for new services or products that can improve the lives or experiences of the participants.

3. **Evaluation**. In this stage, participants evaluate the ideas that emerged through the generation phase, and select one or more ideas to move forward towards implementation.

In our in-depth case study discussions below, we include descriptions of key activities that highlight each design stage, including discussion of the selection and sequencing of activities. Activities varied across the groups due to differences in participant feedback and project direction. The full list of activities for MSU and PSU is included in the appendix.

Exploration Phase
Penn State

For the group at Penn State, campus partners helped to facilitate the recruitment of six first-generation students who bonded very quickly with one another. These students connected over a variety of things.

Throughout the beginning sessions, conversations discussed anxiety around the cost of attending Penn State, meeting expectations of their parents and family members, pressure they received from their family to perform well and succeed at Penn State, and their desire to not let anybody down during their time as an undergraduate.

In the first session, all participants and facilitators created timelines explaining their experiences that led them to arriving at Penn State (see Figure 1). This activity allowed participants to see commonality with their peers and see that the facilitators were invested in getting to know the participants. In reviewing the timelines, the facilitators were able to see how some participants focused on accomplishments and others had their timelines driven by social events or academic milestones.

Fig 1. *Timeline* **activity completed by a PSU participant, showing their journey to Penn State.**
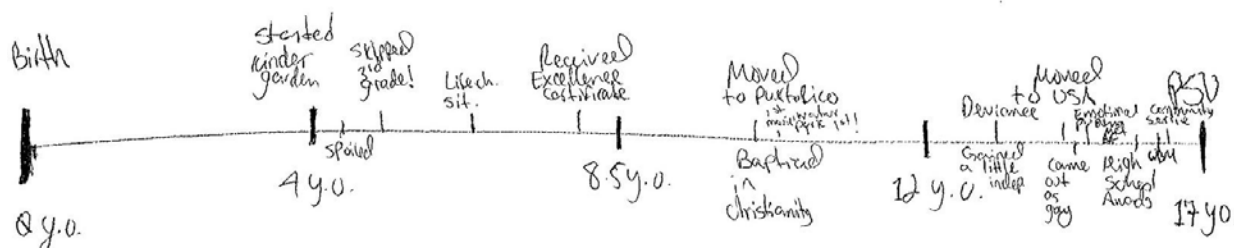
The foundation created in the first session allowed the group to have a larger breakthrough in the second. During the second session, facilitators used Intuiti Creative cards. These cards have more abstract drawings on them and required the students to creatively interpret the images. The students were asked to pick three cards to tell the story of where they are, where they would like to be, and how they were going to get there. Several of the students mentioned that the "where they wanted to be" was a place where they felt grounded, and the time it would take to get there was their journey or path.

In working with the Intuiti Creative cards, one of the facilitators asked the students what they felt would be the biggest challenge or barrier to reaching where they wanted to be. After a brief moment of silence, one of the older students, a senior, spoke to the group about being a first-generation student. She talked about what she has learned being a first-generation student at Penn State. This opening up was just what the group needed to ***really*** start talking to each other. Looking back, this was a crucial point with the group, because the students felt comfortable sharing their experiences and opening up with one another. During the final, debrief session, the students shared that one thing that surprised them about this experience was how deep they had gone with their peers during the 10 sessions.

Montana State

The group at MSU began with getting-to-know-you exercises. Participants for the project were identified with the help of the director of the university's American Indian Center. With a common identity as Native American students, participants began sharing their similarities and differences through exercises such as the ***Great Pie***. This exercise, drawn from 75 Tools for Creative Thinking, asks participants to draw a pie chart that represents their day-to-day activities (See Figure 2).

Fig 2. *Great Pie* activity completed by an MSU participant, showing various day-to-day tasks. This activity serves an introductory purpose.
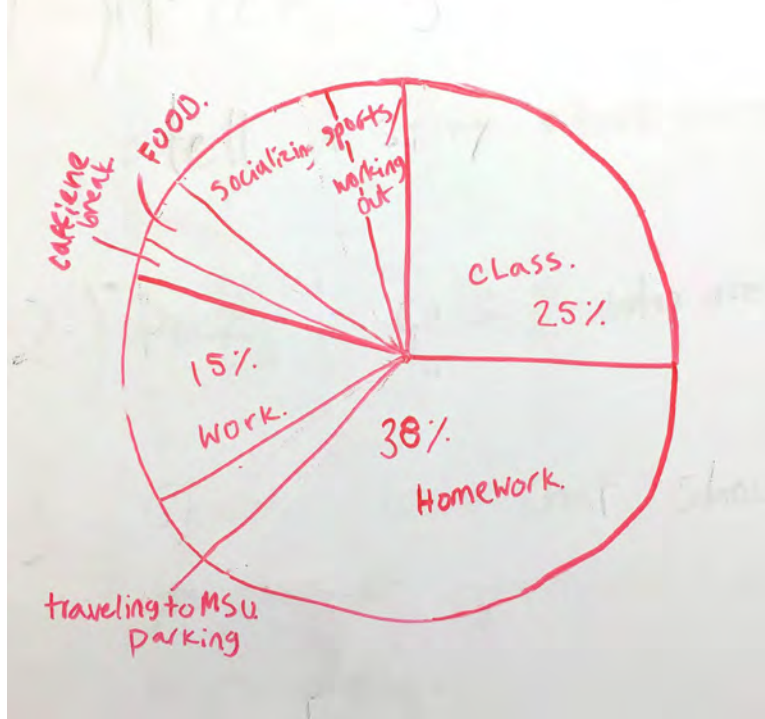
The Great Pie helps participants begin to share insights about their daily life and to get to know each other. Introductory exercises like this are important for cultivating an open, trustful space of creative thinking. After participants established a rapport through activities like the **Great Pie**, we then turned the focus of our conversations to the library experiences of the participants. The activity **Mind Map** helped illuminate participant conceptualizations of the library as an entity (see Figure 3).

Fig 3. *Mind Map* activity completed by an MSU participant, showing a visual representation of the related parts of the library.

The **Mind Map** allowed each participant to share their idea of the library. The mind map is a useful framework for showing interconnections among different components of the library. In the example mind map above, the library is shown to be understood as primarily comprised of study spaces, coffee, research help, computers, and information resources. Each participant shared their mind map and the group discussed "pain points" present within the maps. Through the discussions around the mind maps and other activities, it emerged that students felt overwhelmed and intimidated by the scope and scale of a large university library. Particularly for Native students, who encounter study spaces occupied mostly by non-Native students, the physical space of the library can appear to be unwelcoming due to long-standing and looming racism. Through the exploration stage of the participatory assessment process, these feelings of being unwelcome and intimidated emerged as a key factor affecting participants' library experience. With this issue in mind, the group moved to the generation stage, and began generating new ideas and strategies for addressing this key problem.

Generation Phase
Penn State

It was during the fourth session that the Penn State students and facilitators uncovered their first problem, and these conversations would shape our future sessions. The fourth session was a boundary spanner session; it was both an exploration and a generation phase session. The group did a second **Unpeeling the Onion** activity to more deeply explore the students' perceptions and relationships to the Penn State Libraries. In their onions, students identified that, while they enjoyed studying at the library, many felt the library could be crowded and distracting. These elements of the library contributed to the idea that the library was not inclusive to all learning styles. A few of the students in the group talked about how the library was not their favorite place to study; one of the students shared that, before this study, she had only been to the library twice and neither experience was overall positive (see Figure 4). Using this activity allowed us to explore the students' experiences in the library and we began to uncover the problems they saw with the space, services, and accessing resources.

Fig 4. *Unpeeling the Onion* activity completed by a PSU participant, showing their relationship and experience with the Penn State Libraries.
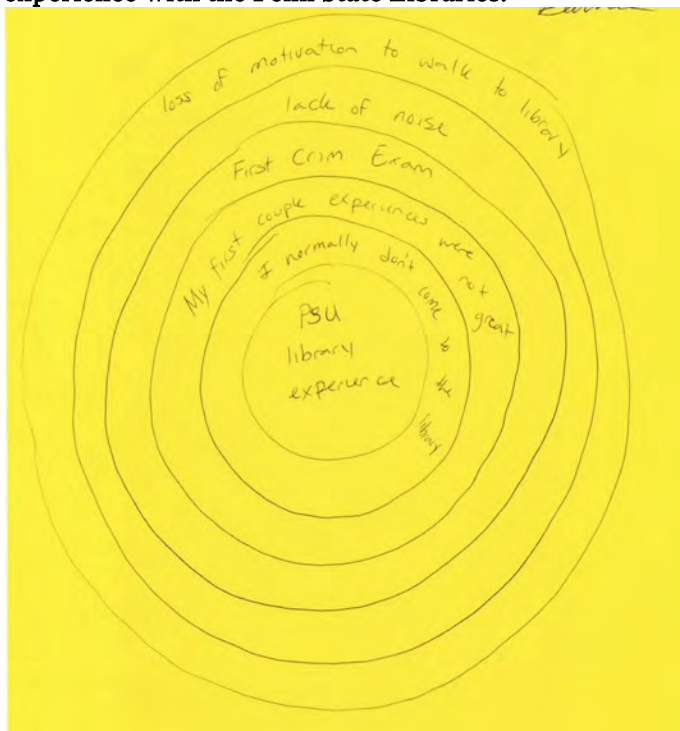
By the end of the sixth session, we had identified and articulated our two biggest problems:

1. Due to either no information or misinformation, first-generation students might have issues feeling like they belong in the library or are just intimidated by the library. This might be caused by preconceptions of what a library is, along with no context, limited role models, and lack of instruction.

2. The library as a noisy place, paired with a lack (sometimes) of policy enforcement for those students being rude/disruptive.

After careful reflection, we chose to pursue the first problem; sessions seven and eight focused on activities meant to discover ideas to help with this problem. The facilitators did their best to let the students brainstorm ANY idea, no matter what context the facilitators had on previous solutions that had been employed in the library to solve this problem. By the end of the eighth session, the group had 40-plus ideas that could be used during the evaluation phase.

Montana State

In the exploration phase, the team identified a key problem encountered by Native students—feeling intimidated by, or unwelcome in, the library. To begin the process of generating ideas for responding to this problem, participants completed the activity of **Predicting Next Year's Headlines**. In this activity, participants are asked to think into the future and to imagine that a publication is writing an article on the results of the project. The prompt for this activity asks the participants to write a headline for that article. This future-oriented activity helps participants share their desires for the project and can generate ideas and consensus for possible outcomes. One participant generated four different possible headlines, including one that read, "Native American Students Help Improve Library Usability." (See Figure 5.)

Fig 5. *Predict Next Year's Headlines* activity completed by an MSU participant, showing the desired future results of the project.
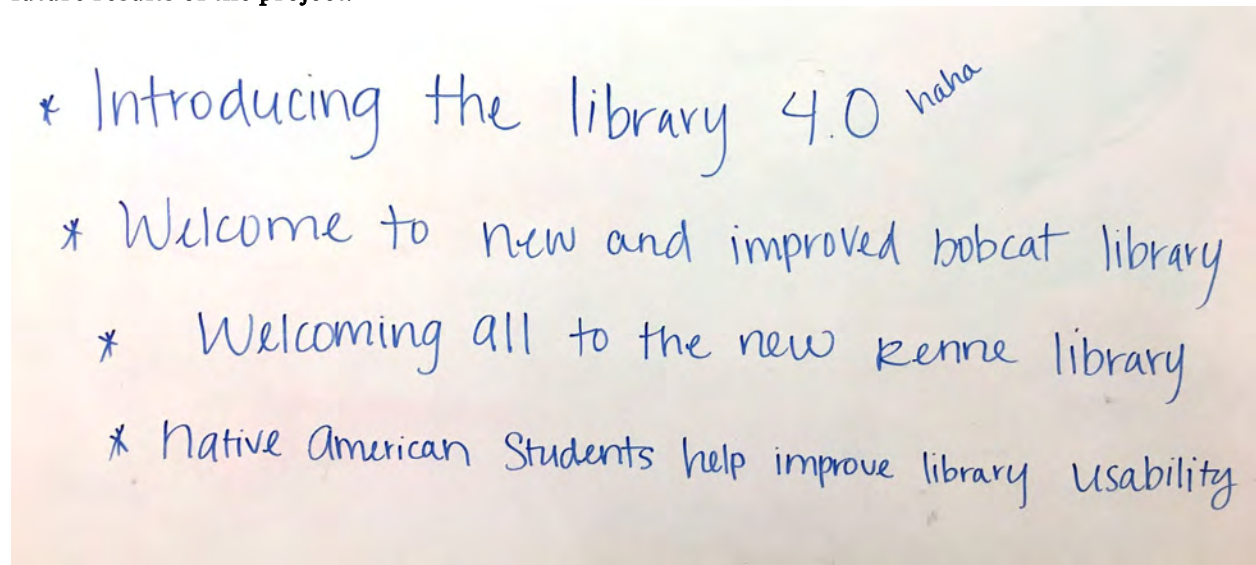
Predict Next Year's Headlines illustrates the generative stage of the design process. The particular example above also illustrates the participatory nature of the process, as the participant recognized that the students themselves were essential contributors to the project. All participants then shared their headlines, and the group discussed shared goals. The evidence from the headlines activity along with the other activities in the generation stage informed these discussions. What emerged from this conversation was a collective desire to improve the ease of use of the library for Native undergraduate students by creating a new library promotion

and outreach campaign for the university's Native community. Our next step was to generate further detail around this shared goal.

The activity **Clockwise** allowed the group to develop ideas for promotion and outreach. In this activity, participants assign different ideas to the numbers around a clock face. Two dice are then rolled so that two numbers can be matched together randomly. The group then discusses the two ideas together, which sparks more new ideas. In our case, the clock face was populated with ideas for promotion and outreach, such as posters, brochures, radio spots, and a social media campaign (Figure 6).

Fig 6. *Clockwise* activity completed by MSU participants. This activity generated new ideas for outreach services for students.
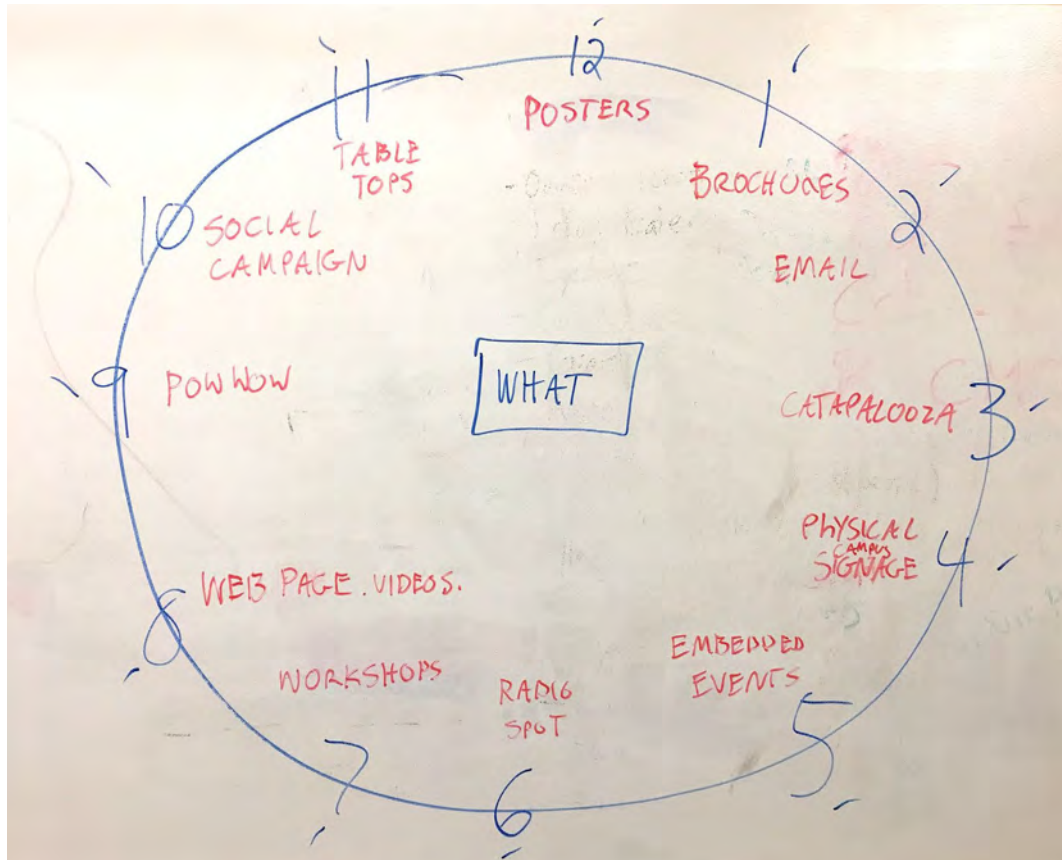
The dice roll then combined these ideas together randomly. The group discussed these ideas and continued to mix and match until a feasible and desirable idea emerged (Figure 7).

Fig 7. *Clockwise* activity completed by MSU participants. In combining multiple ideas together, new ideas emerged. Red highlights mark the final idea for a promotional poster series.
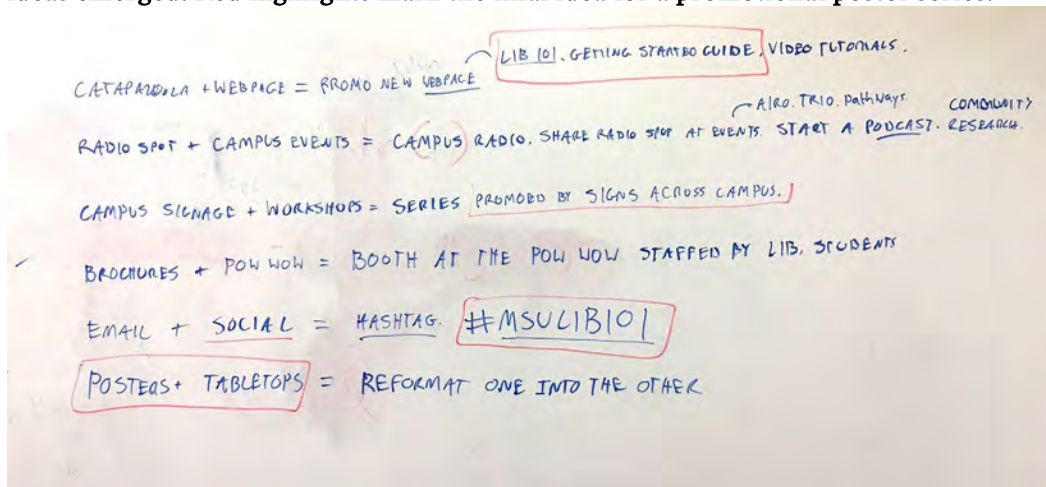
The ***Clockwise*** exercise produced the idea for a multi-part promotional poster series and social media campaign. Follow-up conversations revealed that this idea was desirable within the group, feasible in terms of sustainability, and viable insofar as it could be achieved by the group within our time frame. We then turned to the evaluation phase to further refine this idea and drive towards conclusion.

Evaluation Phase
Penn State

During the ninth session, the facilitators took the many ideas that had been generated in the previous sessions and discovered four, overarching themes the ideas shared. These four themes were:

3. Tours/gamification of library

4. Library going to the students

5. Library promotion

6. Increasing student voices

To start the ninth session, the facilitators had the students select the top two themes they wanted to focus on. The students selected "Library going to the students" and "Increasing student voices." With those two themes, the group went through the checklist activity. This activity asked the students to take an idea and think through the necessary knowledge, skills, scale, time, and resources needed to make the idea possible. While this activity did not work out perfectly, it did lend itself well to really talking through some ideas and thinking about the various elements needed to make an idea work. Again, the facilitators made sure to allow any idea to be discussed, regardless if the library had already tried that idea in the past.

From this conversation, a few necessary elements came out through the checklist activity. These elements included:

- Creating a strong pitch about the library that an engaging student can deliver to their peers. The group spent a lot of time talking about the necessary personality characteristics someone would need if they were to go into first-year seminar or large lecture classes to discuss the many great things about the library.

- Student leaders needed a holistic picture of the library. Whether it be library student employees or students in a library club, the students agreed that these ambassadors for the library needed a holistic view of the library and the various services and resources it provides.

- Providing incentives to students who participated in library workshops or participated in a library student group. Just like the pitch, there is value in providing an enticing incentive.

- Scale. Throughout the conversation, the facilitators kept asking the students if the ideas they had were scalable and if reaching every student at Penn State was the goal. The students quickly recognized that reaching every student was not possible, and in order to scale most efficiently, the focus should be on foundational classes or large lecture classes that could result in a high impact.

In the end, the Penn State students did not identify one solution, but instead proposed a set of characteristics and traits that should be included in any solutions that would be put forward after their study to help raise students' awareness of the library.

Montana State

The evaluation stage focused on refining and creating the idea produced during the generation phase. In designing the promotional poster series, a leading factor for refinement included the content of the posters. To help shape discussion on this topic, participants completed a *Smiley Voting* activity. For this activity, participants brainstormed various library services that could be featured on the posters, including coffee, the writing center, and checking out books and technology. Working on a whiteboard, each participant then placed smiley faces next to the services they thought were the most important to feature (see Figure 8). The mechanics of this activity are important, in that the votes allows for more equal access to the whiteboard. Participants can then express why they placed their votes next to certain services and not others. Consensus emerged from this discussion and the group decided on seven services to feature: finding the library, tutoring, writing center, research help, group study rooms, coffee, and technology checkouts. The number seven also carried specific cultural meaning for members of the group.

Fig 8. *Smiley Voting* activity completed by MSU participants. This activity allowed participants to share votes and produce a ranked priority list relating to different library services that would appear on the promotional poster series.
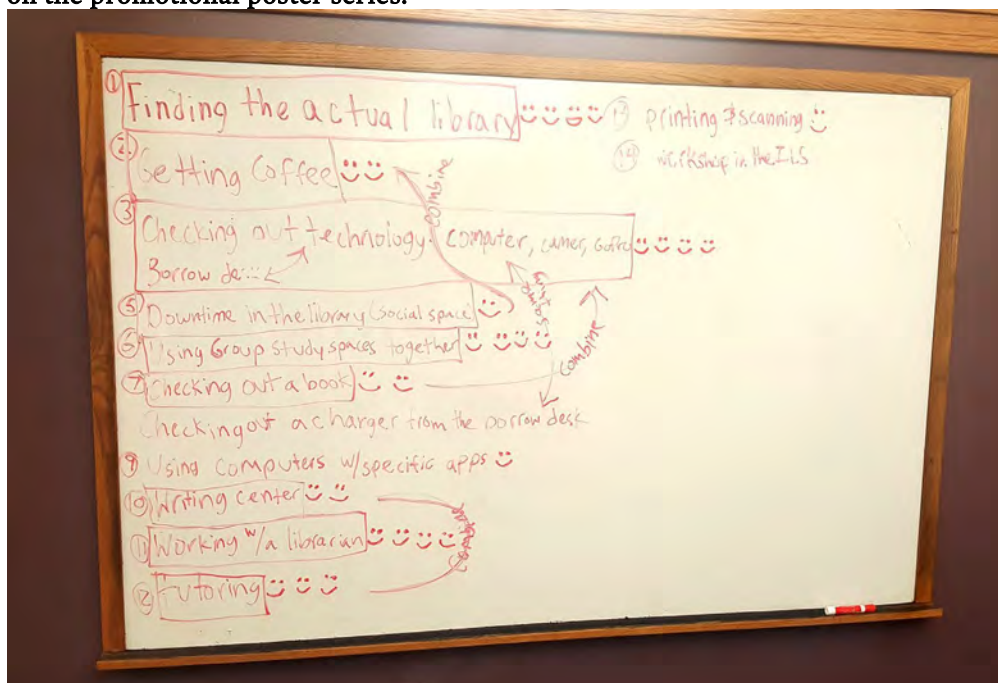
With the content of the posters collaboratively determined through Smiley Voting and other activities in the evaluation stage, we moved forward in creating mock-up designs of the posters with **Paper Prototyping** (See Figure 9).

Fig 9. *Paper Prototyping* **activity completed by an MSU participant, showing an early model for the promotional poster series.**
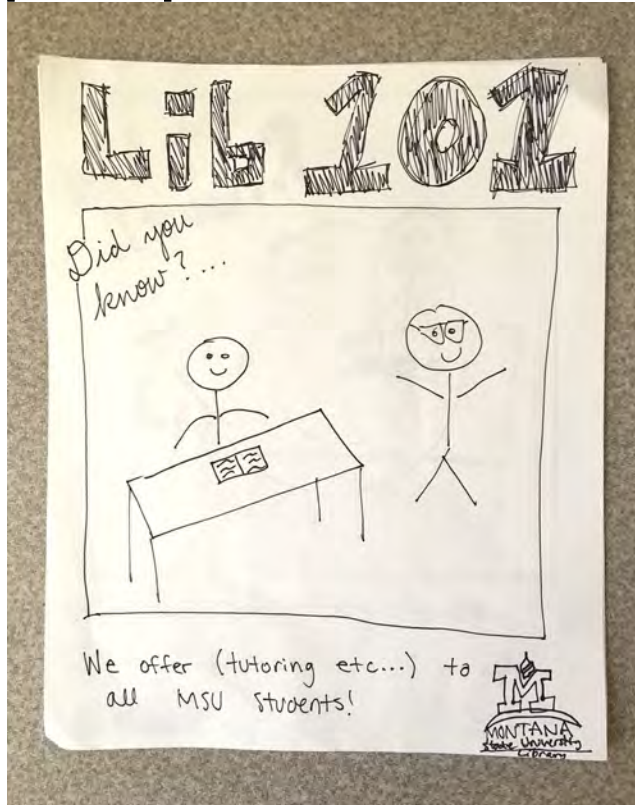
The group ultimately created a seven-part promotional poster series and social media campaign, titled #MSULib101 (See Figure 10).[22]

Fig 10. The final design for the MSU promotional poster series.
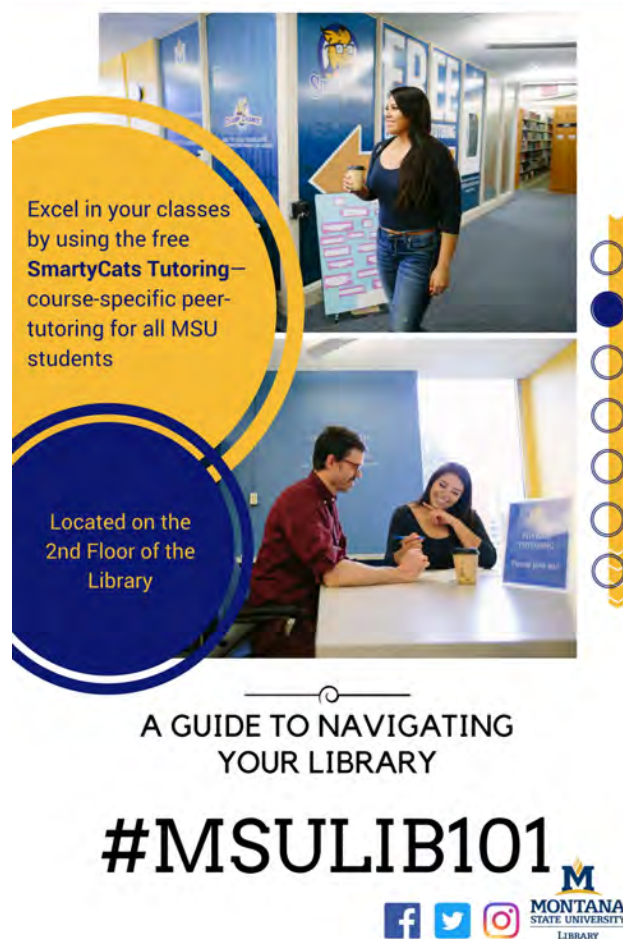
Case Study Outcomes

Participatory design works to produce two primary types of outcomes: practical and political.

Practical Outcomes

Through this process, the first-generation student group at PSU produced new service designs for engaging other first-generation students, while the Native American student group at MSU produced a seven-part poster series and social media campaign designed to welcome Native American students into the library.

Political Outcomes

In addition to co-designing new services, participatory design also aims to generate political outcomes that focus on empowering participants. The foundational values of participatory design include mutual learning, power sharing, and the equal recognition of expertise among all participants. Within this equity-focused, participatory framework, the student participants became expert library users who expressed readiness to advocate for the library to their peers. More than that, the students—members of underrepresented populations who often feel at the margins—developed a stronger sense of place and confidence on campus that will contribute to their success at our institutions. And for the librarian facilitators, the in-depth co-design process enhanced our ability to understand these student populations. We gained new insights into the experience of our student participants that we can apply to better serve these important populations. Ultimately, the participatory design process equipped us with the tools and insights to assess and improve the conditions of their success.

Recommendations for Practice

Based on our experiences at Montana State and Penn State, we have a few recommendations for those interested in implementing a participatory design study at other institutions. The recommendations below are practical and will help ensure that participatory design can be one effective methodology within a library's broader assessment program.

Resources

Time and money can be one of the biggest challenges in supporting this type of project. For the lead facilitator and others involved with the project, there is a lot of time invested in both preparing for the sessions and then the act of leading the sessions with the participants. Because this method relies on the participants to drive the direction of the project, the facilitator cannot plan too far in advance. For both Montana State and Penn State, the facilitators would spend a few hours leading up to and after each session, documenting the work done by the participants and planning ahead for the next session. This time is needed to help shape the project, document the process, and ensure that the results are something the group can work with at the conclusion of the study.

The time commitment for participants is also a challenge to be addressed. Both projects included ten one-hour sessions and their success relied on continued student participation. We recommend considering how to address this challenge from recruitment through project completion. In recruiting students for both MSU and PSU, participants were provided monetary compensation for their participation. At PSU, students were promised up to $150 in incentives, such that each participant received $10 at the end of each session and an additional $50 if they participated in all 10 sessions. At MSU, students were paid an hourly wage of $12. Additionally, the volunteer recruitment form included questions inquiring about commitment to all 10 sessions, interest in scholarship opportunities, and a question asking why they should be selected for the opportunity to participate. While the appeal of a substantial cash incentive was the primary motivation for participating, the questions on the volunteer form communicated the importance of committing to all sessions and the participatory nature of the project. In addition, since all participants are paid for their role in the project, there is a need to have resources that can be drawn from and given to the students.

Participatory design projects of this variety require substantial logistical efforts to ensure smooth session administration and participation. To that end the project requires, arranging for a space to conduct each session, recording equipment as desired, instruments and peripherals for session activities need to be pulled together, coordination is needed for providing food and monetary incentives including necessary forms and signatures, and frequent communication with participants (texts sent the morning of each session) is essential.

Assessment

Assessment for participatory projects often focus on one or more of three key aspects: the design process, the design product, and design sustainability. In terms of process, assessment can focus on the operations of the project and the type and depth of participation that occurred. In terms of product, assessment can focus on the tangible result of the process and its implementation. And in terms of sustainability, assessment can focus on the immediate and longer-term impact of the process and the product on relevant communities. In our cases, the process and the products of our projects were validated with participants throughout the duration of the projects and at its conclusion via informal interviews and reflections. In this way, assessment itself also worked towards participation.

Session Reflections

A habit of regular reflection is key to documenting a participatory design study. The lead and secondary facilitator should anticipate spending approximately an hour after each session documenting what has occurred and begin to connect the dots between sessions. Waiting too long after the session can result in a less robust summary and, perhaps, the loss of valuable data and insight. Another strategy Penn State used was to have someone who did not help facilitate a session watch the video recording. Then, using a facilitator's reflection, the video recording, and reviewing scans of written artifacts, they could write a more

general summary of the session. These multiple perspectives can be useful later, after the study has concluded, in writing up reports, scholarship, and moving forward with recommendations made by the participants. During the study, reflections assist in providing direction for the next session and preparing the secondary facilitator for future sessions.

Facilitation

When putting together a group to lead a participatory design study, it is important to create an intentional team. This team should have colleagues from multiple departments and with various roles within the library. Having team members with different levels of student interactions, various networks, and assorted responsibilities for the oversight of library programs can be instrumental in connecting with the student participants, creating an engaging set of sessions, and implementing student ideas. For both Montana State and Penn State, our assessment departments played a key role in the processes, and they added colleagues who would help in a variety of ways.

From the team, one lead facilitator, who has the capacity to devote considerable time to the project, is crucial. This lead facilitator will serve as the bridge between the sessions, helping to gain trust with the participants, and help their colleagues easily move in and out of sessions as the secondary facilitator. The lead facilitator should have a good understanding of institutional culture and constraints. This insider knowledge will allow them to help guide participants, especially in the evaluation stage. While we want participants to freely share ideas, with no constraints or limitations, a lead facilitator is needed to help shape those ideas and provide any necessary context to the participants. While secondary facilitators are crucial in running the sessions and getting to know the students, the secondary facilitators often noted there was some disconnect when they did not attend the sessions regularly.

Finally, in building this team, it is important to provide an opportunity for facilitators to have some train-the-trainer sessions before actually guiding students through the design process. MSU, for example, offered a series of "design sandboxes" for library staff in the months leading up to the project. These informal sessions allowed the project team to practice and experiment with design activities and sequencing in a low-stakes environment. These training sessions allow the facilitators to try out activities, practice facilitation skills, and learn more about the participatory design process. If all facilitators are trained at the same time, it creates the opportunity for the research team to better get to know one another, which helped contribute to making the process more comfortable for the students.

Participant Recruitment

Your research team should include members who have networks outside of the library. Depending on the student population you hope to explore, you will want to find colleagues who might have connections with these stakeholders, or build in time to build relationships with the communities you wish to work with. These stakeholders might be program coordinators for TRiO or new student orientation, student leaders for relevant student clubs, or other administrative units like the registrar's office who would know how students are classified in the institution's system. When it is time to recruit, you will want to make sure you have the necessary and appropriate community connections in order to build a group of student participants.

Conclusion

The process of introducing an element of participation to assessment allows for more voices to come forward in the assessment lifecycle. As one tool in the assessment toolbox, a participatory design can bring together meaningful user-centeredness with evidence-based decision-making. With its attunement to power dynamics, equal expertise, and mutual learning, participatory design is also well suited for assessment projects that focus on non-traditional user communities. As is evident in the above case studies, participatory assessment put the user in the driver seat, and often these users can co-create new ideas or amplify existing ideas for improving library services. Ultimately, participatory design can be an empowering, culturally responsive, and effective approach for designing and assessing library services and experiences.

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18. "Brand Deck," https://branding.cards/. This card set provides a controlled vocabulary of words that participants can use to guide discussion.
19. "Intuiti Creative Cards," Intuiti®, https://intuiti.it/. This card sets contains illustrations that can prompt creative thinking.
20. "75 Tools for Creative Thinking," http://75toolsforcreativethinking.com/. This toolkit contain 75 activities that cover the full range of the design process.
21. "Home," Gamestorming, http://gamestorming.com/. This collection of activities contains a helpful introduction to the design process, as well as numerous activities for all stages of the design process.
22. For the full presentation of posters, see http://www.lib.montana.edu/about/msulib101.

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Appendix
Table 1. Participatory Design Activities.

Design Stage	Penn State	Montana State
Exploration	Time Machine The Great Pie Intuiti Creative cards Unpeeling the Onion (twice) 4Cs	Interviews Vision cards Great Pie Mindmap Build Your Vehicle The Time Machine
Generation	Library is/is not Predict Next Year's Headlines Consequence Triangles Library FAQ Library Tour Clockwise	Predict Next Year's Headlines Collage Journey Map Value Curve Clockwise
Evaluation	Dot voting Checklist	Club Members Smiley Voting Paper Prototyping Storyboarding
Final	Memory wall	Final design creation

1G Needs Are Student Needs: A Mixed-Methods Approach to Understanding the Experiences of First-Generation College Students

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Abstract

How can Duke University in general—and the Duke Libraries in particular—further support the success of its first-generation (1G) college students? To explore this question, a cross-departmental team of library staff conducted six focus groups with 1G students during the 2017–2018 academic year and analyzed responses from the biennial student survey (overall N = 2,381) with the 1G status demographic (N = 127). Overall, the existing research on 1G experiences generalizes to students at Duke. While 1G students' experiences are not monolithic, we identified nine findings relating to 1G students' experiences on campus and in the libraries. These findings identify patterns of common difficulties among students and suggest points to leverage for intervention and support. This paper summarizes the research team's methodology and findings and describes ways that library staff and campus stakeholders have implemented the team's recommendations to improve library services and access for 1G students. While this study focused on the experiences and needs of 1G students, it should be emphasized that 1G challenges are student challenges: support or expansions of campus and library services targeted toward 1G students will help all students succeed.

Background

First-generation students, many of whom refer to themselves as 1G, can encounter experiences unique to their background in a university setting. While many are successful, 1G students typically do not have family experience to draw on in navigating college life. They are also more likely to hold financial and other responsibilities that impact their academic and social life.

After analyzing Duke students' responses to the 2015 COFHE Enrolled Student Survey,[1] library staff became interested in learning more about 1G students and determining whether studies conducted elsewhere translated to Duke students' experiences. A team of staff from Research and Instructional Services and Assessment and User Experience studied a subset of Duke's 1G population to learn more about these students' university and library experiences. In September and October 2017, the team conducted four focus groups with first-generation college students at Duke, followed by two additional focus groups with first-year students in the spring of 2018.

Prior to planning the focus groups and survey, the team contacted the Duke Office of Access and Outreach (A&O)[2] to understand the overall landscape for Duke's 1G students. The team learned that 1G students comprise approximately 10% of all students, which translates to roughly 170 students in each class. About 20% of 1G students (60 incoming) are offered admission to the Rubenstein Scholars (RS)[3] program, a merit-based program offering a full scholarship and additional funding for services such as parent visits. While all 1G students have access to a set of core services—including a pre-orientation program, a faculty lunch series, social outings, and support from A&O—RS receive additional support and onboarding, and program evaluation conducted thus far has primarily occurred within the RS program. This team chose to study both RS and non-RS 1G students.

Methodology

The team first contacted the Institutional Review Board (IRB) to verify that IRB review was not necessary for the project, given that the team does not plan to retain identifying information or use findings to attempt to draw generalizable conclusions (rather, the team intends to use findings for internal improvement only). The team then gathered and reviewed relevant literature (Appendix A, Selected bibliography) and reached out to colleagues to discuss similar work that had been performed at other university libraries (e.g., survey

and focus groups conducted with 1G and non-1G students by Stacy Brinkman and her colleagues at Miami University[4]).

In consultation with A&O, the team formed a recruitment strategy and planned the content of the focus groups (Appendices B and C, Focus group scripts). The team decided to conduct six focus groups: three with upperclassmen, one with RS upperclassmen, and two with first-years. Working with A&O and staff in the Institutional Research Office, the team sent focus group invitations (Appendix D, Recruitment email) to 411 1G sophomores, juniors, and seniors in the fall of 2017. The recruitment email resulted in 28 volunteers, 16 of whom were scheduled for focus groups in September. We were unable to schedule a seniors-only group and so instead had three mixed focus groups. The RS recruitment email was sent to 27 students and resulted in five volunteers, two of whom were able to be scheduled for a focus group in October.

Recruitment for first-year focus groups was conducted in the spring of 2018, to avoid the potential stress of attending a focus group during one's first semester at Duke, and to allow more time for reflection. Similar email procedures were followed.

Figure 1: Structure of focus groups conducted with 1G students during the 2017–18 academic year

| Mixed (Sophomores to Seniors) | Mixed (Sophomores to Seniors) | Mixed (Sophomores to Seniors) | Rubenstein Scholars | First-years | First-years |
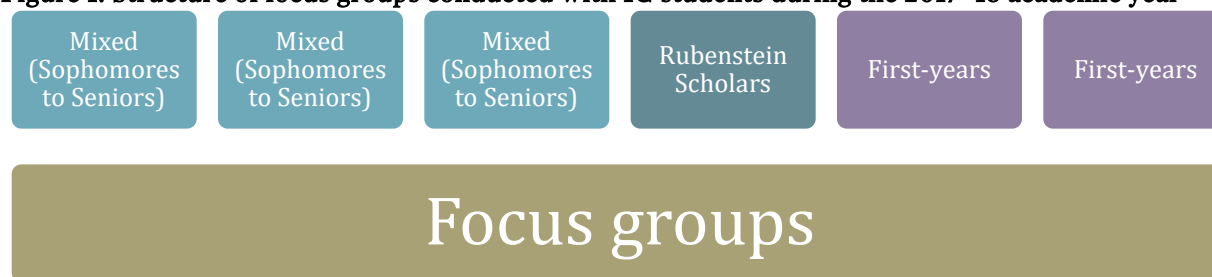
Focus groups

Four focus groups for sophomores, juniors, and seniors were conducted in the fall semester; two focus groups for first-year students were conducted in the spring.

Each of the five non-RS focus groups was attended by two DUL staff members: one to moderate and another to take notes. The two-person RS focus group was attended only by a moderator, so as not to overwhelm students with a large number of staff. All focus groups were recorded with an audio recorder to facilitate data analysis and note taking; recordings were kept in a secure location and erased once analysis was complete.

In addition to focus group findings, the team analyzed data from a 2018 university-wide survey. The 2018 survey included questions intended to illuminate how all students feel about using library spaces and services. Probes included the following: "The library is an important part of my experience at Duke"; "For me, the library is a welcoming place"; "I am confident in my ability to use library resources."[5] Library staff were particularly interested in comparing 1G students' survey responses to these types of questions to the responses from the general student population. Library staff did not conduct special recruitment to increase the participation of 1G students for the university-wide survey; 1G students were simply included alongside others in the sample provided by staff in the Institutional Research Office.

Individual emails were sent to each student in the sample, asking them to participate in the survey. Two hundred thirty-eight (238) 1G students were included in the sample, representing 5.5% of the total student sample and 10.4% of the undergraduates included in the sample. One hundred twenty-seven (127) 1G students responded to the survey (including students in the sample and students who answered a second version of the survey at an open URL). 1G students comprised 10% of the 1,254 total undergraduate respondents. This accurately reflects the composition of the total undergraduate population. 1G students' survey responses were analyzed and compared to responses from the general student population.

General findings

Finding 1. Students perceive a dearth of academic and social information capital.

We asked all focus group participants the following, "Have you ever felt like other people around you know things about college that you don't know about?" Each time, the response from the group was laughter, and an overwhelming expression of, "***Yes***, of course, all the time." One student captured the experience of her continuing-generation peers—who have family members' experiences and knowledge to draw on in navigating college—having access to a stunning amount of information that was inaccessible to her:

> "Who told you that? Have you been told your whole life you have to do this? Was there an info session I missed?"

Students repeatedly referred to Duke's demanding academic environment and the abrupt transition from their high school habits to the expectations of the classrooms of an elite university. Students reported that they gained knowledge about how to succeed academically (such as how to study or pace coursework across the semester) over time, rather than coming to Duke in possession of much of that knowledge already as many continuing-generation peers seemed to do. At times, Duke staff also take for granted how much knowledge incoming students have.

> "When I first came here, I was just so shocked by how everybody else knew how to succeed in college level classes."

> "I made an appointment with a DAE [Director of Academic Engagement in the Academic Advising Center]. She threw a lot of information at me. She spewed words at me and I had to go and Google what she said."

Information capital is not limited to classrooms; it is also used in social contexts and in navigating college life. 1G experiences are diverse: while some students reported feelings of isolation, others described feeling supported through orientation programs and a lively community on Duke's East Campus, where many undergraduates live.

While 1G students perceive that continuing-generation students are able to rely on family to guide them through myriad informational and financial challenges encountered in college, 1G students do not have access to this information from their parents. In addition, they sometimes feel unable to share the stress of college with their parents.

> "You have the pressure of pretending 'I'm okay.' My parents are so proud of me that I can't tell them what's really going on."

How do students describe overcoming this information gap? While we suspect this gap is never perceived to be completely filled, it can be assuaged through mentorship at multiple levels. Early experiences with supportive upperclassmen, graduate students, staff, or faculty are key lifelines for gaining information.

Finding 2. Finances are stressful, and an early source of feeling unwelcome.

Past research suggests that feeling that one ***does not belong*** is a global concern for first-years adjusting to life on a college campus, and one particularly poignant for 1G students. Duke is no exception to this pattern. Several focus group participants shared comments they received from their peers after revealing that they were the first in their families to attend college. Such comments can exacerbate feelings of not belonging.

> "Oh you're smart for a first-generation student. I never would have known!"

First-year focus group participants quoted other early encounters with roommates or colleagues that continued to sting. Many of these comments reflect the fact that financial security is one of the starkest differentiators between many 1G students and their peers at Duke.

"There's definitely a mentality that exists at Duke that middle class is poor and lower class is even worse. Not that everybody is like that, but it certainly exists."

When 1G students reveal aspects of their own financial circumstances to their peers, they receive blowback in several ways. For example, a few students shared that their financial aid was stigmatized, with other students suggesting that those who receive aid are very "lucky" to pay so little, or stating explicitly their own significant costs of attendance, possibly to engender shame or guilt. These experiences are formative, alienating, and angering.

"You don't understand: my family makes half of what it costs a year to come to this school. I know it sucks that your parents are paying 40 grand a year or whatever, but some of us don't even make 40 grand a year."

Overall, the gap between financial backgrounds makes itself clearly known when students arrive on campus, in ways big and small, from abrasive comments to difficulties purchasing meals or trouble participating in social events (e.g., joining other students going bowling or to the movies). While academic breaks and summers are important times to step away from classwork to refuel or reconnect with loved ones for most students, undertaking exotic travels or even just returning home to see family during the holidays is not an option for 1G students with financial stressors, many of whom must work or do not have families who can pay to support them.

"Some of us don't have credit cards that we can use. Some of us don't have $25 to add to our FLEX account. Some of us are helping our parents [financially] back home... Just because you go to Duke doesn't mean you can afford to live at Duke all the time."

Finding 3. An ecosystem of supportive offices and people on campus is critical, but knowledge of and willingness to access resources takes time.

The landscape described above is important to understand because it is the one 1G students step into when they arrive at Duke. However, peer attitudes and financial impediments are difficult intervention points. The unwelcoming comments described above come, after all, from other young adults, learning in their own way to adjust to a new environment. In contrast, faculty, older peers, and staff are better positioned to be support systems native to the institution:

"When you go to Duke resources, people are more than happy to help you. Adults at Duke are much more receptive and much more understanding of our issues as first-generation students."

In general, students spoke warmly of the many services, programs, and offices offered on campus. This included the Office of A&O, resident assistants (RAs), peer advisors, a close community on East Campus as freshmen, pre-orientation, the Women's Center, the Financial Aid office, Counseling & Psychological Services (CAPS), Duke Reach, and cultural student groups.

Figure 2: Word cloud of campus spaces that focus group respondents identified as safe and welcoming

The staff in the Office of A&O were mentioned frequently. Students praised staff members, citing their open door policy, knowledge, and willingness to offer genuine and consistent support. A&O's help navigating financial aid helps students access opportunities, such as study abroad, which would have otherwise remained out of reach. Students reported stigma associated with visiting several resources, such as CAPS, the Academic Resource Center (ARC), the Women's Center, and identity centers. Other students reported that finding the right peer support network is not necessarily straightforward.

> "I mean, I'm [Latino], but going [to Mi Gente] once, I felt really off... When I went later [in the semester] to try to join, they already had their group and clique..."

> "Same thing with the Queer Alliance here at Duke. I find them to be very exclusionary, very clique-y. (Other focus group members: 'Yeah.' 'They are.' 'Very wealthy, too.')...So, even the groups that are supposed to be for minorities, they should do better at being open."

Finding 4. The cost of textbooks is a special pain point.

In most focus groups, students shared the challenge, stress, and fear of purchasing expensive textbooks. This anxiety about textbooks rests on top of an ongoing concern about finances. Some students noted that they serve as a primary source of support for their own parents, contributing to the pressure they feel to be successful at Duke. Students described the systems they had developed over the years—often through trial-and-error—to circumvent textbook expenses. This included social networks (e.g., Facebook groups for textbook exchanges and purchases), renting or borrowing the textbook and scanning its entirety, using the library's course reserves or Textbooks on Reserve Program, and spending a long time searching for free online PDFs of textbooks. Students described extensive efforts to find affordable copies, taking great pains to maintain their workbooks so they could re-sell them at the end of the semester, and to locate upper-level textbooks that were not available through Textbook on Reserve.

> "[*Laughter*] I've never researched so hard as when I'm looking for a digital version of a textbook!"

Students who knew about and utilized the Textbooks on Reserve Program made special note of its impact and importance in alleviating some financial burden.

> "The textbook rental program has been really important and impactful for me…To get them here and be able to rent them out for 3 hours has been perfect. It's really important to have that."

Results from the library's biennial student survey also support the idea that the Textbooks on Reserve Program is particularly important for 1G students. Students rated the extent to which **more textbooks to check out for classes** would improve their library experience (response options were "a lot," "a little," "not at all," and "no opinion"). While continuing-generation students also report that an expanded Textbooks on Reserve Program would improve their library experience, 1G students said expanding the program would improve their library experience "a lot" at a rate 13% higher than non-1G peers (59% to 46%). Moreover, 1G students were more likely to report that the "print books, textbooks, and articles on reserve service" do **not** meet their needs (9%), compared to continuing-generation students (4%).

Some students described supportive professors. Others discussed feeling unwelcome and trapped when they sought understanding from professors for unaffordable textbook expenses.

> "Right off the bat, I had so many expenses I hadn't experienced in high school. Students who can't pay for a $200 textbook aren't welcome. I even talked to professors: 'I can't afford this.' [They would reply], 'You're in this class, you have to get the books.' I went to a public high school. It was so weird to come to Duke and get zero support."

Findings related to the library experience

Focus group participants and biennial survey respondents reported interacting with the Duke Libraries in diverse ways, reflecting the variety of services offered by the library.

Figure 3: Word cloud of how focus group respondents described the Duke Libraries

As reflected in **Figure 3** above, many students value the libraries' physical spaces for studying and gathering:

> "My day at Duke pretty much involves me going to class, and then me going to the library. And then, being there for pretty much the rest of the night. The library, for me, is a physical

space to be. It's a bit of a home. When I walk into the library, there's a certain shift in attitude. Now, I know there are certain things I have to accomplish."

Other students reported using library services such as printing, borrowing movies, chat assistance, leveraging librarian expertise, performing online research, borrowing technology like computers or phone chargers, and much more.

"I very, very highly utilize the library website. I have also utilized the librarians, particularly the History librarian. I was directed even further to a librarian who focuses on the Caribbean. That was insanely helpful, and it was mostly all online chat, but being directed online to great resources that we have access to has been insanely helpful to have the primary resources I need for a class project."

Results from the student survey support the idea that the libraries are an integral part of life on campus, with 80–85% of respondents agreeing with the statement that, "The library is an important part of my experience at Duke." However, continuing-generation students are more likely to "strongly agree" with this statement (50%), compared to 1G students (40%).

1G students left 79 comments on the survey. Most comments from both 1G and continuing-generation students were in response to the question, "What are your ideas for making Duke Libraries more of a safe space?" While there is no single theme to 1G comments, many 1G students report that the libraries feel safe and welcoming. A few comments about the library as a safe space are listed below:

"Making Duke Libraries a safe space is a task for those who visit the library. While the staff and building itself are a 'safe space', the conversations that can be overheard in the library by other students/patrons are not always the most welcoming or inclusive. It will take an effort on the part of everyone and a campaign to raise awareness about the need for inclusivity and sensitivity to make the library a truly safe space on campus."

"Many of the groups on campus congregate and study together. While this is understandable, it can be daunting to walk into a room full of people who do not look like you or have similar experiences while searching for a seat. Overall, Duke Libraries are a safe space, and I think their displays and literature represent the broad perspectives of the student body."

"Overall, I believe that Duke University Libraries does a great job of assisting students and helping them to feel comfortable in what can be an extremely stressful environment. Not only do the libraries help our academic endeavors, they also assist with any other type of social support that students may need."

Finding 5. 1G challenges are challenges common to many Duke students.

Broadly speaking, 1G students' survey responses did not differ from those of continuing-generation students. Both 1G and other students are generally confident in their ability to use library resources and report that they have successfully used the library and/or the library website to find research articles and books for class assignments. They find the website easy to use, believe that the library is welcoming, that library staff are helpful, and that the library is an important part of their experience at Duke.

Overall, the four areas in which more than 50% of *all* undergraduates responded that expanded services would improve their library experience "a lot" include:

- More spaces for quiet/individual study
- More textbooks to check out for my classes

- Additional specialized spaces for honors researchers, graduate students, or other student populations
- More spaces for collaborative study

Survey data indicated a few differences between the services that 1G and continuing-generation students believe to be important to their academics. **Figure 4** shows services that 1G students more frequently listed as "important" than continuing-generation students.

Figure 4: Survey responses of services that are important to students

IMPORTANT TO YOUR RESEARCH, COURSEWORK, AND TEACHING

■ non-1G ■ 1G

Service	non-1G	1G
Variety of seating options	77%	87%
Reservable project/study rooms	63%	75%
Print books, textbooks, and articles on reserve	48%	67%
Drop-in assistance at a library service desk	46%	53%
Self-checkout	30%	39%
Access to DUL's special collections	25%	35%
Scheduled assistance from library staff	22%	32%
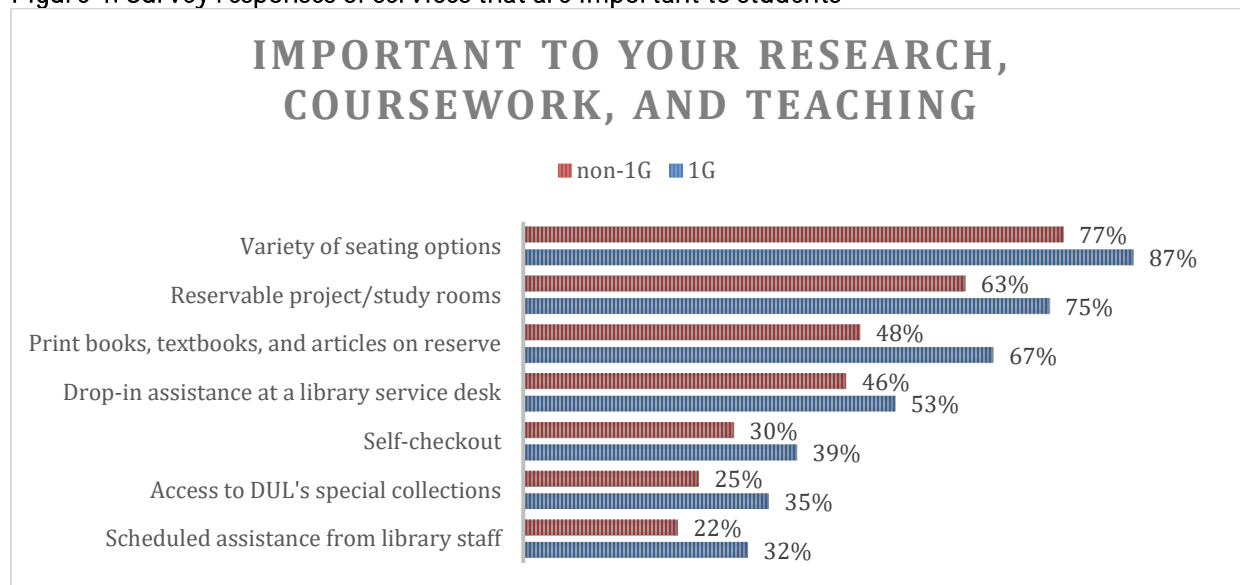
Items shown are those that reflect a greater than 10% difference between 1G and continuing-generation students.

Student survey respondents were asked what existing services met or did not meet their needs at Perkins and Bostock Libraries. While students tended to feel similarly about these items, survey data indicates that two services are particularly important to 1G students: the Textbooks on Reserve Program and the device-lending program. 1G students indicated that *additional devices and equipment to check out* would improve their library experience "a lot" at double the rate of continuing-generation students (26% versus 13%). Among 1G students, the top requests were additional chargers for devices such as laptops and phones (21% of requests) and cameras (18%).

Finding 6. It is sometimes hard to find existing resources at the library.

As students progress in their academic careers at Duke, they often require more specific academic tools. On the way, they discover the wealth and depth of resources for rigorous academic research available to them at the library. While this process of discovery is typical of scholarly growth for all students, 1G students may particularly benefit from early knowledge and access to keystone academic supports and library services.

When asked about services they wish they had known about earlier, focus group participants mentioned the Textbooks on Reserve Program, library workshops (e.g., Matlab workshops), subject librarians, short-term lockers, and the ability to reserve study rooms. Students described numerous library resources they have discovered seemingly by chance or long after their first semester at Duke. At multiple points during the focus groups, students expressed that important services are not adequately marketed or shared with all 1G students. First-year 1G students reiterated the feeling of "unknown unknowns": of understanding that many resources are available, but often finding it difficult to locate specific points of access.

Finding 7. Getting help from experts at the library is important, but difficult.

Students indicated they believe the best way to receive help is often to ask others, e.g., at a service desk, through chat, or via advising relationships. They also indicated, however, that reaching out to library staff can be intimidating or even frightening. They described an initial barrier to asking for help, even while knowing it is likely the best way to receive assistance. Students noted feeling that their questions are "silly," and they believe they have "gaps" in their knowledge. Students also reflected that it would be helpful for the person providing guidance to understand students' lack of familiarity with library resources and services.

"We have a librarian for an English department, and for the Linguistics department...but it would be awesome to have a 1G librarian. Just someone who already knows that we don't know anything, and it's okay."

Finding 8. Checking out books using call numbers is daunting.

Focus group participants frequently noted difficulty finding and checking out books using call numbers. 1G students did not pin this difficulty on library staff, but rather on their own lack of knowledge.

> "The assumption is that we've been in libraries before. They [library staff] were helpful after I admitted I didn't know my way around."

The stacks are an understandably daunting environment, especially for those unfamiliar with academic libraries. Students reported feeling supported once they made their confusion clear.

> "I remember them [library staff] just putting a number out in front of me. And I didn't know what to do with it. And I ask, 'Where do I find this?' And they're like, 'It's right there.' And I said, 'I don't know how to do this.' And that realization then washed over that person....And so they were helpful after I explained I didn't know what I was doing, but I don't think everyone can admit that they don't know how to use the system.

Finding 9. While students generally view the library as a safe space, 1G students feel less strongly that this is true.

Some of the most striking differences in responses between 1G and continuing-generation students relate to the survey question about safe spaces. For the purposes of the user survey, a "safe space" was defined as a place in which people can feel safe from discrimination, harassment, and any other emotional or physical harm. Students were asked the degree to which they agree that Duke University and Duke University Libraries are safe spaces.

Only 20% of 1G students "strongly agree" that Duke Campus is a safe space for them, compared to 36% of continuing-generation students. While it is a small percent, four times as many 1G students (4% compared to 1%) "strongly disagree" that campus is a safe space for them. Duke University has some work to do before all students, and especially 1G students, feel that it is a safe space. These responses are shown in Figure 5.

Figure 5: Survey responses, "For you, is Duke University a safe space?"
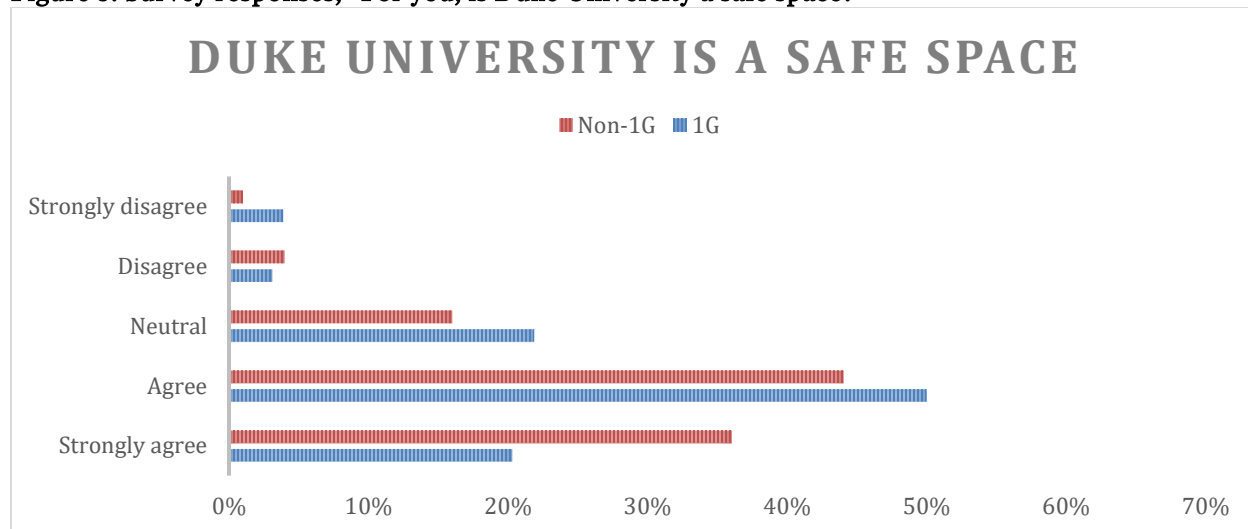
Both 1G and continuing-generation students feel strongly that the libraries are more of a safe space than Duke University. This is encouraging, as a major goal of the library is to provide a welcoming space for all. Differences in feelings about the library as a safe space between 1G and non-1G are less stark but still present: 52% of 1G students "strongly agree" that the libraries are a safe space compared to 61% of continuing-generation students (Figure 6).

Figure 6: Survey responses, "For you, is Duke Libraries a safe space?"
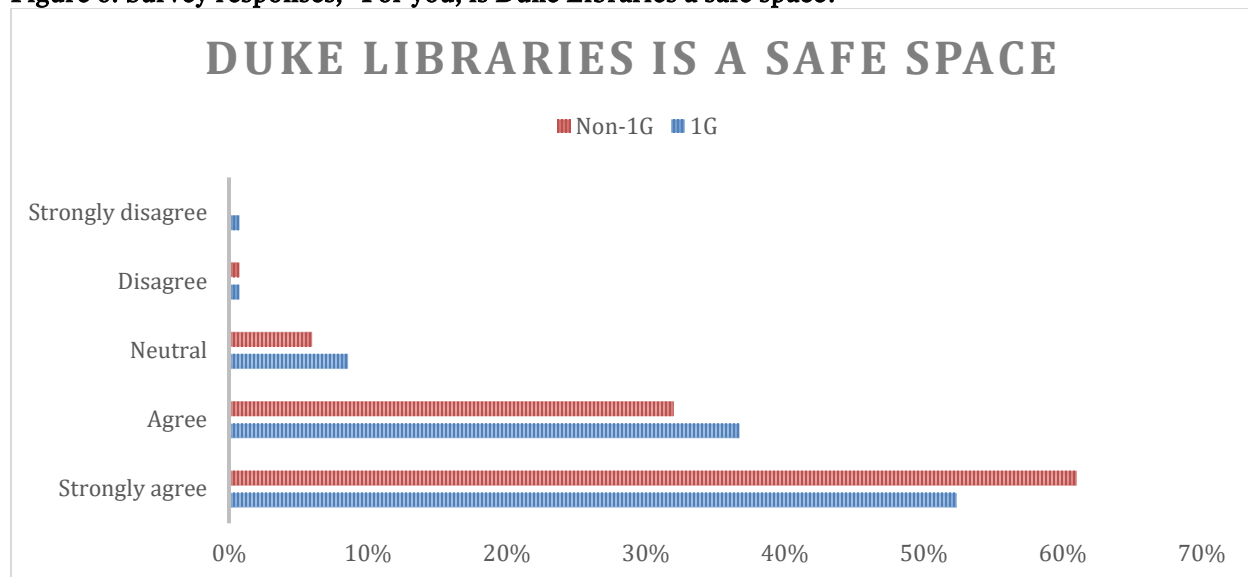
First-generation students are resilient and successful members of the Duke community. The early years on campus, which involve finding the right communities for support and learning new academic skills, can be a difficult transition for some. While all students experience challenges in college, 1G students may not have access to certain sources of information capital and can have significant financial stressors that are difficult for many peers to understand. The Duke University Libraries are well poised to support the success of 1G students on campus. Library staff can help reduce the burdens associated with transitioning from high school to college by making academic and research support known to students early and often, providing access to cost-prohibitive textbooks, and continuing to make the Duke Libraries a welcoming space for all students.

Next steps
These findings became the basis of the 19 recommendations (Appendix E, Recommendations) outlined in the research team's full report.[6] For example, one important recommendation was to expand the Textbooks on Reserve Program.[7] Though the library already had a pilot program, it became clear that all students would benefit from expanding the program to include more textbooks and increasing marketing of the program. In fall 2018, the program expanded to include textbooks from the 100 largest courses on campus, and the library has already seen an increase in student use of these books. There was also a recommendation that a librarian be designated as a 1G student success librarian as a way to build the ecosystem of supportive offices and people described in focus groups. We hope to gain funding for a new full-time staff position in the future. In the meantime, the library has identified funding for a part-time internship for this purpose, and a member of the research team added this function to her numerous other responsibilities. In her capacity as the 1G student success librarian, she coordinates the libraries' efforts, makes connections with other programs and departments providing support, and serves as a point of contact for 1G students.

Additionally, the library formed a 1G Study Recommendations Implementation Team (headed by the 1G student success librarian) to prioritize recommendations and work across the library to improve services, library instruction, and marketing/outreach to 1G students. One of the team's first projects was to increase the library presence during the RS summer program. In addition to providing a library instruction session and one-on-one appointments with the students in this program, librarians attended a poster session and a mixer as a way to increase their presence. Also, the team is engaging with the staff dedicated to working on our service desks to find ways to help students feel more comfortable asking questions and navigating our book stacks. The team is pleased with their progress thus far and looks forward to finding new ways to connect with and support 1G students.

Conclusion
First-generation students are resilient and successful members of the Duke community. The early years on campus, which involve finding the right communities for support and learning new academic skills, can be a difficult transition for some. While all students experience challenges in college, 1G students may not have access to certain sources of information capital and can have significant financial stressors that are difficult for many peers to understand. The Duke University Libraries are poised to support the success of 1G students on campus. Library staff can help reduce the burdens associated with transitioning from high school to college by making academic and research support known to students early and often, exploring ways to make textbooks more affordable, and continuing to make the Duke Libraries a welcoming space for all students.

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Endnotes
1. The Consortium on Financing Higher Education (COFHE) is a voluntary, institutionally supported organization of thirty-five highly selective, private liberal arts colleges and universities. COFHE surveys provide for systematic examination of the undergraduate experience. See more at http://web.mit.edu/cofhe/.
2. The Office of Access & Outreach (A&O) has three full-time staff, two summer fellows, and a fellow director. A&O is responsible for supporting both first-generation and low-income students. While almost all 1G students at Duke are low-income, many low-income students are not 1G. See more at https://undergrad.duke.edu/office-access-outreach.
3. The Rubenstein Scholars (RS) Program is a merit scholarship and support program run by the Office of Access & Outreach for exceptional, low-income, 1G students at Duke University. The program will begin its third year in the fall of 2018. The program includes a full scholarship, an intensive six-week summer program prior to the beginning of the first-year at Duke, mentorship, a laptop, and funding for summer professional opportunities. See more at https://rubensteinscholars.duke.edu/.

4. Stacy Brinkman, Katie Gibson, and Jenny Presnell, "When the Helicopters Are Silent: The Information Seeking Strategies of First-Generation College Students," in *Proceedings of the 2013 ACRL Conference: Imagine, Innovate, Inspire, April 10–13, Indianapolis, Indiana*, ed. Dawn M. Mueller (Chicago: Association of College & Research Libraries, 2013), 643, http://www.ala.org/acrl/sites/ala.org.acrl/files/content/conferences/confsandpreconfs/2013/papers/BrinkmanGibsonPresnell_When.pdf.

5. See DUL Student Survey 2018 script at https://library.duke.edu/sites/default/files/dul/users/Joyce Chapman/Word versions.zip.

6. "Understanding the experiences and needs of 1G students at Duke," Duke University Libraries, last modified May 2018, https://dukespace.lib.duke.edu/dspace/handle/10161/17144.

7. "Top Textbooks at the Duke Libraries," Duke University Libraries, accessed January 7, 2019, https://library.duke.edu/course-support/course-reserves/textbooks.

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Appendix B: Focus group script for sophomores, juniors, and seniors
Introduction

Welcome, everyone, and thank you for being here. My name is [name], and I work in the Assessment & User Experience here at Duke Libraries. Library staff are interested in learning more about the needs and experiences of particular groups of students here at Duke, and we're starting by talking with first-generation college students. Again, thank you for being part of today's focus group and sharing your experiences on campus and using the library.

I will moderate today's session, and [name] will take notes and help watch the clock to make sure we stay on schedule. I have some questions to guide us through the discussion. Keep in mind that there are no right or wrong answers to any of these questions, and you don't have to answer every question.

First, just a few ground rules that we have found helpful in keeping these discussions productive [review ground rules]

Discussion questions

Warm-up (5 min)	1. Brief intro from moderator 2. Brief intros from participants: Name and hometown. ***End brief intros with more info from the moderator or note taker to model openness and vulnerability.*** **3.** POST-IT: Think about the people, services, or spaces you feel are most supportive and safe at Duke. Take a moment to write these down, one idea per post-it. We'll be discussing these later but not posting them anywhere.
First year experience	1. SCRATCH PAPER: What did you find easiest about your first semester (or year) at Duke? Take a moment to write your thoughts on the blank paper in front of you; then we'll discuss as a group. **2.** SCRATCH PAPER: What did you find most challenging during your first semester (or year) at Duke? Take a moment to write your thoughts on the blank paper in front of you; then we'll discuss as a group.
Belonging—self perception	1. What has made you feel welcome at Duke? 2. What has made you feel unwelcome at Duke? 3. What makes the people, services, or spaces that you just wrote out on post-its particularly safe and supportive?
Informed—self-perception and reflection (college)	1. Have you ever felt like other people around you know things about college that you don't know about? 2. If so, what are some of the things others seemed to know about that you did not?
Info seeking	1. Since you've been at Duke, what do you do if you have questions or concerns about college? 2. Is there a person, group, office, or place you usually go to? 3. If so, describe this person, group, office, or place and a time you went to that person or place for help.

Library—experience and first reaction	1. POST-IT: What words or feelings come to mind when you think about the libraries at Duke? ***Take a moment to write these down, one idea per post-it. We'll be discussing these later but not posting them anywhere.***
	2. Have you used the libraries at Duke? If so, describe how you use them.
	3. What works well for you?
	4. What does not work well?
Research anxiety	1. What kinds of research do you do?
	2. What do you find most positive or exciting about doing research?
	3. What do you find most confusing, challenging, or uncomfortable about doing research?
Informed—reflection (libraries)	1. Are there things that you know now about **the libraries** at Duke that you wish you had known before you started at Duke?
	2. If so, what are those things?
	3. How did you come to know them?

Conclusion

Those are all the questions I have. I've really enjoyed talking with you this afternoon/evening. Thank you for taking the time to meet with us. I'd be happy to stay after this session or meet with you later if you'd like to share anything else.

Appendix C: Focus group script for first-year students

Introduction

Welcome, everyone, and thank you for being here. My name is Emily, and I'm Head of Assessment & User Experience here at Duke Libraries. Library staff are interested in learning more about the needs and experiences of particular groups of students here at Duke, and today we're talking with first-year first-generation college students. Again, thank you for being part of today's focus group and sharing your experiences on campus and using the library.

I will moderate today's session, and Ira will take notes and help watch the clock to make sure we stay on schedule. I have some questions to guide us through the discussion. Keep in mind that there are no right or wrong answers to any of these questions, and you don't have to answer every question.

Discussion questions

Warm-up (5 min)	1. Brief intro from moderator 2. Brief intros from participants: Name and hometown. ***End brief intros with more info from the moderator or note taker to model openness and vulnerability.*** 3. POST-IT: Think about the people, services, or spaces you feel are most supportive and safe at Duke. Take a moment to write these down, one idea per post-it. We'll be discussing these later but not posting them anywhere.
First year experience	1. SCRATCH PAPER: What did you find easiest about your first semester at Duke? Take a moment to write your thoughts on the blank paper in front of you; then we'll discuss as a group. 2. SCRATCH PAPER: What did you find most challenging during your first semester at Duke? Take a moment to write your thoughts on the blank paper in front of you; then we'll discuss as a group.
Belonging—self perception	1. What has made you feel welcome at Duke? 2. What has made you feel unwelcome at Duke? 3. What makes the people, services, or spaces that you just wrote out on post-its particularly safe and supportive?
Informed—self-perception and reflection (college)	1. Have you ever felt like other people around you know things about college that you don't know about? 2. If so, what are some of the things others seemed to know about that you did not?
Info seeking	1. Since you've been at Duke, what do you do if you have questions or concerns about college? 2. Is there a person, group, office, or place you usually go to? 3. If so, describe this person, group, office, or place and a time you went to that person or place for help.

Library—experience and first reaction	1. POST-IT: What words or feelings come to mind when you think about libraries? These can be the libraries at Duke or libraries you used before coming to Duke. Take a moment to write these down, one idea per post-it. Write "Duke" at the top of the post-its that refer to feelings or words about Duke Libraries. We'll be discussing these later but not posting them anywhere. 2. Have you used the libraries at Duke? If so, describe how you use them. 3. What works well for you? 4. What does not work well? 5. How do the libraries at Duke compare to libraries you used before coming to Duke, perhaps during high school?
Research anxiety	1. What kinds of research have you done during your first year at Duke? 2. What do you find most positive or exciting about doing research? 3. What do you find most confusing, challenging, or uncomfortable about doing research? a. Prompt, if needed: What services have helped you learn to do research or use the library? [students might mention Wr101, library orientation programs, or Focus here]. What other services might help first-year students learn to do research or use the library?
Informed—reflection (libraries)	1. Are there things you've learned about the libraries at Duke during your first semester and a half that you wish you had known when you started in August? 2. If so, what are those things? 3. How did you come to know them?

Conclusion

Those are all the questions I have. I've really enjoyed talking with you this afternoon/evening. Thank you for taking the time to meet with us. I'd be happy to stay after this session or meet with you later if you'd like to share anything else.

Appendix D: Recruitment email

Dear [First name],

We need your help. We (the staff at Duke University Libraries) are trying to better understand the unique needs of the students we serve, beginning with a focus on first-generation college students. Your input will help us improve library services, spaces, and resources to better meet your needs.

Would you be willing to participate in a focus group at the library with 3–6 other first-generation college students? Once we have a list of potential participants, we will schedule the discussion at a time (likely before Fall Break) that works best for the majority of volunteers. The focus group will last 90 minutes and will include a catered lunch or dinner. We understand that you might not be able to participate once the exact date and time are set, and that's OK—just let us know if you are interested!

If you are interested in participating, please RSVP by the end of day Tuesday, September 12th. Feel free to let me know if you have any questions or concerns.

RSVP now

Yes, I would like to participate in a focus group

No, I do not want to participate in a focus group

Depending on interest, we may not be able to accommodate everyone who volunteers due to size constraints. Thank you for considering, and for helping Duke Libraries staff better meet your needs!

Joyce Chapman
Assessment & User Experience Department
Duke University Libraries

Your privacy is important to us:
We truly value the many unique perspectives that students bring to Duke, and it is important to the Libraries to understand all students' experiences, backgrounds, and information needs. We hope you will consider joining us. While the Libraries will summarize what we learn from the focus groups in a report that will be shared internally with library staff as well as with the Office of Access & Outreach, your participation in the focus group will be confidential. Participants' names will not be included in any report, and your name will not be associated with anything you say. However, you will not be anonymous to your fellow focus group participants during the discussion. We will ask everyone present to please keep what is said confidential out of respect for each other.

Appendix E: Recommendations

1. Designate a 1G student success librarian

2. Offer library and research training sessions designated for 1G students

3. Participate in Duke's 1G pre-orientation sessions

4. Advertise library services that may be particularly appealing to 1G students

5. Expand the Textbooks on Reserve Program

6. Advertise the existing Textbooks on Reserve Program to 1G students

7. Investigate ways to make the libraries feel like more of a safe space for all students

8. Encourage all staff and students who work at service desks to be aware that many students come to Duke with little experience using academic libraries

9. Develop general guidelines for staff regarding the information they provide about public scanners

10. Investigate possibilities to expand the device lending program

11. Research the possibility of a dedicated study and storage space for 1G students

12. Develop a peer mentor program for conducting library research

13. Send a letter from the university librarian to 1G students' families

14. Advertise the libraries' student advisory boards to 1G students

15. Advertise student library jobs on the 1G listserv

16. Collaborate with campus partners to advertise library services to 1G students

17. Communicate this report and its findings to focus group participants, 1G students, and campus staff who work with 1G students

18. Communicate this report and its findings to other campus stakeholders

19. Conduct ongoing assessment with 1G students

Tracking the Elusive Undergraduate Non-user: Triangulating a Senior Survey, Library Instruction Data, and LibQUAL+® Results

Laurel Littrell
Kansas State University, USA

Abstract

Kansas State University collects survey data annually through a locally developed senior survey that includes questions about library use and satisfaction. The libraries use LibQUAL+® every three to four years, and the library instruction program collects data on what courses and programs use library instruction and how many students attend instructional sessions. What correlation might exist among these three data sets? Is there consistency between usage and satisfaction rates that can be linked with library instruction? From studying and comparing these results, there appears to be correlation in most instances. Further study of usage and impact of additional resources, such as customized online course guides, could provide additional insight, especially for areas with less formal library instruction but that still report a greater usage and satisfaction of the university libraries than areas with more library instruction. Examining the three sources of data broken down by college or discipline can also identify gaps in library contact and usage. These areas can be targeted for marketing and promotion of library services and resources.

Purpose

Generally, obtaining library use and satisfaction information from library users is not particularly difficult. Finding information about non-users of the library is quite another matter.

Kansas State University is an R-1 university with nine colleges: Agriculture; Architecture, Planning & Design; Arts & Sciences; Business Administration; Education; Engineering; Human Ecology; K-State Polytechnic Campus; and Veterinary Medicine. In addition to these are Global Campus, offering online degree programs in the various colleges, K-State Olathe offering courses and programs through the other colleges in the Kansas City area, and the Graduate School.

At Kansas State University Libraries, there are three sources of information that can provide insights about student usage of library services and resources at the college level.

- The locally developed Senior Survey asks questions about student use and satisfaction with many components of university life, including library services, resources, and facilities. Beginning in 2013, these results are available by college, for those colleges offering undergraduate degrees.

- The LibQUAL survey asks questions about frequency of use of resources on library premises or through a library webpage. These results also can be determined by college with careful mapping of the LibQUAL standard disciplines with those of the university.

- Library instruction data is tracked through LibAnalytics and includes the course code (tracked to a specific college) as well as course number (designating the level of course) and the number of students attending.

Design and methodology

By comparing these three sets of results, could one potentially track areas of the university that may be underserved by the libraries and target these areas for focused outreach and further study, if there is consistency in the data? Will the information be detailed sufficiently by discipline to provide useful insight?

K-State Senior Survey

As is typical for most universities, Kansas State University offers an "exit survey" to graduating seniors.[1] These efforts began in earnest in 1999 and have taken various forms over the years. In 2006, the survey expanded to query students about their broader experiences on campus, including interactions with fellow students, faculty, and various university services and components including library resources, staff, and services. These responses were on a five-point Likert-type scale (from very satisfied to very dissatisfied) and also included a "did not use" response. These results were aggregated to the entire university.

In 2009, the questions regarding university services and resources were changed from the Likert-type scale to asking the students to select one of the following options:

- Used and was satisfied
- Used and was dissatisfied
- Knew about but did not use
- Did not know about

Institutional memory has been lost as to the rationale for changing the responses accordingly, but the differences between "knew about and did not use" and "did not know about" seemed intriguing and useful. From this year on, the libraries tracked the senior survey data, pulling out the library-related questions and studying the responses longitudinally over the last ten years.

There are four questions on the senior survey that are library-related:

- Access to electronic library resources (databases, electronic journals, and books)
- Library staff (assistance in research, effectively finding information, learning how to use the libraries)
- Library holdings (quality and quantity)
- Library facilities (atmosphere, available seating, hours)

Other similar questions that students were asked related to residence hall facilities, various offices on campus—including the registrar, food services, concert and lecture series—and so on. There is interest in the libraries about the need to update the questions, with concern that students may not understand the terminology "library holdings" and the difference between that and "access to electronic library resources."

In 2013, Senior Survey results were made available to the campus community by the colleges that offer undergraduate degrees: Agriculture, Arts & Sciences, Business Administration, Education, Engineering, and Human Ecology. Other colleges in the university, including Veterinary Medicine and Architecture, Planning & Design, only offer graduate degrees. The colleges designated as Global Campus and K-State Olathe offer degrees through the other colleges. Another campus, K-State Polytechnic, has a separate library system and assessment methods and is also not included in this study. For these six undergraduate colleges, the K-State Office of Assessment employs PowerBI, a Microsoft Office 365 product, as a data visualization tool to provide access to survey results in a wide variety of demographic configurations, including by college.[2]

The two similar questions explored in this study, regarding the use of online library resources and the library facilities, can be seen longitudinally as below.

Figure 1: Senior Survey ten-year results for access to electronic library resources. In 2017, library budget cuts resulted in a subscriptions cut, correlating with increasing dissatisfaction rates.

■ Access to electronic library resources (databases, electronic journals and books) %

Year	Did not know about	Used, and was dissatisfied	(tall bar)
2018	2.9	17.1	3.1 / 76.9
2017	1.8	13.7	4.3 / 80.3
2016	1.9	12.2	3.4 / 82.5
2015	1.6	11.3	4.5 / 82.6
2014	1	9.8	4.6 / 84.6
2013	1.3	9.9	5.4 / 83.5
2012	2	13.7	7.7 / 76.6
2011	1.6	14.7	7.6 / 76
2010	2.3	15.7	7.8 / 74.2
2009	1.8	15.3	8.2 / 74.7
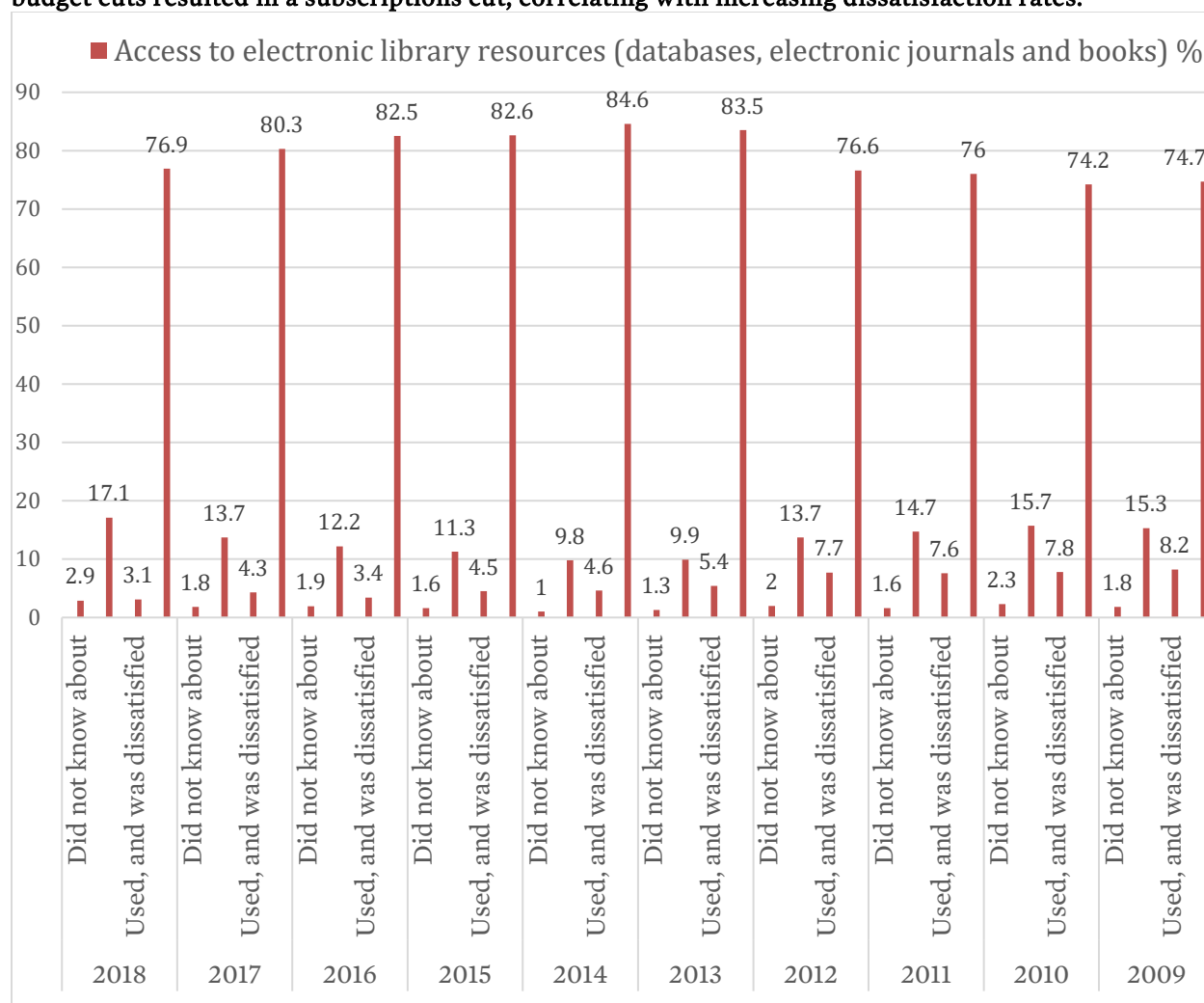
Figure 2: Senior Survey ten-year results for Library Facilities (atmosphere, available seating, hours). In 2016–2017, library hours were cut because of budget cuts, correlating with an increase in rates of dissatisfaction.
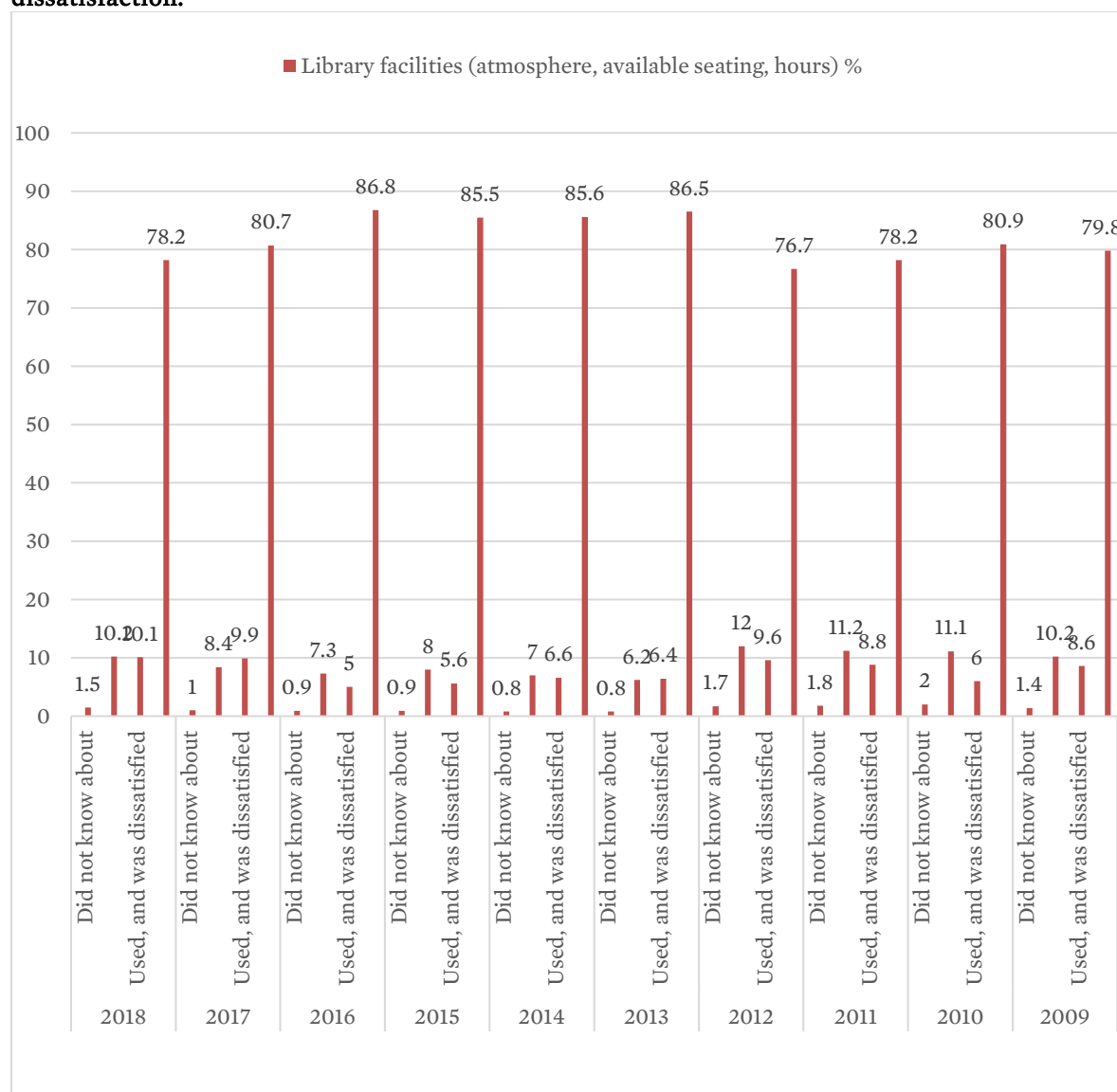
LibQUAL

Another tool used every three to four years by K-State is the LibQUAL survey.[3] LibQUAL was used in 2007, 2011, 2014, and 2018. Results are compared longitudinally, both by user groups and by disciplines, and have yielded satisfactory results especially when the qualitative information provided (comments) is carefully considered and analyzed. LibQUAL's capability of determining areas of priority for user groups and disciplines, as well as respondents' self-reporting library usage, are particularly valuable for this study. For the 2018 iteration of LibQUAL, the standard disciplines used by LibQUAL were mapped more closely to correspond to the colleges of the university, particularly smaller colleges such as Human Ecology, Veterinary Medicine, Agriculture, Education, etc. This was more difficult for the College of Arts and Sciences, the largest college at K-State, but the broad discipline areas (humanities, social sciences, etc.) offered opportunities for more granular data that will be useful for other projects.

By studying the results of the LibQUAL questions that inquire about usage of the library, including frequency of using resources "on premises" and using resources through library webpages, one can compare similar usage data reported in the same college from both the Senior Survey and from LibQUAL. Pleasantly, but not surprisingly, consistency existed between these two data sources. As part of the LibQUAL service, one must indicate the number of students in each discipline/college so one can determine the representativeness of survey respondents. This groundwork also was useful in studying the Senior Survey data and subsequent representativeness when comparing the 2018 LibQUAL data with the 2018 Senior Survey data.

Figure 3: LibQUAL Library Use Chart for Undergraduates, 2018
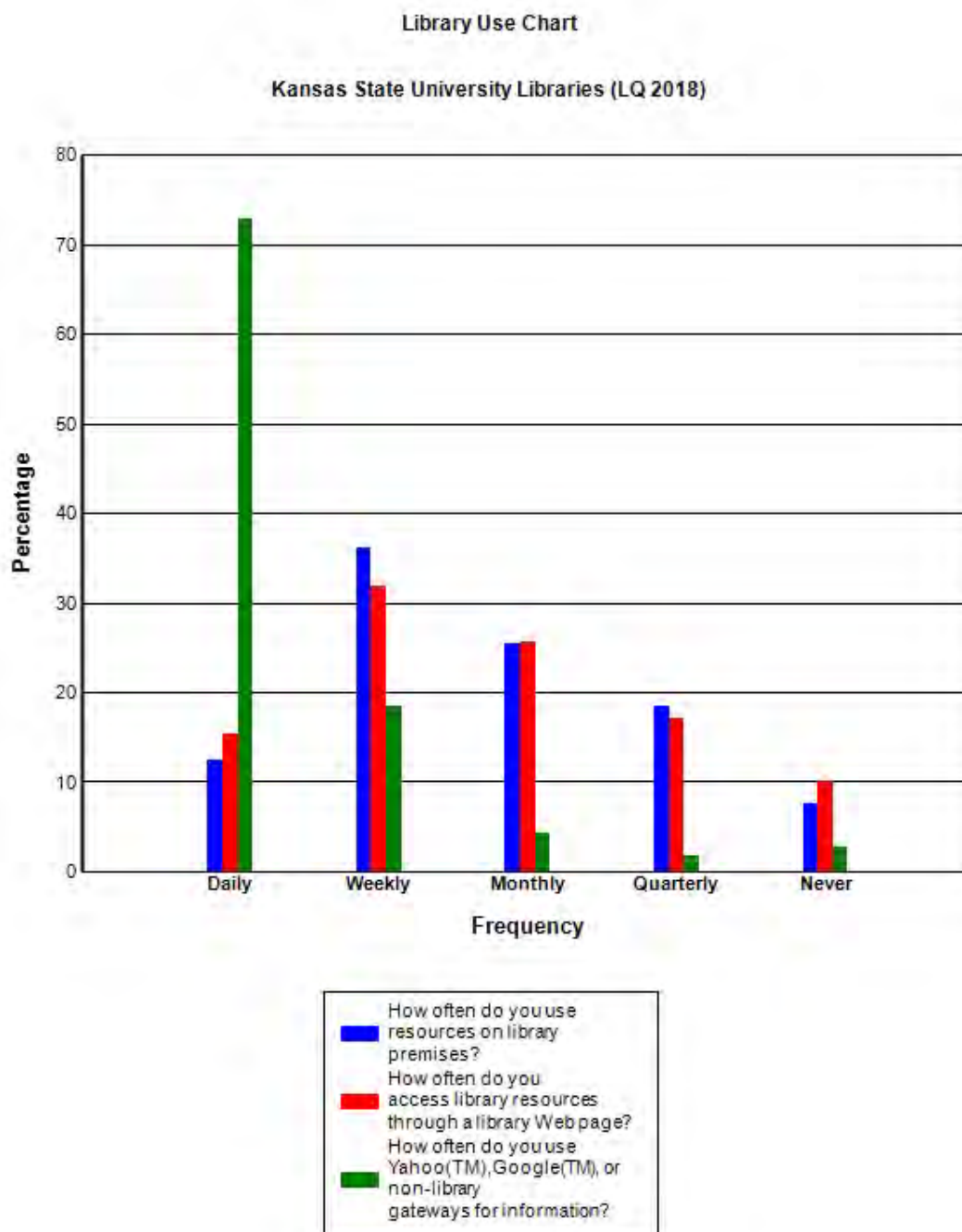
Figure 4: LibQUAL+® Library Use Chart for Undergraduates, 2014
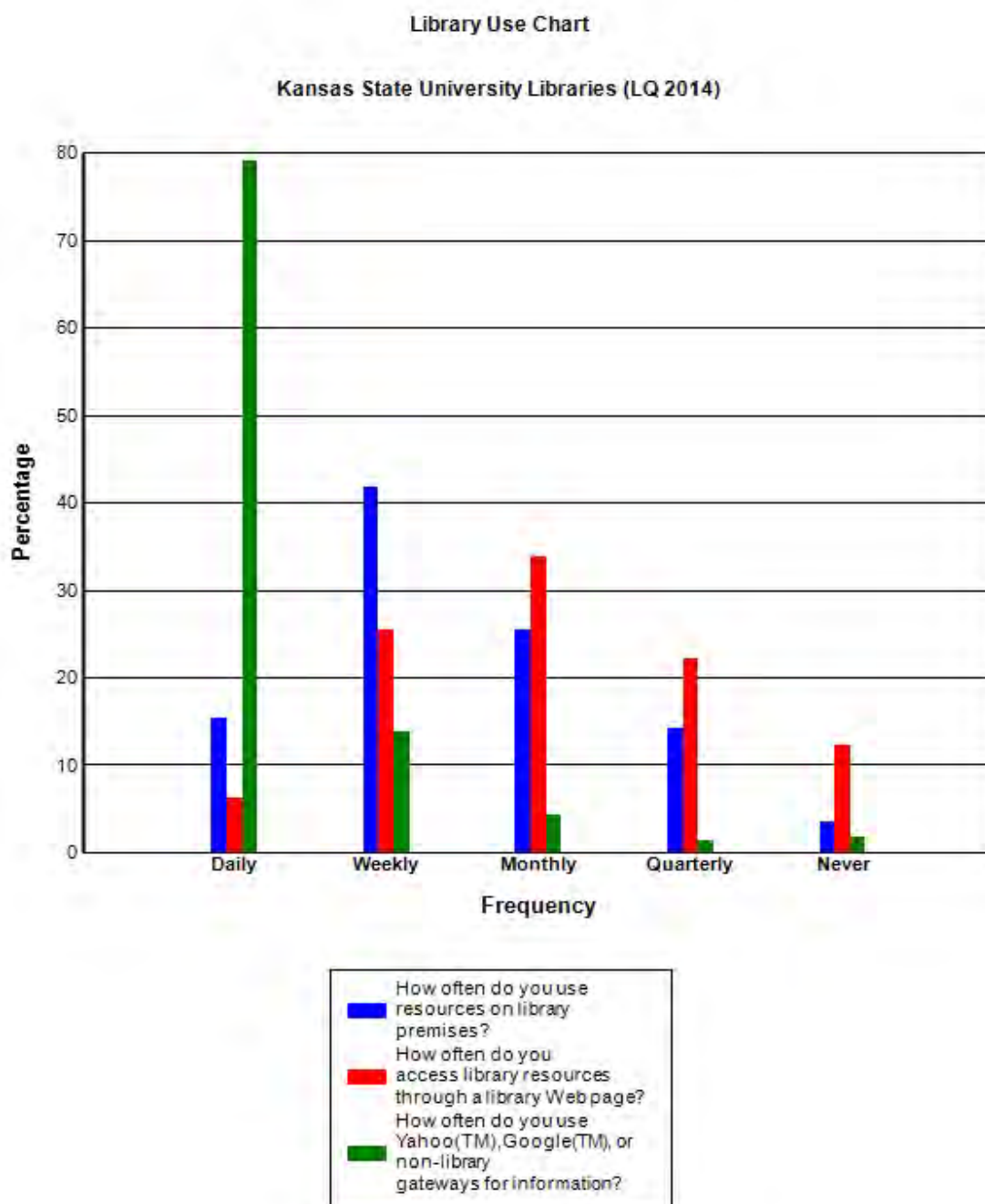
Library Instruction Data

Information about library instruction has been tracked through LibAnalytics beginning in fall 2013.[4] By determining what college offered each particular course librarians worked with, the number of classes and students attending these classes for the 2017–2018 year could be gathered, corresponding with the latest LibQUAL and Senior Survey data. Would there be any link to the number of students reached through instruction with the number of students reporting library usage through the two surveys? Would any useful correlation exist? By comparing the number of students in each program with the number of students

experiencing library instruction, a possible percentage of students from each college affected could be determined. However, there are many problems with this method.

- All students are required to take courses in the College of Arts & Sciences for general education requirements. In an attempt to offset this, only upper level courses were analyzed with the idea that students taking an upper level undergraduate course are more likely to be seeking a degree from that college; this, however, is certainly not completely accurate.

- Students frequently change majors and take courses in other colleges. This analysis cannot compensate for those.

- Interdisciplinary studies, minors, and certificates that span more than one college are becoming more frequent.

- Some students undoubtedly are counted twice (or more), inflating the percentages of participants in instruction.

- Sample sizes, when broken down by college, begin to get very small.

- Librarians create online research guides for disciplinary areas and courses. The impact of these guides and students working one-on-one with librarians outside of classroom library instruction cannot be factored into this study.

- Existing branch libraries mainly affect a few graduate programs of the university (Veterinary Medicine, Architecture), with the lone exception of the Math/Physics library. All other undergraduate programs rely almost exclusively on the main campus library.

After studying these problems with correlating this data, one might inquire as to the usefulness of this comparison, but a couple of factors do support the study of this data.

- Consistency exists between the three data points; however, even within all three, sample sizes become small enough to bring some concern.

- None of these results are surprising to any of the librarians working with these programs.

Triangulating the Available Data
Both surveys used—the Senior Survey and LibQUAL—ask similar questions about library usage and offer this information broken down by college. The 2018 LibQUAL disciplines were mapped much more carefully than previously to correspond with the colleges (with the exception of Arts & Sciences). The wording of both sets of similar questions was somewhat different.

Terminology of two Senior Survey questions:

- Access to electronic library resources (databases, electronic journals and books)
- Library facilities (atmosphere, available seating, hours)

Requested responses for both questions:

- Used and was satisfied
- Used and was dissatisfied
- Knew about but did not use
- Did not know about

Terminology of two LibQUAL questions:

- How often do you use resources on library premises?
- How often do you access library resources through a library Web page?

Requested responses for both questions:

- Daily
- Weekly
- Monthly
- Quarterly
- Never

For this study, the Senior Survey responses to analyze were selected as "Knew about but did not use," "Did not know about," and "Used and was dissatisfied." For LibQUAL, responses for "Never" were selected. Results for these by college were compared, along with representativeness for both surveys and mapped against the instruction data.

Representativeness

Library instruction was offered to 192 upper level undergraduate courses in 2017–2018, reaching 36.5% of upper level undergraduate students. Among the six undergraduate colleges included in this study, percentages ranged from 64.1% of students in the College of Education to 9.0% in the College of Engineering, with 13.8% in the College of Agriculture. The remaining three colleges (Arts & Sciences, Business, and Human Ecology) all ranged from 30 to 39%.

LibQUAL representativeness was fairly evenly spread across the colleges, with 4–6% of undergraduates responding from each college. Senior survey responses ranged from 7–10% across the various colleges. Although response rates were lower than one would hope, the evenness of the rates across the colleges is useful to consider although sample sizes are small.

Findings

Notable consistency exists between the LibQUAL data and the Senior Survey regarding library use, awareness, and satisfaction in various disciplines. The level of activity in instruction, for the most part, mirrors these results as well and can assist librarians in pinpointing areas of the university that are underserved by the libraries, particularly for areas that showed greater dissatisfaction or were less aware of library resources available.

Three of the six colleges stood out with particular responses. Positively, the College of Education saw a high of 64.1% of upper level students experiencing library instruction. These students also had the highest LibQUAL response with 6.4% of undergraduates in the college responding. Correspondingly, these students reported the highest rates of onsite library usage and the highest rates of satisfaction with resources and library facilities. Possible contributions to this could possibly be that this is the smallest college, is very close-knit residing in one building on campus, the education building happens to be right next to the large main university library, and the education librarian is a long-term well-experienced librarian with a stellar instructional and faculty partnership record. What is particularly notable is that, out of all the colleges, the College of Education is the only one that reported on the Senior Survey that no students did not know about the availability of library resources and facilities (although a few chose not to use them).

Figure 5: Senior Survey reporting for library resources and facilities, College of Education, 2018

College of Education Senior Survey, 2018, %

	Access to electronic library resources	Library Facilities
Didn't know about	0	0
Knew about but didn't use	12.8	3.5
Used and was dissatisfied	1.2	7
Used and was satisfied	86	89.5
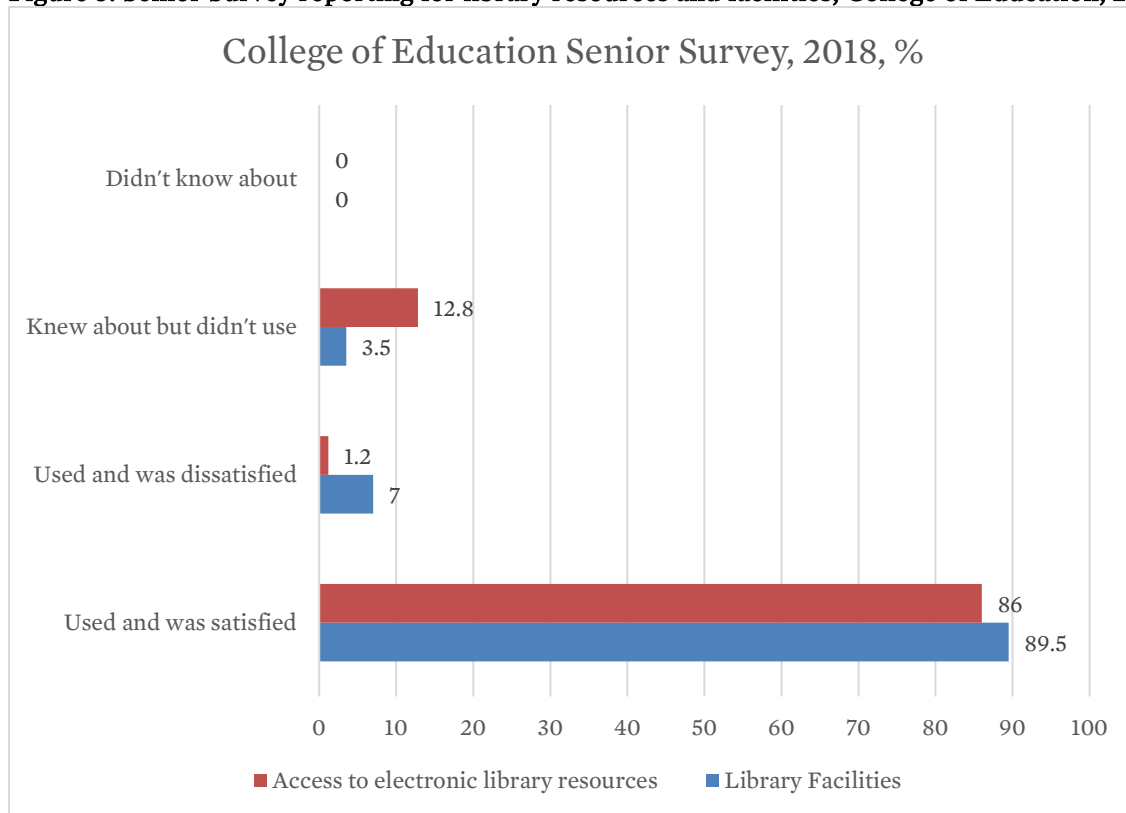
Figure 6: LibQUAL usage report for College of Education, 2018

Library Use Chart

Kansas State University Libraries (LQ 2018)
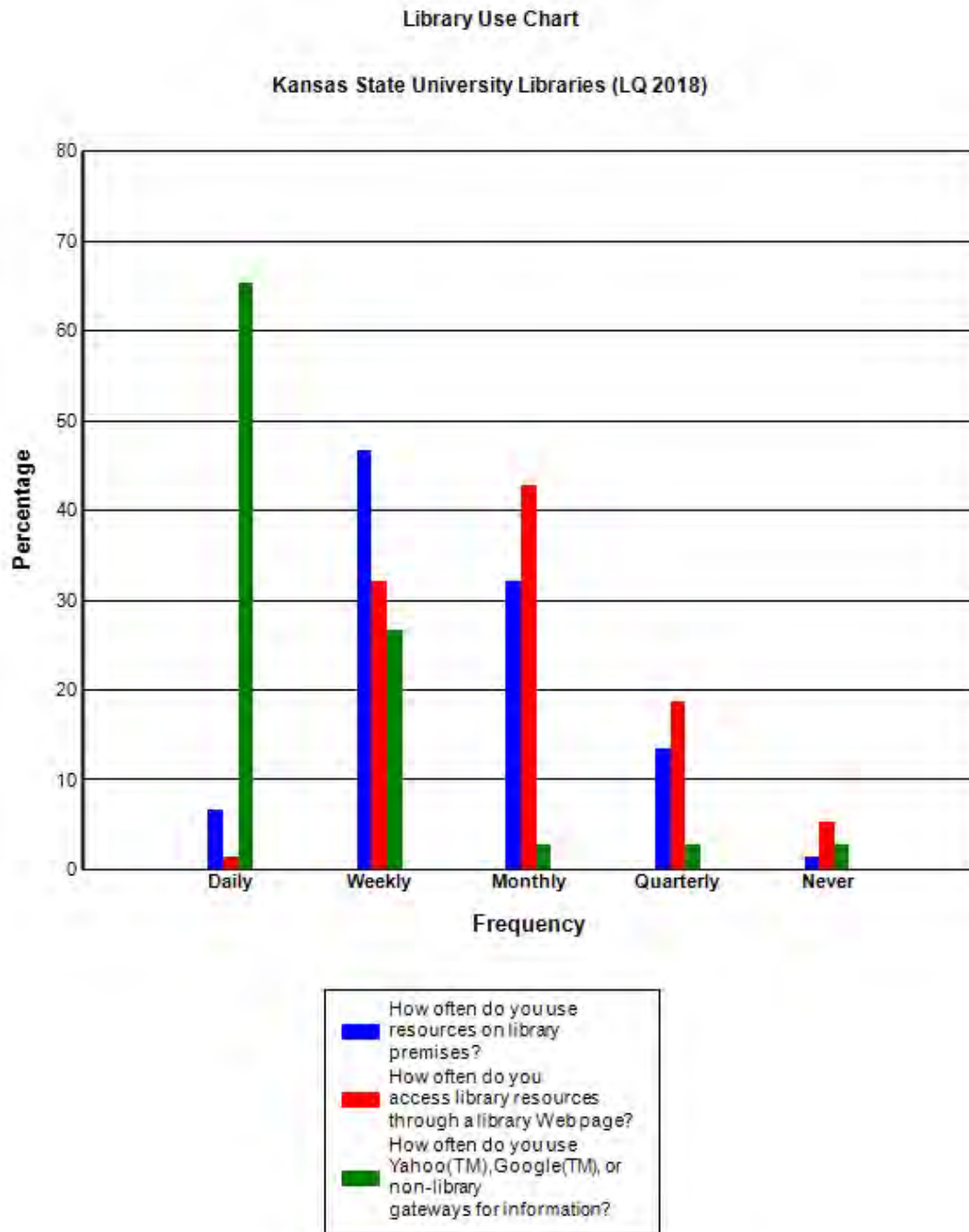
The College of Engineering had the lowest rate of upper level student instruction with 9.0% students reached, but these students did not report a particularly low rate of usage or expressed any particular dissatisfaction with library facilities or resources. Some unusual factors about this college include the decision by the college in May 2015 to close the branch engineering library. The engineering librarian has made a significant effort above and beyond most disciplines to provide comprehensive online research guides for various engineering topics, although determining the impact of these guides is far beyond the

scope of this paper. A longitudinal study of the impact of the closure of this library would provide more useful information.

The third college that appears more affected by library instruction is the College of Agriculture. The percentage of students participating in library instruction for this college is the next smallest to Engineering (13.8% for agriculture). In the Senior Survey, this college also reported the smallest use of online resources and library facilities, although this was not borne out in LibQUAL.

The College of Agriculture at Kansas State University is large and distributed. Although the College of Arts & Sciences is larger in terms of student and faculty headcounts, the College of Agriculture is massive in terms of building footprint, research centers, and land acreage with extensive farming and ranching operations, either on the edges of the main campus or varying miles away. Students, staff, and faculty are scattered across a large geographic region. The agricultural studies librarians are well aware of the issues and have been working diligently to promote library collections and services. The use of online resources and services has improved communications tremendously, but complicating matters are the many independently operated libraries/reading rooms that have sprung up in these locations that are outside of the main library system. Students are confused about the organizational place of these reading rooms and often make comments about them on surveys such as LibQUAL, including asking for renovations to the spaces or additional resources.

Figure 7: Senior Survey reporting for library resources and facilities, College of Agriculture, 2018

College of Agriculture Senior Survey, 2018, %

- Access to electronic library resources
- Library Facilities

	Access to electronic library resources	Library Facilities
Didn't know about	4.8	2.4
Knew about but didn't use	30	14.8
Used and was dissatisfied	2.8	8.3
Used and was satisfied	62.4	74.5
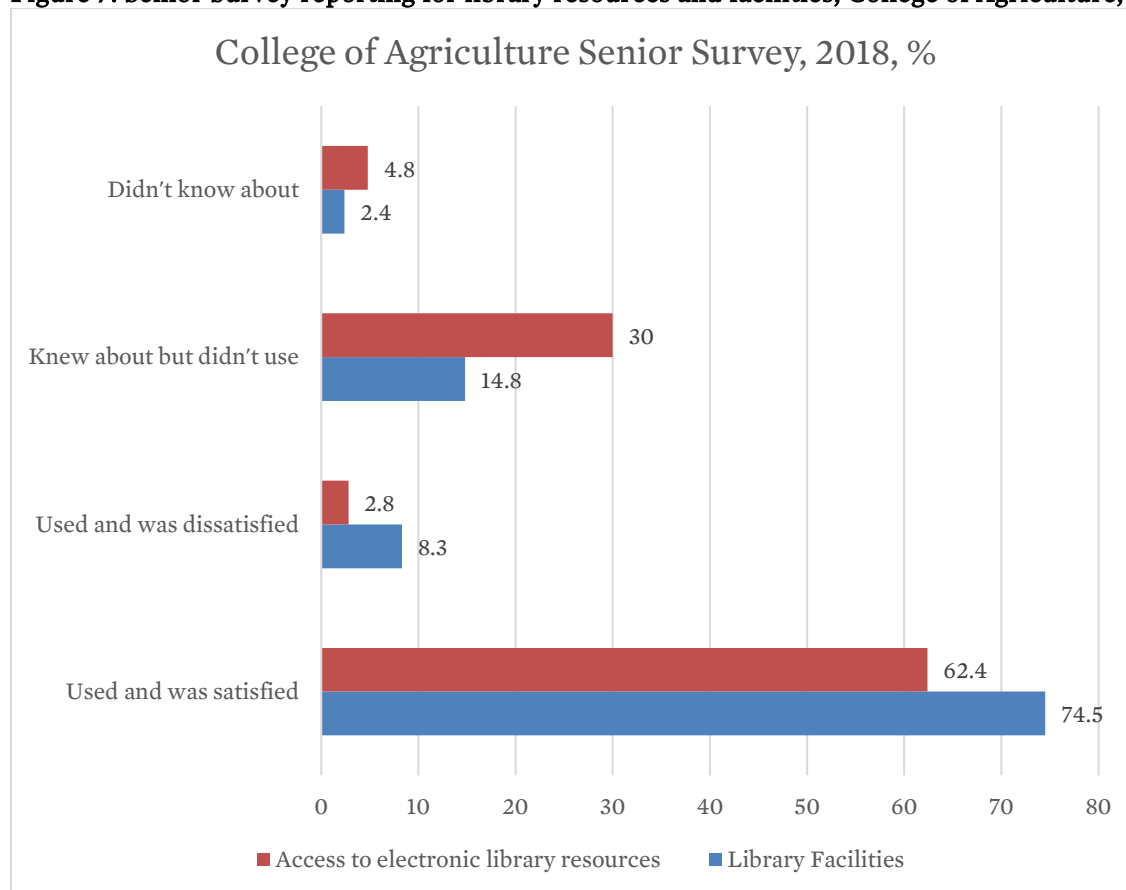
Figure 8: LibQUAL usage report for College of Agriculture, 2018

Library Use Chart

Kansas State University Libraries (LQ 2018)
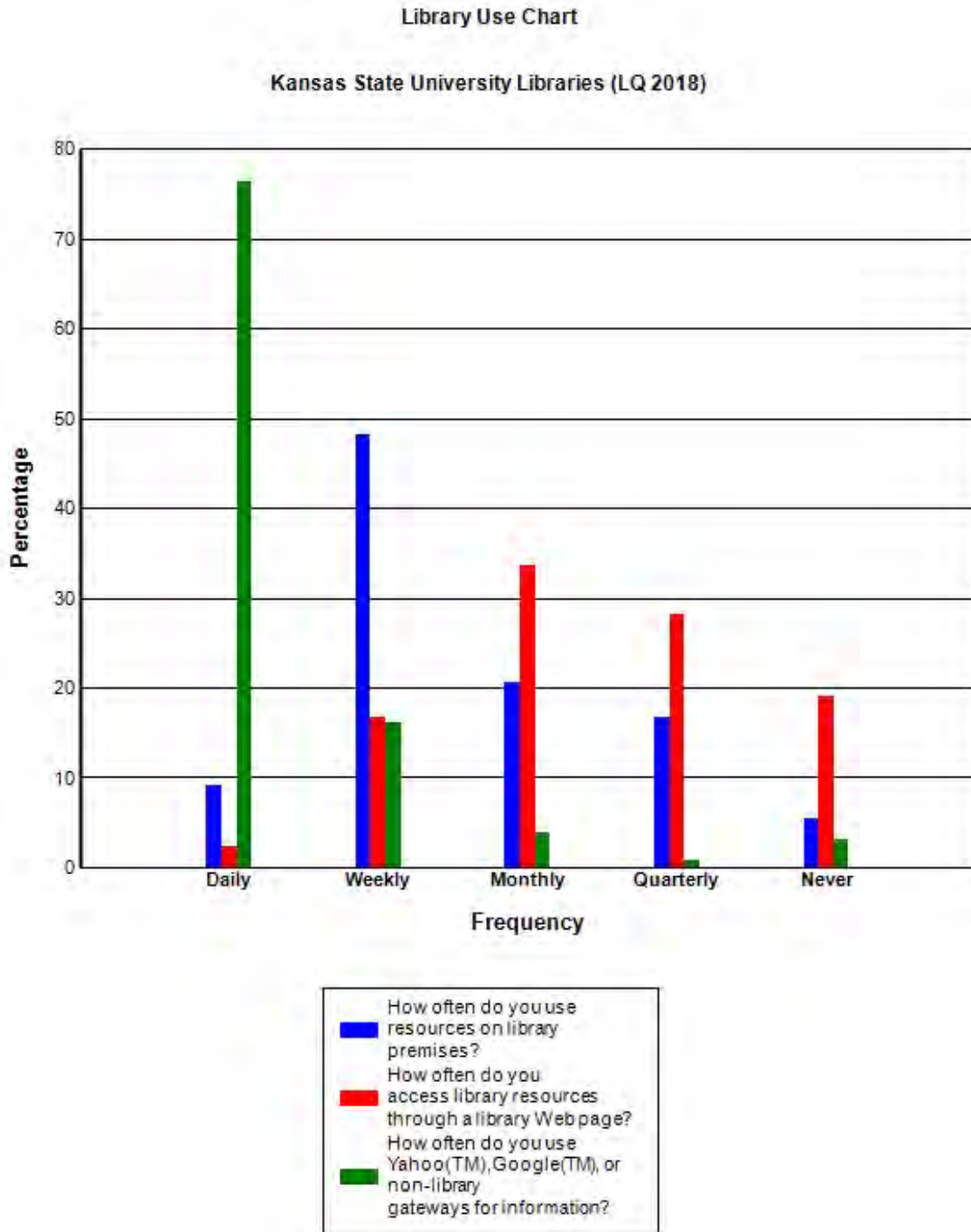
Another interesting component to study would be the effect of proximity to physical libraries, particularly for undergraduates who value the study spaces and available technology. Does this proximity positively affect the College of Education's use of library spaces, and more to the point, does it affect even the use of online library resources? Drilling down into the program level in the larger colleges would be useful as well. One or two agricultural departments are close to the main library; would these report greater library usage than those much further away, even for online resources? What link, if any, exists?

Practical implications and value

As is typical with many studies of this nature, more additional questions are raised than are answered and some of these will be worth pursuing. To further complicate matters, the main campus library at K-State, Hale Library, was extensively damaged by toxic smoke and water during a roof fire in May 2018. With heavy reliance on a large central library with only three small branch libraries available, disciplines that rely on print/historical resources are particularly hard-hit, as are students who depended on the library to provide study space and necessary technology for their successful academic endeavors. The effect of this disaster will overshadow any assessment efforts in the future, but will provide unique opportunities to demonstrate library value in ways that could not be done through any other means. One would certainly not intentionally completely close a large central library unexpectedly for two years as an experiment, including making nearly all the physical collections unavailable. The advantage is that the opportunity does exist to study the ramifications of this closure, but, of course, one must consider the enormous disadvantage of the tremendous negative impact to many students' individual academic efforts. At any rate, there will be lessons to learn and studies to make about providing library resources, collections, and spaces when the means to deliver these has been abruptly removed for an extended period of time.

Aside from the fire coming on the heels of this study, there are aspects to consider for other institutions. For areas that report more "did not know about" or "did not use" responses, it may be possible to probe more deeply with students and instructors about why—what resources are they using instead? Are there locally available resources within the program? Are they using tools that are provided by the libraries but are unaware who provides them? How can we improve our communications and outreach with these areas?

The opportunity to identify areas of the university with more non-users is a valuable tool and could provide a model for other institutions that utilize similar surveys for students.

Figure 9: Percent of students taught in upper level undergraduate courses for each college

students taught, % of students in the college

- Agriculture
- Arts & Sciences
- Business
- Education
- Engineering
- Human Ecology

lack of use or dissatisfaction with library facilities, with % taught
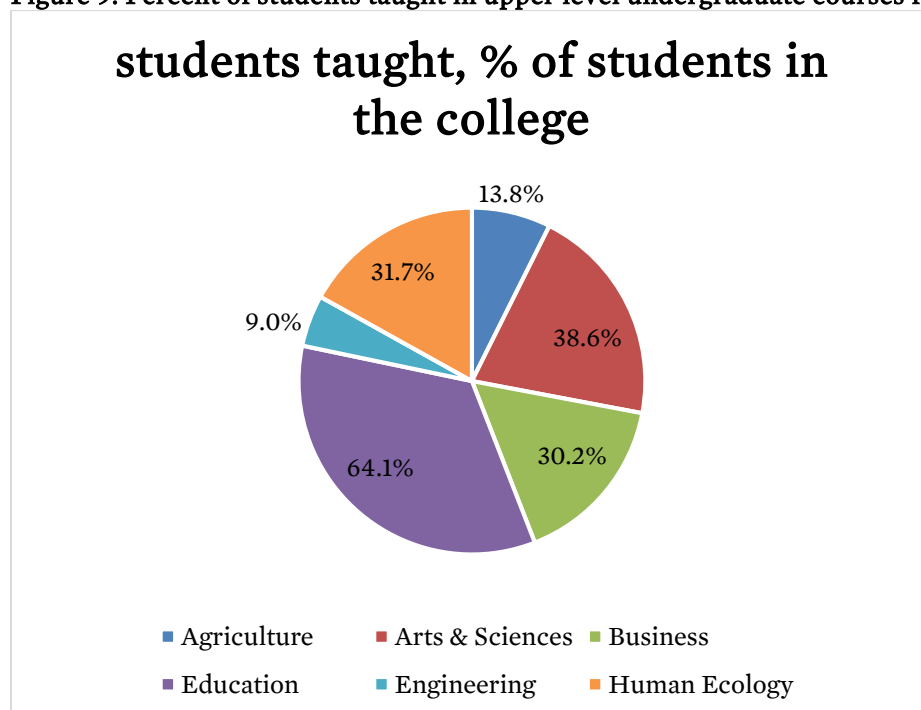
Figure 11: Percent of students reporting lack of use or dissatisfaction with online library resources, compared with percent taught in each college, 2018

lack of use or dissatisfaction with online resources, and % taught

Legend:
- ■ % never use online
- ■ % no e resources
- ■ used e resources and was dissatisfied
- ■ students taught %

Values by college:

College	% never use online	% no e resources	used e resources and was dissatisfied	students taught %
Agriculture	19.1%	34.8%	2.8%	13.8%
Arts & Sciences	11.7%	11.0%	3.3%	38.6%
Business	27.0%	29.3%	3.4%	30.2%
Education	5.3%	12.8%	1.2%	64.1%
Engineering	19.4%	18.1%	3.9%	9.0%
Human Ecology	4.0%	9.7%	3.1%	31.7%

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Endnotes

1. "Senior Survey," Kansas State University Office of Assessment, last modified June 27, 2018, https://www.k-state.edu/assessment/surveys/seniorsurvey/.
2. PowerBI, accessed October 1, 2018, https://powerbi.microsoft.com/.
3. LibQUAL+®, accessed October 1, 2018, https://www.libqual.org.
4. LibAnalytics, from SpringShare, can be used to track reference transactions, instructional sessions, and other information. It has largely been replaced by LibInsight from the same company. https://blog/springshare/com/category/libanalytics/.

Collaborative Assessment for Student Success: Analyzing Nontraditional Students' Library Perceptions and Usage

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University of North Carolina at Greensboro, USA

Introduction

Assessing the library's impact on student success is vital for all library departments, but many assessments exclude nontraditional students. According to the National Center for Education Statistics, a nontraditional student is defined by many characteristics, such as: delayed enrollment into higher education programs, part-time attendance, working full-time, financial independence from parents, caretaking responsibilities, single parenthood, and having received a GED.[1] Since there are so many definitions and characteristics of nontraditional students, the literature tends to study a specific population within this group. Higher education libraries can provide many vital services to nontraditional students, including saving them time in their academic career, by training students on how to more effectively find, evaluate, use, and credit information in research papers and assignments. With the growth of assessing nontraditional students, it is important to use various assessment strategies on this population, as well as collaborate within your library and institution to enact change. In this paper, two librarians discuss assessing online and transfer students at the University of North Carolina at Greensboro (a mid-sized public university) through surveys, usability studies, and pre- and post-test evaluations. These assessments ultimately led to new library programs and a position, as well as future ideas for continuing to assess these important populations.

Literature Review

To better engage a broader patron base, librarians are also starting to assess the research needs of nontraditional students. Libraries have performed surveys targeting nontraditional students, showing that this population needs more attention and services than traditional students, as well as service points available during the weekend.[2] According to Branch, many nontraditional students mostly use the Internet to find information for coursework and learning more about the library through information literacy instruction and courses give these students more confidence in their research skills.[3]

Transfer students are a significant population in higher education. A report from the National Student Clearinghouse Research Center found that over one-third of all college students transferred to a different institution within six years.[4] The term "transfer students" often refers to students who move from a two-year college to a four-year institution, but transfers from a four-year institution to a two-year college are common, and there are other paths that students might take from one institution to another.[5] The transfer population at an institution can include a wide range of students with different experiences, but there are challenges. Some challenges include: difficulty with the transfer process, loss of academic credits, adjusting to new policies, feelings of being overwhelmed, difficulty connecting with university faculty, and perceived stigma (whether from a workplace, a community college, or military service).[6]

Transfer students can also miss institutional support and non-curricular experiences by entering an institution as sophomores, juniors, or even seniors. Receiving institutions try several approaches to integrate transfer students. Articulation agreements among institutions seek to make the transfer process seamless.[7] Some institutions provide an orientation and some institutions have adapted high impact practices, such as a studies seminar course or a learning community.[8] McBride et al. report that libraries at Oakland University partnered with student affairs by participating in orientations, providing handouts on library services for transfer students, and offering a "tiered program of information literacy instruction" and "expanding liaison services." Other schools offer a series of workshops or transfer-only sections of a general education course.[9]

Online students are a specific group of nontraditional students that can encompass many populations. Online learning and courses are growing at a rapid rate in America, with 42 percent of American students taking at least one online class as of 2015.[10] With this increase in flexible online programs, the demographics of online students are largely nontraditional, such as veterans and working adults returning to school after a hiatus.[11]

Since online students are a growing population, there is an increasing amount of literature on assessing library services for online students. According to the Association of College and Research Libraries (ACRL) Distance Learning Library Services, librarians and libraries must provide equal access to information literacy and research services and resources to online students.[12] Librarians are performing assessment on online and distance students in a variety of ways, such as authentic, formative, and summative assessment of online instruction[13]; interviews with online students[14]; online learning analytics[15]; and final product assessment.[16] The literature shows the importance of using multiple assessment methodologies to learn about online students and library services and resources specific to each institution.

Transfer Students: Initial Survey of Incoming Transfer Students

At the University of North Carolina at Greensboro (UNCG), librarians have offered extensive outreach and instruction to first year students but recognized incoming transfer students had differing levels of exposure to information literacy. Based on these gaps in the literature about transfer students and their information literacy skills and needs, a team of librarians at UNCG University Libraries (UNCG Libraries) surveyed all incoming transfer students in fall 2014. The survey, adapted from surveys used to assess incoming freshmen on both attitudes and skills toward information literacy, asked for basic demographic information, such as incoming grade level, exposure to previous library instruction, the transferring institution type (community college, other in-state four-year college, out-of-state four-year college), age range, and whether the student had completed a research paper. Additionally, "test" questions were created and informed by the now-redacted ACRL Information Literacy Standards to determine baseline skills in evaluating websites, proper citation, and constructing search statements. Students were also asked about their own perceived skills and where they thought they needed help. The survey was created in Google Forms and a link was embedded in the solicitation email to recipients. The research team created and applied a rubric instrument with which to evaluate responses to the search strategy question.

Of the 1,068 students solicited, 155 incoming students responded. The survey age ranges were chosen to reflect several stages of life that might reflect basic differences in information literacy skills and needs. In this study, 35.7% of respondents were in the 18–21 age range, 35.7% were in the 22–29 age range, and 27.9% of respondents were in the 30–59 age range. The largest percentage of incoming transfer students (55.2%) transferred from community colleges, with 14.3% of students transferring from in-state colleges and 26.6% coming from out-of-state colleges. The team presented three questions to test library-related skills. The first asked students to select keywords to search for library resources on a research topic related to smoking. The second asked students to look at two websites on quitting smoking and select which one was the best source for a paper and why. The final question asked students which of three statements needed to be cited. The first question yielded the most significant results and was used to determine knowledgeability. The created rubric scores were a three-point scale of "knowledgeable," "fair," and "poor."

Results showed that the oldest students surveyed scored the lowest on information literacy knowledgeability, as did the students from community colleges. About 73% of all transfer students who responded scored either fair or poor in terms of knowing appropriate use of search terms and 21.6% reported never having had library instruction. Of those who scored "knowledgeable," 6.1% had never had library instruction, while 54.5% of those who scored "poor" had never had library instruction. Interestingly, as age increased, the likelihood of having had library instruction decreased, which most likely reflects greater emphasis on instruction and information literacy over time. Those 30–59 age range students were more likely to have never had a library workshop as a student, more so than the 19–29 age range students surveyed.

Transfer Students: Participation in the Assessment in Action program

In 2012, ACRL was awarded close to $250,000 for the third year of a three-year project called "Assessment in Action: Academic Libraries and Student Success," a program sponsored by multiple planning grant partners. The purpose of this program was to allow librarians to learn assessment and research skills and to collaborate in these assessment projects, not only internally, but strategically across campus.

Two of the team members were invited to provide library instruction to two sections of FFL 250: Enhancing the Transfer & Adult Experience at UNCG. This optional class is targeted to transfer students and adult learners and is designed to assist these learners in developing competencies essential for academic success. The team designed a pre-test asking students to find books in the library, choose which of two articles was scholarly and why, and describe their comfort level with various research tasks. The original intention was that students would complete the pre-test outside of class before the library instruction session. Students would then attend the library instruction session, engage in hands-on exercises in all the areas covered by the pre-test, and then take a post-test very similar to the pre-test with different examples. The team imported results into Excel and analyzed using SPSS, comparing pre-test and post-test responses. Though some interesting results emerged, this study also had limitations and challenges. The pre-test links were not delivered to students prior to the class, as intended. Thus, the instruction librarians had to reallocate time to allow for both the pre-test and the post-test within the 50-minute session. To reallot time to add the pre-test, the topic of proper citation was truncated.

Librarians on the team created a rubric to evaluate answers to the three questions. Attitudinal questions were graded on a three-point Likert scale of not comfortable, somewhat comfortable, and very comfortable. What was found to be statistically significant was the increase in comfort with common research tasks. Students indicated a 25% increase in comfort with finding journal articles, and a 26% increase in comfort with finding books. Also, while several students indicated they were not comfortable with finding books and journals in the pre-test, zero indicated the same in the post-test.

Figure 1: Comfort level finding journals in the library, pre- and post-tests.
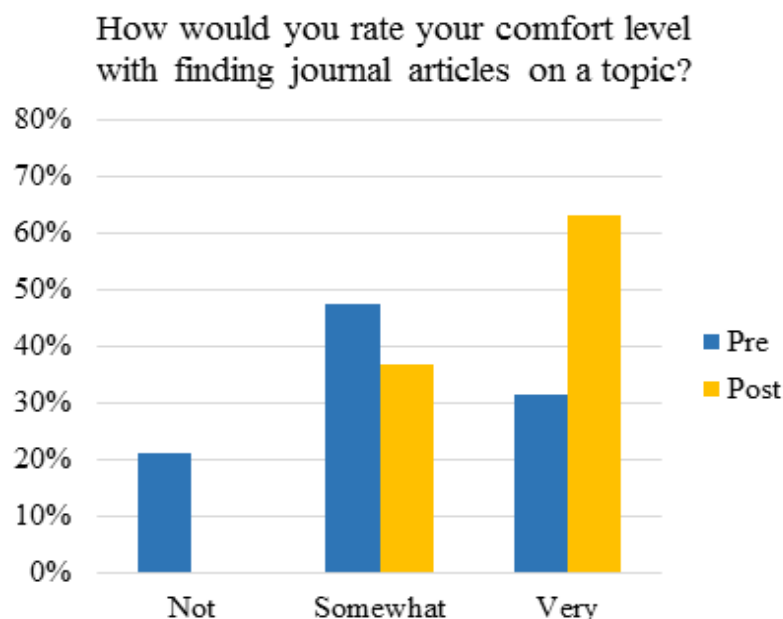
Figure 2: Comfort level finding books in the library, pre- and post-tests.

How would you rate your comfort level with finding books in the library?
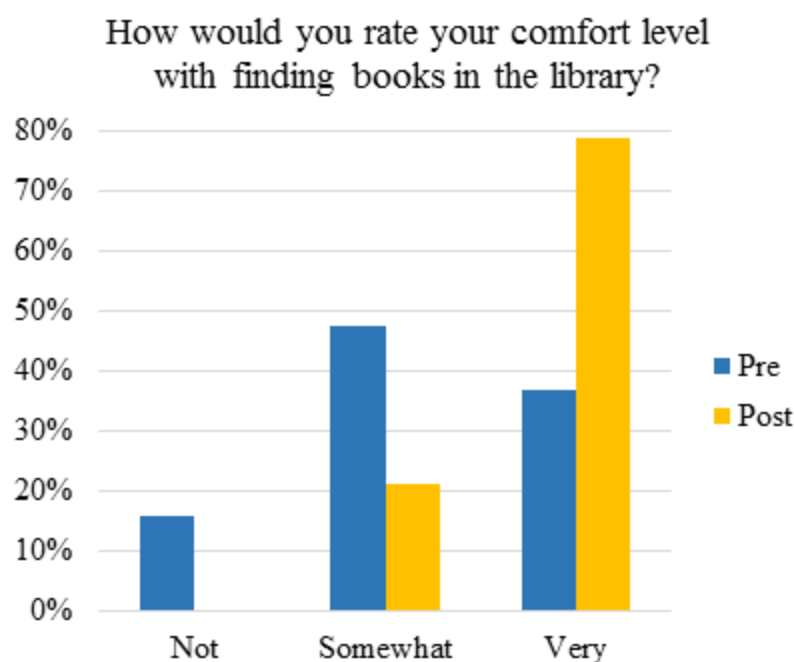
Figure 3: Most challenging skills identified in pre- and post-tests.

Which skill do you think is MOST challenging?
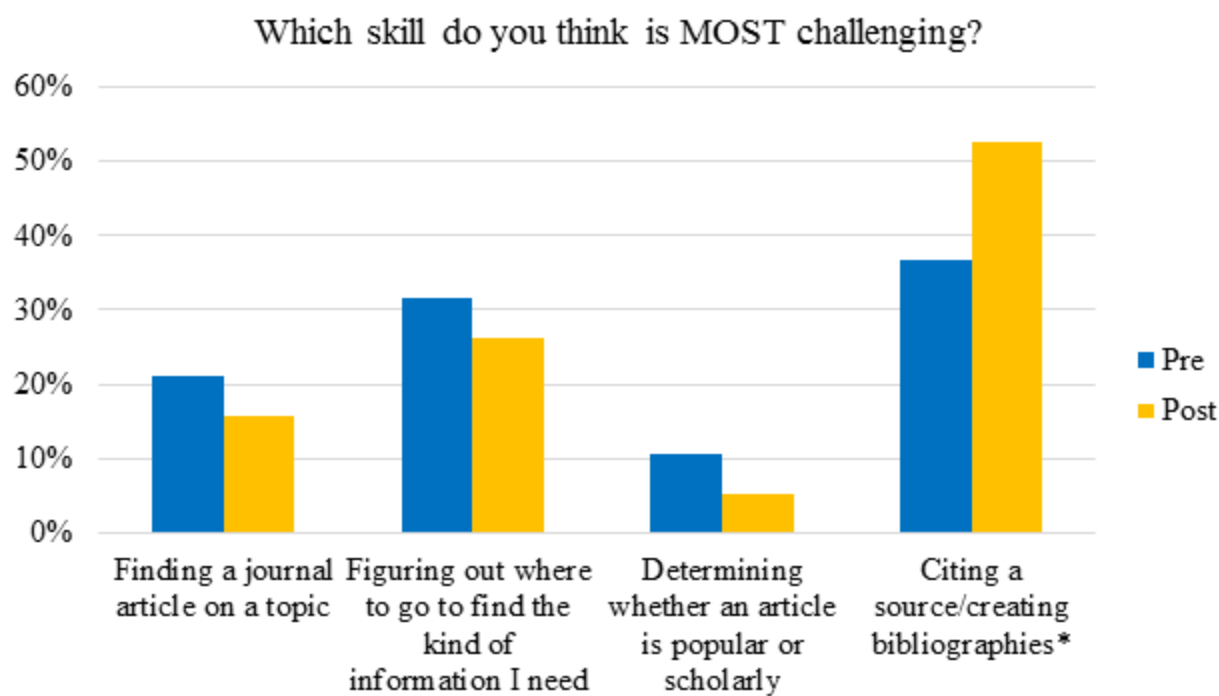
Team members designed the second study to follow up with the cohort of 2014–2015 incoming transfer students one year later. Some of the same demographic questions were asked, with a few additional ones to address gaps identified previously. Again, these students were asked to complete a few questions to determine their information literacy skills and then asked what types of interactions they had experienced with librarians, including visiting the reference desk, using chat, having a librarian provide instruction in one

of their classes, and having a consultation with their subject librarian. Though we sent out emails to the same list we consulted the year before, almost half of the emails sent bounced back. It is assumed that most of these emails bounced because the student was no longer enrolled. The team could not determine why so many students had left UNCG, but this could speak to issues with retention of transfers. Because of the smaller number of available email addresses, the number of respondents had dropped, this time to 58.

The smaller sample size made it more challenging to find differences between demographic groups. While direct comparisons between the 2014 study and the 2015 study are not meaningful, it is interesting to note that, in the initial study, about 73% of respondents scored as either fair or poor in keyword searching skills, leaving only 27% as knowledgeable. Our second study used a four-point scale, rather than a three-point, as we were able in the 2015 study to give extra credit to respondents who demonstrated knowledge of Boolean search strategies. If we combine the results for those who scored 1 and 2, we could say that roughly 57.7% scored "fair" or "poor," a 15.3% improvement over the 2014 survey results. The 2014 study found significant differences were found in knowledgeability based on age, transferring institution type, and previous exposure to library instruction. Unexpectedly, the 2015 study showed no significant differences found by any demographic factors.

One year later, 59.3% of respondents reported that a librarian delivered an instruction session in one of their classes over the previous year. The most significant finding was that students who had received library instruction had sought and received consultations from subject librarians more often than what would be expected if there were no relationship. The bar plot in Figure 4 shows that, of those that did receive instruction, a greater proportion received help from a subject librarian. Therefore, this is evidence of a relationship between a student attending a class at UNCG in which library instruction was provided and receiving help from a subject librarian.

Figure 4: Correlation between students who have had library instruction and have sought help from a subject librarian.

Relationship of receiving help from subject librarian & attending a UNCG class in which library instruction was provided
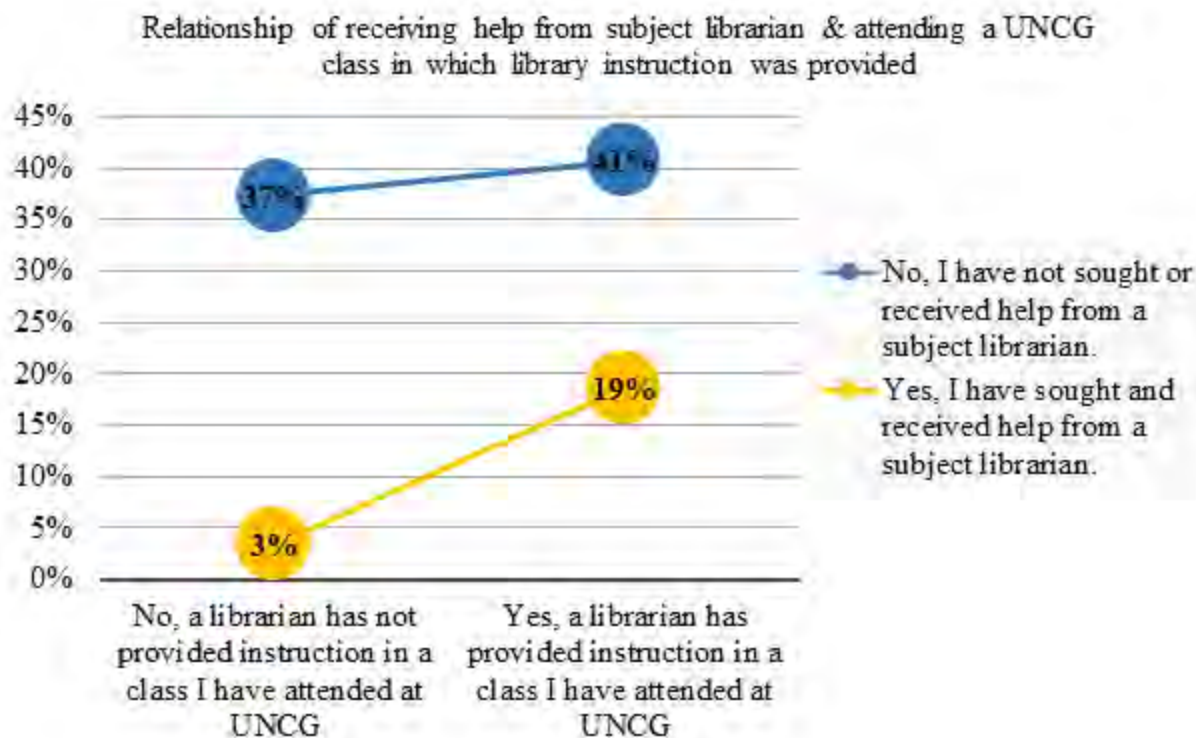
Online Students: Surveys to Online Students and Instructors Teaching Online

The online learning librarian and e-resources librarian at UNCG Libraries designed surveys to learn about the information needs and perceptions of online students and instructors. In fall 2017, two surveys were sent out to any student taking an online course and to any instructor teaching an online course at UNCG. These surveys were a combination of Likert scale, multiple choice, and open-ended questions. A gift card incentive was offered if students and instructors entered their email, disconnected from the responses. Around 8,300 students received an email with the survey, with a little over 700 students completing the survey, whereas 333 instructors were emailed the survey, and around 75 responded.

The survey was created and distributed on Qualtrics, which was also used for analysis. The demographics of the survey matched UNCG's online population. Many of the questions were about methods of information retrieval, what library resources and services they use or had never heard of, and rating the frequency of use and importance of using online library services and resources. The librarians also analyzed the open comment responses in the surveys through Atlas TI with the code groups of: barriers to access; feelings and emotions; finding information; library resources; library services; marketing, promotion, outreach; student population; and usability.

When looking at results from instructors, many instructors are finding online resources for their courses through recommendations from fellow researchers and UNCG Libraries. For online library resources and services, instructors listed access to resources as the most important service they wanted, with interlibrary loan being second. Many instructors were not familiar with UNCG Libraries streaming films, chat service, online course guides (Springshare LibGuides), and consultations with librarians. While instructors mentioned that they recommended library resources to students, it was rare for them to mention or select specific library databases, LibGuides, or even a librarian to help students find resources. Students responded that they rely heavily on their instructors and the UNCG Learning Management System (LMS) Canvas to get information for school, but they did list UNCG Libraries as a place for information retrieval. Most students who responded had never used the library's virtual chat and interlibrary loan. Like instructors, students listed online resources such as articles, eBooks, and streaming film as the most important service that the library provided, and a little over half were satisfied with these online resources. Almost 30% of students responded that their classes did not require them to use library resources to be successful, and almost half of the students who responded were not aware that the library provides access to streaming media.

Instructors also listed web browsing (Google) as the most frequent method of retrieving content for their courses. Many of them also listed that they get all the information they need for their courses on the Internet (13%) and that their classes or research do not require the use of library materials (17%). Though many instructors commented that they have a lack of knowledge about library online resources and services, most of them listed online resources (articles, e-books, databases, and streaming media) as very important in terms of UNCG Libraries virtual services and resources. Many instructors commented on the services which they had never heard of, such as, "I see there's a lot more I can and need to take advantage of" and "I wish I had known about the possibilities."

Figure 5: From 2017 survey to students, asking "How often do you use the following methods to learn about new information for school?" The Daily response shown here shows that Canvas and web browsing (Google) are the most used.

- UNCG's University Libraries website/catalog
- Conversation (face-to-face, text, or chat based)
- Ask a librarian
- Email
- Social Media
- Flyers/Posters
- Web browsing (Google, Bing, etc)
- Canvas
- Another library website/catalog
- Other
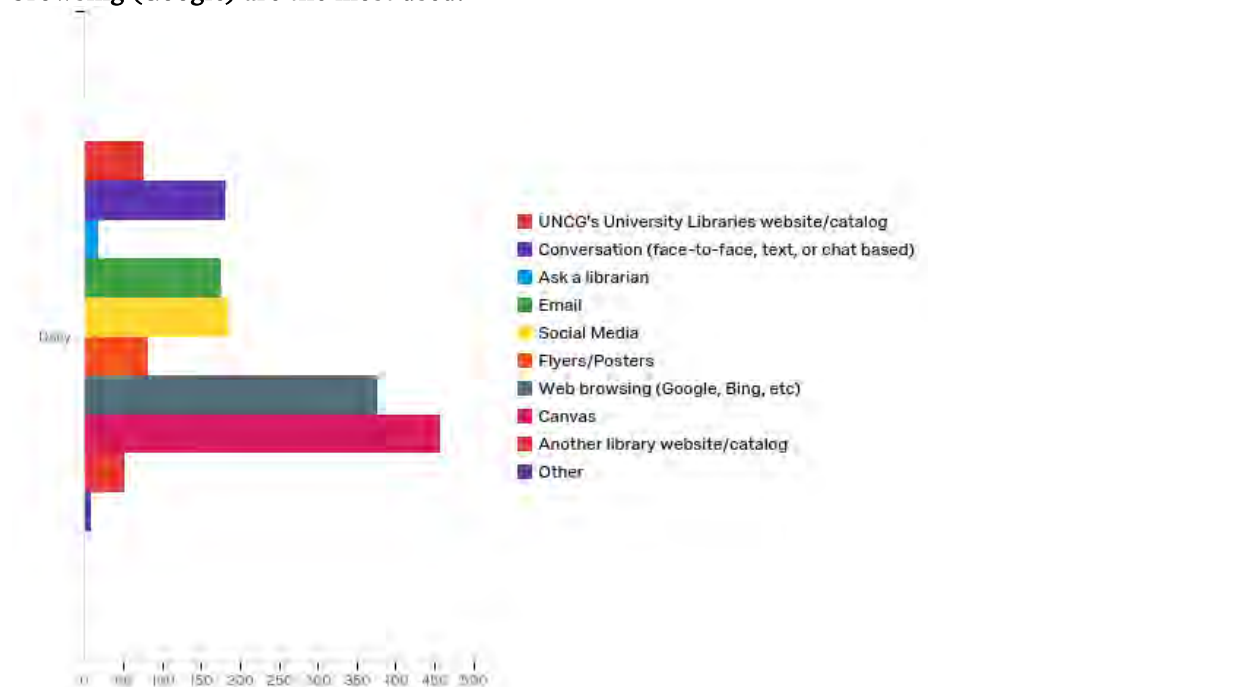
Figure 6: From 2017 survey to instructors teaching online asking, "How important are the following UNCG Libraries virtual services and resources to your teaching and research?" Many instructors thought online resources are very important.

- Online Resources (articles, ebooks, databases, streaming films, etc)
- Online Tutorials (videos, Prezis, etc to help you use library resources)
- Course/Research guide creation by a subject librarian
- Assistance with questions about copyright, open access, Open Educational Re...
- Library instruction to help students get started on research, find search p...
- Consultations (one-on-one meetings with the librarian)
- Chatting with a librarian (through virtual Ask Us! service)
- Interlibrary Loan and Materials/Book Delivery

The comments in both surveys were coded and analyzed in Atlas TI and brought up similar themes to the question responses; UNCG instructors and students continued to mention that they were unaware of many

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of the online library resources and services. Some suggestions about improving student and teacher awareness from the comments are: the library being better integrated with Canvas, more orientations for online students, email campaigns, and a one-credit required library information literacy course. Online graduate students mentioned the importance of hearing from their liaison librarian early in their academic careers to stay on track for writing their dissertation. Most comments were positive about the library and the services provided (particularly those that had contact with their liaison librarian). Some comments did complain about the library interface and the number of logins required to access materials when off campus.

Figure 8: Amount of student comments made about "barrier to access" from the 2017 survey to online students and instructors. "Lack of knowledge" was commented on the most in this survey.
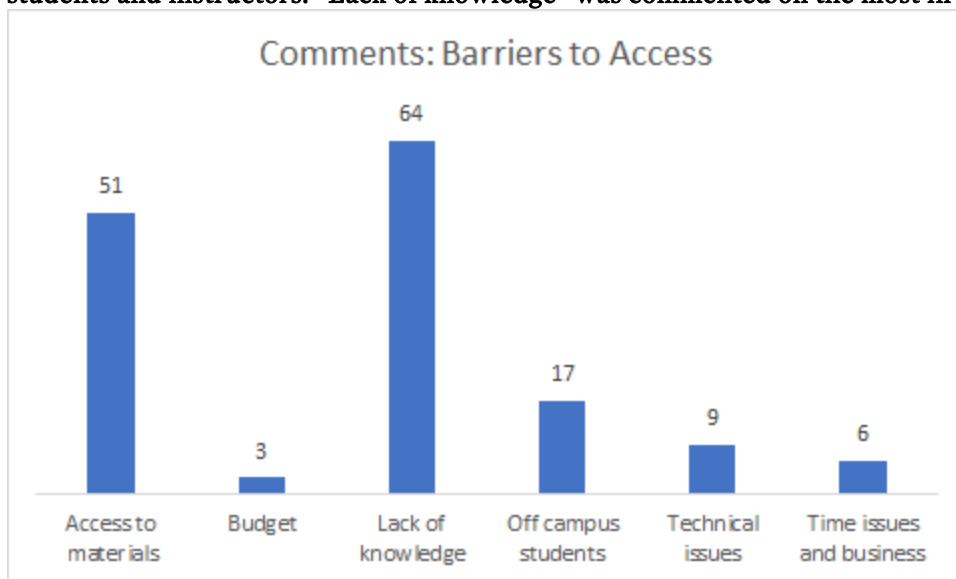
Online Students: Usability Study

The online learning librarian, e-resources librarian, and information technology librarian performed a usability study in spring 2018 by recording students using library online websites and guides on a laptop using Camtasia (face-to-face students) or the virtual meeting tool Webex (with online students). The librarians had the students answer a series of questions before the session about their library experiences and instruction. Students then performed tasks such as finding the library database Project Muse and a database for their subject from the UNCG Libraries database page. And lastly, they were asked some questions about their department LibGuide (based on their major). This study was performed on ten face-to-face students (all undergraduates) and two online students (both graduate students).

Though UNCG Libraries was only able to recruit two online students to participate in the usability studies, the entire study contains interesting results that can help the library improve services to online students. Both the face-to-face and online students mentioned being overwhelmed by some of the information presented on the website, database site, and LibGuides. Many of the undergraduate students did not know the definition and purpose of a library database and many were confused about where to start searching for resources for a research project. Some of the undergraduates had a database they used often, even if it was not a relevant database to their major or research. Many students had never used their department or course LibGuide, but when presented with the guide, they were impressed. Both online students mentioned that LibGuides were hard to find, with one mentioning the importance of bookmarking these guides. One of the online students expressed frustration at having to constantly login while researching off campus.

Both studies show that online students and instructors teaching online have a lack of awareness about many of UNCG Libraries services and resources in an online environment. New conversations and committees have been formed on marketing since this survey and usability study, with more collaborations on how to

implement email campaigns by working with the UNCG Libraries director of communications and marketing. Based on these surveys, UNCG Libraries has also implemented some new initiatives for online students and instructors. In August 2018, Online Library Orientations were offered to undergraduate and graduate students, as well as instructors (both face-to-face and online), with the incentive of being entered to win a gift card for attendance.[17] Over 40 instructors and graduate students came to these orientations and no undergraduates attended. In January 2019, UNCG Libraries will integrate in the LMS Canvas through the SpringShare LibGuides LTI, meaning that a Library Resources tab will be turned on in every academic course at UNCG within Canvas. This will link students and instructors to either a specific course, department, or general library LibGuide. UNCG Libraries Research, Outreach, and Instruction (ROI) department is currently working on revamping the online library research tutorials to more closely align with the ACRL Information Literacy Framework and UNCG Libraries new student learning objectives. This tutorial revamp also provides the opportunity to improve the research tutorials based on these assessments, as well as provide education about library resources to nontraditional and online students, who might otherwise not get the opportunity for face-to-face library instruction.

Future Directions: Nontraditional Student Assessments and Programming

In late 2017 and early 2018, a series of focus groups were offered to transfer students to determine what some of their greatest challenges were in school, how they preferred to study, and their overall impressions of the library. The research team believed that more general information is needed about the lives of transfer students so that UNCG Libraries can provide targeted outreach and marketing. The results of this study are currently being analyzed and coded, but early analysis found common themes of feeling strained for time, having difficulties getting to know other students as transfers, and wanting and appreciating a variety of study spaces in the library for different needs. Other outcomes of the transfer student studies are increased collaboration with entities across campus that work with transfer students, inclusion in transfer student orientations and information fairs, and more targeted instruction and outreach. UNCG hosted a half-day meeting in 2017 for librarians from our largest feeder community colleges to find ways to collaborate and will be working with community college students participating in a new dual admissions program.

Since online students are growing at a rapid rate, UNCG Libraries would like to find more ways to include online students in all library assessments and create more targeted assessments to online students. In the future, the online learning librarian will collaborate with groups across campus to run Distance Education Advisory Groups, where undergraduate and graduate online students will meet virtually once to twice a semester to answer questions about UNCG services and resources. Currently a group of various university staff, librarians, and instructors has formed, created questions, and is participating in training on how to effectively facilitate focus groups.

Looking at services that online students are using—such as chat—is another way we can analyze the research needs of online students. The online learning librarian and the health science librarian are currently conducting a study of chats from UNCG nursing students. There are four online graduate degrees and certificates available in nursing, designed for professionals already in the nursing field that want to continue their education.[18] From this analysis, a guide and FAQ list will be made to help train librarians, interns, and student workers on how to best handle health science research questions. Though the results are still being analyzed, there are similar patterns as other student assessments, such as confusion about resources and using Google for research.

Conclusion

Nontraditional students come to or back to school with many challenges, and libraries can help ease many of their research issues; but the library cannot help if nontraditional students do not receive contact, instruction, or information about researching online. Nontraditional students are an important population for libraries to serve, and assessing this student population ultimately improves library services and resources to all students. These assessments from two university librarians on transfer and online students show the importance of library instruction, reaching out at the start of student programs, effectively promoting and marketing materials and services, and proving the value of library resources to improve

assignments and research. Ultimately these studies are just the beginning; more analysis on nontraditional students will continue with focus groups and a virtual chat analysis to see further into the needs of nontraditional students.

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Ranking Data Outliers for Collection Budget Analysis: Allocating for the Future

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Abstract

Finding an objective and reliable means of allocating annual collection development budgets is a perennial challenge in research libraries. Many libraries tend to rely on methodologies such as applying standard inflationary increases across all or some types of funds. These methods tend to maintain and perpetuate funding priorities from year to year. Changing campus needs, including new programs and curriculum, innovations in research methodologies and teaching, and new campus-wide strategic priorities constantly challenge us to overcome the collection allocation inertia that may set in if empirical data is not used to test budgetary assumptions and then allocate resources to meet changing priorities.

Faced with new campus-wide priorities, including the launch of new academic programs and campus-wide multidisciplinary initiatives, as well as fiscal pressures, such as budget cuts for library materials and annual price inflation, the Binghamton University Libraries developed a system to analyze our collection budget and evaluate our budget allocation methodology using 17 data points.

Our methodology involved comparing the rankings of program funds across data points and using disparity in rankings to identify programs that are potentially over- and underfunded. We began by gathering four fiscal years of data, 2013/14–2016/17, on all library supported programs. The data was drawn from internal library and campus data, and externally created cost information for monographs and journals. Library data included costs for monographs, journals, and databases as well as circulation and interlibrary loan data. Campus data included faculty FTE, degrees granted, number of students by level (undergraduate and graduate), and course hours by department or program. External data included average monograph cost and serials cost by subject area. Once the dataset was created, each data category was ranked from highest to lowest in value. Then, library budget rankings for monographs, journals, and databases were compared to the rankings of all data points. A summary sheet was compiled to determine programs with over- and underfunded indicators. The summary sheet also indicates trends over the budget years examined. By tallying the number of times a program was labelled as either "overfunded" or "underfunded" across the ranking comparisons, we identified programs that should be examined as potentially over- and underfunded.

Through this analysis and consideration of qualitative measures, such as a program's support of general education courses, interdisciplinary nature, and dependence on monographs or journals, we will be able to identify potential areas for reallocation of collections funds and better address anticipated campus curriculum and research needs.

Background

Founded in 1946 as a liberal arts college, Binghamton University has evolved into a highly ranked public doctoral research university. Serving 13,700 undergraduate students and 3,600 graduate students, the university boasts one of the highest retention (92% for freshmen) and graduation rates (81%) among public universities in the nation. As of fall 2017, Binghamton had 754 full-time and 293 part-time faculty. It is part of the State University of New York (SUNY) system.

University strategic priorities include growing our graduate and research programs while maintaining our traditional strength in the liberal arts. In 2013, Binghamton developed a new approach to support faculty and research by creating five Transdisciplinary Areas of Excellence (TAEs). These include Citizenship, Rights, and Cultural Belonging; Health Sciences; Material and Visual Worlds; Smart Energy; and Sustainable Communities. In fall 2017, a sixth TAE in Data Science was established.

Introduction

The Binghamton University Libraries have nearly 2.5 million print volumes, more than 200,000 print and electronic journals, and 358 databases. In the early 2000s, the library collection budget was relatively flat. In 2013 and 2014, the libraries was given new funding to support the new TAEs. Starting in 2016, the collection budget was given annual inflationary increases of 3% for monographs and 6% for journals and databases.

In 2007, the libraries conducted a collection allocation review. The review committee chose a normalized ranking analysis of several data points, including total expenditures, FTE faculty, number of graduate and undergraduate students, number of degrees, interlibrary loan statistics, and serial cost. The analysis identified over- and underfunded programs. The committee recommended increasing budgets for underfunded programs when possible, and several were given modest increases over the years.

In 2018, the libraries determined it was necessary to conduct a new collection allocation review, as campus priorities had changed with the introduction of TAEs, changes within academic departments, and the introduction of new programs.

Literature Review

Library literature on collection allocation note that many studies utilize common data sets. In a review of methodology, Canepi[1] noted that the most frequently used factors were student enrollment, number of faculty, material cost, and circulation statistics; other data factors used less frequently were course offerings (nature or number), academic programs, research output, and number of faculty publications. Some studies include additional quantitative and qualitative data, including library and/or university priorities[2] and librarian expertise.[3]

Walters[4] noted that the choice of data "is always subjective and dependent on local conditions." While many use the most common data points, some studies did not include specific data points due to quantity or quality of data, or time needed to collect data. After their analysis, the study by Lyons and Blosser[5] excluded data on academic programs, monographic circulation, electronic resources usage, interlibrary loan, and dependency on format due to various shortcomings for each category. Dinkins[6] advocated use of historical allocation and usage data only to be as effective as more complicated, time-consuming, and complex data use allocation analysis.

While there is commonality in data, collection allocation studies apply different formulas or assessment techniques in their analysis. Catalano and Caninano[7] wrote about the use of five allocation methods by large academic libraries: "percentage-based, weighted multiple-variable, factor or regression analysis, historical spending plus percentage of new formula, and circulation-based statistics." After evaluation of each method, Catalano and Caninano reported the adoption of a method that relied on subject librarian expertise and circulation statistics.[8] In his study, Walters characterized the data into demand, supply, and cost categories, and utilized factor analysis. Also using demand, supply, and cost data, Lyons & Blosser[9] used ordinal scales and quartiles for ranking. As previously mentioned, Dinkins[10] used historical spending plus circulation statistics.

Methodology

In performing our collection allocation review, we decided to use a ranking comparison analysis: we compared the rankings of program funds across data points and used the disparity in rankings to identify programs that are potentially over- and underfunded. While this approach lacks the precision of other methods of analysis, it enabled us to readily identify programs for more thorough analysis using both quantitative and subjective analysis.

Preparing Funds and Data for Ranking

Data for fiscal years 2013/14–2016/17 was collected in preparation for the ranking and comparison analysis. The statistics gathered for ranking and comparison were composed of university-collected data, including course hours (undergraduate, graduate, and total), full-time enrollment (faculty, doctoral students, master's

students, undergraduate students), and number of degrees granted (doctorate, master's, baccalaureate, and total degrees), as well as data collected internally from library resources, including monograph circulation amounts and number of interlibrary loan requests (by material type [articles, monographs, and total requests] and requestor [undergraduate student requests, graduate student requests, and faculty requests]).[11]

Due to various factors, some program funds were combined, reassigned, or omitted. Funds associated with independent and interdisciplinary programs were combined with or reallocated to departments' funds that most closely aligned with the subject.

This reallocation was based on the required credit makeup of each program, where the dollar amounts and statistics were allocated according to the ratio of each subject area. For example, the politics, philosophy, and law (PPL) program exists as a major and earnable baccalaureate degree; however, there are neither budgeted funds nor course hours for the program. Thus, because PPL requires a course load of one-half philosophy, one-quarter history, and one-quarter political science course hours, the statistics for PPL were divided accordingly into the philosophy, history, and political science datasets. This process was also carried out for integrative neuroscience, which was split into one-third biology, one-third chemistry, and one-third psychology.

Some subject funds were deemed complementary to each other enough based on the funds supporting similar or shared materials, programs with content and course overlap, and, in some cases, subject librarians who covered multiple program funds in which there was significant content overlap of materials acquired, to be combined. The German and Russian Studies (GERRUS) and Russian and East European Program (REEP) funds were combined based on shared subject content and overlap of course hours and teaching faculty, for example. Other funds combined for similar reasoning, include environmental studies and geology, as well as art and art history.

Additionally, some programs were too small and/or possessed too few data points to be significant enough to be included in the rankings and rank comparisons. These programs were either added to other funds or omitted from calculations completely. The data for the student affairs administration program was added to education, and global and international affairs was added to political science. The funds for library literature, materials science, the Middle East and North Africa Program (MENA), and writing were additionally omitted, either due to no existing program and/or not enough data.[12]

The resulting combined and already established programs were then broken into their monograph, journal (PX), and database/online (EX) budgets. The monograph budgets were further broken into their Monograph A (print monographs), Monograph B (electronic monographs), and standing order (SX) funds, but, for the purposes of this project, were considered in their entirety as total monograph funds. These programs were then ranked based on these three individual fund types.

Ranking and Comparing Gathered Data

Programs were ranked according to these individual datasets, and these rankings were then compared with rankings of each program's fund rankings by subtracting dataset ranks from fund ranks according to each subject area. A result of zero would indicate that the program's fund ranking correlates perfectly with its ranking according to that point of data, suggesting an adequate allocation of funds for that program. A positive result would indicate a potential excess of funding, and, conversely, a negative result would indicate a potential need for additional funding.

Figure 1

This project entails 43 subject funds to evaluate, three types of funds per program, and 17 points of data with which comparisons are to be made. In an effort to determine potential outliers, only comparisons resulting in differences more than 10 and less than -10 were notated as potential areas of surplus or deficit. These rankings, comparisons, and designations can be seen in Figure 1.

Once these comparisons and calculations were completed, the sums of notations of potential surplus and potential deficit were compiled in a summary sheet to provide an overview for each program and their respective funds. These summary sheets were further refined into three additional summary sheets for the monograph, journal, and database funds in order to illustrate clear trends across years for each subject area in their respective fund types.

Analysis/Outcomes/Results
Analysis of the Rankings Data

The rankings data provides insight into several aspects of our collection allocations. The summary rankings (programs across all factors) provide an immediate, somewhat impressionistic view of our collection expenditures across monographs, journals, and databases.

Most rankings are consistent over time, with programs rising/falling only a few places from year to year. Art/art history stands out as the most-likely-to-be-overfunded program considering all rankings from 2013/14–2016/17. Several funds are consistently among those most likely to be overfunded: physics, sociology, anthropology, management, philosophy, biology, and chemistry. Many of these funds currently have significant monograph, journal, or database funding in our current collections budget. Similarly, several funds cluster in the bottom quartile (indicating potential underfunding) over this same time period: human development, Judaic studies, cinema, public administration, computer science, theatre, biomedical engineering, and health and wellness studies. There are no instances in which funds show any dynamic movement, i.e., rise from the lowest quartile to the top quartile of funding factor totals. Funds that are well-off tend to remain well-off, and those that lag, lag. Arguably, this demonstrates very clearly the impact of relying primarily on a system of annual percentage increases for allocating monograph, journal, and database funds: usually 3%, 6%, and 6% every year, respectively. The implication is that funding for programs does not rise and fall in importance to the university's mission or budgetary goals, does not fluctuate in terms of hours taught or number of student FTE, does not have different needs for resources or strategic growth, etc. Funding is consistent over time.

Further insights can be gained by dividing the summary rankings into format specific factors: monographs, journals, and databases. When we do this, we can clearly see that the social sciences and humanities tend to be more monograph-based programs while the sciences are more journal-based. The only science fund to break into the top quartile of potentially overfunded monograph funds is biology. Similarly, many of the highest ranked journals and databases are science funds; though history, art/art history, sociology, and management are also in the top quartile.

Figure 2

With the summary rankings divided into format specific factors, we can also see even more clearly how consistent the rankings have been from year to year, particularly on the upper end of the rankings (Figure 2). From 2013/14 to 2016/17, the top eight ranked monograph funds were the same eight subjects: sociology, art/art history, philosophy, comparative literature, anthropology, history, English, and biology. Only minor shifts in rankings occur. Similarly, the top journal ranks tend to be occupied by several funds: physics, chemistry, biology, anthropology, psychology, sociology, and mathematical sciences; although here, we do see more significant variation, with funds like mechanical engineering and environmental studies/geology dropping out of the top rankings. Database rankings show little variation as well—the same funds tended to fall into the top rankings. There is very little movement from year to year; our budget allocation has remained very consistent over the past four years.

The summary of ranking factors gives a high-level impression of collection program behavior. Breaking factors out by format provides even more detail. To examine program funding in more detail, ratios of factors were examined with rank program expenditures to gain more insight into the extent of over- and underfunding, as well as provide more points of comparison between funds. Averages were also calculated for each measure to provide a midpoint value.

Creating Ratio Values to Supplement Rankings Information

To test the rankings methodology and to provide more insight into our collection allocations, we calculated ratios for each of the comparisons in our ranking system. For example, we calculated the monograph expenditures per number of hours, FTE, course hours, and degrees granted across all the disciplines. The results of these calculations were ranked from highest to lowest. Finally, we computed the average for all the figures to serve as a baseline for comparison. These calculations can be considered as a whole or grouped into monographs, journals, and databases.

Figure 3

As expected, this work supported the rankings results data. By calculating the ratios, we were able to see not only the rankings, but also the magnitude of the difference in rankings and how far above and below our average expenditures for each of the program budgets lay (Figure 3). In many cases, this data provided a clear indication of which program funds were outliers and which program funds to consider reallocating.

Some data proves more useful than others in the rankings. Average price data in particular proved to be more helpful for secondary analysis—explaining the rankings—as opposed to calculating the ranks. We were hard-pressed to demonstrate a relationship between the average price of a book in a field and the number of degrees granted by a department. Price is, however, useful in determining why one monograph budget might be higher than another—if the average cost per book is higher for a particular subject area, arguably, the corresponding program's budget should reflect that. In the future, price data could be used to normalize the rankings.

Results of Ratio Calculations

Monographs

Monograph ratio calculations yielded particularly striking results. When spending per course hour was calculated, history ($11.31/course hour), sociology ($11.07/course hour), comparative literature ($10.40/course hour), and art/art history ($10.21/course hour) stood out as outliers for potential overfunding, particularly when compared to the overall average expenditure of $3.36 per hour.

These program funds also appeared to be outliers in other monograph spending calculations, such as cost per degree granted. Comparative literature ($2,902/degree granted), history ($917/degree granted), art/art history ($807/degree granted), and sociology ($617/degree granted) were significantly higher than the average of $170 per degree granted in 2016/17.

Several program fund expenditures ranked highly across nearly all monograph categories. Comparative literature ranked in the top ten of all programs for nine ratio calculations: total monograph expenditures/undergraduate hours ($11.52 versus $3.85 average); monograph totals/total course hours (10.40 versus 3.36 average); monograph total per faculty member ($2,434 versus a $914 average); monograph expenditures per masters FTE ($9,432 versus the $364 average); monograph expenditures per undergraduate FTE ($2,095 versus the $73 average); monograph expenditures per PhD granted ($9,432 versus the $5,193 average); monograph expenditures per master's degree granted ($18,864 versus the $170 average); monograph expenditures per undergraduate degree granted ($5,390 versus the $239 average); and monograph expenditures per degree granted ($2,902 versus the $170 average).

Several program funds regularly ranked lowest for monograph spending, indicating they might be underfunded. These funds included nursing, management, psychology, and biomedical engineering. These programs also ranked lowest for key measures, such as total monograph expenditures per total course hours and total monograph expenditures per degrees granted. Results for biomedical engineering were particularly striking: this program ranked lowest in almost all categories. To some extent, this could be due to biomedical engineering's interdisciplinary nature, as it encompasses several research areas. For a program granting 91 degrees in 2016/17, it is clearly an outlier for monograph spending and support per degree granted.

Journals

Journal ratio calculation results were more nuanced than the monograph ratio results. One significant reason is the difference in costs between STEM and social sciences and humanities journals. Not surprisingly, physics, with a disproportionately high average cost per journal for its comparatively small program, $2,644, appeared in the top rankings of nearly all the journal ratio calculations. The disproportionately high cost of STEM resources likely distorted the results, particularly for smaller programs.

Journal rankings ratio data yielded some unexpected results. Computer science, for instance, came up as underfunded in many of the journal ratio calculations. Comparative literature, with an average cost per journal of $198, was highly ranked in journal dollars per degree, $845/degree, compared to a $280 average/degree. However, when the journals expenditures per total course hours was examined, comparative literature fell below average: $3.03/course hour versus the average of $5.54/course hour. This could be a good example of a program that grants fewer degrees, yet teaches more course hours and may be heavily engaged in offering service courses and supporting general education requirements for students.

Databases

Addressing database budget allocations presents some challenges, as well. We do not have subject-specific databases for several programs, including German and Russian studies, health and wellness studies, geography, and cinema, while other programs may have database products but no dedicated funds. For example, we have a number of history databases, but the funds are contained in the libraries' reference fund. Our database data also did not include general collections of articles such as Academic Search Complete, JSTOR, Project Muse, and Wiley. Programs do not benefit equally from these sources. As a result, some of the database results may not reflect the total content available to support the program.

The database data does provide information on program support and possible unmet needs. A lack of databases in a subject area may indicate an unmet need, warranting further investigation. For example, do we need GIS/mapping software to support geography? Would our cinema program benefit from access to more subject-specific databases?

The database ratio rankings indicate some programs have more expensive databases and require specialty search tools, specifically art/art history and chemistry. Chemistry has a 2016/17 database cost per degree granted of $1,082, versus the average of $175. Art/art history has a 2016/17 database cost per degree granted of $1,117 versus the average cost of $175. Both of these programs have unique searching tools and indexing for images and structures.

Some programs have online resources that are used by other programs. IEEE Xplore, assigned to electrical engineering, and ArtSTOR, assigned to art/art history, are both used heavily by other departments. Due to this, their ranking and apparent overfunding may not be an accurate assessment.

Arguably, some programs have a disproportionate number of resources. Chemistry, physics, and art/art history have more databases and journal collections from scholarly societies as well as commercial vendors. In some cases, there are more scholarly societies that publish core content, while in other cases, specialty searching tools are needed to access content. Other programs, like English, rely upon fewer tools to document and share their scholarship.

Larger Trends from Rankings and Ratio Calculations

Overall, the current collections budget appears to reflect the historical evolution of academic programs on campus. Older, more well-established programs have larger funds and more collections support (number of databases and journals) than newly established programs. One possible reason for this has been the lack of infusion of new collections funds into the budget as programs have been launched on campus, with most new program budgets created from existing collections funds. Another potential reason for this is the incremental single percentage increases for books, journals, or databases budgets every year. This approach helps preserve the advantage of larger funds and keeps smaller or newer funds from growing to meet needs.

As over 40 points of comparison indicate, there are many variables that can influence annual collections fund allocations. Applying inflation adjustments to the current system takes none of these into account. Inflation adjustments also do not take into account campus and library strategic plans, evolving university priorities, differing departmental needs, and additional new programs and schools. This underscores the need to look beyond simple inflation when allocating annual collections funds.

One exception to this budgeting evolution was the allocation of a significant amount of collections funding for five (later six) TAEs. Over a three-year period, funds were allocated to each of the five TAEs to address collections needs identified from faculty requests and internal library collections discussions. As a result, there is more support for newer programs built into these funds as many collections choices came from existing unmet needs in newer programs.

The journal and database allocations and ratio calculations clearly reflected the higher costs for STEM content as well as specialized professional programs such as management. The average price for content influenced ranking results a great deal. We also saw numerous instances where a program appeared to be overfunded considering dollars per degree ratios, but underfunded when funding per course hour was calculated. Some examples include chemistry, mathematics, and history. Numerous programs had relatively few enrolled majors of their own, but had very high numbers of course hours taught, indicating a high degree of service teaching or more options for fulfilling degree requirements. In both instances, this data was noticeably biased.

Conclusion

From the data collected from rankings and ratios of ranked categories, we can draw some general conclusions on implications for collection funding as well as opportunities for further research.

Implications for Collection Funding

This study suggests some possible scenarios for reallocating program funds. From both the rankings and ratio data, some funds appear to be overfunded (art/art history) while others appear to be underfunded (bioengineering). A possible next step could be to create strategies for reallocating the collections budget over time, both to address new program support as well as reduce the "historical advantage" from which some programs have benefitted.

As an alternative to reducing fund support, program funds could be frozen and not given annual percentage increases for inflation. Inflationary funds could then be concentrated in the underfunded areas in need of support. Freezing funds, as opposed to cutting them, may be more palatable to subject librarians. Making larger, more drastic changes to funds may also antagonize faculty and campus administration, which can be counterproductive to support of the library as a whole.

Another approach would be to reconsider the current model of bibliographer-based allocations and examine if a zero-base or alternate budgeting system would better meet evolving collection needs and address strategic changes. Are there opportunities to be more entrepreneurial, such as creating a fund pool of one-time money to buy perpetual access to archives or e-resources and reallocate this fund on a regular basis? Another option to consider is setting a percentage of funds as fixed and rebudget the remainder (i.e., 80% of the budget fixed and 20% re-budgeted).

There are also opportunities to further study collections inequities. One option is to perform a needs-based assessment for programs and collection products in all areas of the collections budget. This data can be obtained from profiling a selected list of Carnegie classification peer libraries (doctoral, high research activity) or examining unmet item requests. Another option could be to collaborate with other SUNY campuses offering doctoral programs to compare our collection budget structure.

Another future activity may be to determine optimal allocation ranges for major types of collections content and formats. This would require some analysis to develop these standards and baselines for collections; for example, how much do we want to spend on monographs, journals, and databases?

A further goal is to move beyond a comparative model for analyzing collections and examine the broader impact of technology, scholarly communications, and accreditation standards to monitor the overall health of our collections budget. For example, where art/art history stands in relation to philosophy is a secondary concern if both are underfunded. This may be a more strategic way of meeting our patrons' needs and building the collection for the future.

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Endnotes

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6. Debbi Dinkins, "Allocating Academic Library Budgets: Adapting Historical Data Models at One University Library," *Collection Management* 36, no. 2 (March 2011): 128–129, https://doi-org.proxy.binghamton.edu/10.1080/01462679.2011.554163.
7. Catalano and Caniano, "Book Allocations," 193.
8. Catalano and Caniano, "Book Allocations," 209–210.
9. Lyons and Blosser, "Analysis and Allocation Systems," 305.
10. Dinkins, "Allocating Academic Library Budgets," 128–129.
11. The statistics for ILL requests were ranked in decreasing value, as opposed to increasing value for the funds and other statistics. This decision was made because an abundance of requests via ILL indicates a deficit in resources, while a lack of ILL requests indicates sufficient resources.
12. Notes on data: The Pharmacy fund was implemented beginning in 2016–2017, but the university program did not officially start until the 2017–2018 academic year; calculations utilizing Pharmacy data, therefore, were not conducted due to lack of available statistics. Furthermore, there were instances where calculations were not considered where there was no data available/no particular fund or dataset for a program. History, for example, has a sizable monograph fund but no Database/Online fund; thus, History was considered in all monograph ranking comparisons and no database/online ranking comparisons.

Collecting Globally, Connecting Locally: 21st Century Libraries

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Introduction

Just a few decades ago, bibliographers at research libraries strove to build the largest, most comprehensive collections—with material from as many countries and in as many languages— as the budget would allow. Having a high percentage of unique items was desirable, and usage was not a core indicator of value. In fact, many ascribed to the philosophy that if **one** patron used a book **one** time in **one** hundred years, then the acquisition of that book helped fulfil the mission of the research library.

But the expectation for today's collection development librarians has changed. Given the reality of fixed (or decreasing) budgets, rising serials costs, an explosion in scholarly publishing, a diverse array of new formats, and the rapid growth of new academic programs and fields of study, collection development librarians are expected to build collections more closely aligned with the institution's teaching and research needs.

Understanding how well the collections we build meet the needs of our users is challenging for all librarians, but it is particularly challenging in area studies. The number of publications—and the range of languages— that **might** be of use to researchers is vast, but usage is inherently low. An analysis done at Berkeley demonstrated this discrepancy, finding that the average cost per circulation for international and area studies materials compared to all other subject areas was 6:1. It is worth noting that this cost per use ratio underreports the total cost per use discrepancy because it does not include the cost of cataloging. Cataloging costs, especially for the less commonly taught languages (any other language than English, French, German, and Spanish), is significantly higher than for English.

But **less use** may not mean **less value**, so what evidence **besides** circulation and e-usage data can selectors gather to make informed decisions about what is needed to support the faculty's global research interests? And further, how might we determine the appropriate allocation of funds to support global studies, and the appropriate balance of English and non-English language sources within area studies?

We decided to focus on faculty **behaviors** in order to get a deeper understanding of the impact of non-English language resources on their scholarship. Citation analysis is a uniquely powerful method because it analyzes all resources that the author used to support his/her thesis. Scholarly citations and bibliographies include resources not owned by the library (or by any library) which usage data—even interlibrary loan data—cannot provide. Analyzing the citations also addresses the concern that many publishers of foreign language materials do not currently provide online usage data.

But behavior alone is not enough; we also wanted to understand faculty **beliefs** about the value of non-English language material for their teaching and research. To get a better understanding of their attitudes, we decided to use a survey, followed up by interviews with faculty who agreed to talk with us so we could get a more in-depth understanding of their needs.

Literature Review

Several studies have explored the use and impact of foreign language material on scholarship, primarily through citation analysis. Kellsey and Knievel's 2005 longitudinal analysis of journals in several humanities disciplines, including history, investigated whether the percentage of foreign language citations decreased over time (1962–2002). They found that the **number** of foreign citations did not drop but the **percentage** did—as the number of English language sources rose, quite significantly in some disciplines. In their article, they

describe 6.7% of citations in German as "unusually high" and 11.1% in Italian to be "extraordinary." Interestingly, these percentages have become a benchmark in subsequent studies.

Schadl and Todeschini's 2015 study analyzed the citations of 179 dissertations on Latin America completed at the University of New Mexico from 2000–2009, and found that, overall, 12% of the articles cited and 16% of the books were in Spanish. The percentage varied by department, and in the history of art (which grants few dissertations, so is not well reflected by the average), it was as high as 54%. They concluded that Spanish language material was essential to research in Latin American studies and justified the expenditure, but that Portuguese did not.

Edwards et al., 2017, analyzed the use of non-English language sources in 5,668 dissertations from 98 departments at UC Berkeley, 2008–2015. Overall, 4% of the total citations were to non-English language sources, but this varied widely by discipline, ranging from 57% to 7% in the twenty departments with the highest use. Not surprisingly, these were the departments that emphasize languages and cultures outside the US, including Hispanic languages and literature, French, romance languages and literatures, Italian, German, Slavic and more. In the social sciences, history had the highest percentage (25%), followed by geography, political science, and anthropology. A perhaps more surprising finding was that, of the 398 languages that Berkeley has collected, 345 had no citations from any department during those eight years.

Giullian and Monroe-Gulick's 2017 assessment of the Slavic and Eurasian collection (and area studies more broadly) used a citation analysis of a random sample of the citations from 64 area studies faculty CVs. They found that foreign language material comprised 17% of the material cited across all regions (Slavic, East Asian, Latin American, and African), varying from 14 to 21%, with the top subjects of languages, linguistics, literature, history, economics, and political science. The authors were not surprised by the high percentage of English language material used in area studies, stating that, "It's no secret that foreign language materials generally fall into the low-use category at academic libraries in North America," and identifying that the more important question is to focus on "how much" to spend on foreign language material.

The OhioLink study did not look at impact—just at usage—but it is valuable because of the size of the book collection that was analyzed. Almost 9% of the total collection—2,383,462 non-English language books—were held by the consortium's libraries. Their analysis found that the average circulation rate for books is 0.109 circulations per year. By contrast, the average circulation rate for the 14 most widely held languages was only 0.019. The most heavily used non-English books were in Spanish, but their rate—.065—was still well below the average.[1]

Methods

There are many measures we could use to evaluate the impact of our non-US collections on faculty research and teaching, potentially including qualitative measures (surveys, interviews, observations, focus groups) and quantitative measures (circulation statistics, online usage, course reserves, and citation analysis). Each measure has its own strengths and challenges. For example, circulation statistics may include books not actually read, yet citation counts may include materials which faculty accessed outside of library holdings, perhaps through personal collections, which might not be a good indicator of the library's collection strength. And while faculty increasingly rely on digital access, publishers specializing in foreign language materials or digitized primary sources may not provide online usage data.

After evaluating our options, we chose a mixed methods approach which allowed us to capture both faculty attitudes (how they feel about our collections and what they think they read) as well as behaviors (what they actually cite in their publications). This addresses the classic tension in both behavioral science and library science between what people do and what they say they do.[2]

We started by creating a database of all 509 faculty in the social sciences at Berkeley as determined by their faculty profiles and publications, with a particular note on their geographic focus. Our data services librarian, Joshua Quan, then [created a visualization](#) of faculty's geographic research interests by academic

department.[3] Following this, we identified four social science departments with significant research activity using non-English language materials: anthropology, history, political science, and sociology. Around three in four faculty in these four departments indicated a non-US research interest, whereas only one in four faculty in the other social science departments had comparable interests. And some departments, such as business and psychology, were wholly US-focused.

Within the four departments, we focused our survey and citation analysis on 107 faculty members who had significant global research interests.[4] All full-time current faculty listed on department websites in 2017 were included, excluding only emeriti and temporary faculty hires.

We then searched for their publications over the last five years (2013–2017). When determining which publications to include in the citation analysis, we included only those with more than one reference, thereby excluding reviews of a single book. If a faculty member had published multiple versions of an article, we only included original versions published within 2013–2017, excluding reprints or translations of earlier work, as we wanted a bounded focus on their original citation choices in a given period of time.

To find these publications, we searched by date and faculty name in Scopus, Web of Science, CVs, disciplinary databases, and Google Scholar.[5] We were able to extract about half of the needed citations using the Scopus API, and student workers manually entered other non-English language references into a spreadsheet. Librarians coded each non-English citation by language, and the assessment program librarian analyzed quantitative results in Excel and Tableau.

Following this analysis of faculty citations, we designed and distributed a survey in Qualtrics to 105 faculty in anthropology, history, political science, and sociology whose profiles listed research interests outside of the United States.[6] This survey (see Appendix 1) asked how faculty acquire non-English material, the kinds of foreign sources they use, and their level of satisfaction with our support of global research. We also asked if they would participate in a follow-up structured interview or focus group to more deeply explore their needs for non-English material.

The response rate for this survey was a respectable 50%, with responses strongest in history (72%) and moderate in anthropology, sociology, and political science (29, 24, and 24% respectively). Response rates were assisted by an email from the dean of the social sciences, and then by subject liaisons, encouraging participation. This assessment project would not have been possible without significant work on the part of student workers manually inputting the data, specialized language and technical data skills on the part of librarians, interlibrary loan staff who obtained the material not held at Berkeley, and librarian time dedicated to research.

Citation Analysis Findings

In order to analyze the frequency of foreign languages collection use in cited references, we started our publication search for the 107 faculty from the Scopus database and also from their CVs, disciplinary databases, Google Scholars, and others. Due to the lower coverage on social science content and book content, Scopus has only indexed 58% of the 107 faculty's publications, and 42% of the publications are identified somewhere else. One finding that surprised us was that the foreign language use patterns in cited references were extremely close between the Scopus and non-Scopus publications. The analysis below is based on all of the publications.

For the five-year time period (2013–2017), 737 publications from all 107 faculty were included in the citation analysis. By searching authors' names, 424 publications came from the Scopus database. The other 313 publications were identified manually. In total, 58,480 references were analyzed. On average, each faculty author published 7 items during the five-year period, and cited 79 references. The majority of faculty publications (57%) were journal articles, while the majority of the cited references were books or book chapters (65%).

Of the 58,480 references, 16% (9,611) were in foreign languages with significant variations between history and the other three departments (see Figure 1). Thirty-six percent of the cited references from history were in foreign languages, but only 9–10% in anthropology, political science and sociology.

Figure 1. Frequency of non-English references cited by UCB faculty from 2013 to 2017 from the four departments: anthropology, history, political science, and sociology.
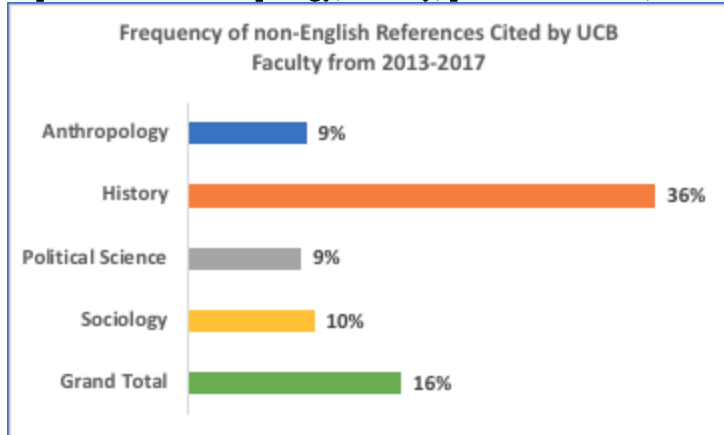
Among the 9,611 references in foreign languages, only 25 unique languages were identified (Figure 2), and the top 9 languages represented 98% of the references. The four departments have some variations, with Spanish being the most cited language for anthropology and political science, Italian for sociology, and French for history. The remaining 16 languages (Portuguese, Arabic, Greek, Turkish, Vietnamese, Swedish, Polish, Estonian, Danish, Norwegian, Hebrew, Dutch, Marathi, Kanuri, Hungarian, and Catalan) had low usage, and were cited less than two times annually by the faculty in the study.

Figure 2. Percentage of each foreign language cited across all the foreign language citations from 2013 to 2017 by UCB authors from the four departments: anthropology, history, political science, and sociology.
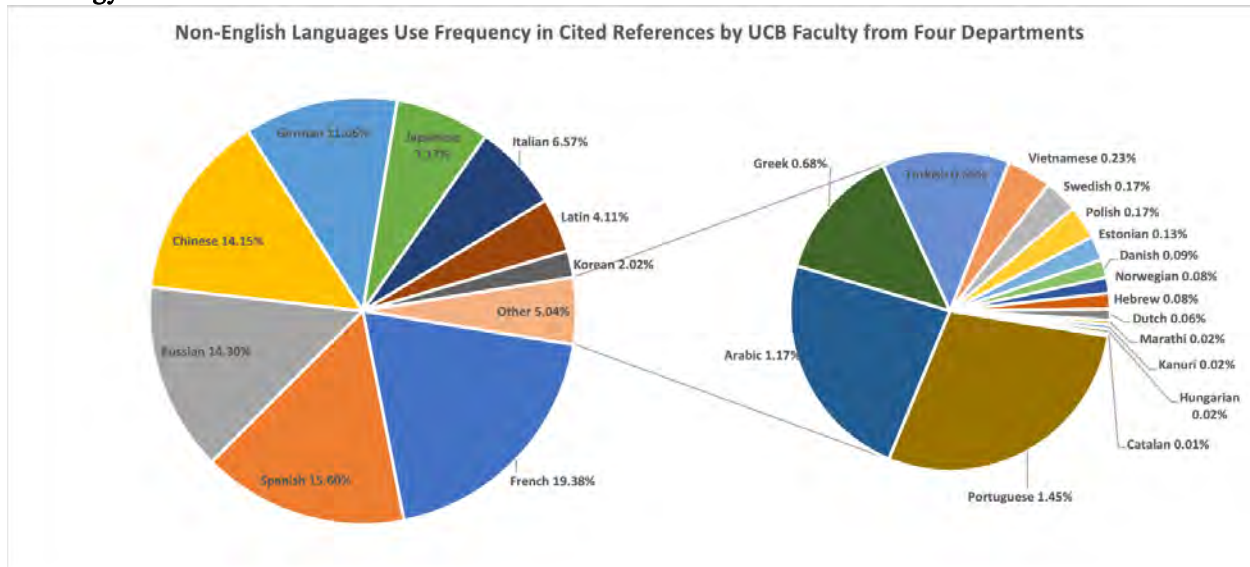
We also analyzed the citation trends of foreign language collections for the last five years. The percentage of cited foreign language collections varied a lot from year to year, ranging from 11 to 22%. However, the 2017 citation rate of foreign language collections (16%) is close to 5 years ago (19%). Long-term monitoring is required in order to identify and analyze trends implications.

Survey Findings

During spring 2018, a survey was sent out to 105 faculty members, to better understand the faculty's need for foreign language materials for their teaching and research and their satisfaction with the current library collections in this area. The overall response rate was 50%. History was both the largest in terms of potential responders (39 faculty members) and had the highest response rate (72%). Sociology, political science, and anthropology had fewer potential responders as well as a lower response rate, ranging from 24 to 29%. Six faculty did not identify their department affiliations. Due to the higher representation from history, our overall survey findings can be driven by their responses. See Figure 3 for the responses distribution across departments.

Figure 3. Survey response percentages across the four departments: history, anthropology, political science, and sociology.
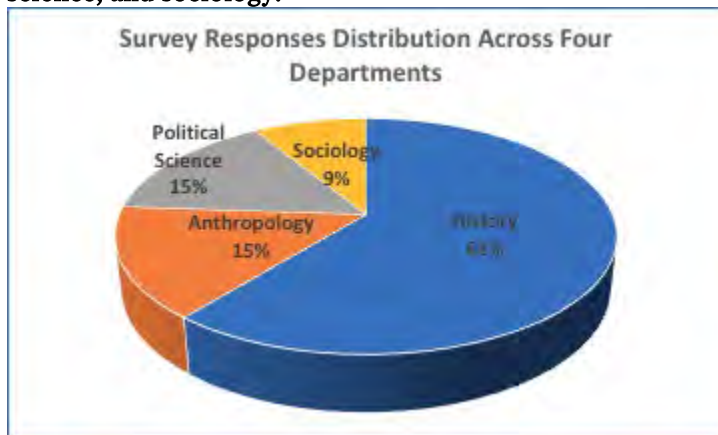
Faculty satisfaction with accessing international or foreign language material for research and teaching was high, with 80% stating that access to materials was satisfactory or great, and that the UC Berkeley Library (including interlibrary loan services) provided most of the material they needed, most of the time. International travel, personal collections, and free resources were also identified as alternative channels for access. However, 14% requested improvements in access to foreign or international language materials for teaching, and 6% for their research. In comments, they noted gaps in the collection by area of the world, language, or format, as well as short loan periods for ILL. While overall we were pleased with the faculty's level of satisfaction with our collections, we did elicit some negative comments which we will explore more deeply in structured interviews, the next phase of this research project.

As to actual usage, faculty with research interests outside the US require heavy use of foreign language materials, with 80% saying they needed these materials over 20 times in the past five years. Many noted their frequent use of this material, commenting that our frequency scale was too low, with one estimating that two-thirds of all their research was conducted in foreign languages—"far more than 20+ times" in five years. Another added that "more than half the materials I use (and ALL of the primary sources) are in languages other than English." In terms of the types of material used, faculty noted academic books and journals most often, popular fiction and language learning material the least. History faculty again has the highest percentage (90-plus %) of frequent users of materials in foreign languages and English-language material published outside of the US/UK. Even though the survey did not specifically ask about the needs for print versus electronic collections, there were a few comments about the desire for both formats.

The geographic focus of faculty research was widely distributed, with the largest single concentration in Western Europe (Figure 4):

Figure 4. Percentage of each geographic area of focus identified via survey study across the four departments: anthropology, history, political science, and sociology
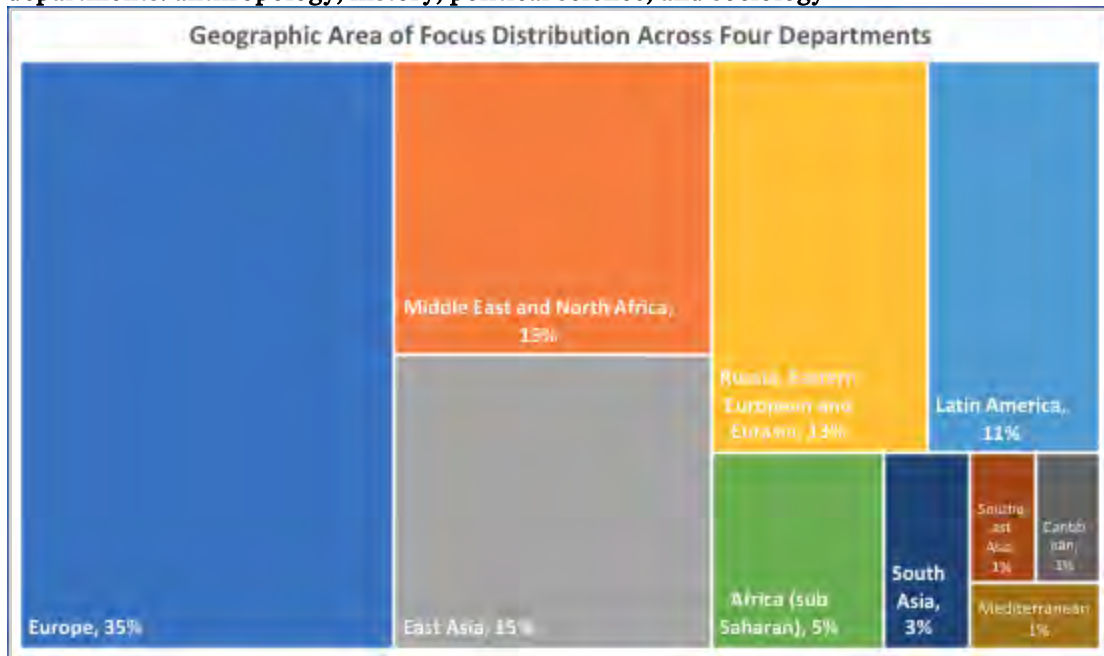
Languages used were diverse, with the most frequent being French, German, Spanish, Italian, Japanese, Portuguese, Russian, and Chinese (Figure 5). Another 21 languages were noted, several by only one person. Many respondents indicated that they frequently use more than one non-English language.

Figure 5. Percentage of each foreign language identified via survey study by UCB faculty from the four departments: anthropology, history, political science, and sociology.
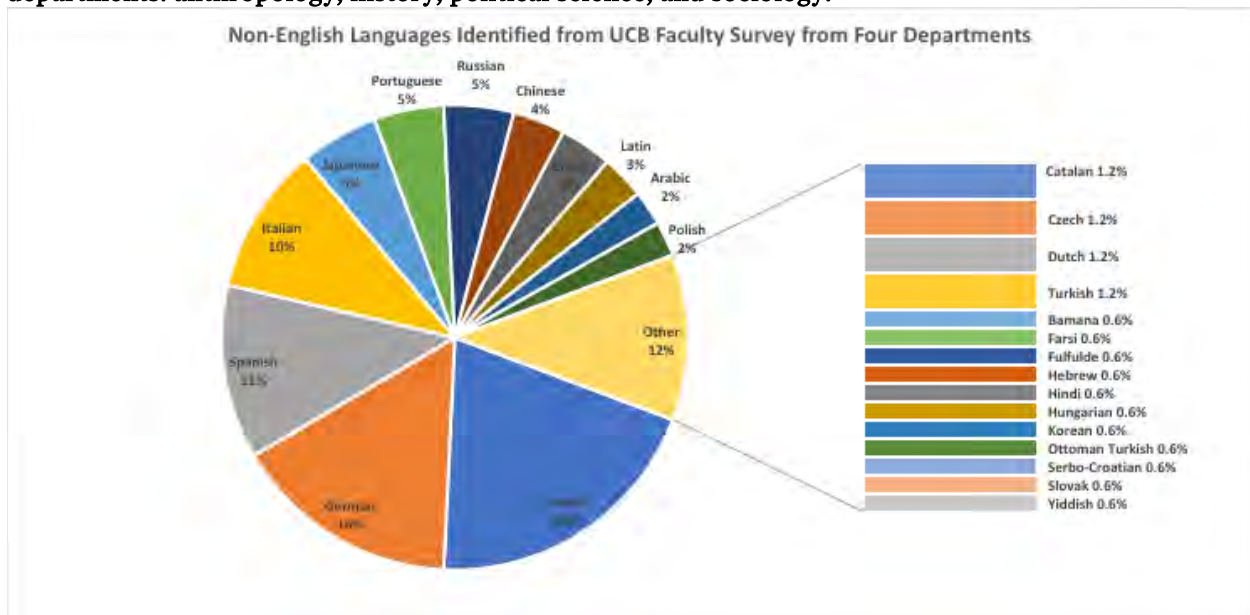
In the survey, many faculty commented on their heavy use of materials in not just one, but multiple foreign languages. Also, two faculty revealed a niche need for materials published in languages different from their area of focus, for example, Japanese material about China, or French/German material about Russian history.

The core languages identified via survey study were very close to the languages cited by Berkeley faculty, including French, Spanish, Russian, Chinese, German, Japanese, Italian, Latin, Korean, Portuguese, and others. However, each study identified a few languages that the other study did not. The citation analysis and the survey identified a combined 36 languages in total (Figure 6).

Figure 6. Foreign languages identified from both citation analysis and survey study, including shared and unique ones.

Survey unique: Czech; Zarma-Songhay; Yiddish; Ottoman Turkish; Bamana; Hindi; Fulfulde; Yucatec Maya; Farsi; Serbo-Croatian; Slovak

Shared: French; Spanish; Russian; Chinese; German; Japanese; Italian; Latin; Korean; Portuguese; Arabic; Greek; Turkish; Polish; Hebrew; Dutch; Hungarian; Catalan

Citation unique: Vietnamese; Swedish; Estonian; Danish; Norwegian; Marathi; Kanuri
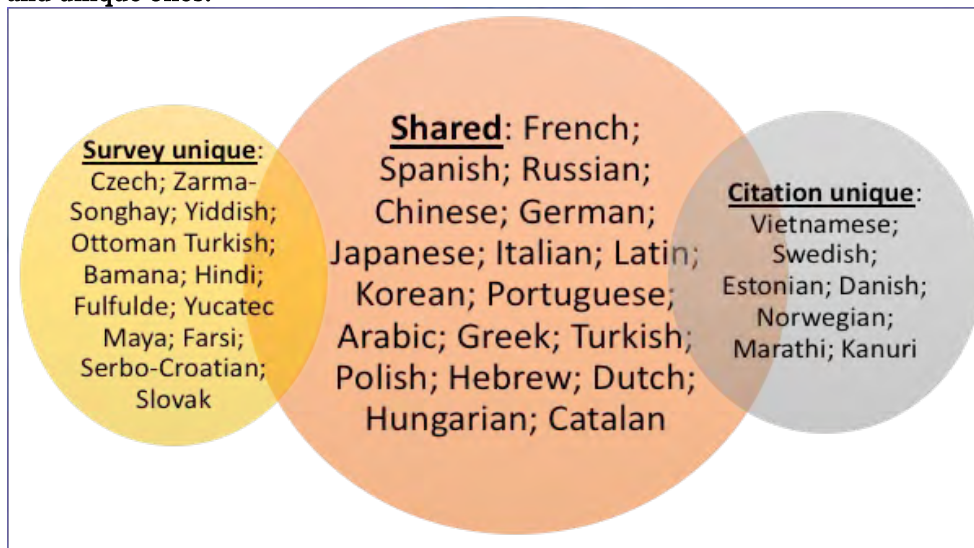
Faculty emphasized the importance of access to this material, noting that, "as a global research university, the library is essential to allowing us to meet [counter] the forces that push us toward monolingual, monocultural, insular, or provincial scholarship" and asserting that "high quality research remains largely dependent on library holdings on our campus."

At the same time, a few faculty have expressed concerns about the impact of the library's recent budget cut on collections, and asserted the value of a "just-in-case" collecting strategy. One faculty commented:

> Most of the books I currently use were acquired at a time when very few people at Berkeley read Russian, and they were purchased on the expectation of future use. Had volume of use been the criterion then, I would now have nothing to work with.

And another:

> A good library collection lies at the heart of a major university. I would not have come to Berkeley as a full professor if the library system was mediocre and if the university were to downsize the library, it would be one of the reasons to consider leaving. The library needs to be protected at all costs.

Conclusion: Practical Implications and Implementation

This work has helped us get a much better sense of faculty needs and behaviors. The interactive visualization of the faculty's primary geographic focus enabled us to see, for the first time, the geographic interests of all 500-plus social sciences faculty. The database of faculty research interests by country enabled area studies librarians to identify the social sciences faculty with interests in their broad geographic areas. This is otherwise very difficult, if not impossible, since many areas (Latin America and Africa, for example) are not tied to an academic department and have highly interdisciplinary interests.

Over time, the UC Berkeley Library has collected material in 398 languages. During the most recent fiscal year (2017/2018), the library cataloged items in 158 languages. Meanwhile, the citation analysis and the survey identified only 36 languages which the faculty felt were needed for their research and teaching. And of the total 398 languages ever collected, 373 were not cited even once by the four departments during the five-year period of the study.

When we began this project, we understood that non-English language material would be inherently lower use than English—but our findings indicate that the impact may also be lower than we thought, at least at the local level. We are aware that there are two important limitations to this study—we did not analyze the value that Berkeley adds to the broader academic community as a provider of content through interlibrary loan, and we did not analyze usage by departments outside the social sciences. We hope that both will be examined in the future.

But our findings have provided evidence that we need to make some changes in our collecting policies—and our funding allocations—in order to insure that collections are aligned with the institution's teaching and research needs in the social sciences.

Susan Edwards, Social Sciences Division Head, UC Berkeley
Chan Li, Assessment Program Librarian, UC Berkeley
Celia Emmelhainz, Anthropology and Quantitative Research Librarian, UC Berkeley
Adam Clemons, African and African American Studies Librarian, UC Berkeley
Liladhar Pendse, East European and Latin American Studies Librarian, UC Berkeley
Natalia Estrada, Reference and Collections Assistant, UC Berkeley

Endnotes
1. Gammon and O'Neill, "OhioLINK."
2. Heath, "Applying Human-Centred Design," 51.
3. "Social Sciences Faculty Research Geographies," RPubs, http://rpubs.com/jq834488/296789.
4. This means that both our citation analysis and survey are focused on faculty with global research interests, and are most relevant to other areas with a strong global focus.
5. For more on this strategy, see: Emmelhainz and Estrada, Searching for Recent Anthropology."
6. 107 surveys were originally sent out, but one professor passed away and another left the university.

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Appendix 1: Text of Survey Instrument in Qualtrics
Foreign Language and International Publications

Welcome! As we make difficult decisions about future collection development, we need your input. This survey is focused on your experience obtaining the print and e-resources that you need to support your research on countries outside of the US/UK, and in languages other than English.

Q1. Do you, or do graduate students you work with, currently conduct research that relies on primary or secondary materials published outside of the US/UK and/or in languages other than English?

Yes—keep going

No—end of survey

Q2. In the past five years, how often have you used the following print or electronic resources for your research:

Materials published in a non-English language?

[Choices: 0, 1–10, 11–20, more than 20 times]

Materials published outside of the US/UK [in English]?

[Choices: 0, 1–10, 11–20, more than 20 times]

Q2b. *[Comments:]*

Q3. In the past five years, how often have you used the following <u>types</u> of print or electronic resources <mark>*in foreign languages*</mark>?

[Choices: 0, 1–10, 11–20, more than 20 times]

Academic books

Academic journals

Data (non-governmental)

Government information (including data)

Language-learning materials (primers, low-level children's books)

Multimedia (film, images, sound recordings)

Newspapers

Popular fiction

Reference works (dictionaries, bibliographies, encyclopedias)

Special Collections (rare or archival material)

In the past five years, how often have you used the following <u>types</u> of print or electronic resources <mark>*published outside of the US/UK*</mark>?

Academic books

Academic journals

Data (non-governmental)

Government information (including data)

Language-learning materials (primers, low-level children's books)

Multimedia (film, images, sound recordings)

Newspapers

Popular fiction

Reference works (dictionaries, bibliographies, encyclopedias)

Special Collections (rare or archival material)

Q3b. *[Comments]*

Q4. Besides English, what other languages do you utilize in your Library research?

[multi-select]

Chinese

French

German

Japanese

Portuguese

Russian

Spanish

Other:

Q5. Outside of the US/UK, what is your geographic area of focus?

[multi-select]

Africa (sub-Saharan)

East Asia

Europe

Latin America

Middle East and North Africa

Russia, Eastern European and Eurasia

South Asia

Southeast Asia

Other:

Q6. In the past five years, how have you obtained material published outside of the US/UK that you need for your research??

[Choices: Most of the time, Some of the time, Rarely, Never]

UC Berkeley Library (including NRLF)

UC Berkeley's Interlibrary Loan Service

International travel

Buy for my own (or my research team's) personal collection

Request via personal networks

Freely available online

Q6b. *[Comments:]*

Q7. Please rate your satisfaction in accessing international or foreign language resources for your ==research==:

[Choices: Great, Satisfactory, Needs Improvement, Not Applicable]

Q7b. *Please provide positive or negative feedback to help us improve:*

Q8. *The next question switches focus from your research to your teaching:*

Please rate your satisfaction in accessing international or foreign language resources for your ==teaching== at UC Berkeley:

[Choices: Great, Satisfactory, Needs Improvement, Not Applicable]

Q8b. *[Comment] Please provide positive or negative feedback to help us improve:*

Q9. What is your primary departmental affiliation?

Anthropology

History

Political Science

Sociology

Q10. Are you affiliated with one or more area studies centers or institutes on campus?

[multi-select]

Center for African Studies

Center for Latin American Studies

Center for Middle Eastern Studies

Center for Southeast Asia Studies

Institute of East Asian Studies

Institute of European Studies

Institute of Slavic, East European and Eurasian Studies

Q11. Any other comments:

Open text:

Q12. Are you interested in contributing to an interview or focus group so that we can learn more about your Library needs?

If so, please let us know how to contact you.

Name

Email

Thank you!

Appendix 2: Academic departments included in the social sciences at Berkeley

African American Studies

Anthropology

Business

Demography

Economics

Education

Environmental Design (Architecture)

Environmental Design (City and Regional Planning)

Environmental Design (Landscape Architecture)

Ethnic Studies

Gender and Women's Studies

Geography

History

Information

Linguistics

Political Science

Psychology

Public Policy

Social Welfare

Sociology

The Collection Assessment is Done... Now What?

Karen Harker, Coby Condrey, and Laurel Crawford
University of North Texas, USA

Purpose
About collection management

The methods used to manage collections have changed dramatically in the last half century, a phenomenon that has been well documented in the literature.[1] This has been due in part to a reaction to the rapid growth of information resources,[2] increased costs of acquiring these resources coupled with decreased share of institutional funding towards libraries,[3] and the shift to digital formats, resulting in changes in methods of making these resources accessible to library patrons. Some in the field have gone so far as to suggest that collection management is undergoing a "paradigm shift."[4] These changes have increased the need for information about the collections themselves, notably inputs (costs and needs), outputs (purchases/acquisitions, circulations, and uses), and outcomes (citations, student grades, and faculty grant successes).[5]

About collection evaluation

Collection analyses, evaluations, and assessments are an important aspect of collection development services provided by librarians. Collection evaluation "encompasses analysis of the library's collection, its use, and ultimately its impact," with the "real objective" being not to measure a collection's quality, but rather its "utility—how effective the collection is in satisfying the purpose for which it is intended."[6] This emphasis on outcomes reflects the growing trend of assessment in librarianship as a whole, which is well summarized by Megan Oakleaf in her seminal work, ***The Value of Academic Libraries***. In this report, Oakleaf recommends that librarians go beyond traditional measures of inputs and outputs, (primarily acquisitions [costs and counts]) and use data, and instead examine the impact that library services, including collections, have on student and faculty outcomes.[7]

Some librarians have developed formal collection evaluation programs that are comprehensive and extend beyond the traditional metrics, as advocated by Oakleaf. Duncan and O'Gara,[8] at James Madison University Library, developed a "holistic and agile" collection evaluation method, including a rubric of measures and benchmarks. Madeline Kelly[9] implemented a "tiered" collection assessment service at George Mason University to the subject librarians, providing more or less detail and analysis based on the needs and purposes of the evaluation.

Harker and Klein found, in their survey of collection evaluation practices at ARL libraries, librarians in most academic institutions conduct evaluations as sporadic projects based on ***ad hoc*** needs, notably accreditation reviews or the influx of funding for a particular subject. Indeed, the lack of positive change (in policy, selection, funding, or patron perception) resulting from these time-consuming projects has been noted by some in collections management. Furthermore, while librarians allude to potential uses or outcomes of such evaluations, such as "knowing the collection" or adjusting the "collection and managing activities to increase congruence between collection and [institutional] mission,"[10] few professional resources on the topic provide specific methods of applying the results of these time-consuming and data-intensive assessments.

The collection development leadership at the University of North Texas Libraries has opted to take a more comprehensive approach: we incorporate the findings of our routine collection evaluations, such as gaps and strengths, into subject-based projects to enhance targeted subsets of the overall collection with funding purposefully planned within the collections budget.

Design, Methodology, or Approach
Subject-based collection evaluation

The current method used at UNT Libraries of evaluating subject-based collections is based largely on the historical collection development environment. There had been an established subject librarian service, which had once included collection development responsibilities, supported through subject-based funds. In addition, until 2012, there was an approval plan that was structured along the same subject-based divisions as the funds. Finally, there were recurring accreditation reviews, for which brief evaluations of support for the subject of the program were conducted. Much of these aspects have changed in recent years.

Since the creation of the Collection Development Department in 2010, responsibilities for selection of resources have become more centralized. Due to major reductions to the collections budget in 2012 and 2014, we reduced the funds available for purchasing monographs so greatly as to make the individual accounts practically worthless for many subjects. In 2012, the UNT Libraries began a pilot program of demand-driven acquisitions as a potential solution to this problem. We pooled the funds for the entire program, covering all subjects, into a single account. The pilot was successful, so we expanded the program to include three e-book platforms. The subjects covered by the program were based largely on the former approval plan.

From this structure of subjects grew our collection map, in which Library of Congress Classification ranges were applied to organize holdings and usage into subject areas based on curricular divisions within the university. We extended this mapping method by using the Conspectus ranges of the WorldCat Collection Assessment System (now called WorldShare Collection Evaluation System), and by applying selected ranges to multiple collections, as appropriate. For example, the range associated with the concept of management (HA29-32) is relevant to numerous professional programs in our institution, including educational administration, emergency management, and hospitality and tourism management. This method is described in detail in *Academic Libraries and the Academy*.[11]

The UNT Libraries Collection Development Department currently evaluates between five and seven collections each year, some of which are broad (e.g., history) while others are quite narrow in focus (e.g., aviation logistics). This schedule, originally designed to suit the library's needs, has recently been revised to align with the university's own "Academic Program Review," in which the libraries are asked to comment on the support of each academic program under review. The change in scheduling these evaluations increased the number of collections to be evaluated each year (up to 10), so we made the methods more efficient and standardized to accommodate this increased workload.

The large question to be answered by each evaluation is that which is found in most accreditation reviews: *How well does the subject-based collection meet the needs of those most interested in this subject?* We center our collection evaluations on the following key aspects of collection development: patron needs, capacity of the collection, usage, and impact. The needs are assessed based largely on enrollment trends, program type and degrees awarded, and faculty research interests and output. We also gather faculty research interests from the university website, while we assess faculty output based on articles indexed in the *Web of Knowledge*. The capacity of the collection is a description of the holdings, specifically by age and format. Capacity is also measured qualitatively by comparison with standard lists, such as the *Journal Citation Reports* (JCR) and Choice's *Outstanding Academic Titles* (OAT). Usage includes both circulation and e-resource usage data, although the latter is more limited in scope at this time. The individual subjects (that is, the Conspectus subjects, composed of LC classification ranges) are assessed qualitatively based on distributions of holdings, by age and by format, usage, and interlibrary loan (ILL) requests to determine overall strengths and gaps. These judgments are largely subjective, informed by the current curriculum and topics of research interests, knowledge of the direction of the academic program, and discussions with the subject librarian.

The result of each evaluation is a summary report that includes a description of the overall collection, a review of the current needs based on academic, curricula and research trends, results of the analyses of

capacity (quantitatively and qualitatively), usage and impact, and conclusions that are centered on the broad question of how well the collection meets the patrons' needs. Specifically highlighted are subject areas which are particularly strong (relevant areas that have a large number of titles which are recent and well-used) and those which may need particular attention. The specificity of these subjects is useful for the subject librarian for selecting monographs, while the broader subject areas are useful to the Collection Development Department for selecting packages and collections of resources.

Action Plan
Budget
In 2015, the UNT Libraries implemented a new method of collection development to reflect changes in collection philosophy and realities of library budgets and the marketplace.[12] Our new method of collection acquisition resulted in a drastic change in the materials budget, moving us from a traditional subject-based budget to a simplified "one big pot" budget. Previously, each subject area was allocated a specific, small amount of funding based on a historic formula; we also distinguished between one-time and ongoing funding for each subject area. The new model distinguishes only between one-time and ongoing funds for the entire main collection—there is one very large fund for each. The main collection materials budget is shared by all subject areas—from history to social work to biology. The new budgeting model allows us to better plan and implement application of collection evaluation results to our selection and acquisition activities.

The new "one big pot" must accommodate planned and unplanned purchases for an entire fiscal year, so we have dramatically shifted our planning process to ensure expenditure of the entire budget in a timely fashion. To do this, we thoroughly plan the use of the big funds. We begin each year with a list of both planned purchases and enhancement projects. The goals and budget are planned, but the specific materials to be purchased have not yet been identified. Enhancement projects range from narrow subject areas (e.g., forensic science) to item types (e.g., graphic novels) to very specific genres (e.g., select *an* interactive anatomy resource). The head of collection development (HCD) determines in advance the amount of funding for each enhancement project, based on the amount of the materials budget and the needs identified in the collection evaluation.

Staff
Implementing these complex enhancement projects without restrictive budgeting infrastructure was initially a challenge. To do this, we delegate responsibility for expenditure across our team. Each enhancement project includes a project leader, along with clear goals and a specific budget. As with many libraries, the collection budget includes a certain amount of undesignated funding set aside for unplanned purchases, such as monographs, new journals, etc. The HCD monitors expenditure of both the delegated budgets and the shared funds. Towards the end of the fiscal year, the HCD begins monitoring expenditures much more closely by requiring increased communication from team leads and staff. Eventually, HCD approval of all purchases are required, to ensure we do not over-expend.

Implementation
Enhancement Parameters
The library's extensive coverage of the universe of scholarship made assessing all of the collections every year not feasible. Instead, the collection assessment librarian (CAL) has planned a ten-year cycle of subjects for review within the collections. Each subject-based collection is to be evaluated, and the strengths and gaps reported on, in one year; the collection is then targeted for enhancement the following year. The enhancement projects have a specifically allocated budget and mostly encompass one-time purchases, although the HCD can approve modest amounts of additional resources paid by subscription.

Starting Points
The collection assessment report identifies the topics most underrepresented in the library's holdings. For each project, the CAL additionally compiles title lists for consideration. The title lists are materials (mostly monographs) in the specific subject areas of the collection, identified from three sources: works listed in *Choice's* OAT to which the library does not provide access; materials requested through ILL, and; JCR titles

in the top quartile. The OAT maintains a higher priority over other sources. The project leader communicates with the subject librarians and occasionally with faculty, soliciting ideas and, eventually, reviews of enhancement proposals. This communication is primarily via email for the kick-off and the final proposal, with one face-to-face meeting during the time period of the project.

Roles

The collection development liaison librarian (CDLL) leads the enhancement efforts, using the collection assessment report, consulting with key librarians and faculty in the research field, and assigning research and acquisitions tasks to monographic acquisitions unit staff. The CDLL researches potential suppliers, guides the staff assisting with the project, and selects materials for purchase. Some of the CDLL's work involves negotiating discounts with vendors for additions to the library's reference and e-book platforms or for packages of electronic resources such as e-books and archival collections.

The CDLL directs the two monographic acquisitions associates to research and recommend packages of e-books and other electronic resources related to each enhancement project. The associates ensure that potential acquisitions include content on the gap areas, check package titles against existing holdings of the library, and later order individual titles. The CDLL handles reference platform purchases and some of the package purchases. The electronic resources librarian completes the work for a few of the package purchases when requested by the CDLL.

Four collection enhancement examples: Engineering; Education & Learning Technology; Ethnic Studies; Business

One of the first collection enhancements we formally conducted under this new plan was for engineering. As with most science-related disciplines, engineering researchers rely heavily on relatively expensive journals and database subscriptions, and the designated enhancement allocation could not fund all of the recommended materials. The CDLL proposed four separate combinations of resources, some weighted heavily toward subscriptions, others much less so; nevertheless, each option included the highest-ranked requests from the subject librarian. The review team of collection development librarians eventually chose a combination approach. We agreed to spend about half of the allocation for one-time purchases of 14 reference books and one year-long trial of a science publisher's entire catalog of monographs (over 3,000 titles); the other half of the allocation was used for database subscriptions and a subscription to an online library of current technical reference materials. In the process of evaluating e-book packages for the enhancement, it became evident that many titles were available as demand-driven acquisitions (DDA) discovery records. Instead of buying these titles, the CDLL created a separate tracking system for these materials and added these 400-plus titles to the library's DDA discovery pool. This early enhancement was a challenge due to the high number of relatively expensive subscription items considered important to address the needs of the engineering research community. The solution was to allow a higher-than-expected amount of recurring costs, to use DDA to acquire some of the needed content with no up-front funding required, and to explore the option of purchasing short-term access to the entire catalog of a prominent publisher in engineering and technology, with a potential future purchase of highly used titles.

The enhancement for education and its sister discipline, learning technology, was more in line with the original vision of the enhancement projects to primarily purchase items with one-time costs. The final proposal for this enhancement allotted about 80% of the budget to over 770 monographs that were requested by the subject librarians, recommended from the collection evaluation, or selected due to their availability on reference platforms. The remainder of the budget went to non-book resources: six types of robot construction kits, ten tablet computers, and a charging station. The subject librarians in this enhancement strongly advocated for these non-traditional items to provide future teachers the experience of creating instruction around new and evolving technologies. The CDLL also added over 1,200 titles to the library's DDA discovery pool.

The ethnic studies enhancement was highly interdisciplinary; it covered women's and gender studies (which included some LGBTQ topics), Latino/Mexican American studies, Jewish studies and Native American

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studies. The final proposal approved by the review team devoted approximately 40% of the budget to 118 OAT and reference platform resources; the content of these selections addressed each of the ethnic studies areas with at least a few worthy resources. The remaining funds went to four electronic archival collections of digitized primary resources from under-heard voices within the library's ethnic studies collections: Native American empowerment movements, the history of women's movements for two time periods (late 1780s to early 1930s, and the 1970s), and government reactions to radical movements in the 1960s. The CDLL also found over 240 titles to add to the library's DDA discovery pool; these works were OAT and reference platform resources. Finally, the CDLL recommended ten new journals that were approved for subscription, with the costs coming from the general fund due to a windfall of ongoing funding.

One of the largest recent collection enhancements was for business. This broad category supports the academic and research programs that included the traditional topics of accounting, finance, management, and marketing, as well as insurance, real estate, business law, decision sciences, operations and supply chain management, logistics, merchandising, hospitality, and tourism. The proposal for this enhancement was entirely for monographic content: 85 OAT, 80 reference platform titles, 220-plus ILL and peer-held titles, plus 160 titles in three packages from well-regarded business resource publishers, for a total of nearly 590 monographs owned outright. As expected for such a diverse range of topics, the CDLL identified over 730 titles to add to the library's DDA discovery pool.

Limitations and Future Directions

While the methods that we currently use for assessing our collections are in-depth and user-centered, they are currently limited to inputs and outputs, rather than outcomes and impact. We are investigating methods of effectively and efficiently assessing the impact of our collections on student and faculty outcomes, notably student achievement and success, and faculty research publication and success in grant applications.

We are also interested in evaluating our efforts by measuring usage of resources added to the collection through the enhancements. We identified these resources as having been acquired through the enhancement, which will enable us to compare the usage of these resources with those otherwise acquired during the same time period.

Conclusion

Like many libraries, we had collected information about our collections for years while struggling to apply it effectively. Once we removed barriers by reorganizing our budget and overhauling the way we manage selection, we were able to apply our data to collection development activities. We refined collection assessment activities to focus on actionable information and information important for reporting results. This ensures that our collection development activities are truly evidence-based. Macro decisions, such as planning enhancement project timing, budgets, and goals, are based on subjective and objective data gathered and considered by the team. Micro decisions, such as whether to purchase a specific product, are also based on evidence gathered and made available to the selector. Measures reported are more meaningful and accurate. We are able to make good use of collection assessment efforts by applying the collected data to practical outcomes.

Our collections are benefiting from the structured enhancements; through this method, we have purchased many materials previously considered unaffordable. We can identify gaps and address them in a timely manner, and we are able to support expensive requests more often. More importantly, we, as collection development librarians, are gaining confidence in our selection decisions. Every decision is defensible and thoroughly documented. While some stakeholders may disagree with our judgments and decisions, we can and do provide justifications based on evidence. We are able to deliver accurate and timely reports when requested, and provide information regularly to stakeholders about how we are developing the collection and why we made the specific decisions.

From a management standpoint, while the application of data has been challenging to coordinate, it has tangible benefits as well. We expend our budget more efficiently, while pleasing more of the patrons more of

the time. We have very good reasons for the decisions we make and can explain our decisions to patrons quickly and simply. The application of data to collection development activities allows the HCD to plan effectively and respond to unexpected events quickly. For example, last year, the provost gave a $500,000 influx for new materials to the library—and there were only a few months remaining to spend it. Even though the resulting decision-making process was unplanned, we were able to quickly make evidence-based choices and justify them to administration.

The methods used to evaluate our collections consume a considerable amount of human resources. We, therefore, consider it important that the results of these expenditures are put to good use. We are able to make decisions about acquiring resources by applying the knowledge gained from the evaluations regarding strengths and weaknesses of the collection, as well as the direction of research and curricula of the related programs. The results of the evaluations provide direction for the CDLL on which to concentrate efforts or research resources. Thus, over three years' time, we have evaluated 17 collections covering 21 distinct academic programs, and enhanced 13 collections. We are able to contend that the decisions that we make regarding resources selected for enhancing the collections are well founded. This, in turn, demonstrates our judicious use of funds for supporting the university and the relevant academic and research programs.

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Assessing Textbook Cost and Course Data for a High-impact Textbook Lending Program

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Abstract

Although open education initiatives are gaining traction at many higher education institutions, the promise of open access or free textbooks for all courses is not yet a reality. Meanwhile, the high cost of textbooks remains an obstacle to academic success for many students. Providing equal access to education is central to the mission of academic libraries, and librarians at the University of Texas at San Antonio decided to support student success by offering a selection of textbooks on reserve. Given a modest annual textbook budget, it was important to identify textbooks that would have the greatest impact on student success. Librarians developed an assessment methodology that identifies lower-division, core courses with high enrollments and expensive textbooks, giving additional weight to courses with a high percentage of students who receive grades of D, F, or who drop the class. Focusing on these criteria, among others, enables the library to provide a selection of high-impact textbooks that circulates heavily and assists students in classes with a demonstrated need for academic support.

Introduction

Achieving high rates of student success, retention, and graduation is an important goal for institutions of higher education, and academic libraries are employing various approaches to demonstrate the positive impact of their collections and services on student success. Institutions at all levels are working to understand and remove barriers to student success, and one challenging area for many students is the financial cost of a college education, including the high cost of textbooks.

In 2016, leaders and policy makers in the state of Florida conducted a student survey to determine the impact of high textbook costs on academic success. Florida's 40 public postsecondary institutions used an online survey, the Student Textbook and Course Materials Survey, to gauge the effect of the cost of course materials and textbooks on students' educational decisions and their progress to graduation. Over 22,000 students completed the survey, and the results indicated that the high cost of textbooks had serious, negative consequences for students, limiting access to courses and slowing progress towards graduation.

> The findings suggest that the cost of textbooks is negatively impacting student access to required materials (66.6% did not purchase the required textbook) and learning (37.6% earn a poor grade; 19.8% fail a course). Time to graduation and/or access to courses is also impacted by cost. Students reported that they occasionally or frequently take fewer courses (47.6%); do not register for a course (45.5%); drop a course (26.1%); or withdraw from courses (20.7%).[1]

ALA's strategic planning document, ***American Library Association Strategic Directions***, lists Equitable Access to Information and Library Services as a key action area and notes a "critical need for access to library and information resources, services, and technologies by all people," including those who experience "barriers to equal education."[2] Offering access to selected textbooks, especially during a student's first few college semesters, is one way libraries can support first generation, economically disadvantaged, and minority students, helping their institutions to foster inclusivity and supporting equal access to education.

Context

The University of Texas at San Antonio (UTSA) was established in 1969 and currently enrolls 32,000 students in over 160 degree programs, including 24 doctoral programs. The school has been designated as a Hispanic-Serving Institution and is classified as a Carnegie R2 doctoral university. In fall 2018, 55% of

students were Hispanic and 63% of all students identified as minority. Over 40% were economically disadvantaged (eligible for Pell grants), and 46% were first generation college students. In addition, 24% of students attend school part-time, giving an indication of the number of students who work to support themselves and their families while pursuing their educational goals. To UTSA students, the high cost of textbooks matters.

Background

The library's textbook lending program was initiated prior to 2009 by instructors who placed their personal copies of course textbooks on reserve for student use. The textbooks were heavily used, and after a semester or two of use, many were literally falling apart. Although the library's collection development policy specifically excluded textbooks (with certain exceptions), librarians saw the heavy student demand for textbooks as an opportunity to support student success. They decided to change the collections policy and allocated $15,000 to replace worn out items and purchase additional textbooks for a number of lower-division classes with high enrollments and expensive textbooks.

Usage of the textbooks grew, and the library responded by increasing the textbook allocation gradually over the next five years, primarily purchasing books for lower-division courses with high enrollments when the textbook cost was over $100. Based on course enrollment, the library purchased from one to six copies of each title, usually one copy for every 100 students. This approach enabled the library to focus on supporting freshman and sophomore students—those who are most at risk for dropping out at UTSA—by providing textbooks for the large survey and core classes. By 2017, the textbook allocation had reached $70,000, and approximately 4,500 textbooks and other course materials were available on reserve.

Figure 1: Growth of the Textbook Program
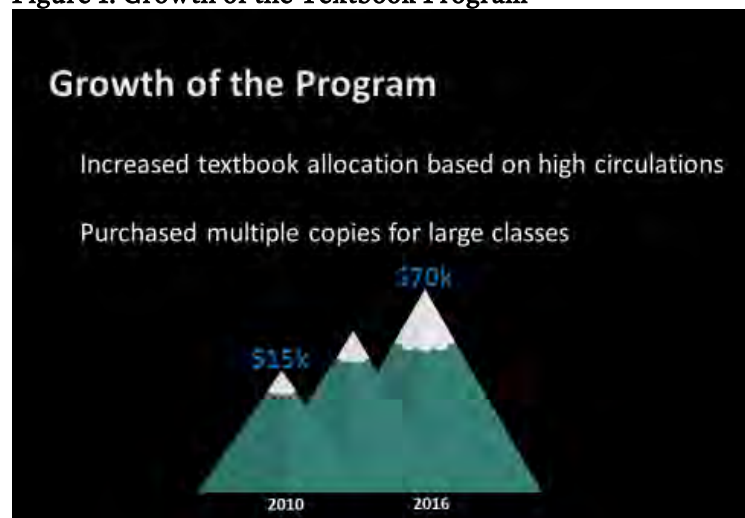
Program Management

Managing a textbook lending program of this size requires considerable staff time and effort. Textbook titles and editions change frequently, and it is challenging to provide funding for textbooks, given collections budget constraints. Faculty must be notified when textbooks are purchased for their classes so they can inform the students.

Heavy textbook circulation increases the workload at the service desk as well, both in terms of reserves collection maintenance and customer service. For example, when all copies of a textbook are checked out, students' names are placed on a waitlist, and the student is notified when a copy becomes available via a pager system, similar to the pager systems used in restaurants. The library actively promotes the textbook service, with the result that some students expect to find all their textbooks on reserve. Marketing for the textbook service has been changed to emphasize that only selected textbooks are available on reserve.

Despite the management and service challenges, use of the service has increased, and student feedback provides additional assurance that the value of the service more than justifies the costs. A collateral benefit of textbook lending is that it brings many freshman and sophomore students into the library, allowing us to offer them the wider range of services that support academic success, including laptop lending, group study room reservations, the Writing Center, and more.

Findings

As mentioned previously, the high-impact textbooks have been heavily used by students. In FY2017, 4,500 textbooks accounted for over 50% (84,672) of the total physical material initial circulations (168,725). Comparing the cost per use for textbooks with other materials easily justifies the expenditure of collections funds and staff time, since each textbook receives many more uses than the other print books or DVDs in the collection.

Figure 2: Initial Circulations: Textbooks vs. General Collection* 2014–2017

Initial Circulations: Textbooks vs. General Collection*
2014–2017

Year	General Collection	Textbooks	%
2014	98,285	64,180	40%
2015	83,561	83,668	50%
2016	68,845	89,602	57%
2017	68,984	84,672	55%

■ General Collection ■ Textbooks   ***excludes ebooks**
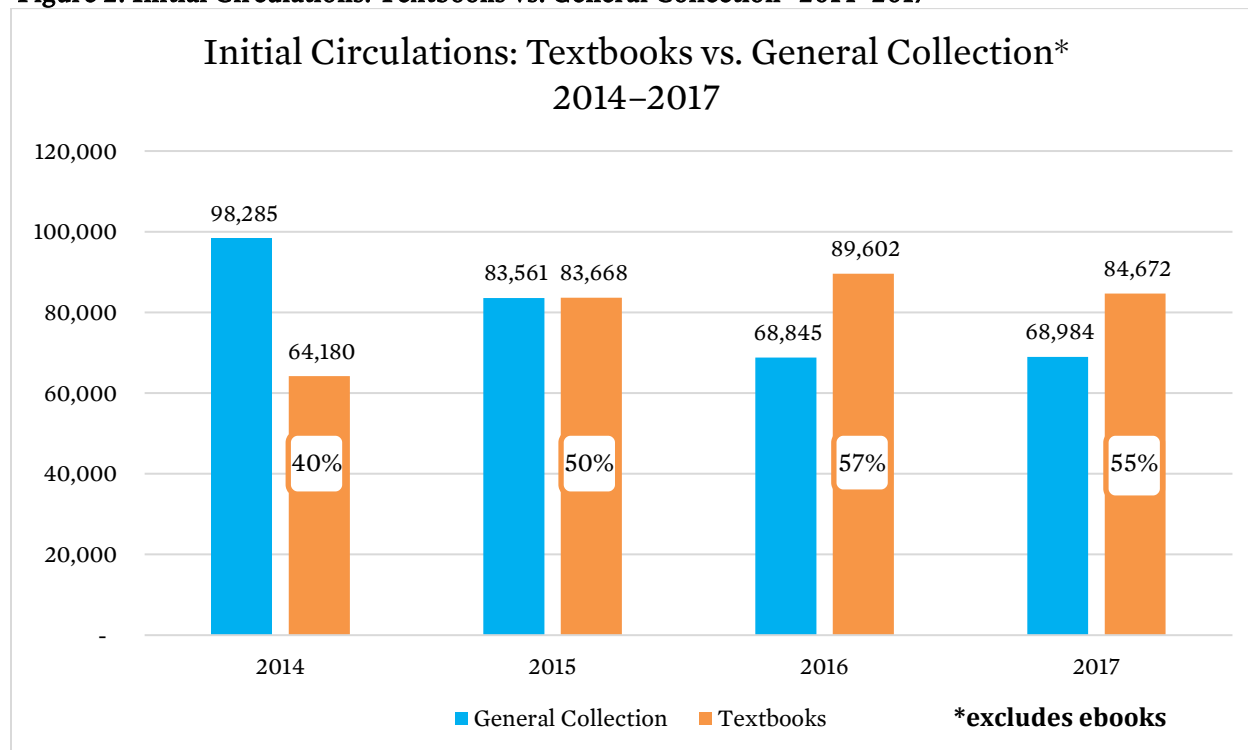
Textbook Strategies

The print textbook lending program is only one part of the library's textbook strategy, however. Due to the challenges of circulating physical textbooks and in order to better serve users, the library attempts to purchase these materials in electronic format, actively pursuing multiuser e-textbooks as a preferred option. However, relatively few textbooks are currently available in e-formats with student-friendly platforms and multiple simultaneous users, and this option has had a limited impact for high-impact courses. The library also has taken a leadership role on campus in the movement to incorporate low- or no-cost Open Educational Resources or OER materials into courses. The university displays textbook costs in the schedule of classes, so students are aware of the cost of course materials when registering for classes. However, while the library provides grants for faculty who adopt OER materials for their courses, both for individual classes and at the departmental level, only a fraction of classes currently use low- or no-cost textbooks. Therefore, while OER holds much promise, at present it provides only a partial solution at most schools. In the future, the increased availability of textbooks in electronic format and OER together should reduce the demand for print textbooks on reserve. In the meantime, considering that 4,500 textbooks generate half of the library's print initial circulations, this service seems like an excellent value.

The methodology for identifying and assessing high-impact textbooks has evolved over a period of eight years to include data streams for textbook costs, course enrollment, and course-related student success measures, among others. In the second section, the data collection and assessment methodology and outcomes will be described.

Assessing the High-Impact Textbook Program

Early analyses of the textbook program were limited to readily available data: raw circulation counts and rough estimates of circulations per textbook. Increased demand for textbooks was evident in the continued upward circulation trend over a multiyear period. Initially, the library did not have an efficient method of identifying textbooks assigned each semester. This caused a variety of related logistical issues, including time-consuming manual course and textbook lookups performed by library staff. The campus bookstore finally succumbed after years of repeated requests and provided the library with access to textbook assignment and cost data by semester.

Analysis of the resulting new data yielded some valuable insights for the library and for the campus. Librarians calculated new averages, including average cost per textbook and average textbook cost by academic department and college. Also calculated was the average number of textbooks assigned by academic department and college, both for undergraduate-level and graduate-level courses. Enrollment data and cost data were combined to calculate cost offset estimates. Textbook circulation data and textbook cost data were combined to produce some rough estimates of cost per circulation. With enrollment data integrated into the analysis, the number of courses and students supported by the textbook program was calculated.

To better understand student demand, the library briefly experimented with a fully demand-driven textbook program alongside the high-impact textbook program. Resulting analyses revealed interesting and concerning patterns—e.g., a disproportionately high number of textbook requests placed by graduate students—that led librarians to refocus the overall textbook program to best support the university's most at-risk students. Rethinking the fundamental questions was crucial: How does the university define the most at-risk students? Is there unmet textbook demand by these students? Which courses have the largest at-risk student populations?

Refining the "High-Impact Course" Designation Methodology

Previously unseen campus data provided some answers to these questions. When first designing the high-impact textbook program, the library had access to a list of only selected courses with a grade of D, F, or withdrawn (W). Librarians asked the Office of Institutional Effectiveness to provide complete course, section, and instructor data, along with student enrollment counts and aggregated D/F/W data for all courses. The new data provided both a more holistic and a more granular view of enrollment distributions by course, department, and college. The data also revealed the university's recently introduced practice of designating courses critical for student retention as "Success Marker" courses. Identifiers for "Gateway" and "Core" courses—those for which completion is required for students to advance in a degree program or college—were added to this dataset.

To effectively incorporate D/F/W and course enrollment data into the methodology for identifying high-impact courses, it was first necessary to define what constitutes a "high" level of impact. Native data distributions guided the methodology, as the enrollment data combined with D/F/W rates and D/F/W percentages fell neatly into distinct tiers that have remained fairly consistent over time. Notable variances have served as an early indicator of significant enrollment shifts, signifying a change in the curriculum or in department- or college-level degree requirements.

Textbook cost data from the campus bookstore was incorporated into the list of high-impact course candidates to identify the most expensive textbooks in target classes. Analysis of high-impact textbook circulation data was added to identify a purchasing threshold for the number of copies to purchase, based on

enrollment. As suspected, enrollment and D/F/W data confirmed that courses designated as Success Marker, Gateway, and Core should be folded into the high-impact textbook purchasing program.

Figure 3: The library's Tier One and Tier Two High-Impact Course Criteria
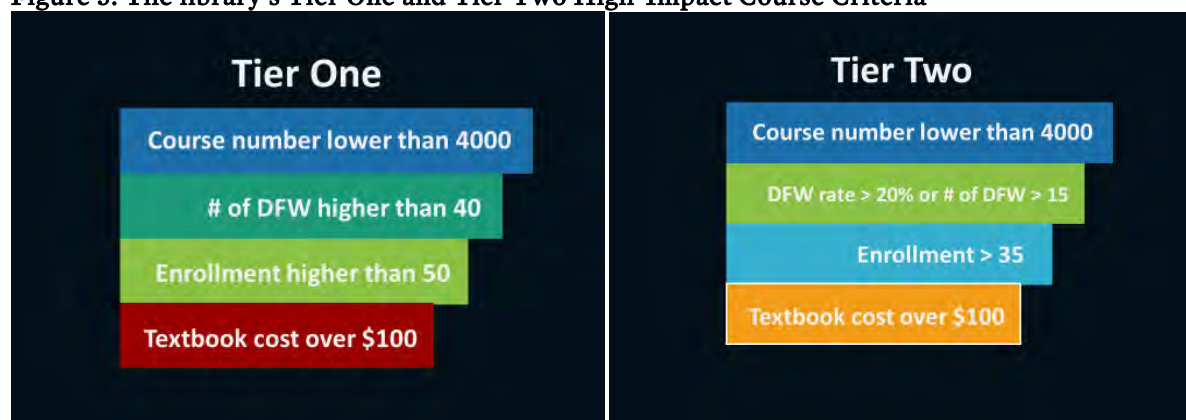
At UTSA, high enrollment and significant D/F/W rates are priority criteria for OER course grants. Much of the analysis for the high-impact textbook program is equally suitable for identifying potential "high-impact" OER course candidates. Courses that have adopted OER materials can easily be tracked, and the corresponding absence of those courses' print textbook circulation statistics can be seen in the textbook circulation data. These OER-influenced declines are desirable print circulation impacts.

Additional Program Refinements

After observing persistent pockets of unmet user demand not represented in the refined high-impact textbook methodology, the library now incorporates high pager use data into the textbook program analysis and routinely purchases additional textbook copies as a result. Additionally, library staff identify repeatedly requested textbooks that the library does not own, reach out to the faculty who teach the associated courses, and often place a copy on reserve. Textbooks for these courses may not fully fit the definition of highest impact, but this is a cost-effective way to meet users' observed demand through the library's traditional course reserves program.

To stretch funds, the library proactively identifies heavily used textbooks and formats suitable for reinforced bindings. The bindery service is inexpensive, and the books with reinforced binding have remained in remarkably good condition, resulting in savings of thousands of dollars that might otherwise have been spent on replacement copies.

Print Textbook Analysis

Even with clean metadata, a few potential factors may impact cost per circulation analyses: the cost, the demand, and the availability of an item. Items with a high cost and high circulation or with a low cost and low circulation might reasonably have a low cost per use. High-cost, low-circulation items and low-cost, low-circulation items will have a relatively higher cost per use. Statistics for items with high demand may be artificially low if there is insufficient textbook availability. Identifying which factors drive the results of an analysis can be a helpful exercise. The distribution of each factor across a dataset may also reveal useful information to inform a purchasing strategy.

E-Textbook Analysis

E-textbook cost per use can be challenging to calculate accurately at scale without a system to ingest e-book usage statistics across platforms and account for possible permutations in print ISBNs and e-ISBNs. For institutions that support hybrid OER—for instance, those who track library-assigned materials as part of the OER effort—e-textbook cost per use can be an informative metric for individually assessed resources.

E-textbook cost offset can also be a valuable metric. Because of difficulty approximating the cost of e-textbooks for individuals compared to the institutional rate, librarians chose an equivalent print-per-textbook cost and multiplied this amount by the number of students enrolled in a course to calculate ballpark e-textbook cost offset figures. A relatively small number of e-textbooks tend to be available for designated high-impact courses, but the library does purchase e-textbooks when available in an access model appropriate for course use.

Potential Pitfalls and Other Considerations

In the library's high-impact textbook analyses, metadata is king. Cryptic abbreviations, ambiguous and common titles, custom editions with ISBNs that confound reliable identification, multiple versions of similar texts, and missing format information are common in the textbook title and cost data file from the campus bookstore. Authors' names are rarely disambiguated. Prices can vary, depending on whether a textbook is available for purchase or rental, or depending on the format and bundling options.

In addition, textbook editions can change over time. Different editions of the same textbook may be assigned for different sections of the same course. Some textbooks may be assigned to multiple courses and sections, resulting in a many-to-many relationship. Textbook assignments can change from semester to semester or year to year. Not all UTSA faculty report their assigned textbooks to the campus bookstore, which means that analyses built on textbook bibliographic and cost data from that list can be incomplete and potentially inaccurate.

In a multi-copy program, different copies of textbooks may be purchased at different times of the semester. It may be advisable to roll up the collective circulation and cost data for multiple copies over a specific time period, especially for "cost-per" calculations. Similarly, recently acquired, damaged, or lost items should be isolated and possibly removed from "cost-per" calculations. Some data are more sensitive to outliers, potentially skewing averages. For example, in some analyses, zero-cost and zero-usage data for courses with no textbook assigned were removed.

The library had to reconsider integrating faculty-owned textbooks into various textbook program analyses. These textbooks often represent only one of several copies that circulate. Analyzed separately, information about faculty-owned textbooks may lack context. The library now uses the same record and checkout conventions for faculty-owned textbooks as other multi-copy textbooks in the library's collections.

Other helpful tips for analysis: Be mindful when comparing metrics for samples of significantly different sizes. If needed, compare population proportions prior to performing an analysis. When building one analysis atop another, consider how choices made in a base analysis might affect other analyses layered atop the initial analysis. When comparing buckets of data, variations in frequency for the same metric can impact an analysis. For example, textbook circulation periods can be far shorter than circulation periods of general collection items. It is important to account for this variance when reviewing and comparing overall collection circulation counts.

Other Benefits of Analysis

The library has realized other positive results of the new high-impact textbook methodology and refined program. Information about designated Success Marker, Gateway, and Core courses raised librarians' awareness of the university's evolving curricular strategies, allowing closer alignment with campus priorities. Formalizing the high-impact textbook methodology provided a platform for additional discussions with faculty members and enhanced relationships with existing faculty users of the library's course reserves services. Facilitating access to textbooks through the high-impact textbook program and the OER program reinforces the library's role as supporter of student success.

Conclusion

At UTSA, the textbook lending program has evolved from merely lending faculty copies of textbooks to the current methodology, a mashup of campus data and textbook information that takes into account student

performance in a course. Although implementing a textbook lending program requires staff time and effort, the service can be implemented at any level, and the barrier to entry is fairly low. By simply identifying high enrollment classes with expensive textbooks and securing a modest fund allocation, libraries can offer support to lower-division students who may be in need. Including additional sources of data will enable a library to fine-tune the selection process and potentially increase the impact on student success.

As the availability of OER materials and e-textbooks grows, it is likely that the demand for textbooks on reserve will decline. At present, however, the change appears to be an incremental rather than a transformational process. During the transition, high-impact textbook selection strategies can help relieve the high cost of textbooks for students most at risk, supporting student success and equal access to education.

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Mining EZProxy Data: User Demographics and Electronic Resources

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Abstract

After a mandate to utilize data to demonstrate impact on student success, Virginia Tech University Libraries began diving into previously untapped data sources. Given that the collections budget makes up 48% of the total library budget, roughly 90% of which streams to electronic resources, it was deemed necessary to make more direct connections between electronic resource usage and student success.

Usual practices prior to the charge involved analyzing usage from Counter reports and cost data, such as frequency and cost per use, primarily for the purposes of serials budgeting and negotiations. Due to these past data collection analysis practices, university libraries could only create basic inferences about its electronic resource users. In order to create more robust user inferences, the university libraries turned to EZproxy logs as well as university-collected student data and began a multiphase research project based on the connection between the two data streams.

The long-range purpose of the research project is to create better understanding of student user demographics by connecting electronic resource usage information with university-held student demographic information. Ultimately, plans include impact measurement of the university libraries on Virginia Tech's overall success and constitutes the start of a broader systematic study of the impact of university libraries' dollars spent on electronic resources. Development of this study includes research into encryption and anonymization techniques, as well as current best practices in security of personal information. Discussion will include challenges, including on- and off-campus usage access and meeting resistance to utilizing personally identifiable data. The discussion will also include tools utilized in the study, which include EZproxy, Graylog, Python, and Tableau.

Background and Purpose

Total collections spending typically makes up 37% of an academic libraries' total library expenditures.[1] Virginia Tech's collection spending consumes even more than the average at 48%; electronic resources consume 90% of that collections budget. Given the sheer proportion of funding devoted to electronic resources, it is not surprising that administrators need more data to demonstrate the effectiveness of investments. Libraries, like all other university units, need to map their outcomes to the university's and demonstrate value and impact, and doing so with data is imperative. "More than 2,500 institutions worldwide are currently using Ezproxy," and, for many universities, utilizing usage data from EZproxy creates opportunities to demonstrate value and impact.[2]

Literature Review

Libraries use a variety of methods to demonstrate the impact of their products and services. One university library analyzed the following service points where they also collected corresponding user identification at each: all types of reference questions, circulation transactions, instruction sessions, delivery requests, interlibrary loan requests, and EZproxy logins for off-campus users. While that university had already performed a cost-benefit analysis for most services points, it had not utilized EZproxy data but decided to do so after more pressure to demonstrate impact on student success. After collecting user data, they obtained demographic data corresponding to each user via campus institutional research. Like many investigating impact, they obtained the following: academic standing, academic level, academic program, age, sex, ethnicity, enrollment status, and GPA. Notably, the service demonstrating most use was the EZproxy login data.[3]

McCarthy studied data of 4,803 distance learners enrolled in at least one online class by means of off-campus EZproxy logins and from the college registrar records using the Banner system. The researcher utilized

EZproxy data to determine how frequently distance learning students accessed electronic materials and combined that data with GPAs from Banner. McCarthy found that students who accessed library resources remotely via EZproxy on at least one occasion outperformed those students who never accessed library resources remotely by 15%.[4] Only data from off-campus users of EZproxy was examined in this study.

Allison collected anonymized student identification numbers, their GPA, and class standing for all graduate and undergraduate students for two consecutive academic years. After matching these data to off-campus EZproxy login data and library circulation data, the researcher found that students using library resources demonstrated a usage pattern that increased as students advanced upward through ranks, and that ultimately students who used library resources more exhibited higher GPAs and retention rates. With regard to retention, lowest usage corresponded with those students who left the university prematurely. Further, the researcher discovered a correlation between GPA changes and variations in library activity for both undergraduate and graduate students.[5] Much like McCarthy's study, this investigation did not include on-campus use of electronic resources.

While McCarthy and Allison could not provide data for on-campus users of electronic resources, Davidson et al. included both on-campus and off-campus use of electronic resources as they studied correlation to student GPAs. They chose to include on-campus usage particularly because another study showed that two-thirds of electronic resource usage originated on campus. As with other studies, they retrieved student GPA data via Banner, and in their case, the Office of Institutional Effectiveness anonymized the data for them. Their study showed the percentage of the population who logged in at least once during the semester and the average number of users in that population. Subsequently, the researchers broke down the population by student by college, department, and major; student by level, class, and gender; undergraduate GPA by department and class; student by race/ethnicity; athletic status; Greek status; faculty by department; and staff by department. The analysis of students by college, department, and major revealed that, within the humanities, the classics, English, and religion constituted the three highest usage areas but art students were less likely to log in. In the sciences, students in health sciences used databases more than biology, computer science, and mathematics students. When the researchers looked at undergraduate use of electronic resources and GPA correlation, the data showed that a higher percentage of students logging in and a higher number of logins led to higher GPAs.[6]

Beyond using EZproxy to study impact on student success, at least one study writes of their use of EZproxy and Google Analytics to analyze against COUNTER usage reports and to understand user pathways to electronic resources.[7]

Protecting student privacy continues to be a topic when studying impact of services on students, and libraries exhibit several different methods of ensuring student privacy and disclosing the study to participants. Thorpe et al. revealed that they provided both digital and print patron consent forms and informed all patrons that their participation was optional. All staff were trained to describe the study in the event patrons inquired about it.[8]

Methodology or Study Design
Project Scope
This project involved the collection of data about how Virginia Tech licensed content is utilized by the Virginia Tech student body. The purpose of this program is twofold. The first is to discover whether information about off-campus use can allow reasonable assumptions to be made about on-campus use by comparing study demographics to enrollment demographics. The second purpose is to learn about off-campus student users. This project uses data collected from July 2, 2018, to August 11, 2018, which corresponds with a full academic course of Summer II classes.

Data Retrieval
This study involves database usage through the collection of EZproxy logs. EZproxy is an industry-standard access and authentication software that allows users to gain secure access to web-based, licensed content

that users discover in libraries.[9] This means that Virginia Tech users can access online library materials from off campus. EZproxy is always running, so if the IP address is acknowledged as coming from the university, EZproxy does not request authentication. If the student is off campus, the IP address does not match with the registered range of university IPs. EZproxy then will authenticate the user by requesting their university username and password. Once authenticated, EZproxy passes the user's request to the content provider using an accepted university IP.

At Virginia Tech University Libraries, EZproxy data is automatically collected in a log and held in a server with a Graylog interface. Graylog (www.graylog.org) is a log management system that overlays log data and aids in collection, visualization, and system alerts. This server and its interface has restricted access, which is housed and controlled through the university library's IT division. Graylog is useful to this project as it was relatively simple to use the interface to export various elements of EZproxy data logs in a common .csv format. This overlay also allows the programming of certain parameters to allow for an easier data cleaning and organization process.

From each login, the following variables were collected: date and time of access, database accessed, IP address, geolocation from IP address, personal identifier (PID) if available, and affiliation. On-campus users were screened out, and then unique PIDs were collected and connected with student demographic information via the university's Banner system. This step also eliminated non-students, as PIDs of people who were not enrolled in classes could be reasonably assumed to be faculty, staff, alumni, or another non-student designation. The demographic information collected included: residency (in- or out-of-state), major, college, race/ethnicity, completed hours, gender, age, and overall GPA. This data was completely de-identified.

Python and Relevant Libraries

Thanks to the organization through Graylog, the initial dataset extracted was generally straightforward and clean. But the dataset comprised several gigabytes in size, which made it a large dataset by the library's Data Analytics Team's standards. Because of its large size, this study utilized Python to implement all of the data pre-processing. In addition to being able to handle large datasets, this object-oriented language has a relatively shallow learning curve and excellent online learning resources. The Python programming language was chosen for several reasons: it is one of the top industry-standard languages for data analysis, the researchers in this study had familiarity with it, and, because it can run on a local machine and is non-cloud based, it is ideal for securely handling data with personally identifiable information.

The libraries used within Python for data wrangling for this project consisted primarily of NumPy and pandas. NumPy is a fundamental package needed for data analysis when working with arrays, more specifically arrays of different shapes.[10] Pandas assists with practical manipulation of relational and labeled data in Python.[11] Both libraries are considered core libraries for data analysis and statistics. In order to do some initial visualizations for early data analysis, this project employed the data visualization library Matplotlib.[12] Seaborn, a library based on Matplotlib but affording additional functionality, was also utilized.[13]

Data Pre-processing

One of the useful features of Graylog consists of its ability to automatically pull geolocation data in from non-private IP addresses. However, due to a systems error, the location was not available for the time period needed. To rectify the problem, the data analyst exported only unique IP address information and then used an alternative method to gather the geolocation information. This data was then reintegrated into the original data frame.

Based on the IP address, 24.9% of the over 4 million records were identified as automated system checks, and these were removed before analysis of the data. Other transformations of the data include adding converting timestamp information so that it is a recognized time object, and adding week numbering in addition to months and days.

Once this was complete, the next step involved removing on-campus and admin data, exporting remote users by their university personal identifier, and sending the information to be merged with university student demographic data. The student demographic information was returned completely de-identified by Academic Services Analysis & Reporting, and for reasons of security and privacy, all original datasets that were kept were similarly removed of this personal identifier.

Visualization and Analysis

All visualizations and final analysis utilized Tableau, an end-to-end analytics data platform. Many academic libraries have moved to using Tableau, and it is an industry standard in business and analytics. Tableau integrates querying, exploration, and visualization of data into a single process.[14] Tableau is a favored tool for library analytics at the university libraries at Virginia Tech for a variety of reasons, including the ability to connect to a variety of file and system types; drag and drop technology that requires no coding experience (although it can be helpful); visualizations and dashboards that are publishable to the web via Tableau Public; and dynamic dashboards rather than a static product that allows users to drill down into the data. In addition, the authors of this paper had experience with using Tableau. One author had prior experience and training before her experience at Virginia Tech, and the other was able to attend the Tableau conference with grant money for learning data visualization tools.

Tableau is not the best tool in all circumstances, however. It is fairly expensive, and because of all the capabilities, there is a steep learning curve, especially when it comes to specific customizations. In order to share protected data that should not be made public, there is an additional expense for software such as Tableau Server or Tableau Online. Although this institution makes extensive use of Tableau, there are many other reliable, cost effective options available.

Findings
Overview

For the 31-day time period of Summer II classes, patrons accessed electronic resources approximately 3.4 million times from both on and off campus. While this may sound impressive, automated system checks inflate the total. Consider, too, that research is not a linear process, and often researchers often access resources again and again in a single session.

Of the off-campus users, 5,386 unique users accessed resources with a total accession rate of 1.8 million hits, and an average 329 instances per login. Again, this number seems high, and only reflects each resource page accessed and not actual resources downloaded; it does not reflect time spent on a page. The vast majority of unique off-campus users were students, with 1,166 unique non-student users who are assumed to be faculty, staff, or faculty emeritus. The 4,220 unique off-campus student electronic resource users are in comparison to the 3,741 students who were enrolled in Summer II classes at Virginia Tech.

Initial observations

Off-campus use during the summer was expected to be higher than during the fall and spring academic semesters, and this was the case with 52.5% of users logging in from off-campus locations, 43.7% of users coming from on-campus, and the remaining 0.2% consisted of administrative checks on systems. Fall and spring semester off-campus use averages between 35% and 40% of all users.

During initial observations, the geographic information from IP addresses of both on- and off-campus users was mapped in Tableau. This helped to verify the data was accurate. The expected result was that on-campus users would be located on the Virginia Tech campuses in Blacksburg, Roanoke, and Arlington, Virginia, and off-campus use would be scattered. This indeed was the case; however, there were a few instances of on-campus uses from IP addresses in other parts of the United States and other countries throughout the world. Some of this anomaly can be explained by VPN use by faculty and staff.

On- and off-campus use comparison

One of the main reasons for this pilot study was to investigate whether off-campus users provide an accurate representation of enrolled students during Summer II. Although systems exist to collect off-campus electronic resource use, some library faculty resisted efforts to have users authenticate through EZproxy without regard to the IP location being on or off campus. In order to begin this investigation, it was necessary to compare on- and off-campus use to see where there were similarities and differences that occurred. It is important to note that, while this paper refers to on- and off-campus users, this is intended to mean on- and off-campus usage, without distinguishing whether a user is exclusively off-campus, exclusively on-campus, or regularly uses resources from both on and off campus.

An initial comparison included a look at usage through date and time. The periods of heavy use for both groups occurred late mornings, afternoons, and early evenings. Similarities in patterns of use showed up as well, including less use over the weekends and overall frequency increasing from mid- to end of semester. One notable difference indicated that off-campus users exhibited heavier usage later into the evening than on-campus users.

After looking at date and time, the next focus centered on the actual electronic resources. Little variety presented itself with regard to the number of publishers utilized during the study. The top 24 publishers off-campus users accessed comprised 99.43% of all publishers used during the Summer II session. Similarly, the top 24 publishers that on-campus users accessed comprised 99.89% of all publishers accessed. In addition, a high degree of similarity appeared when looking at the publishers accessed from both on and off campus. All of the top 24 publishers from the off-campus list appeared in the on-campus list, although the rankings could be quite different.

The average rank difference for the top 24 publishers was 5 places, the median was 3.5, and the mode was 3. The top publishers for off campus were: EBSCO (19.9%), JSTOR (11.3%), Science Direct (11.66%), Web of Knowledge (6.27%), and ProQuest (0.58%) (Figure 1). The top publishers for on-campus users were: Web of Knowledge (13.55%), Science Direct (11.6%), EBSCO (9.99%), Ancestry (Library Edition) (9.43%), and ProQuest (7.42%) (Figure 2).

Figure 1: Top 24 Publishers Accessed from Off-Campus
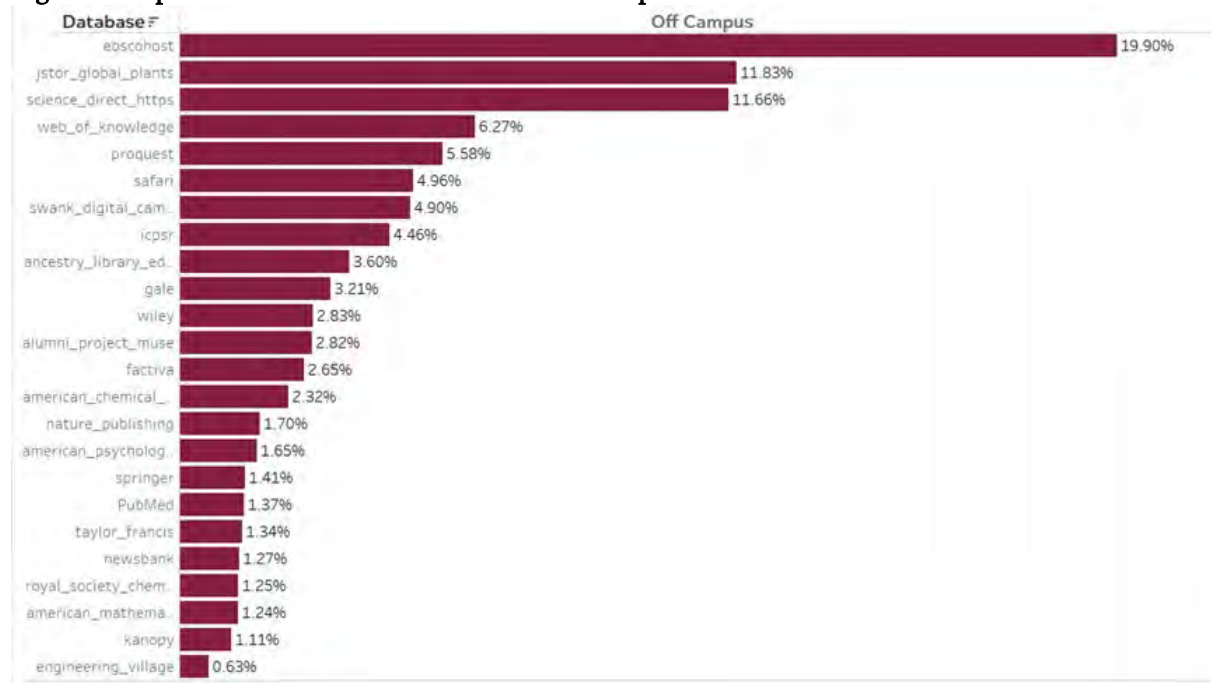
Figure 2: Top 24 Publishers Accessed from On-Campus

Database	On Campus
web_of_knowledge	13.55%
science_direct_https	11.60%
ebscohost	9.99%
ancestry_library_ed.	9.43%
proquest	7.12%
gale	6.81%
icpsr	5.99%
taylor_francis	5.96%
alumni_project_muse	3.95%
wiley	2.92%
engineering_village	2.60%
newsbank	2.46%
springer	2.43%
safari	2.38%
jstor_global_plants	2.15%
PubMed	2.13%
american_chemical_	2.08%
nature_publishing	1.83%
kanopy	1.28%
american_psycholog.	1.07%
swank_digital_cam.	0.91%
factiva	0.61%
american_mathema.	0.52%
royal_society_chem.	0.22%

Where off-campus users are located: includes students and non-students

An overwhelming number of off-campus student and non-student users, 95.5%, connected to the databases from the United States. The next largest locations of connection include Denmark (0.6%), Japan (0.6%), Germany (0.5%), India (0.4%), and the United Kingdom (0.3%) (Figure 3). In the United States, 73.4% of connections occurred in the same state as the university location, Virginia. The rest of the connections came from every state in the Union, none of which comprised even 5% of the total, even from adjacent states like Maryland and North Carolina or the adjacent District of Columbia (Figure 4).

Off-campus and non-student users were most likely taking or teaching classes near campus locations. The highest percentage of off-campus use overall, 58.4%, comes from the city of Blacksburg, Virginia, where the main Virginia Tech campus is located (Figure 5). Surrounding towns such as Christiansburg and Radford are also in the top 20 cities. Other cities and towns in the top 20 include areas where there are satellite campuses such as in the National Capital Region with Arlington, Falls Church, and Alexandria all in the top 20.

Figure 3: Top Countries Where Off-Campus Users Accessed Electronic Resources

Off-Campus Top Countries

Country	
United States	1,566,231
Denmark	9,787
Japan	9,500
Germany	8,087
India	6,513
United Kingdom	4,854
Republic of Korea	4,483
Switzerland	4,353
China	3,981
France	3,848
Canada	3,218
Turkey	2,613
Saudi Arabia	2,274
Peru	1,828
Egypt	1,764
Ecuador	1,483
Bangladesh	1,311
Iran	1,242
Australia	1,220
Kuwait	624

Figure 4: Top States Where Off-Campus Users Accessed Electronic Resources

Off-Campus Top States

Region Name	
Virginia	1,092,925
Maryland	72,718
California	54,824
North Carolina	42,329
New York	34,686
District of Columbia	30,097
Texas	24,452
Pennsylvania	22,779
Ohio	13,963
New Jersey	13,253
Illinois	12,736
Michigan	11,827
Georgia	11,061
Florida	10,703
Washington	9,536
Massachusetts	9,472
Tennessee	9,088
South Carolina	6,379
Colorado	5,363

Figure 5: Top Cities Where Off-Campus Users Accessed Electronic Resources

Off-Campus Top Cities

City	
Blacksburg	572,414
Roanoke	75,301
Richmond	41,957
Washington	29,825
Midlothian	28,743
Radford	27,196
Christiansburg	25,351
Oxon Hill	23,179
New York	22,334
Annandale	21,701
Alexandria	21,580
Virginia Beach	18,788
Arlington	17,889
Ashburn	10,639
Fairfax	9,998
Falls Church	8,148
Raleigh	5,323
Williamsburg	3,141
Blacksburg (Farmvie..	1,244

Off-campus student user profile

Off-campus student electronic resource users had an overall GPA of 3.49 and an average age of 28. The higher age does reflect the higher number of graduate student users, who had an average age of 32. Undergraduate student users averaged slightly older than usual at 22 with a median age of 21. Summer off-campus student users were older than traditional students. Commonly, students range in age from 18 to 21. While Virginia Tech does not publish an average student age or age range, according to collegefactual.com, 64.5% of Virginia Tech students are in the age 18 to 21 bracket, compared to the national average of 60%. Undergraduate students had an average GPA of 3.24. This was then improved by the graduate students' average GPA of 3.74.

Off-campus unique student users and enrollment

The data show that the unique student users who logged into online databases from off campus are closely aligned with Summer II enrollment figures in some areas. The numbers are unequal, with there being more unique student users than enrolled students. This is not alarming, as many students who are not officially enrolled in summer classes may be working on individual projects. In order to make fair comparisons, the data are presented as percentages of the whole, such as percentage of total enrollment versus percentage of total unique student users.

One area where unique student users and enrollment figures are in opposition is in the composition of students. Undergraduates comprise 76.7% of Summer II enrolled students, but only account for 34.5% of unique electronic resource users (Figure 6). Similarly, Summer II enrollment consisted of 16.7% graduate students, and in the same time period, 62% of unique electronic resource users were graduate students (Figure 7). Among electronic resource users, the large percentage of graduate students is roughly equal across all colleges. This is not an unexpected result. Logically, it can be posited that graduate students are called upon to do more frequent and more in-depth research than undergraduate students. They have also had a longer time to familiarize themselves with the library and doing research for electronic resources. Institutional interlibrary loan statistics for the past three years corroborate this assumption; graduate students order over five times more articles than undergraduate students.

Figure 6: Student Use to Enrollment Comparison by Level
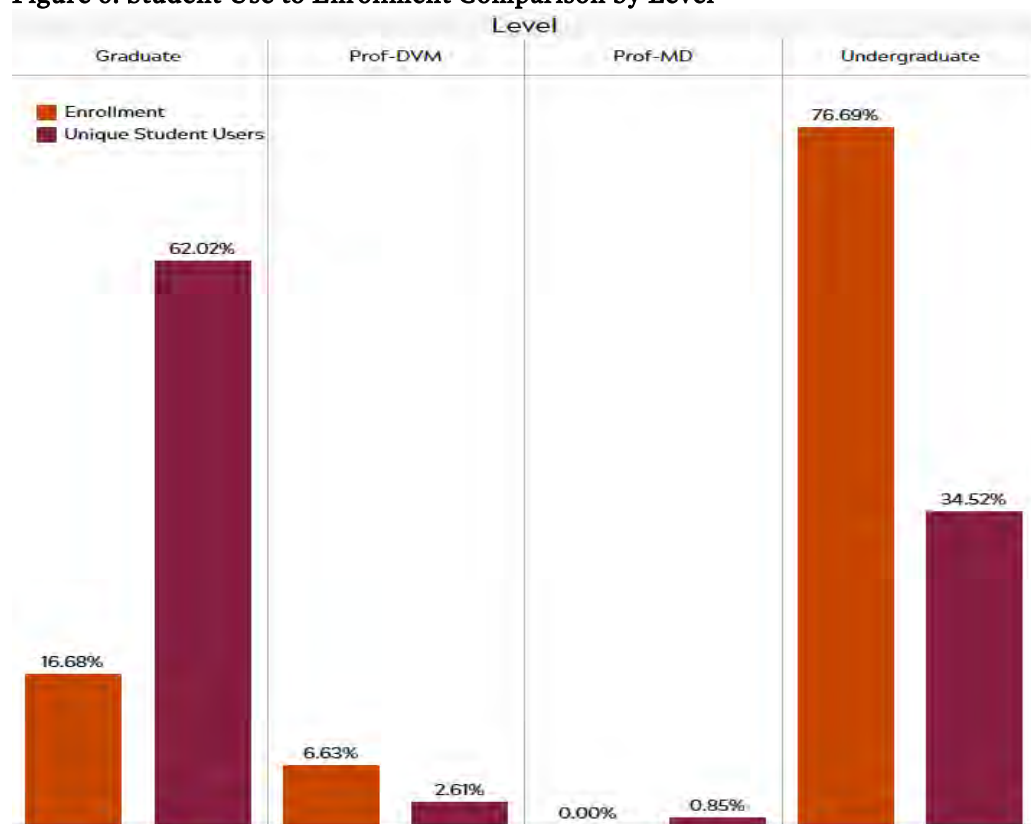
Figure 7: Distance between Student Use and Enrollment

Level	% of Total Enrollment	% of Total Use	Difference Between
Graduate	16.7%	62.0%	-45.3%
Prof-DVM	6.6%	2.6%	4.0%
Prof-MD	0.0%	0.9%	-0.9%
Undergraduate	76.7%	34.5%	42.2%

Both gender and ethnicity are voluntarily self-reported by students at Virginia Tech. Gender figures among unique electronic resource users correlate very closely to enrollment percentages, with surprisingly small percentage differences of (unique-enrolled) 0.87% female, 0.6% male, and 0.27% not reported (Figure 8). In the area of race and ethnicity, every category of unique electronic resource users fall short of the enrollment percentages, with the exception of students who identify as Asian. Because the library traditionally does not gather ethnicity information on its users, it is impossible to see if this is consistent with past library use, much less speculation on the implications.

Figure 8: Gender Comparison of Unique Off-Campus Students and Enrollment Figures
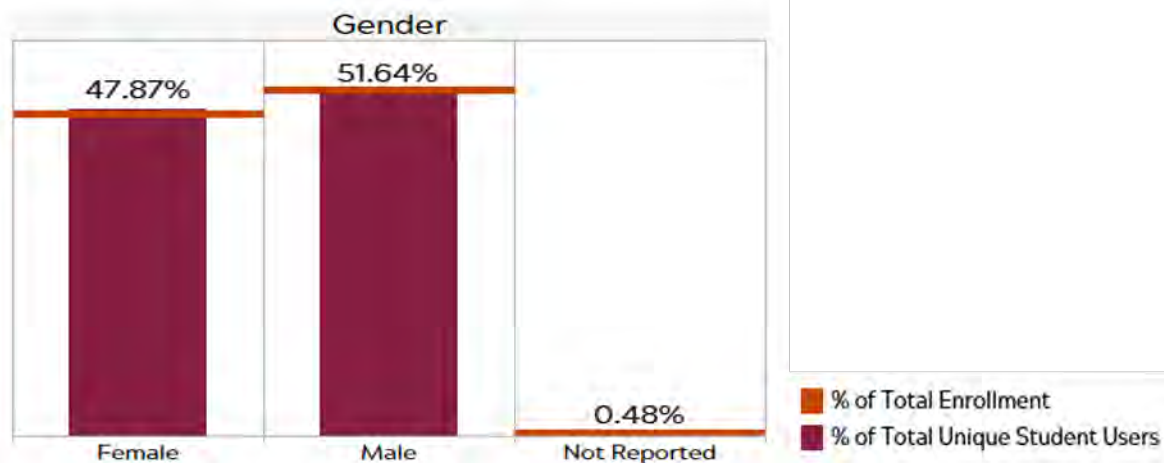
Comparing enrollment to usage by college, only two colleges exceed a 3% gap between enrollment and usage (Figures 9, 10). One of these colleges is engineering, which is overrepresented by electronic resource users, with 23.1% of all students enrolled in classes and 28.4% of all unique library users who are engineering students. The biggest discrepancy is in the College of Business. It comprised 15.9% of all enrollment, yet unique students only accounted for 6% of the total electronic resource users who were aligned with the College of Business. Average GPAs were similar between the two colleges, as well, although slightly higher for engineering (3.57) than for business (3.49). As noted before, graduate students account for the majority of off-campus electronic resource use. Comparing students from the Pamplin College of Business to the College of Engineering, the percentage of graduate to undergraduate students who used electronic resources were both roughly 60% undergraduate to 40% graduate.

Figure 9: Off-Campus Student Usage by College
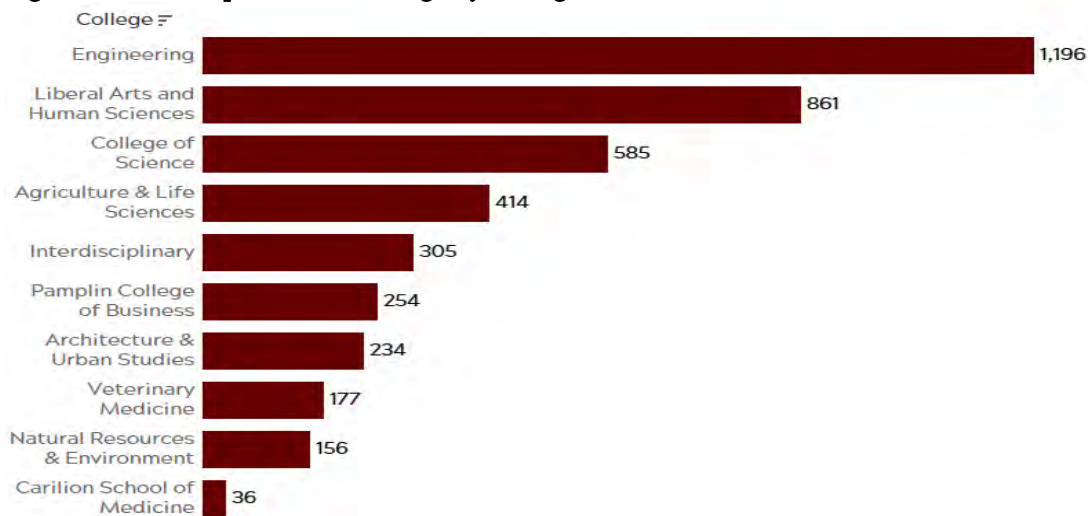
Figure 10: Distribution of Difference between Off-Campus Usage and Enrollment by College

College	% of Total Enrollment	% of Total Unique Student Users	Difference
Agriculture & Life Sciences	7.5%	9.8%	-2.3%

College	% of Total Enrollment	% of Total Unique Student Users	Difference
Architecture & Urban Studies	6.1%	5.5%	0.6%
Business	15.9%	6.0%	9.9%
Carilion School of Medicine	0.0%	0.9%	-0.9%
Engineering	23.1%	28.4%	-5.2%
InterCollege	5.9%	7.2%	-1.3%
Liberal Arts and Human Sciences	17.9%	20.4%	-2.5%
Natural Resources and Environment	2.7%	3.7%	-1.0%
Science	13.8%	13.9%	-0.1%
Veterinary Medicine	7.0%	4.2%	2.8%

Both off-campus student users and enrollment figures had a majority of students with a primary residence within the state of Virginia (Figure 11). In-state enrollment percentages are much higher at 69.98% than off-campus users at 57.42%. The higher percentage of off-campus out-of-state users may reflect the number of students who are not enrolled in summer classes yet still engage in research and academic study or are distance learning students.

Figure 11: Comparison of Location
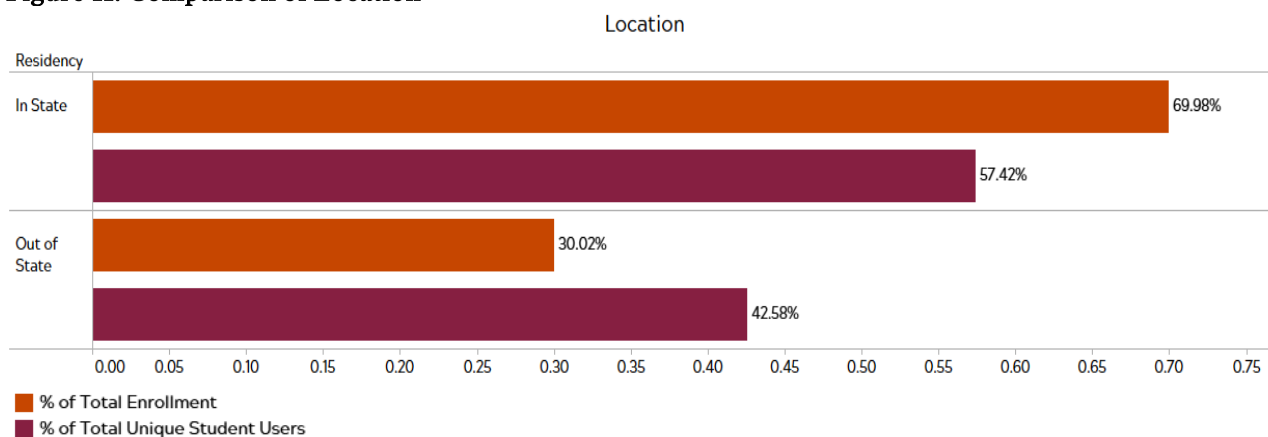
The evidence is inconclusive to determine, based on this information, whether off-campus users are an accurate representation of on- and off-campus student electronic resource use in Summer II. While the gender balance is accurate, and the data look promising, without additional information about on-campus use, it would be overreaching to make a determination.

Recommendations based on findings
Further studies
As stated previously, without access to on-campus usage demographic information, it is difficult to come to a conclusion as to whether off-campus electronic resource usage data is an acceptable proxy for all electronic resource usage data and to create actionable recommendations. Therefore, further study is recommended.

In absence of on-campus EZproxy electronic resource usage data, a particularly useful study would be an in-depth, qualitative study that follows how students use electronic resources regardless of location. Pairing a qualitative study with the data from this quantitative study would allow a more holistic view of how students use library electronic resources. Coupled with the off-campus usage data, it would create a broader overview of patterns of use.

Although quite a bit of demographic information about unique users exists, it would also be beneficial to discover if connections exist between frequency of use and markers of student success, such as GPA, retention, and/or graduation rates. This extension of the original study would come closer to the ultimate goal of linking library use to student success.

Discussion
Limitations of the Data
It is important not to overstate the results of this study, due to a demographic analysis that consists sole of data from off-campus users. We can guess that the off-campus users are also on-campus users, but to what extent? In addition to the number of users who access electronic resources both on and off campus, it is difficult to know how a student's behavior changes when they are off campus versus when they are on campus.

Another limitation of the data is that, once the resource user information is connected with student demographics, the data is completely anonymized upon return. While this is beneficial when adhering to privacy protocols, it means that, at the current time, there is lacking a way to connect frequency or location information to demographic data. For instance, while the data show that unique engineering students make up the largest percentage of users, do they also access the resources more often? Having this information would lead to a clearer picture of our student users.

Patron privacy and ethical data collection
During the course of this project, there was much concern from library faculty at Virginia Tech about this project and the implications on patron privacy. Due in part to these apprehensions and other logistic practicalities, the full project involving requiring on-campus users to log in through EZproxy is not likely to move forward in the near future. However, this expressed unease underscores the importance of communicating with library faculty and all interested parties about what protocols and extensive security measures were used for collection of data and the security of personal information.

The original encryption procedures to ensure patron privacy involved sending student personal identifiers through two separate cryptographic processes. The first was to subject the identifiers to a random cryptographic process called "salt" that uses randomly generated additional input for each identifier. This new character string would have then been "hashed" to further de-identify the character string. Instead, when working with the Virginia Tech Office of the Registrar, there were university-level processes already in place regarding student information and anonymization protocols. Researchers underwent a thorough vetting process to receive permission to submit unique personal identifiers through Academic Services Analysis and Reporting in order to connect them with student demographic information. The information that came back was completely de-identified, as mentioned previously. While slightly frustrating at the time, placing the onus of anonymization protocols on the Registrar's Office actually did much to alleviate library faculty concerns.

This study also brought to light how much information about electronic resource use is available through EZproxy logs. Library IT, now fully aware of all the data the EZproxy logs collect, are in talks about whether to retain this information and, if so, what security protocols are needed for this data.

Further Analysis

Steps have already been made to collect electronic resource usage through EZproxy data that has occurred during the fall 2018 semester. At Virginia Tech and most universities, summer semester sessions are different from fall and spring semester sessions in a variety of ways. Using fall data will give a more accurate representation of an average user's experience. It will also be valuable to see how fall usage and summer usage data differ and at what points they converge.

Additionally, initial explorations have been made into how EZproxy information can be compared with traditional COUNTER reports. Knowing how those two data streams can inform each other would help with active decision-making in collection assessment.

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Shopping for Sustainability: Re-Envisioning the Secret Shopper Assessment

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Introduction

We at Alkek Library have used the Secret Shopper assessment for several years to measure services as well as to inform initiatives to improve customer service. However, the Secret Shopper assessment in its present form requires tremendous time and energy from staff and provides limited, and seemingly diminishing, returns. In summer 2018 we began to research and review Secret Shopper to see if we could discontinue this time-consuming assessment. Unfortunately, we found that it is necessary for both reporting on our outcomes and understanding our services better through multiple types of data. Since we must continue it, we are working to make the Secret Shopper assessment more sustainable. Through research, examining our own experience, and understanding data collection in Alkek Library, we are developing a more strategic and sustainable assessment using economies of scale and an outcomes-based approach. A more sustainable Secret Shopper assessment will provide us with multiple types of data—descriptive, actionable data as well as measurements of success—about more types of user experiences, while also managing the assessment with less staff time commitment and effort.

Research

For Alkek Library's Annual Report, we passively collect huge amounts of data that describe a high-level overview of services, so we expected that this would be enough to replace the Secret Shopper assessment. Unfortunately, descriptive statistical data does not give us the full story or the information we need to improve. Outcomes-based, mixed-method research—using a deliberate mix of quantitative and qualitative assessments to address a specific question or issue—provides detailed information on complex and multifaceted service transactions.[1] Mixed-method research can ensure useful data are collected, check for consistency of findings generated by different sources, and provide actionable information.[2] Using both qualitative and quantitative methods to measure service interactions fleshes out a larger story of services provided, giving them color and detail, and improves the quality of all data collected.[3]

However, incorporating qualitative methods into the assessment mix to better understand the user experience of services is notoriously difficult. User surveys are one option, but these put the onus on the user to provide information. And in the case of service points where patrons move on after they complete their transaction, a survey would be either ignored or hurriedly completed without the introspection needed to provide usable qualitative information. Waiting to send a follow-up survey decreases the likelihood of reliable responses.

Another option for collecting qualitative data about service points is direct observation. Direct observation of services does an excellent job of providing information missing from surveys and comments, but it is also difficult to implement.[4] We have not employed this method at Alkek because, while the burden is not on the users, direct observation can be intrusive, takes a large amount of staff time and effort, and potentially infringes on the rights of users and staff.[5]

The Secret Shopper assessment is a third option for collecting qualitative data on service transactions. Borrowed from the retail and hospitality sectors, Secret Shopping is a technique for evaluating services in which trained evaluators work "undercover," asking prescribed questions at service points and then immediately recording details of their experience using a reporting document.[6] Secret Shopping is unique among service assessments in that it gathers information from natural transactions without directly putting a burden on either the staff providing the service or the general user.[7] It is an excellent replacement for third-person qualitative observation, with the added benefit of presenting the service from a user's perspective. It is also flexible enough to collect quantitative data using the same reporting tool.[8] This is useful as service

points often require complex and multifaceted behavior on the part of the staff, which a mixed-method approach can capture well.[9]

However, there is some disagreement in the literature about what the Secret Shopper assessment can measure. While some libraries used the evaluation to measure user satisfaction, the majority did not. Their reasons for not doing so included: (1) examining user experience is not the same as examining user satisfaction; (2) even with good customer service, the correct information (or process, technology, etc.) may not be satisfying to the user; and (3) the evaluation can only measure what the shopper, as an observer, can describe or measure, including the actions and behavior of the staff, the accuracy of the answers received, and their own perceptions of the encounter.[10]

Despite this disagreement about the limits of the assessment, most libraries use Secret Shopper for a similar purpose: to explore known or suspected service issues, to metaphorically hold a mirror up to the staff, and to assess specific outcomes. These outcomes include practicing continuous quality management and proactive improvement; measuring employee behaviors and "soft skills;" measuring procedural and answer accuracy; and measuring space attributes.[11] Some have used the assessment in different ways, to successfully measure and describe physical spaces and technological interactions.[12] Others have even used it to examine wayfinding by writing broader questions and allowing shoppers to choose and locate the service point they thought would best be able to answer their question.[13]

Secret Shopping in Alkek

Alkek Library's Secret Shopper assessment was envisioned in 2014 by Sarah Naper, director of Research and Learning Services (RLS), as a method of collecting new data about the library's service points. Earlier in the year, the library had restructured reference services, transitioning to a triage model and training student workers to staff the reference desk. The pilot assessment went ahead in fall 2014 and covered all points of patron-staff interaction within RLS: circulation/reserve desk, reference desk, periodicals/media desk, government information desk, interlibrary loan office, online chat, and stacks management.

Three library staff members served on the team that designed and implemented the pilot assessment. Team members wrote question prompts that pulled from statistics, chat transcripts, and personal experience and then developed them into more complete "scenarios." Scenarios consist of information about the service point to be assessed, a question to ask, background details to flesh out a believable transaction, and information about the resources a staff member might use to answer the question. Some scenarios anticipated a referral to another desk or department, so shoppers were told that they were not required to follow through on a referral; they were asked to focus on their experience at the initial point of contact, not necessarily on the completeness or accuracy of the answer. Finally, shoppers were asked to record their responses in a secure, online form. Shoppers were recruited from the university's Alpha Phi Omega chapter and were each responsible for two scenarios. The shopping period lasted two weeks, and shoppers could ask their questions at their own convenience during regular service hours.

Following the shopping period, the team anonymized the collected data; shoppers' names were removed from their responses, and specific details about the interactions (e.g., time of day, identifying information about staff members) were scrubbed and replaced by neutral pronouns and descriptors. Supervisors received an overview report that summarized all responses and detailed reports on their respective service points.

After eight semesters of running the assessment, we have made minimal changes to it besides modifying and adding scenarios to accommodate changes to library services. Through fall 2018, Secret Shopper was run each semester by the user experience librarian and one other library staff member. After the first semester, Alpha Phi Omega could not provide enough student volunteers, so student workers from other areas of the library—including technical services and special collections—were recruited as shoppers.

Initially, supervisors had a generally negative impression of the Secret Shopper assessment. To alleviate these misgivings, supervisors were asked for input on which skills should be tested and were assured that no

individuals would be singled out and that the results would not be shared widely. As Secret Shopper has been repeated, supervisors have embraced the assessment more. Because the assessment has been performed consistently over an extended period, repeated issues are eye-opening, and isolated negative interactions stand out more. They have also appreciated opportunities to celebrate positive responses.

Although supervisors have never been given a formal charge to put Secret Shopper results to use, several training initiatives have come out of the assessment. Most notably, student worker training across the department has been expanded to include a weekly newsletter and a day of training activities before each fall semester. Training initiatives focus particularly on consistency of information across service points and reinforcement of best practices and policies. Permanent departmental staff also now receive a similar weekly update email.

Over time, however, we have begun to see diminishing returns from the Secret Shopper assessment. While our time and energy invested—scheduling multiple training sessions to accommodate a small number of shoppers and following up with them to ensure completion—has not decreased over time, the quality of our results has. Some of this decline is because our shoppers are also library student workers. This work is not part of their regular job duties, and we have difficulty incentivizing high-quality responses. The student shoppers have noted that critically assessing colleagues is uncomfortable at best and have admitted that they tend to be less critical in case they are also being assessed. We who run the assessment share the blame for diminishing returns. Our reporting document effectively measures our reported outcomes but has not been updated or expanded. We need to continuously update our reporting document to provide critical and actionable information to promote improvement.

Current Project

Because of the time and effort involved in running the assessment and our declining return on investment, we would have liked nothing better than to sunset our Secret Shopper program. However, library administration intends to continue using some of the quantitative data collected in Secret Shopper as reported outcomes to accrediting bodies. After quickly reviewing other data we passively collect, we were not able to find another source of data to meet that required purpose, nor do we have another tool that could satisfactorily collect it. As it cannot be easily replaced, we cannot discontinue Secret Shopper.

To make Secret Shopper truly sustainable we need a greater return on investment from our labor and the labor of our shoppers, so we plan to overhaul and expand the program. Economies of scale will allow us to assess more outcomes than before and fine-tune the collection methods to provide more accurate and tailored data. This requires that we clarify our outcomes and expand the charge to use the Secret Shopper assessment to its fullest potential.

We expect two outcomes from this process: simplification of staffing and a gain in both quantity and types of data that will allow us to successfully measure and improve outcomes. We gain this data not only by increasing the number of scenarios run at each service point, but also by adding non-service-point scenarios, expanding scenario questions, and expanding the reporting document to collect targeted, actionable data where necessary. In this way, we can use the Secret Shopper assessment to its greatest potential: to gather data that can help us make changes and improvements to both our service points and other user experiences within the library.

Simplify Staffing

In our research we found multiple models for recruiting shoppers, including outsourcing, working with business faculty, and using the Human Resources department or existing quality assurance teams.[14] Partnering with faculty fits well with our subject liaison program, so we have decided to use the Secret Shopper assessment as a chance to liaise with business faculty. We are currently working to partner with at least one business faculty to make the Secret Shopper assessment a class assignment. This will provide more shoppers, a centralized training place and time, and a built-in incentive for students to complete the assessment and provide high-quality responses.

More Data/Actionable Data

As we noted above, expanding the Secret Shopper assessment to bring in more data, as well as more actionable data, will give us more bang for our buck. However, since we do not want to duplicate other data collection currently being done, there are multiple steps to this process:

1. Run a data scan;

2. Run an outcomes scan and choose outcomes;

3. Analyze data against outcomes to choose data and data types needed to provide a mixed method approach to specific outcomes;

4. Modify scenarios and reporting documents to bring back the appropriate data.

Data Scan

Our first step was to review the Secret Shopper assessment to see how we currently use it for reporting outcomes and what data it provides for improvement. Our reporting document provides excellent information for the service points it covers, delivering data that both measure and give information for improvement (see Appendix). However, it only measures service points and does not cover patron-library transactions that do not include staff.

We then reviewed other collected data. Alkek Library staff collect both annual report data and outcomes-based data. The more passively collected annual report data is mostly quantitative, creating descriptive statistics that give administration a high-level overview of library uses and practices throughout the year: headcounts, classes taught, etc. The qualitative data we collect, such as chat transcripts, are not easily analyzed. Because these data are unrelated to clear outcomes, they require more analysis when queried for decision-making purposes. The more actively collected, outcomes-based data is collected to meet goals and explore issues. These generally come from targeted surveys or other instruments and are more easily analyzed to answer questions or support changes. We then gathered all the data we collected related to the user experience and labeled it by type (qualitative or quantitative) and collection method (survey, headcounts, chat transcripts, etc.). Organizing this information is necessary to avoid duplicating data when we modify the Secret Shopper reporting document.

Outcomes Scan

Outcomes drive data collection, so we began this step by gathering all library outcomes related to the user experience. For us, this involved reviewing outcomes reported to outside accrediting agencies, as well as internal outcomes related to our strategic plan and mission. We also included any data and data collection methods that measure the outcomes. In the future, we expect to find additional short-term, targeted outcomes from multiple sources, including in our library's strategic plan, student complaints, journey maps, interactions with technology, library processes, space, and furniture. We are especially interested in using the Secret Shopper assessment to measure user experience outcomes that are not tied to a service point.

Another way we will find outcomes to measure is through staff. Like us, most libraries in the literature had librarians and library supervisors write the Secret Shopper scenarios and reporting document.[15] However, all groups that run the Secret Shopper assessment also report that, in order to successfully implement improvement plans, staff buy-in and involvement is necessary. Here we found a strange dichotomy within the literature and in our own experience—for the most part, the extent of seeking staff buy-in is informing them that the assessment will take place and reassuring them that the results will not be used against them.[16] This top-down model is not sustainable, as it requires time and effort to convince staff that the assessment is positive and any resulting improvement plans necessary. We believe that by using an organizational justice model that includes not only supervisor input but also staff and student worker involvement in the process of creating outcomes, we can create better buy-in for the assessment and make the results more meaningful.[17]

We plan to work with both staff and student workers to find outcomes that are meaningful to them, then revise the scenarios and reporting document to incorporate them.

Data Analysis

We have created a process to plan data collection that is far messier than the graphic and list below suggest.
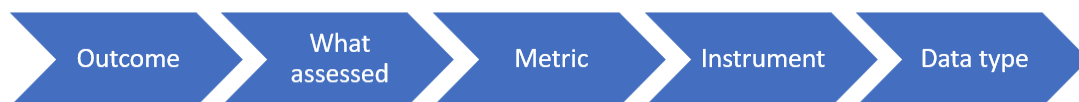
The process generally runs like this:

- Decide what we want to know (outcome), and what we will do with the information when we have it.
- Decide exactly what we want to assess to show whether we are meeting that outcome or not (e.g., are we measuring a specific behavior, answer accuracy, ease of use?).
- Decide what metrics will provide the correct data (e.g., do we need a Likert scale to show measured change over time, or a binary choice question to give direction for making a change?).
- Review the existing data to see if anything we currently collect will be appropriate.
- Find any gaps in the data collected to measure that outcome and decide if the Secret Shopper assessment is an appropriate instrument to collect it.

Using the outcomes as our starting point, we have begun to compare data we currently collect against desired outcomes to find the gaps that the Secret Shopper assessment could be used to fill. Our current Secret Shopper reporting document is not the only source of data we collect on service point interactions, but, as you can see, it is able to provide multiple types of data on one issue.

Data Analysis Table 1: Using Secret Shopper for Multiple Types of Data

MEASURE OUTCOME: Improve staff-user interactions shown by	WHAT ASSESSED	METRIC	INSTRUMENT	DATA TYPE
Improvement over time	User perception of behavior	Likert scale for specific attributes	Secret Shopper	Quantitative—measure
Improvement over time	User perception of interaction	Likert scale for specific attributes	LibQUAL Lite	Quantitative—measure
Exploration of potential issues	User description of interaction	Free text	Secret Shopper	Qualitative—mine for specifics
Assess specific behavior	Were you acknowledged?	Binary yes/no	Secret Shopper	Quantitative—change action

We are in this process now, and we have already found that there are opportunities for the Secret Shopper assessment to fill in data gaps, particularly where outcomes have applicable quantitative data that reveal opportunities for improvement but not the qualitative data that would describe what could be improved. There are also opportunities in which qualitative data have shown specific items that could be improved and

a simple yes/no question about that item could measure whether or not there has been improvement. Here is an example of how to apply this to a different outcome.

Data Analysis Table 2: Using Secret Shopper to Provide Mixed-Method Results

OUTCOME: Improve user satisfaction with cleanliness shown by	WHAT ASSESSED	METRIC	INSTRUMENT	DATA TYPE
Satisfaction with cleanliness (over time)	User perception of general cleanliness	Likert scale for user satisfaction	Survey	Quantitative—measure
Satisfaction with cleanliness (over time)	User perception of restroom cleanliness	Likert scale for user satisfaction	Survey	Quantitative—measure
ADDED: Exploration of potential issues	User description of cleanliness	Free text	Survey AND Secret Shopper	Qualitative—mine for specifics
ADDED: Specific issue (derived from exploration)	Is there soap in the dispensers?	Binary yes/no	Secret Shopper	Qualitative—change action

Using multiple data types, we gain useful and actionable information to provide insights towards improvement. Because the date and time are included in the Secret Shopper assessment, we can see if there are trends specific to particular times or days of the week. We can also gather data on a specific desired attribute (in this case, full soap dispensers). This allows us to find problems, measure the solution, and potentially improve scores on the existing quantitative assessment. Essentially, it helps improve the user's experience. Over time, we expect to repeat this process with other outcomes.

Modify Scenarios/Reporting Document
The two major changes to the Secret Shopper assessment will be to modify the scenarios and the reporting document. The number of scenarios will expand to include non-service-point interactions with technology and spaces. These scenarios will need to be slightly different, as they may have to provide the shopper with more or less guidance in order to make the experience more realistic. The reporting document will also need to be changed to ensure data gaps are filled and bring back more information. This and the expansion to measuring non-human interactions with the library means that we may need to create different reporting documents for different types of scenarios.

We expect to pilot minor changes to existing scenarios and/or the reporting document in the spring 2019 Secret Shopper assessment. The larger scale changes we are looking to complete—translating multiple gaps in the data into changes in the scenarios and reporting document(s) and systematically tracking those changes—are part of a lengthier process that we expect to start this spring.

Next Steps
Since our scope enlarged dramatically, we are behind on our timeline. Our next step is to continue the process of data analysis. But prior to complete overhaul, we can start making changes to the Secret Shopper assessment immediately. We will choose one or two outcomes to pilot, create the scenario(s), and modify the reporting document to collect the necessary data. Once we have completed this step, we will work with business faculty to simultaneously run the Secret Shopper assessment using their students and our student workers. We will then assess their student responses against those from our student worker shoppers to see

if better data are collected. Once the results are satisfactory, we will replace our current Secret Shopper assessment with the piloted replacement, continue working with faculty to provide students for shopping, and expand the entire assessment further as our data analysis continues.

As we move through this process, we realize that the changes that could come from scaling up could be extremely beneficial to us. We expect that scaling up means that we will be able to do more of the higher-level work, more decision-making, and more analysis, which is less time-sensitive and more easily scheduled at less busy times of the semester. Additionally, it means that we will be able to systematize our work, including getting input from staff and reporting back to them; creating a system for tracking what is being explored and measured; updating scenarios and reporting documents; and leveraging partnerships with faculty to centralize training and remove the burden of shopper follow-up.

Where Alkek Library seems to be unique is that we repeat the Secret Shopper assessment every semester. We have maintained this schedule for several years, and we see this consistency as a strength, as we have gained experience and learned lessons over the years. It has helped us track performance over time and will help us track the effectiveness of improvement initiatives. This consistency will also help us evaluate the processes outlined in this paper.

Lessons Learned

Once our preliminary research showed that we could not get rid of the Secret Shopper assessment, we thought it would be a simple project—about a semester—to choose a few outcomes and update the reporting document to bring back data on those items. We will pilot changes doing just this, but in order to keep from duplicating data collection efforts, we decided it was important to begin with the data and outcomes scans and complete a comprehensive analysis of both. This larger scope, along with staffing shortages and the fact that we do not have a single person in charge of all library assessment, has dramatically lengthened our timeline. In short, fully exploiting the Secret Shopper assessment is more work than we had planned.

But as we have moved through this process, we have also found it to be an opportunity far beyond our initial plans. We are hoping that this expansion of our scope means that, when we are done, the Secret Shopper assessment will have become:

- An opportunity to partner with faculty and provide students with a real-world experience;
- A means by which to investigate multiple aspects of the user experience;
- A more powerful tool when used in conjunction with other data collection methods;
- Part of a larger outcomes-based data collection strategy that limits the duplication of effort and the number of assessments we run, and;
- A force for change while at the same time being simpler for us to manage.

Conclusion

Our current Secret Shopper assessment is charged with both measurement of and continuous improvement of service transactions—something we will continue to do—but we are excited to take this opportunity to expand the assessment to measure multiple aspects of the user experience. Doing so with a clear vision of how that data will work with other data currently collected should make the assessment a far more powerful tool, using mixed-method research to provide actionable information that both measures and provides insights as to how we might improve. Based on our experience, research, and our outcomes-based data analysis, over time we will be piloting multiple changes to our Secret Shopper program in order to fully exploit the assessment, and ultimately, to improve the user's experience of the library.

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Appendix: Secret Shopper Reporting Document
Start of Block: Default Question Block
Thanks for your willingness to be a secret shopper. Your feedback will help us provide better service to Alkek Library patrons.

1. What is your name? This will help us make sure that you are credited for your service. Names will be removed before results are reviewed.

_____

2. Which scenario are you evaluating?

3. When did you ask this question? (Please include date and time.)

_____

_____

_____

_____

_____

4. How busy was it? What else was happening at the same time? (Please type NA for telephone or chat questions.)

_____

_____

_____

_____

_____

5. What was the person doing before you approached them? (Please type NA for telephone or chat questions.)

_____

_____

_____

_____

_____

6. Were you greeted when you approached the service point or asked for help?

◯ Yes (1)

◯ No (2)

7. Please respond on each line. The person who helped me...

	Strongly disagree (1)	Disagree (2)	Agree (3)	Strongly agree (4)
was knowledgeable (1)	◯	◯	◯	◯
was competent (2)	◯	◯	◯	◯
was courteous (3)	◯	◯	◯	◯
was friendly (4)	◯	◯	◯	◯
was positive (5)	◯	◯	◯	◯
was attentive (6)	◯	◯	◯	◯
was patient (7)	◯	◯	◯	◯
was professional (8)	◯	◯	◯	◯
made me feel welcome (9)	◯	◯	◯	◯

Do you have any comments about how the person interacted with you? (optional)

_____

_____

_____

_____

_____

8. Please respond on each line. The person who helped me...

	Strongly disagree (1)	Disagree (2)	Agree (3)	Strongly agree (4)
took an appropriate amount of time. (1)	○	○	○	○
asked follow-up questions. (2)	○	○	○	○
provided a thorough answer. (3)	○	○	○	○

Do you have any comments about how the person answered your question? (optional)

_____

_____

_____

_____

_____

9. Did the person refer your question?

    ○ Yes (1)

    ○ No (2)

    ○ Not applicable (3)

If you answered "Yes," where did the person refer you?

_____

10. Please describe the interaction that you had with the person that assisted you (almost a play-by-play). Include any information that you think might be helpful to us.

_____

_____

_____

_____

11. What would you have liked the person to do that they didn't do?

_____

_____

_____

_____

12. Is there anything else that you want to share about your experience?

_____

_____

_____

Thank you so much for your help!

Notes

Tell Me What You Want, What You Really, Really Want: Understanding User Perspectives with Comparative Analysis

Zoe Chao
Penn State University, USA

Introduction
Comparative Analysis

Comparative analysis, or, as the industry calls it, "competitive analysis," has always been a common practice in evaluating usability. By comparing features with competitors, we can determine the product's strengths and weaknesses. In his usability engineering model, Nielsen stated that existing products are often the best prototypes at the predesign stage because they are already fully developed.[1] So even before building the product, valuable information about what features support user needs and meet user expectations can be collected.[2] Useful features can be incorporated into the new product and potential usability problems can be avoided.[3]

Libraries have done comparative analyses with products and systems, particularly on online catalogues and discovery tools. Asher, Duke, and Wilson compared the search results of EBSCO Discovery Services (EDS), Summon by Serial Solutions, Google Scholar, and conventional library resources.[4] In the study, participants were asked to select resources needed for fictitious assignments using two of these platforms. Their selections were then scored by librarians in terms of scope, relevancy, reliability, etc. Majors also conducted comparative usability testing of vendor-provided discovery interfaces (Encore Synergy, EDS, Primo Central, Summon, and WorldCat Local).[5] Similarly, he used task-based testing to assess user experience. However, each participant tested only one interface to prevent "learning" from previous experience. The systems were compared regarding the issues encountered during the tests. Both studies focused on comparing products' usefulness and usability.

Usability and User Experience

Usability of a product has been the focus in UX studies for more than three decades.[6] The usability testing method that has participants think aloud as they complete tasks has been widely adopted since 1990s.[7] The objective measurements of task success and task completion time from usability testing are often the metrics used in comparative analysis.[8]

In the 2000s, the new term "user experience" (UX) began to appear in the research and became an encompassing phrase for all experiences users have when interacting with an interactive product.[9] Researchers came to realize that solely focusing on usability has its limitations. Hassenzahl and Tractinsky in *User experience—a research agenda* point out that goal-oriented usability testing evaluates only the product's pragmatic, instrumental value. The hedonic, affective value of UX is equally essential for a product.[10] The ever-evolving technology and competitive digital market have proved that, more than usefulness and usability, desirability is what makes a product, well, desirable. Users' cognition matters, as does a user's affect and sensation.[11]

As user experience (UX) gains traction in libraries, the focus of our research has shifted from simple usability to a broader understanding of user perspectives. A library's online presence is no longer only about usability and findability, but about connecting to users and understanding their needs. Contrasted with the straightforward approach of measuring task performance in usability testing, how do we evaluate other dimensions of user experience of a system? In this paper, I will discuss how to use comparative analysis to understand the user's context and preferences for the library's online environment.

Study Overview

From fall 2016 to spring 2018, 186 small-scale UX tests were conducted at the Penn State University's main library entrance. Participants spent five to ten minutes completing one or two tasks in exchange for a cup of coffee and a snack. In this setting, called the UX Café, different UX methods were used in addition to usability testing. The pre-fab, low-cost format of the UX Café allows the libraries to conduct lightweight and focused UX studies regularly without the overhead of recruitment and scheduling in the traditional usability studies process. All the comparative analysis testing was conducted at the UX Café.

Before diving into which "competitor products" to measure against, a scope of the study was first determined and one usability task was designed based on the defined scope. The point of one single definite task was to make sure that participants were not overwhelmed by testing with multiple websites during the short timeframe of the UX Café. The tasks were user-centered and scenario-based: for example, "Imagine you and your friends would like to reserve a group study room in the library at 2 PM this Wednesday. How would you make the room reservation using the library website?" In addition to the Penn State University Libraries (PSUL) website, the participants would also be asked to perform the same task on the websites of three peer institutions. They were then given a short interview to share their opinions based on their experiences.

The advantage of such a study is that the participants become more aware of possible alternative designs after seeing and experiencing other interfaces, which expands their vocabulary in describing their perspectives and preferences. Therefore, it is important to provide a variety of options from other well-developed websites with different functions and layouts to draw out users' perspectives of a good design. The usability testing results were measured in task success and task completion time. The rankings of test sites and the in-person interviews provide self-reported data from the participants. In addition to comparing with peer institutions, the testing format was also used to compare between the existing design and mockups within PSUL.

This comparative method was used to gauge users' perceptions of the top navigation menus, frequently used pages, and search result pages for the Discovery tool of the PSUL website. It was evident that a small design decision can trigger users' different reactions towards the interface. Though the scope of each study is discrete due to the time constraints of the UX Café, we have learned much about users' perspectives, which help guide future interface design decisions for the library's website. In the following sections, I will first describe the processes and results of three case studies and then discuss collectively how these comparative analyses help us gain insight on user experiences beyond usability.

Case Study 1: Top Navigation Menu
Context and Method

In January 2015, PSUL started its site migration which was overseen by the Web Implementation Management Team (WIMT). Stakeholders debated whether to use drop-down menus or landing pages for the presentation of the top navigation. Due to time constraints, it was decided to move forward with landing pages and to conduct user studies afterwards. (In hindsight, such debates could be easily resolved by similar comparative analysis with peer institutions' navigation menus at the predesign stage.)

After migration was completed, a comparative analysis was conducted to gauge users' preference on the design of top navigation menus. The goal of the study was to investigate whether users prefer drop-down menus or landing pages. Also, should we include descriptions for the menu items? (See Figure 1 for an example from Northwestern University Libraries.) Three peer institutions—Northeastern University (NEU), Northwestern University (NWU), and North Carolina State University (NSCU)—were selected to compare based on their menu designs and functions (see Table 1).

Figure 1. Top navigation menu of Northwestern University Libraries. The descriptions of the priority menu items append after the link.
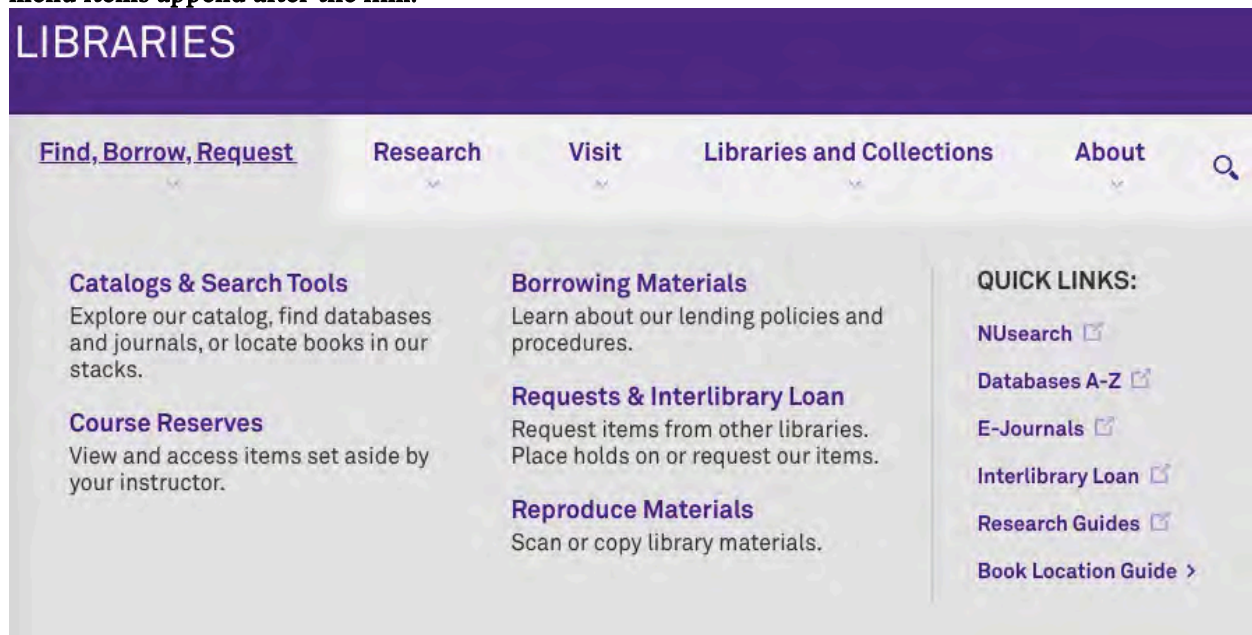
Table 1. Components of top navigation menu of selected libraries.

	Function	Design & Content
NEU	Click to dropdown menu	Small, bolded links with descriptions
NWU	Hover to dropdown menu	5–6 prominent links with descriptions, plus a list of quick links on the side
NCSU	Hover to dropdown menu, with a 1-second delay	Regular links, without descriptions
PSU	Click to landing page	Big, bolded links, with descriptions

Participants were asked to find the Interlibrary Loan (ILL) information of these three libraries' home pages using the top menu. They then were asked to complete the same task on Penn State Libraries' home page and to talk about their preferred design. They were told they could give up the task and move on to the next site if they thought they could not find the ILL page.

Results

Seventeen students participated in the study. Sixteen participants preferred hover to drop-down and one preferred the landing page. One student shared his insight that drop-down menus work better than a landing page when the Internet is slow. Most students (11 out of 17) did not read the description under the links. They admitted that they only scanned the anchor text and ignored the non-link text. Half of the participants (9 out of 17) were observed navigating back and forth between menus as they were uncertain which menu (e.g., Services, Research, or About) the interlibrary loan would fall into.

Not all students successfully found the ILL pages. Due to the task asking for "interlibrary loan" information, participants scanned for the term specifically. NWU has the term "interlibrary loan" in the menu as a link; NEU has it in the description; NCSU does not include the term in the menu. In the end, fifteen students

found the interlibrary loan pages of NWU, eight for NEU, and one for NCSU. The majority (13 out of 17) preferred NWU's menu because they were able to scan the links easily for the term and complete the task successfully. Though many (11 out of 17) did not read the descriptions, they considered others would find the descriptions helpful and stated that they did not mind having the extra text in place.

Case Study 2: Discovery Interface
Context and Method
A discovery tool, such as Serial Solution's Summon or EBSCO Discovery Services (EDS), offers users one search box and a unified interface for search results. Though most students prefer this Google-like one-stop search premise, many do not understand the search scope and expect to find libraries' local web pages in the result. To mitigate such confusion, NCSU Libraries first introduced the "bento-box layout" that presents multiple groupings to help students differentiate various libraries' collections and services.[12]

As more and more libraries adopted the bento-box approach, we wanted to know: are Penn State students satisfied with the results our discovery service, Summon, provides? Would they consider the bento-box layout helpful? What else can we learn from discovery services at other libraries? A comparative analysis was conducted to investigate users' perspectives and preferences for the front-end design of discovery services.

In order to provide a variety of looks and feels, I chose three peer institutions based on the interface of their discovery services to compare:

- Bento-box interface: Cornell University (https://www.library.cornell.edu)
- Primo interface: University of Oregon (http://library.uoregon.edu/)
- Customized interface for a cohesive look and feel with the library website: Brigham Young University (https://lib.byu.edu/)

Participants were asked to think of an upcoming assignment and come up with a query to search library resources for the assignment. They would conduct the search on PSUL's homepage (i.e., Summon), plus the three discovery services mentioned above.

Results
Five students participated in the study (one freshman, two juniors, and two graduate students). Overall, they all found useful articles or books for their assignments from the library websites; thus, there was no clear winner regarding relevancy. However, four out of five preferred the bento-box's clear grouping of content type (e.g., books, journal articles) over a long list of search results with facets on the side. Content type was an important factor in their evaluation of result pages, as two students were looking for articles and two for books. Students found it very helpful that the bento-box layout pointed them directly to the desired content type. The reason that one student did not favor bento-box design was because she saw only one book listed in the "Books" group of Cornell's bento-box, compared to others' listings of thousands. In addition to the bento-box design, students expressed preferences for book cover thumbnails and prominent essential item information (i.e., availability, call number, and item location).

Case Study 3: Bento-Box Design
Context and Method
After my recommendation for implementing a bento-box interface, a discovery project team was formed to carry out the implementation. To further refine what design qualities students would find appealing about the interface, I followed up with a second comparative analysis focusing only on bento-box layouts. The discovery layer of three institutions—Cornell, Duke, and Princeton—were chosen to compare with the one of Penn State. Similar to the previous studies, participants were asked to perform tasks and evaluate the search result pages. Participants also ranked the bento-box interfaces in these three categories: labeling (the grouping and naming), layout (the design), and result (the relevancy and usefulness). In addition to the testing at UX Café, we created a paper-based survey (see Figure 2) and sent it to campus libraries with the goal of the study and instructions for how to administer the study.

Figure 2. The paper survey for bento-box interface. The survey took the Olympics theme because it took place not long after the 2018 Winter Olympics.

Results

A total of 59 participants completed the study, including six testing at the UX Café. Not all participants commented on the reasons behind each ranking. In addition, feedback like "easy to use" or "user-friendly" does not provide concrete reasons as to what makes it easy or friendly. Users' judgement on the interface and content is subjective; nevertheless, their preferred qualities emerged after comments were analyzed. Cornell's bento-box outperformed the rest in all three categories. The feedback shows that most participants favor Cornell for its clean and organized look for layout, refined and unambiguous grouping (for example, books and videos are in separate groups, not grouped together as one "Books and Media") for labeling, and the comprehensiveness and the left format filter for results.

Discussion
Show the Possibilities

In usability testing, the product is measured by participants' task performance. Participants' opinions outside of usability are often not investigated. Vaughn and Callicote gave participants a take-home evaluation with open questions about their opinions of the library website. The responses turned out to be generally positive but "vague and evasive."[13] The responses from my non-comparative usability testing paint a similar picture. "Straightforward" and "easy to use" are two common descriptors in the responses which are very abstract and not that helpful. There are many reasons why students are shy on giving specific suggestions. It could be that they are afraid that they might sound stupid because they are not familiar with library resources, or they feel they should not say anything negative because it might hurt librarians' feelings, or they have not even thought about how the website could be made better.

The individual experience of existing products will influence and constrain his/her expectations about the possibilities.[14] When doing usability testing on only one site, a user's focus is limited to the specific context and they may not think beyond that. In the case study of our top navigation menu, without looking at other libraries' navigation menus, participants are likely to concentrate only on the usability task and not think about other possibilities, such as dropdown menus. Also, considering they have likely never seen a bento-box layout, the chance of telling you that the bento-box is their preferred interface is almost zero.

Learn the Positives

By comparing the different designs and functions with other libraries, participants get a better sense on what a library website can offer. They become more articulate based on the examples in front of them. In helping improve our library website, they are open about what features they like and what we should adopt (for example, the book cover thumbnail). They are also candid about the less preferable features on other websites. The tone of the feedback changes from uncertainty to sharing personal preferences. The nature of the study shifts from merely preventing usability problems to creating positive experiences for users.

It is interesting to find out users do not mind having a feature they do not need on the interface as long as the feature does not hinder them in achieving their goals. For example, for the top navigation menu, many participants do not mind having description text next to the links even though they paid no attention to it. In the end, participants preferred Northwestern's top navigation menu because they were able to scan the links easily even with the descriptive text. They did not favor NCSU's menus, though the menus are clean and without extra text. The human brain is malleable. We have unconsciously learned to selectively take in information around us. The design of an interface is more than just minimizing the content to decrease the cognition load. It is also about how we facilitate the interaction between humans and computers. In this case, Northwestern uses strong design and labels to direct users' attention. As Hassenzahl, Law, and Hvannberg put it, "absence of the negative" does not necessarily equate with "positive."[15]

Many positive comments for Cornell's bento-box design in terms of labels and results are generated by the granularity in grouping and the format filter. Not every library can invest the backend development work to support complex functions as such on the front end. However, the design attributes that users desire for a clean and organized interface—uncluttered, nicely spaced, and clearly aligned—are something we can and should work on. We can learn and adopt these positives—in this case, good design elements—from our peer institutions through comparative analysis.

Take in Individual Context

UX is complex. The pragmatic value and the affective value are often intertwined. A participant's reception of a product can be greatly influenced by a one-time execution of the product. For example, in case study 2, the only participant who did not favor the bento-box layout for discovery layer did so because only one book was found with her query, in contrast to thousands of book results found on other platforms. A similar situation also happened in case study 3, bento-box design. One participant strongly favored a less popular interface because her needed database was displayed prominently in the result compared to the results from other discovery layers. In both cases, their liking or disliking of an interface hinged on their context (i.e., the query they used) and, consequently, the product performance (i.e., the search results). As a result, it impacts the credibility of the service we provide and the loyalty from our patrons. They may have completely different opinions if they use different queries. It is very subjective. But this is the kind of nuance that may not be observed in a simple usability testing.

Conclusion

In *User Experience—towards a unified view*, Hassenzahl, Law, and Hvannberg presented three distinctions between UX study and usability study: ***holistic***, ***subjective***, and ***positive***.[16] As a ***holistic*** practice, UX looks for the interrelation between pragmatic aspects and hedonic aspects, taking the experience as a whole. UX is ***subjective*** because it takes into account that testing is an individual experience heavily depending on the context, and in many ways, user preference is as important as usability and other pragmatic measures.

Moreover, UX is ***positive*** in looking beyond the focus of the usability problems and their removal and exploring the positive aspect of the interaction.

Nowadays, users are learning and adopting new technologies at an unprecedented speed. Their expectations for the web environment continue to evolve. Creating positive online user experiences should be a critical part of the library's ongoing endeavor. Comparative analysis can help us recognize the complex perspectives of our users and be our first steps in moving beyond usability and to the realm of UX.

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Comparing Apples to Oranges? Doing UX Work across Time and Space

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Introduction

Usability testing is, famously, an iterative process. You test something, you make changes based upon the results, you test again. The recent website redesign process for the University of Miami Libraries began with an extensive "Discovery and Content Analysis" phase, which was the foundation for over a year's worth of testing across the subsequent stages of the project. Each set of tests was designed to assess and/or improve the performance of specific features of the site and made use of a diverse set of methodologies and tools. While there was no static set of questions or tasks that appeared in all tests, those which performed well were removed from subsequent testing, while those which performed poorly continued on.

After almost 18 months of work, we had tested 75 questions or tasks, using seven different methodologies. We had written up 24 discovery reports and generated over 1,200 box files, which included meeting minutes, notes, raw data, pictures, Excel files, and more. We also had data in Google Forms, in an Optimal Workshop account, email discussions, printed mockups, and presentations to stakeholders. A data management strategy became necessary.

In this paper, we will outline our planning and discovery process, explore some sample activities to highlight the tools and techniques (and the heterogeneous data sources), and discuss how we tried to get a handle on all this data for future UX work.

Planning and Discovery

There is a temptation to do a website redesign just because you have not done one in a while; your head tells you that the purpose of the website is to provide useful information as seamlessly as possible, but your heart and your eyes start to wander. With these warring considerations in mind, we wrote up a redesign proposal for the University of Miami Libraries' Administrative Leadership Team and laid out a number of answers to the question, "Why now?" Some were technical (a desire for a more agile and modern underlying architecture), some were practical (with a number of new applications coming online, we would need to be doing interface work anyway), and some were aesthetic ("modernize and prettify").[1] A further overall reason was the fact that we were a substantially different organization from when the last site was launched: we had a new dean, a new Digital Strategies unit, a new Communications Team, an (under construction) Learning Commons, a new home for our special collections, and more in the works.

The proposal also laid out the team, timeline, and phases. The team was actually three teams, a newly established Website Redesign Advisory Team, the already-in-place User Experience (UX) Team, and the Web and Application Development department. The timeline was...ambitious. And the project was broken into four phases: Discovery and Content Analysis; Plan and Design; Build Out; and Post-Launch Assessment.[2]

Discovery Activities

The Discovery and Content Analysis phase focused on the current website and existing information sources as a foundation for the work moving forward. A series of activities were performed and then written up in reports with recommendations and notes on the process. These reports were then summarized in a master discovery report, which was shared with the Libraries' Administrative Leadership Team, and meant to serve as a reference document for the work moving forward.[3]

Figure 1: Discovery Activities

Audits	Research Topics	Analytics	Other Data Sources	Focus Groups, Surveys, Tests
* Accessibility * Information architecture * Interface * Peer website review * WordPress audit * Page speed * Server analytics	* HTTPS only * Advanced caching	* Google Analytics * Heat mapping	* Faculty interviews * University web guidelines * University Roadmap * Website comments	* Staff survey * Departmental focus groups * Card sorting * One-on-one tests with students

These discovery activities can be grouped into five rough categories: Audits; Research Topics; Analytics; Other Data Sources; and Focus Groups, Surveys and Tests. The individual reports are available online, but it might be instructive to single out some reports for the purposes of this paper.[4] **Audits**, as you might expect, were measuring the current site by some metric: the ***Accessibility Audit***, for example, evaluated the site according to WCAG 2.0 AA web accessibility standards. This report found that the site met most web accessibility criteria, but also found a couple of points that needed remediation (mostly related to the search forms and keyboard accessibility).[5] This sort of audit provides a clear assessment rubric, which can be rerun after the site is complete. The same might be said of the ***Page Speed Analysis***, which used two different online tools to measure how quickly our pages rendered in both mobile and desktop environments. In this case, we compared our results to those of our self-identified peer institutions; these peer institutions provided a convenient random-but-not-random set of comparables.[6] Some of the other audits were more informational and had less assessment potential. The ***Interface Audit***, for example, revealed that we had a lot of mismatched buttons and forms and colours that had built up over time.

Research Topics were areas we knew we needed to investigate for the new site; for example, moving to an HTTPS-only site, which was a separate sub-project that ended up being completed before launching the new site. **Analytics** were data sources that did not require specific research or testing, just gathering results provided by a third party tool. Google Analytics had been running over the years, and so we reviewed the previous fiscal year's results (and sometimes longer timeframes) and made a series of recommendations based on what we saw. Heat mapping, using the Crazy Egg software, was another tool we used for a bird's eye view of how users interacted with the site.

Other Data Sources included information that others had compiled; we reviewed campus documents from the web communications team as well as the overall university's "vision" document, the Roadmap for the Future; a series of faculty interviews that had been done by members of our Learning and Research Services unit; and then the online comments which users had submitted via a module of the SubjectsPlus software (http://www.subjectsplus.com).

Finally, we had more standard UX activities (**Focus Groups, Surveys, Tests**), which might be divided into those done with internal and external users. We began with internal users, and the purpose of these activities was twofold: to get some data on what our internal users wanted with the new site, but also more importantly to get them involved in the process. MailChimp (https://mailchimp.com/) was used to send out

an email directing users to the survey itself (Google Forms), and later used to send two reminder messages to the libraries' Listserv. Out of approximately 120 recipients, we had 58 responses. We also did focus groups with individual departments, which took a lot of time, but again was a good way of getting internal buy-in as well as generating ideas. We were also able to get perspectives from staff members outside of the public service departments.

The primary focus of the redesign of an external-facing website, however, should be with the end users. In the case of a large academic library, the primary (but not sole) user groups are students (undergraduate and graduate), faculty, staff, and alumni. The largest and easiest group to work with is students, and so, as part of the discovery phase, we did two types of testing with students: card sorting and task-based one-on-one user tests. The former test focused on the existing information architecture, specifically the menu system, while the latter tested a broad range of common website activities.

UX Methodologies

There are a large and growing number of methodologies or techniques commonly used in user experience research, which range from the simple (an online first click test or a one-question survey) to the complex (an ethnographic field study).[7] Like many libraries, we do our UX work under resource constraints (both time and money), and this narrows the field of possible tests you might run: tests need to be cheap, and they need to minimize the amount of staff resources used to complete them. Having said this, even a relatively modest test takes up a fair amount of time, when you factor in planning, deployment, and analysis.

Our goal was to continue UX work at every stage of the overall process, so we used what we had learned in the Planning and Discovery phase to seed the testing of the next stages of the project. Working with this base set of questions or tasks, we selected a UX methodology that matched what we were working on in that phase of the project. For example, as we worked on the menu navigation in the early stages of Plan and Design, card sorts were a natural fit. We knew areas from our menus that were problematic, and we tried out alternate ideas. These results were used to generate questions for subsequent tests, which might use a different methodology. For instance, we did "first click" tests on home page prototypes, where we might include a question that tested the navigation, but other questions that tested the search box, the library hours, and other elements of the screen. These tests in turn would generate ideas for what we would test at the next stage of the design.

Getting a handle on everything we had tested and wanted to test becomes complex over time, so we adopted two different strategies to better communicate, manage, and assess our usability work for the overall project.

1. **Storytelling or Scenario Tracking**, where we retrospectively track different tasks over time and across tools. This is more of a communication method, internally and with our stakeholders.

2. **Data Management** approach, which involved archiving and collecting all data and insights to build our UX "database" with a visualization component. This gave us a high-level overview of the entire project and the ability to assess the website redesign project as a whole.

Storytelling or Scenario Tracking

As promised, we want to track how different user needs were tested and addressed across the testing and deployment period. We will step through two user needs (or tasks), taking a look at the tools along the way.

Library Hours

The importance of library hours came up regularly in our user research. Google Analytics is one of the easiest and most obvious places to start, and if you already use the service, the data is essentially in hand. During our discovery phase, we looked at results from the 2016 fiscal year, and saw that the hours page for the main library was the third most popular page on the current site, after the overall home page and the Music Library's home page. When we compared the 2016 results with those of the previous fiscal year, we noticed

that, while the hits for many of the pages had gone down (uh oh), the raw numbers for the library hours page were virtually identical, and thus, in a sense, had gone up (as a percentage of hits).

So, nothing to do? Except, if you look at the source of the hits to the hours page, a whopping 74% of its hits are direct from Google. On the one hand, this is still good: people are finding our hours, even if they are not using our site to do so. On the other hand, this does not help us with the hours placement in our mockups. Beyond the analytics, we repeatedly heard and saw that the hours were important to our users.

During the design phase of our process, we ran "mini design sprints" with groups of users. A "design sprint" is a process that generally takes a week, where a group of designers and non-designers gets together to find a solution to a design problem.[8] On day one, they outline the problem; they make sketches on day two; they review the sketches and vote on a possible solution on day three; the designers create a low-fidelity mockup on day four; and, on day five, the prototype is tested with users and feedback is collected. We modified this process to create "mini design sprints." We had two variants. In one set of tests, we met with groups of internal users—for example, representatives of all the branch libraries together. We brought everyone into a room with a large table and a projector, and handed out pieces of paper with either an empty mobile or desktop template on it.

Figure 2. Sample Mobile Wireframes from SneakPeekIt.com
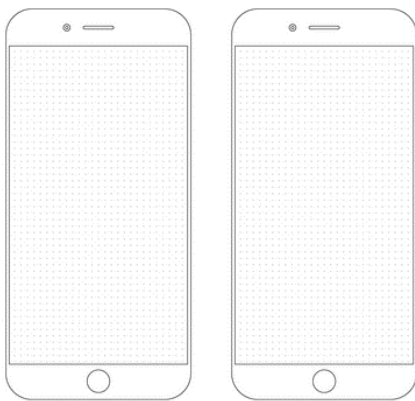
We asked users to complete two tasks, one which required a desktop sketch and another which required a mobile sketch. For example: "Design your branch home page in mobile—show the most important content/functions for you or your patrons in the visible area of the screen. You can test out more than one idea." The users were given seven minutes to draw (after some experimentation, this seemed like a good amount of time), and then we took a picture of their drawing(s), uploaded them to Box (online file sharing software), and brought them up on the screen. Each user then walked us through their design. Next, we brought up on the screen a series of recommendations (with the UX test provenance) and asked if this recommendation would make them modify their design. For example: "Highlight subject guides and liaisons (subject specialists) on the main page of the website (***Faculty Interviews, Staff Survey***)." We found that framing the conversation in terms of our UX research was a good way to focus the discussion on areas we were interested in exploring (while also reminding stakeholders of the other work going on). Posting the sketches on Box also made it possible for people to teleconference in to the exercise.

These mini design sprints took about an hour and worked well, but the logistics of doing the same with faculty and students were daunting, so we tried something different. For faculty, we met with them individually in their offices and did not ask the follow-up questions based on previous UX work. For students, we set up a guerilla usability testing table just inside the entrance to the library and attracted participants with free coffee. The 17 undergraduate participants completed the sprint separately at one of

two stations at our table and were given the same prompt: "Design the Libraries" home page in mobile—show the most important areas for YOU in the visible area of the screen."

Twelve of our 17 sketchers included library hours on the home page, making it one of the most consistent elements. Other consistent elements included **search** (15 of 17, and one of the two without a search box had a note "when look up a book include floor"), **room reservations** (8 of 17), and **log in/my account** (7/17). Sketches ranged from just a few bullet points jotted in the space to ones that created a layout.

Figure 3: Sample Student Designs
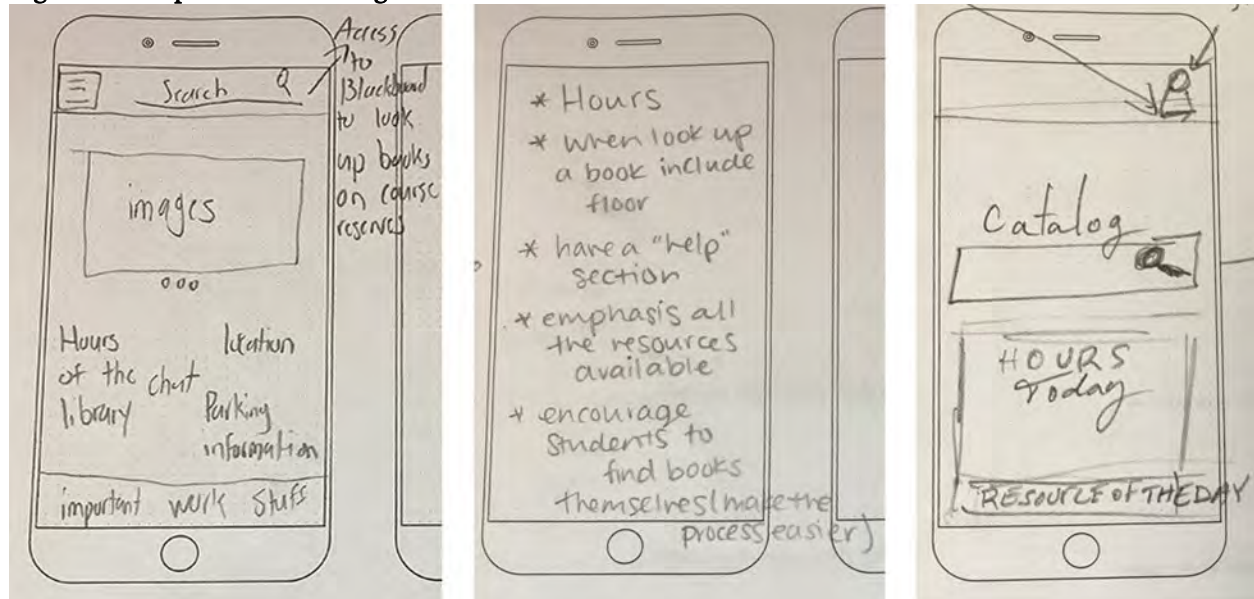
Hours are clearly popular with users, and thus figured prominently in student designs. By summer of 2017, we had three high-fidelity mockups in hand, and wanted to test which of these designs (or which elements from each design) were most successful for popular user tasks. One of these tasks was trying to find hours for a branch library.

Tool: Chalkmark
We chose to do "first click" tests using Chalkmark, an online tool from Optimal Workshop (https://www.optimalworkshop.com/) that allows you to test where on a prototype a user clicks. You upload a flat image, create your tasks, and then assign hotspots on the image that will count as correct clicks. It is possible to simply disseminate a URL for this sort of test, but we chose to set up a table in the main library again, with coffee as an inducement. In August 2017, we posed the same six tasks against the three different prototypes and cycled users through the three mockups. The facilitators did not do anything more than solicit users and pour coffee—the users completed the tasks on their own on a library-supplied laptop.

Specific to our story, we included one task about the Marine and Atmospheric Science Library's hours: "You want to visit the Marine Library, and need to know what hours it is open. Where can you find out what those hours are?" Because the three designs were different, each had slightly different zones labelled as success.

The results for this particular question were not great. The designs had success rates of 47 percent, 50 percent, and 63 percent. The most successful design had a dedicated "Library Locations and Hours" band at the bottom of the page, an element that made its way into the final design. Since we were wondering if people would actually scroll down to see the content "below the fold," we were pleased to see that users were finding this dedicated area. On the other hand, we were also testing our top-level navigation, and (unsurprisingly, with the power of hindsight) moving the links to our branches into a generic **Rooms &**

Spaces category was not a great success. Only 19 percent of our users found it in the navigation, and then it was under ***About***. Wrong answer!

As for the tool, the results display in Chalkmark is pretty great. There is a simple gauge of success—the amount of time it took to complete the task, and then which of the designated "right answer" hot spots were clicked.

Figure 4: Task Results from Chalkmark
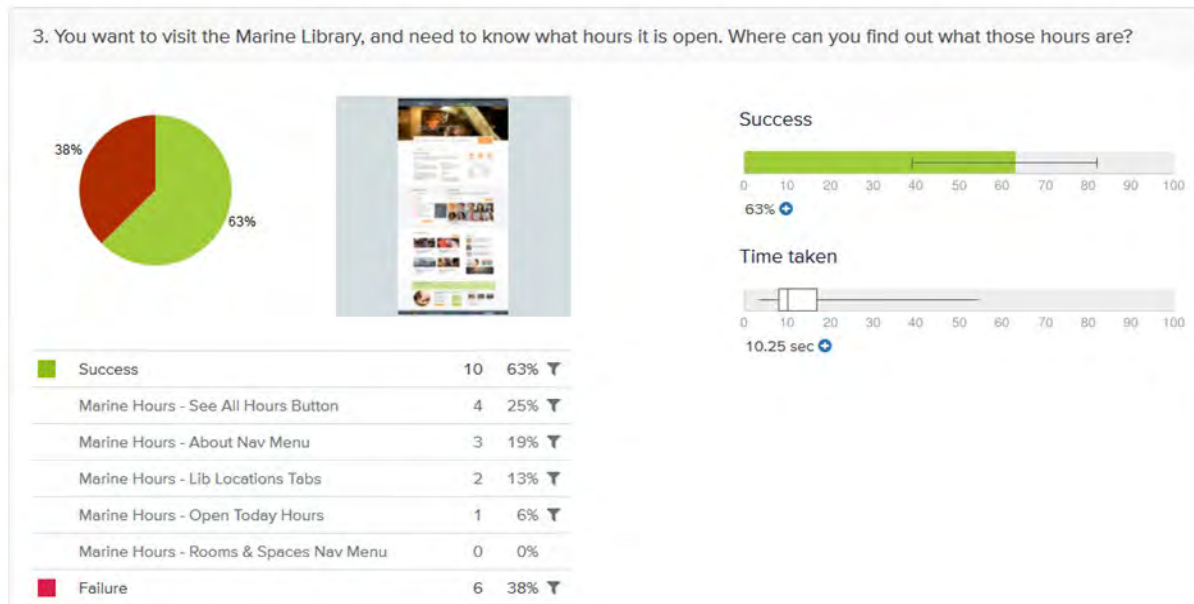
Later in the fall, we wanted to do a test of our revised information architecture. We had run some card sorting tests earlier in the year (which are off-topic for our current story) and wanted to test what we hoped was a close-to-final set of navigational categories and subcategories. This time, we turned to another tool from the Optimal Workshop suite: Treejack.

Tool: Treejack
In Treejack, you create your navigational structure in the software with the categories and nested sub-categories, and then the user is presented with clickable links that chart possible paths through the navigational tree (see Figure 5). The software tracks the paths the user takes, including any times they switch back and try over.

Figure 5: Sample Task Presented to User in Treejack

We ran the study for a week in October, with the following top-level navigational categories: **Services, Research, Rooms & Spaces, Libraries & Collections, About,** and **My Account**. Eighty-one people completed the study. For our Marine Library Hours question, we had a 98% success rate, with a 79% directness rate—that is, the percentage of users who went straight to the "correct" category of **Libraries & Collections**. One nice feature of Treejack is its "pietree" visualization.

Figure 6: Pietree Visualization (Detail)
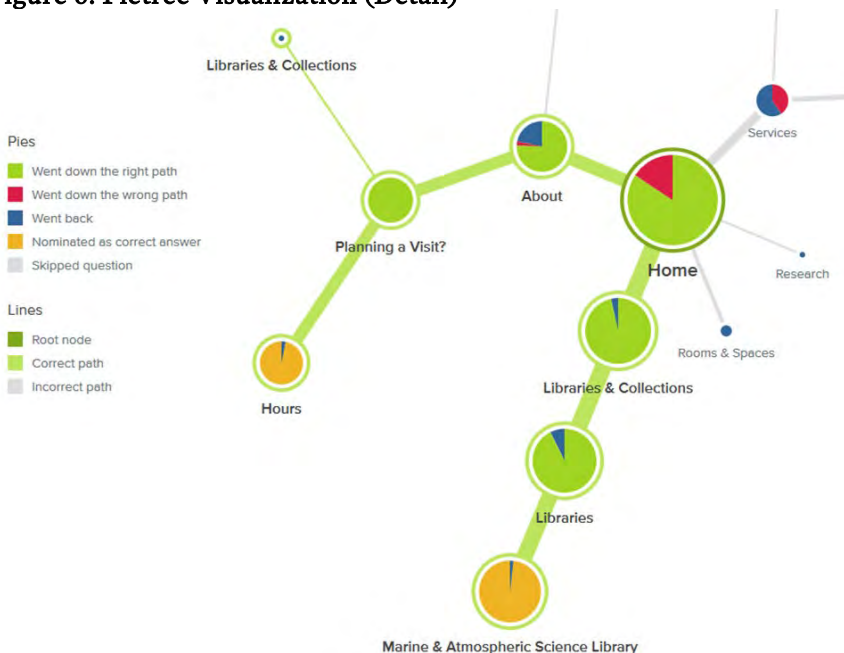
Figure 6 has the sort of visualization you would like to see: users mostly took the desired path (libraries and collections > libraries > marine), but the other path (about > planning a visit > hours) was equally desirable. At this point, we felt that we had a good handle on getting people to library hours on the main page and on a representative branch page. However, we also wanted to see how our library hours widget was working: this

was a little dropdown box that highlighted the particular library's hours, but also allowed one to access the other branch/collection hours (see figure 7).

Figure 7: Library Hours Widget
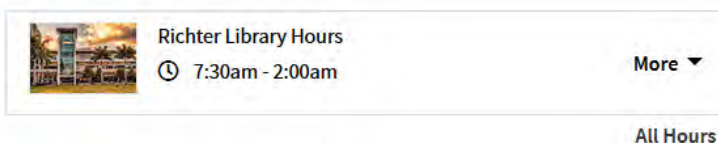
In October of 2018, we ran a one-on-one test in the main library, with a table set up just inside the front entrance doors and with a $5 Starbucks gift card as the reward. One of the questions was a variant of our earlier questions: "You want to make sure the Marine Library is open before you drive over there. Can you find out the hours for the Marine Library?" We found that users took every possible route to the correct information: some went immediately to the widget and clicked "more" to view the Marine hours (2 of 7); others (2 of 7) scrolled all the way down and found it in the footer band; one user navigated to the Marine home page and looked on the widget there (which defaulted to the Marine hours); and then two found the hours listed directly in the ***Libraries and Collections*** mega menu. One of the users even said that she usually Googled the library hours, bringing us back to some of the findings from Google Analytics.

Project Data Management Approach

The importance of archiving past usability findings in a shareable way was noted in several articles published by Jakob Nielsen.[9] Nielsen also stated that "the best usability reports are learning tools that help form a shared understanding across the team." Following these best practices, our usability reports have been systematically published in a shareable Box folder. We have also collected notes, informal reports, and raw data. However, after more than a year, we had done a lot of tests, had a lot of data, and it was sometimes challenging to keep everything straight. While it was easy to compare results from one test to another, and trends were very clear when the same metrics were used, assessing our long-term project as a whole was challenging. As we have outlined, we used different tools and software and had different purposes and metrics. It was time-consuming to review a year and a half's worth of findings, and it was impossible to connect the dots or unravel hidden patterns by just reading the reports' recommendations. We wanted to maximize the value and insight that can be gained only through a high-level overview of the entire project.

Tool: Master Question List

To this end, we used Excel to compile a master spreadsheet of our tests and activities, and then built out visualizations to explore the data. The master spreadsheet consists of the following tables and components:

1. **Test List**: Includes descriptive information about each test and its objectives.

2. **Menus and Subject Groups List**: Includes subject groups, which are types of services or resources (e.g., circulation, course reserve, policies, writing center) derived from the card sort tests. This table also includes the labels of the new and old top-level website navigation menus.

3. **Question List**: Includes all questions asked from all tests, both qualitative and quantitative; test ID and subject group names; and scores. If the results were quantitative, the scores were taken from the tool that was used for the test. Qualitative answers were scored by performance—meaning the UX team had decided in advance a scoring criteria for what was a correct answer based on the test objectives. The full qualitative test answers were stored in a separate Excel file.

4. **Card Sort**: Includes complete card sorting test data sessions and test ID.

Tool: Master Question List—Visualization Component

The visualization component was created with Excel's Power View and Data Model.[10] Power View helps to create interactive charts, graphs, and other visualizations inside an Excel workbook. The data model piece allows one to integrate data from multiple tables and to build a relational data source inside an Excel workbook. The reasoning behind choosing this tool over competitors like Microsoft Power BI was simple: it is free, easy to share, and confidential data can be protected. The Excel file was accessible to the UX team, and Power View updated automatically when additional data was added to the worksheet as we completed additional tests.

Figure 8: Master Question List and the Visualization Component
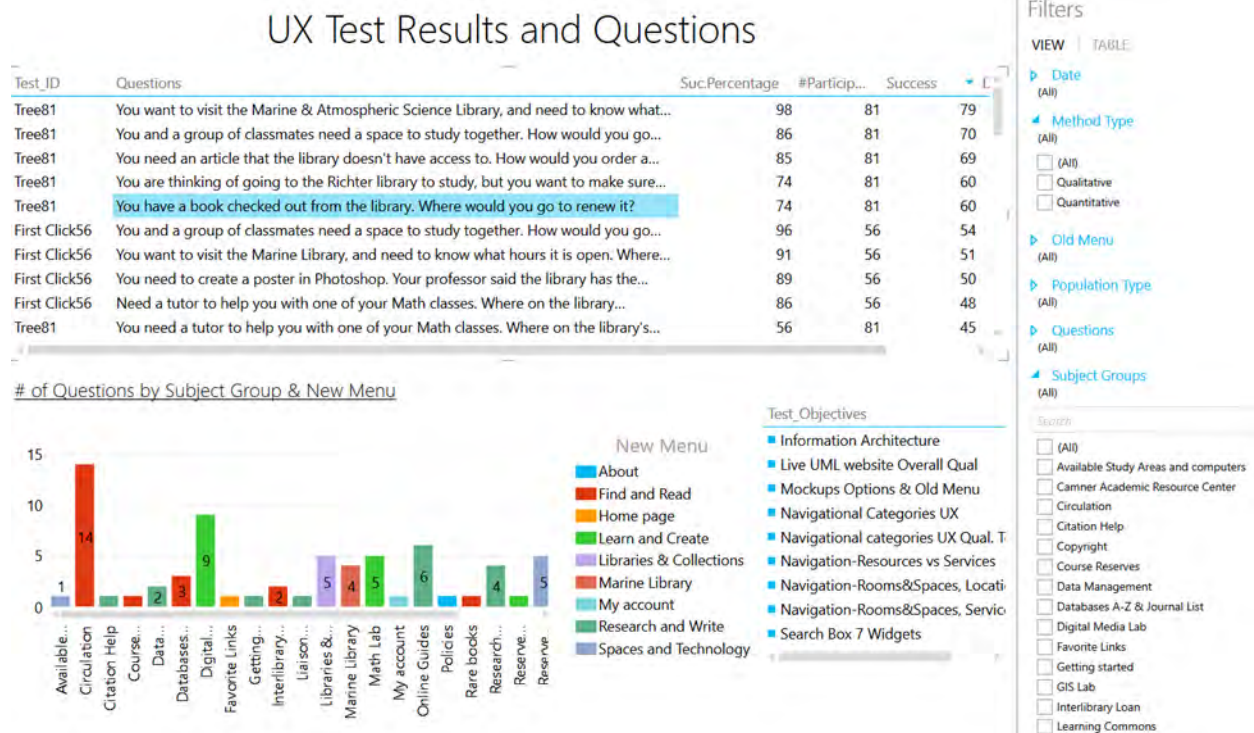
In the article "Archiving Usability Reports," Nielsen singles out the power of performing a meta-analysis on cross-project data to gain insights that transcend individual projects.[11] He also recommends aggregating scores, success rates, task times, and satisfaction rates across multiple studies, first and foremost to answer the most basic question: "Are we getting better or worse?"

In addition to getting a bird's eye view, we are able to use the Master Question List to drill down and answer more specific questions. For instance, we can use the filter option to limit to questions that had been coded as "Circulation," and which took place at any point in the project (see figure 9). We can then easily see the different questions used and if there was variant phrasing; the testing methodology used; how many participants each test had; and crucially examine the relative success rates. We can further filter and compare the questions by population type (e.g., staff, students, or faculty) and the broad type of methodology (qualitative or quantitative).

Figure 9: Master Question List and the Visualization Component Filtered by Subject Group and Method Type
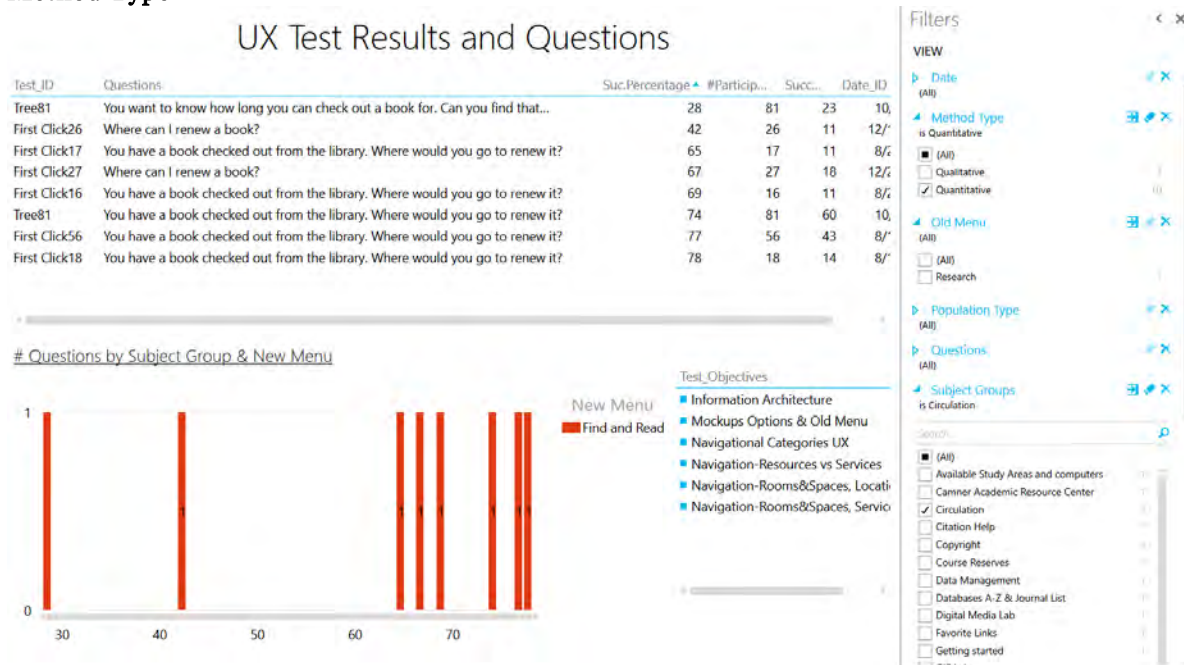
Creating the master question list spreadsheet and visualization enabled us to map the project activity and results. It should be noted that this was not a standalone decision-making tool, but more of a directional tool; it enabled us to see tests, scenarios, and questions in conjunction with one another. It helped us track success rate over time and prioritize what needs to be tested now. When we discovered interesting patterns that needed further investigation, we retrieved the relevant data and revisited our reports and documentation.

Conclusion

With hindsight, we would have done some things differently, but insofar as speed, iteration, and agility are fundamental aspects of UX work, it is hard to imagine a process where you knew everything you wanted to investigate from the outset. It was easier in the Discovery Phase to chart out a course, because you were working with a static set of information—the site as it existed at a particular time. As a result, we felt the Discovery Phase went well, but could have been less comprehensive. As is always the case with assessment, you need to think about what you are going to do with the data, not just collect data because you can.

Once we started testing out new ideas, especially prototypes, we did not have a whole course charted out—we saw problems, or now had new portions of the site in a testable state, and so we tested. We fixed what we could, or tried fixes, and tested again. The methodology changed, and the tests themselves were sometimes tests—for instance, early on we had a set of tasks that were relatively discrete, and later on started doing ones that were intended to flow as a whole imaginary research scenario. This meant the wording of tasks might make assumptions about a student (they are taking a class on Hamlet) that could impact the success rate. One thing we will definitely change moving forward is thinking more about how we score answers as right or wrong, whether it is binary or a point scale or something else, since that can really skew the results when they are looked at later.

Finally, once you have collected the data, make sure you actually use it! This is where setting up something like the master question list provides an invaluable bird's eye view of the process, so you can easily identify the pain points and where you need to do more work.

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Redesigning Harvard Library's Website with User Research at Every Step

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Introduction

In July 2018, Harvard Library launched a re-envisioned and redesigned library.harvard.edu. The site brings together two properties: the former library.harvard.edu, a Drupal-hosted website with information on the Harvard Library organization, and hcl.harvard.edu, a static website with information about libraries related to Harvard College, which is the four-year, undergraduate liberal arts program at Harvard. Our goal for the website was to build something easy to use and "endlessly helpful." The four guiding principles of the website are to:

1. put the user at the center of everything we do,

2. make information accessible, not just available,

3. know that the website will never be done, and

4. use open source solutions and practices.

This paper takes a closer look at the first guiding principle and explores the different ways in which we infused the project with user research in order to keep the project user-focused. We constantly asked for feedback, tested our assumptions, and adjusted our thinking based on what we learned. We kicked off the project with discovery research to determine our focus, conducting interviews with current and potential users. This work resulted in building four personas that we used to help keep our project conversations and decisions user-centered. When the web team had disagreements about the goals for a page or content strategy, we would put ourselves in the shoes of these personas, adopting their perspective to help guide our decision-making.

While using the personas kept our discussions and planning user-focused, they did not substitute for regular user research. We used a variety of UX (user experience) methods in our research, frequently turning to user interviews, brief surveys, and prototype testing. The other major segment of our research during the project centered on the site's navigation structure and content labels. We used card sorting and tree testing to get feedback on how we organized the content on our site. We made sure that each user research study had discrete goals with specific research questions and used whichever UX method was most appropriate for our inquiry.

The research was conducted by the project team with current and future potential users. The studies ranged from informal, on-the-spot research in a cafe or library to formal task-based, think-aloud usability studies in a usability lab. The Harvard project team included one full-time UX researcher, but other members of the team, including our content strategist, designer, and product owner, facilitated testing sessions. The UX researcher was responsible for defining the research questions based on what the team wanted to learn, creating the protocol, and organizing the test sessions. Members of the team that participated in data collection were provided with training or briefings before working with users. Results and recommendations were summarized and presented to the team by the UX researcher.

During our project, we used an agile software development process with a scrum framework. An agile development process uses an iterative development process and scrum organizes the work into timeboxes, also called sprints. In our team, each sprint lasted two weeks. In order to fit effective user research into this process, we conducted research **before** the coding to build a new page, whenever possible. In addition to this regular testing of designs, we added a recurring UX check-in meeting to each sprint. At this meeting, the

entire team would plan for upcoming research needs, review recent findings, and make decisions on what actions to take based on insights. These meetings proved to be extremely useful and kept the entire team apprised of the research and findings on a regular basis.

The website redesign took place from September 2017 to July 2018, although the discovery research was conducted before the official project kick-off, from February to April 2017. The research we conducted is defined by Erika Hall as applied design research, rather than pure research, so we only collected enough data that would help us make a decision about our designs and provide us with useful insights.[1] Over the course of the project, we had input from over 200 of our users in the research studies that we conducted. What follows is some of the methods we used and lessons we learned from the research.

Discovery Research and Personas

In January 2017, Harvard Library began a discovery research phase of our website redesign project. The website was hosted on aging servers, was running on an old version of Drupal, and had outdated front-end design that was not mobile-friendly. We also needed to rethink our content strategy and how we served users, especially those who might not know what resources the library can provide for them. In order to better understand our users, we partnered with a UX consulting agency to conduct preliminary research on ideas for new features and content through user interviews.

The discovery phase of our project happened well before we even wrote the request for proposal (RFP) to hire a vendor for the site's design and development. We wanted to conduct research with users to understand where the gaps were in our current website, what we needed to build, and how users expected the library website to work for them. We collaborated with an outside UX consulting firm to conduct interviews with students, researchers, faculty, and staff during this phase of the research. The interview guide (see Appendix A) contained questions related to how members of the community currently used our library website, along with their pain points and mental models related to the site and libraries. We also asked about what was missing from the library's website experience.

The most important finding of the research was that most users were completely unfamiliar with the website. The main Harvard Library website (not the catalog) provides information on library spaces, services, tools, and staff. Most users were unfamiliar with these resources unless someone, usually a helpful librarian, had specifically pointed them out. Users thought of the library catalog, HOLLIS, as the "main library website." Additionally, most users interviewed said that they typically start at Google or Google Scholar when they begin their research because of its familiarity and ease of use.

Interview participants also said that they were unaware of the availability of library resources outside of the library catalog. Resources like online research guides, workshops, citation tools, and in-person research support were unknown to most participants. Users expressed a need for an easy way to learn about these kinds of resources to avoid the common feeling of "I wish I had known about this sooner" that many participants expressed about certain tools and services.

Finally, the interviews spurred new ideas for features that the library website could provide. The most significant of these was an idea for a way to find library study spaces, cafes, and meeting rooms. We had heard in other user studies that there was a need for this kind of tool, but the discovery research provided the greatest evidence that building some kind of study spot finder would fulfill a need expressed by a wide variety of students.

After reviewing the outcomes of the interviews and aligning them into themes, we created four personas to represent the user goals and motivation of different user types. Personas are an artifact from user research that can be used as a tool to keep a web project user-focused. Personas are specific, detailed, and in-depth profiles of potential users. They are not based in demographics, but rather, represent research themes that serve multiple demographics. Each persona is based in real user research—in the case of

the library.harvard.edu redesign project, the results of the user interviews conducted in the discovery research phase of the project.

Based on the interviews, we created four personas: Overstretched Owen, Rigorous Richard, Engaged Ella, and Curious Carlotta. Each persona has several elements: a photo, a representative quote, biographical information, UX goals, a brief profile, and a summary of habits and pain points. During our project, the web team relied on these personas to create user stories and keep our decision-making user-focused. We found ourselves asking questions like, "What would Richard want on a page like this?" and "How's Owen going to arrive at this page?" By giving the personas tangible identities, they became a useful tool for the web team when having complicated conversations and making difficult decisions. (See Appendix B.)

Prototype Testing and 5-Second Tests on the Library Detail Pages and Find a Space App

The team frequently used prototype testing to get user feedback on design mockups during the website redesign project. Rather than wait until a new page was built for the site, we tested high-fidelity design mock-ups with users to get their input and make adjustments to the design before it was built. By using this method, we were able to get potential users' first impressions and understand how they would expect the functionality to work, with minimal demand on our team's resources.

One of the first pages that we designed for the new website was the library detail page. On the library detail page, users can find information about each library in the Harvard Library system. These pages needed to support a variety of libraries, archives, and collections, so they had to be flexible, allowing for a large amount of detail or a small amount of basic information. We tested the design of this page using content related to the Cabot Library, our main library for science and engineering students. The testing took place in this library, and 35 undergraduate students participated.

For the library detail page prototype test, our goals were to learn what types of content students would prioritize, to get their initial impressions of the design, and to understand the language they would use to describe certain sections of content. We set up the test using a Qualtrics survey. Before showing participants the design, we asked what the most important information related to Cabot Library was and what features they wish they had known sooner. To collect impressions of the design (Figure 1), we showed them the design for five seconds, a technique known as the "5-second test"[2] (https://articles.uie.com/five_second_test/), and then asked them if they agreed with the following statements using a 5-point Likert scale from "strongly agree" to "strongly disagree":

- The site looks easy to use.
- The layout of the site is clear and simple.
- The site is visually interesting.
- The site is friendly and warm.
- The site provides information that is useful to me.

Figure 1, Library Detail V1
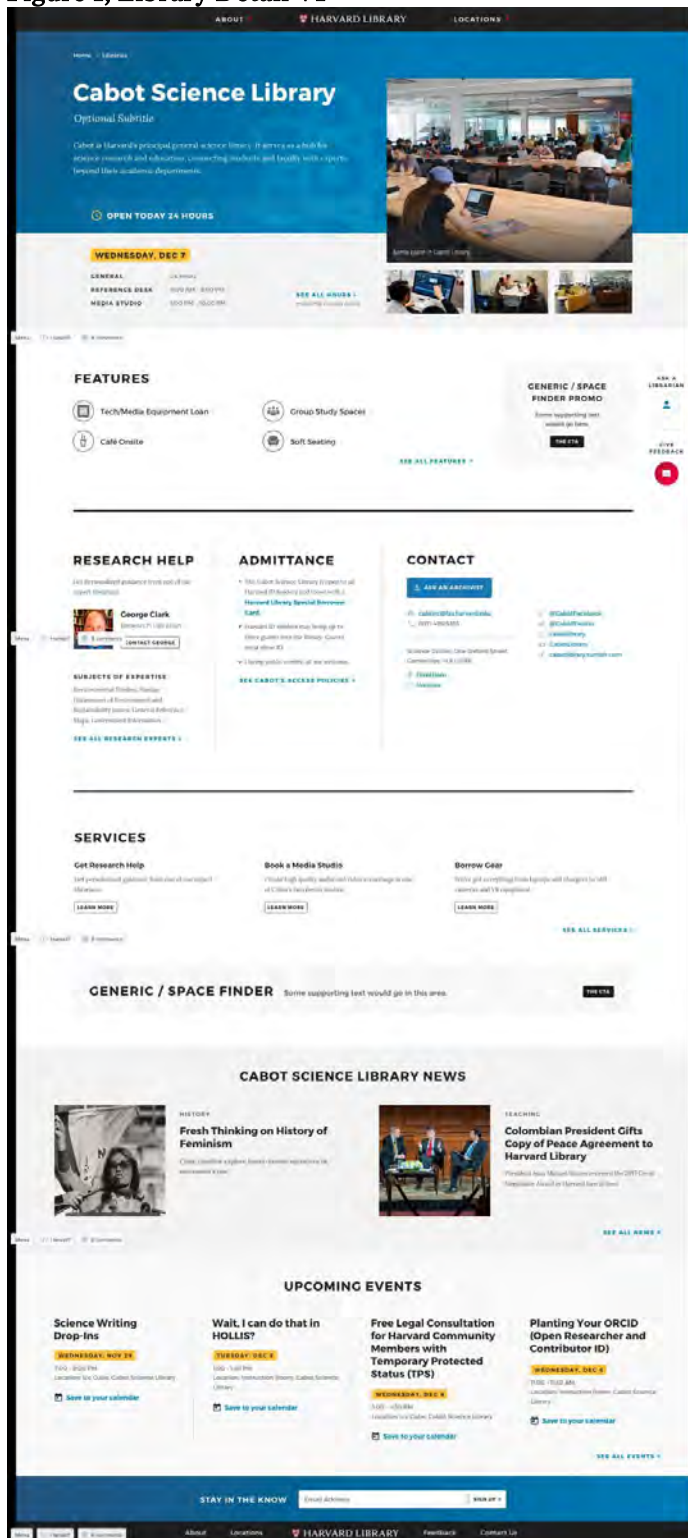
We then asked how they would label certain sections of content so we could better understand what words users would choose to describe information about amenities, technology, and access policies.

What we learned from 35 student participants from the prototype test influenced the second iteration of the library detail design. Students wanted to see a photo that was more representative of the library space itself, rather than the exterior of the science building, and found the first impression of the page to be too cluttered with information. Students gave feedback including, "Reduce the amount of text" and "The design needs more contrast." The team used this feedback and reviewed the content needs of the various libraries; the second version of the library detail page design simplified the first impression of the page, while still providing the key information at the top. We also created a template that could be easily customized depending on if the library was more study-space-focused or collection-focused, or a blend (Figures 2 and 3).

Figure 2, Library Detail V2, Cabot

SERVICES & TOOLS

SERVICE
Research Consultations

SERVICE
Ask a Librarian

SERVICE
Tech Loan

TOOL
Zotero

TOOL
Overleaf

TEACHING
Teach with the Library

SEE ALL SERVICES & TOOLS

EVENTS

UPCOMING EVENTS

Halloween Nation: A Seasonal Talk by Lesley Bannatyne
EVENT
WEDNESDAY, OCT 31ST, 2018

Media Copyright, Fair Use, Protecting Your Work
CLASS / WORKSHOP
MONDAY, NOV 4TH, 2018

COLLECTIONS

Gardner Collection of Photos of the New England Landscape

Geological Map Collection

Gordon McKay and Blue Hill Meteorological Observatory Collections

SHOW MORE

HISTORY

SHOW MORE

Figure 3, Library Detail V3, Houghton
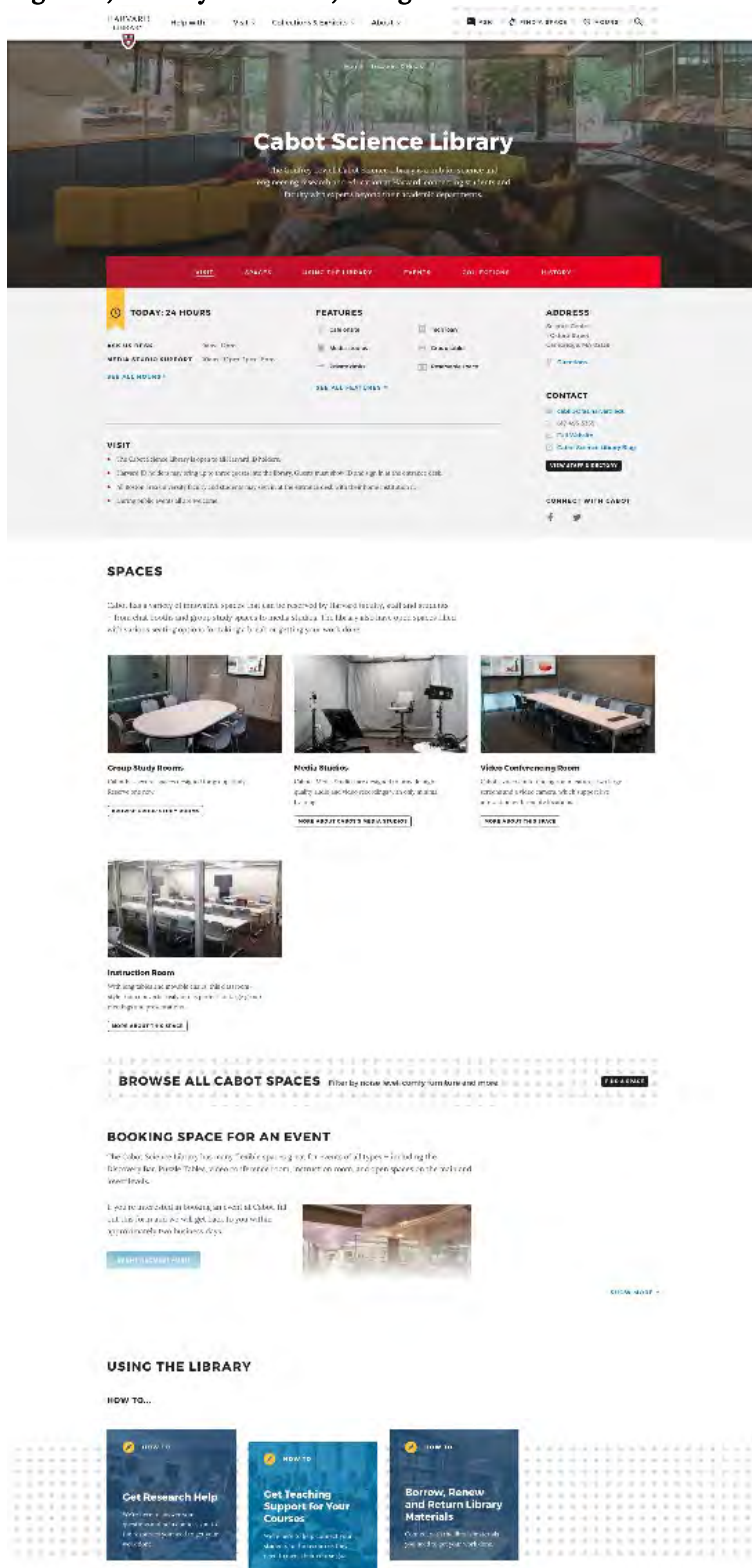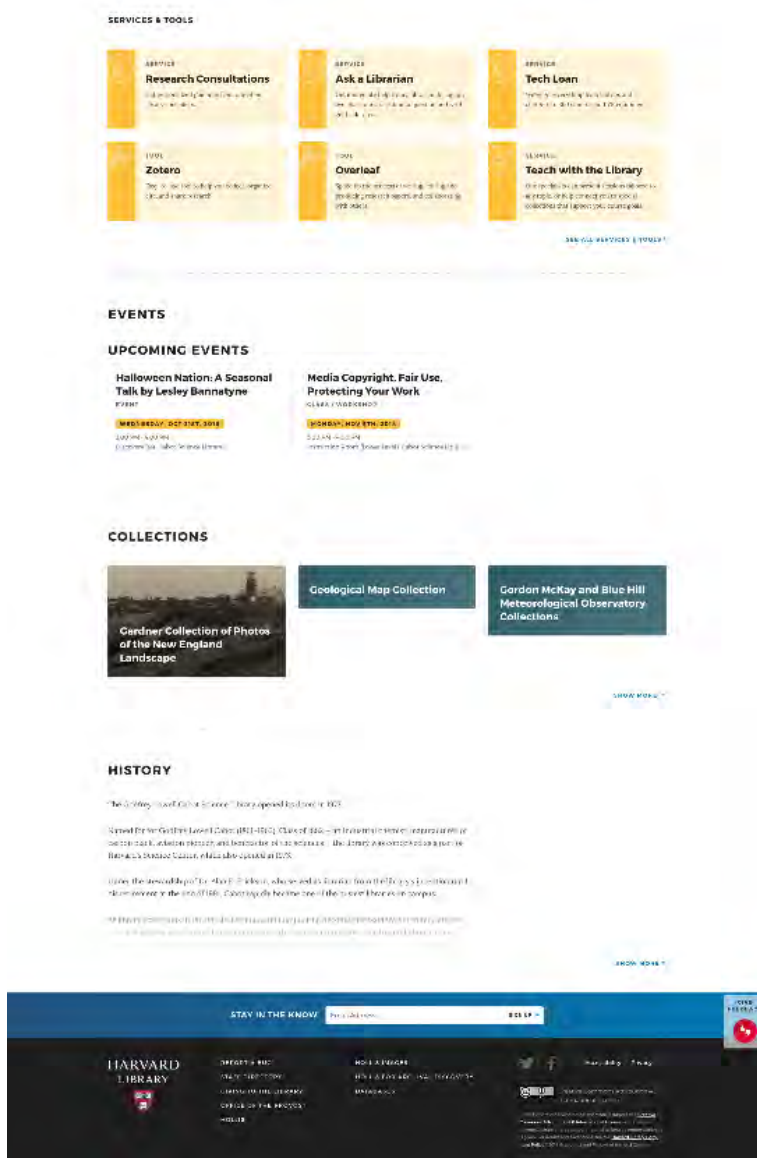
We also conducted prototype testing on our Find a Space app. We built this app because we learned from our initial discovery research that students had trouble finding study spaces in the libraries and understanding the variety of spaces that exist. The layout and design are inspired by other study space finders like those from Cambridge University's Space Finder[3] and University of Washington's Scout.[4] The design has three distinct columns with which users can interact independently, but affect the adjacent panels. The first column lists space filters, the second column provides details, including photos, of each room, and the third contains a map with the space locations plotted (Figure 4).

Figure 4, Harvard Library Find a Space
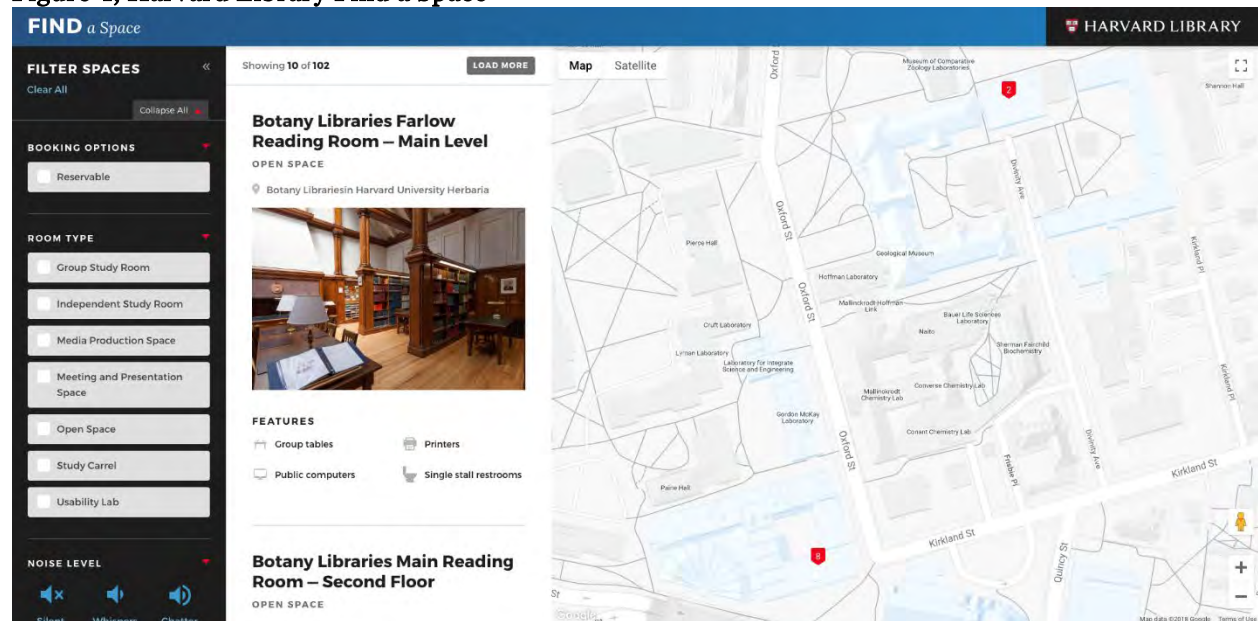
Since the design was based on existing, successful study space finder apps, the focus of our research was on the content organization and labels used within the app, rather than collecting feedback on the design. We did want to know if it was useful for students to have the map taking up a large portion of the screen, but that was the only specific design question we wanted to investigate in this prototype test. In this test, we showed participants a physical paper prototype, and then had a staff member ask questions about the labels, order of the filters, and the map. The staff member recorded participant answers in a Qualtrics survey to keep the data organized and easy to analyze.

A total of 32 students participated in this testing, which took place on the spot in a library entry space. We were particularly interested in better understanding the labels related to furniture. We asked a "this or that" style question to better understand what terminology would be more intuitive for students. The results are summarized in Table 1.

Table 1, Language Preferences for Furniture Labels

Private tables/desks (72%)	Study carrels (28%)
Shared tables/desks (13%)	**Group tables** (87%)
Standing desks (80%)	Standing workstations (20%)
Soft seating (16%)	**Couches/upholstered furniture** (84%)
Movable furniture (87%)	Configurable furniture (13%)

We also asked about which features were most important when choosing a space. The results for preferred order of space features by importance is summarized in Table 2.

Table 2, Preferred Order of Space Features

1	Seating choices
2	Outlets
3	Work surface choices
4	Food & drink allowed
5	Food & drink available to buy
6	Charging stations
7	Whiteboards
8	Printers/copiers/scanners
9	Lockers

Finally, regarding the map question, 23 out of 32 participants found the map to be useful. They described it as "really convenient" and "important," especially for meeting up with a group. The one thing they said that they would change is to add an option to make the map collapsible so that it could be hidden if the user chose to do so. This is a feature we may add in to the app in the future. We used the feedback on the labels and word choices to make the app more usable from the first version, since the testing was conducted before any coding was done.

Card Sorting and Tree Testing, Site Navigation

One of the most complex issues with any website redesign is how the site's main navigation menu is structured. We launched our beta site with a small amount of content and a placeholder navigation system to give us time to formulate the site's content strategy and work with users to define a usable information architecture. We used two UX methods to create and evaluate our navigation structure: card sorting and tree testing. Card sorting helped us define how users would group and label the content, while tree testing allowed us to test two different navigation structures against each other, and create a final version that was most usable. We used the online tree testing and card sorting tools from Optimal Workshop to carry out this research.

In a card sort, users are given a list of "cards." Each card represents an area of content on the website. Cards can represent a large area of content, such as "Hours." Or cards could represent a single page, like a specific tool, such as "Zotero." We then ask users to group cards they view as similar and give each group a label.

A specific question the web team had was around a brand-new content type we are calling "How Tos." How Tos will answer the question "How can Harvard Library help me with..." For example, a page titled "How to Get Teaching Support" would pull together all the tools and services related to teaching that we offer. We wanted to know whether users would group all of the How To pages together or whether they would group them with similar content. The results of our card sorting test showed the How To pages are more helpful if they are grouped with similar content, rather than having the navigation menu present them as a long list of How Tos.

One of the other major findings from our card sort testing is that almost every participant used the word "Visit" as a top-level grouping label. Other popular sub-group labels included "Borrowing," "Research," "Media & Technology," and "Teaching." Armed with this research, the staff from the web team participated in a sketching activity to define the navigation. Eight staff members from the web team each wrote down their own navigation menu. Then we worked in pairs to combine the best parts of each person's navigation

menu, and then in teams of four. Finally we had two navigation schemes. The group then worked together through the two navigation schemes to come up with the final list of top-level navigation items. The final navigation structure we agreed upon was: Help with..., Visit, Collections & Exhibits, and About.

We had decided on the top-level navigation headings, but still needed to organize all of the pages on content pieces underneath. This is where tree testing came in. In a tree test, participants are given several tasks and presented with a clickable navigation tree which they use to complete each task as best they can. We used the Harvard Library User Research Center's email list of graduate and undergraduate students to complete the tree test. Half of the 400-person list received Tree Test A, which contained one navigation setup, and the other half received Tree Test B, which contained the other navigation setup. Users were then asked to complete a set of tasks, such as:

> You used HOLLIS (the library's catalog) to ask for a book chapter to be scanned and emailed to you. Where can you go to find out how long it will take to be sent to you?

Using the tree testing tool, Treejack, we could easily see which navigation scheme worked best for each task. The tool tracks the click path that the participant used when attempting to complete the task. We reviewed the results of the tree test and took the best aspects of our two navigation setups to create our final navigation menu. The team was particularly confounded by a How To on special collections and archives. Would users expect to find that under "Help with..." or "Collections & Exhibits"? After testing, we learned that most users looked for that content under "Help with..." so that is where the link to the page now lives.

Conclusion

Within one week of the website launch in July 2018, we conducted task-based, think-aloud usability testing to understand how undergraduates navigate the site and if there were any obvious pain points. Some of the insights from the usability testing mirrored some of the feedback that we received via our online feedback form. For example, users have trouble locating the option to view library hours by week on the Hours page. This ongoing feedback loop allows us to make informed choices about what enhancements we choose to prioritize. Although the site has already launched, we continue to seek out user feedback to test new features and review any assumptions that we are making.

The discovery research and user testing conducted during the 2018 redesign of library.harvard.edu made a significant, positive impact on our first release. Rather than making choices about the site's design, information architecture, and content based on our preferences, assumptions, or anecdotal feedback, we worked directly with our site's users to make informed decisions. By working with a variety of research methods, depending on our research questions and study goals, we were able to gather the best information to help us move forward in the project. Making user research part of the project process, rather than an afterthought, helped make the site's initial release well-received and usable by our core audience.

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Endnotes

1. Erika Hall, **Just Enough Research** (New York: A Book Apart, 2013), 5–9.
2. Christine Perfetti, "5-Second Tests: Measuring Your Site's Content Pages," **UX Articles by UIE** (blog), September 11, 2007, https://articles.uie.com/five_second_test/.
3. "Scout," Accessed October 29, 2018, https://scout.uw.edu/seattle/.
4. "Spacefinder," Accessed October 29, 2018, https://spacefinder.lib.cam.ac.uk/.

Appendix A
Discovery Research, Interview Guide Example (Undergraduate Student Interview)
Background
- Please give us a bit of background about yourself. What program are you attending at Harvard? When do you expect to graduate?

Experiences
During your time at Harvard, have you used the Harvard Library system at all? For what purpose? Have you used library.harvard.edu?

Talk me through the last time you can remember that you:

- ... used Harvard Library resources [books, data, etc]
    - ... For yourself or on behalf of someone else?
    - [If interviewee doesn't mention Archives, prompt]
- .... attended an event hosted by the library
- ... interacted with library staff
    - ... How did you do it? Phone? Email? In person?
- ... used the Harvard Library website?
    - ... Why? What were you trying to do?

When you were doing or assisting research, how did Harvard Library fit into your overall research process?

- Did you start your search for resources at the library, or did you start elsewhere?
- Were you always been able to find the resources that you were looking for?
- What kinds of resources did you depend on the Library for?
- What kinds of resources did you <u>not</u> expect the Library to have available?

Pain Points
- Considering Harvard Library and associated websites, do you see any major shortcomings that jump out to you?
- What about things that seem to work particularly well?
- Do you feel well-equipped to use the resources that the library provides? Do you feel like you understand how to conduct research as effectively as possible using library collections?

Mental Models
- What does "Library" mean to you?
- What tasks do you expect Harvard librarians to be able to help with? If there were a button for "Ask a Librarian" on the website, what kind of questions might you ask?
- In your mind, what should Harvard Library be responsible for? How well is it achieving these goals today?
- How unified vs. separate do you feel like the various libraries at Harvard are? Do you ever feel like you don't know which library to use for certain resources?

Project
- Is there anything you'd like us to keep in mind as we approach this problem?
- Are you willing to participate in further testing sessions to help us as we refine the vision for the Library site?

Appendix B

Overstretched
Owen
SEAS Student

Age	19
Occupation	Student
Lives In	Lowell House

UX Goals

Get a better understanding of where there are **group study spaces** to reserve with power & white boards.

Learn about content he never knew existed in the libraries, like sheet music.

Make it easier to **find and save articles** he needs for his classes.

Profile & Expertise

He is an undergraduate student in the SEAS program and an accomplished cellist. He took CS-50 during his first semester at Harvard and met two other students with whom he's now building a VR app. He's interested in applying to HBS to get his MBA after graduation and improving the beta version of his app. He has won prizes for his cello performances and organizes a small chamber orchestra in Boston.

Habits & Pain Points

- He uses Google for most of his research needs and will occasionally go to HOLLIS+ if a TA or professor tells him to. When he's tried to use the library to find an article it feels like he's going in circles.
- He gets annoyed when he goes to work in Cabot and there aren't any study rooms available to work on problem sets or his VR app.
- He would love to know if the library provides access to any sheet music, since he doesn't have much budget to buy music for the chamber group that he organizes.

Rigorous
Richard
Visiting Researcher

Age	Late 40s
Occupation	Research Fellow
Lives In	Brooklyn, NY

UX Goals

Get **location details** for Harvard libraries & archives that have the items that he's interested in.

Prepare for his visit and get as much information as possible in advance before arriving at Harvard.

Search all Harvard libraries and archives for **digitized resources** related to his topic.

Profile & Expertise

He is a research fellow at Columbia University, studying 18th century religious history of New England. During the day he takes care of his twin boys and does most of his research and writing in the late evening hours. He only uses a keyboard for all of his computing after injuring both of his wrists rock-climbing made it painful to use a mouse.

He has worked with archivists from Harvard via email, but is planning to visit in-person this semester. He wants to access materials from mulitple locations and meet with staff who are subject matter experts. He only has six days to spend in Cambridge and wants to make the most of his trip.

Habits & Pain Points

- Starts his research at Google to get to systems like HOLLIS+ & OASIS.
- Wants to request all of the materials he needs online, in advance of his visit.
- Isn't sure what his onsite access allows him to do; how late can he stay in the library, can he access printers, how does he access articles behind HUID, etc.
- Would like to schedule appointments with staff prior to arrival.
- Unclear to him where he is allowed to work while visiting Harvard.

Engaged
Ella
Faculty Member

Age Mid 40s
Occupation Professor
Lives In Belmont, MA

UX Goals

Easily **connect with librarians** to provide in-class instruction.

Expose students to the vast richness of Harvard's library resources, specifically through library training.

Make searching **less overwhelming**, especially for students & connect graduate student advisees to appropriate subject databases.

" *Students are more successful when they take a library training session. It's mind-blowing because they realize how much is available at Harvard and how to do things more efficiently.* "

Profile & Expertise

She is a faculty member in the Anthropology department and has taught at Harvard for over twenty years. She is an avid hiker and takes weekend trips to western MA with her Australian shepherd, Maisie. She is an advocate for the libraries and serves on the Faculty Advisory Board. She is invested into exposing more students to special collections and advocates that students 'get their hands' on the materials. She prefers to go straight to the anthopology subject databases that she uses all of the time, rather than using HOLLIS+. She advises a number of PhD students and employs several graduate research assistants.

Habits & Pain Points

- Keeps her frequently used anthropology databases bookmarked in her browser.
- Recommends students starts with subject databases, rather than HOLLIS+ which returns too many results.
- Wants an easier way to access what Harvard has from ancient Greece & Egypt.
- Would use HOLLIS+ more if it were easier to save searches and organize favorite articles.

Curious
Carlotta
GSE Alum & DCE Student

Age Early 30s
Occupation ESL Teacher
Lives In Medford, MA

UX Goals

Get a clear understanding of the privilege rules around **borrowing materials and using library spaces**.

Access **online images** owned by Harvard.

Stay abreast of **current events** at the libraries, esepcially new exhibits.

" *There are striking differences between each library. When you search in Google it's not always clear whether a library is open or not. You're never sure with all of the different schedules.* "

Profile & Expertise

She is a GSE alum, now taking museum studies courses through DCE. She lives with and takes care of her grandmother and nine-year-old sister. She hasn't been able to find a job as an art teacher, so is taking the museum studies courses to move her career in that direction. She is interested in finding out if she has any special access to resources or library locations because she's an alum. She'd also like to understand if students in her ESL class can visit Harvard exhibits and if there's anything that's free for them to use online.

Habits & Pain Points

- She has a busy personal life, but likes to get work done at the library for a quiet 'break' from real life.
- Always feels like the libraries have lots of cool stuff, but it's hard to know how to access it.
- She always hears about exhibits after they close and wants to know how to stay better informed.
- It's challenging for her to find out what libraries she has access to and for how long she can check out books for.

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Assessing Student Learning in Library Instruction: A Faculty Perspective

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University of Michigan, USA

Introduction

Assessing library impact on student learning is essential for demonstrating libraries' integrated value and commitment to higher education. Librarians value this commitment and seek measures of their contributions to higher education. Librarians at the University of Michigan Library taught 808 curriculum-related sessions to 20,780 students in the academic year from September 1, 2017 through April 15, 2018. In order to measure course instructors' impressions of this instruction, an online survey was designed and conducted to assess student learning in one-time, course-integrated library instruction sessions. The goal of this study was to investigate course instructors' perceptions of student learning from these sessions. The results clearly demonstrate the value that library instruction can bring to the student learning experience. The concepts and skills taught through library instruction are foundational and intrinsic to curricula throughout higher education.

Literature Review

There have been many studies concerning course instructors' perceptions of information literacy as a whole, most significantly work done in the UK by Sheila Webber, Stuart Boon, and Bill Johnston.[1] Webber, Boon, and Johnston have also studied how course instructors connect the relationship of information literacy to the work in their academic disciplines. The course instructors in these studies indicate that finding sources and teaching students higher order thinking skills are two highly important information literacy skills. Laura Saunders' extensive survey of course instructors in a multitude of disciplines indicates that course instructors do value information literacy as a learning outcome.[2] Many other studies have reported that course instructors have a low assessment of their students' information literacy skills. These issues are complex and multifaceted. If course instructors believe all three of these documented claims, (1) that course instructors value information literacy, both as a whole and within their own disciplines, (2) that they also believe that students have low information literacy skills, and (3) that information literacy is an important learning outcome, the question then becomes do they also believe that academic library instruction is meeting their course learning outcomes? The goal of our research intends to answer the question of what students are learning in our sessions and whether library instruction at the University of Michigan is meeting course learning outcomes.

Methodology

Librarians developed a very brief survey with questions focused on how well library instruction sessions met the course instructors' learning outcomes, if students were better able to complete course projects, and to identify what specific concepts and skills students learned. The instrument contains three Likert-scale questions and two open-ended questions (Appendix 2). The survey instrument was designed and administered using Qualtrics. The U-M Library uses a locally designed system called the Scheduling App for Library Instruction (SALI) to manage requests for instruction and also to record statistics. Email addresses were obtained from SALI for all course instructors who requested a library session from September 1, 2017, through April 15, 2018. Several instructors had left the university, so their names were removed. If course instructors requested multiple sessions over the 2017–18 academic year, duplicate email addresses were removed so each course instructors received only one survey, recognizing that instructors would be less likely to complete multiple surveys. The survey was sent to a total of 393 instructors. Survey responses were collected from April 3, 2018, through May 8, 2018, to allow course instructors to evaluate student work at the end of the semester. One reminder message was sent to course instructors who did not respond to the first survey request. A total of 171 surveys were completed. This figure represents a return rate of 43.5 percent.

Librarians analyzed the data from the Likert-scale questions and one of the open-ended questions, "Please comment on **concepts or skills** that your students learned during this session." Data from the second open-

ended question revealed that the question was too vague and did not yield useful responses. To analyze the qualitative data generated by the first open-ended question, librarians developed a codebook of likely student learning outcomes based on typical lesson plans. A sample of ten surveys were each coded by two librarians in order to establish inter-rater reliability and develop consistency in the application of codes. All 171 surveys were then divided equally between the two librarians for coding. Data was coded and analyzed using Dedoose.

Results

Responses to the survey reflect a wide variety of disciplines across campus as well as introductory level courses through graduate level programs. Of the 171 surveys completed, 70 represent social sciences courses, 63 are from arts/humanities courses, 19 are from health sciences, 10 are from engineering/architecture, and 9 represent the sciences. Overall, these figures are quite well reflective of the distribution of disciplines for which library instructors generally teach in a given year. Regarding course level, 51 represent 100-level courses, 24 are from 200-level courses, 38 from 300-level courses, 23 from 400-level courses, and 34 from graduate level courses. These figures represent higher response rates from 300-, 400-, and graduate level courses than are generally represented in the overall distribution for which library instructors teach. Library instructors typically teach for more 100- and 200-level courses as a percentage of total instruction. Thoughts about this difference in response rate are included in the limitations section of this paper. With such high response rates from courses at all levels, and graduate level courses in particular, the data provide excellent insight into the nature of instruction commonly occurring across the spectrum of curricula in our schools and colleges.

General Satisfaction

Survey recipients were given three statements to respond to on a five-point Likert Scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree).

1. Students were better able to complete coursework because of this session.

2. The instruction session met my learning goals and expectations.

3. I would recommend library instruction to other instructors.

Responses were overwhelmingly positive to all three statements. One hundred sixty-nine recipients responded to the first question regarding the relationship between the library session and completion of student coursework. One hundred sixty responded either Strongly Agree (115) or Agree (45). Nine responded Neutral. There were no Disagree or Strongly Disagree responses. There were 170 responses to the question about meeting course instructors' learning goals and expectations. One hundred thirty-eight course instructors responded Strongly Agree and 30 responded Agree. Two respondents chose Neutral. Again, there were no respondents who chose Disagree or Strongly Disagree. Finally, the third statement regarding recommended library instruction to other instructional course instructors had a similar pattern. One hundred seventy-one recipients participated in this question with a vast majority responding in a positive manner (Strongly Agree=152, Agree=17). There were two Neutral responses and no Disagree or Strongly Disagree responses.

At first glance, with no negative responses, one might question the survey's design or pool of recipients. It is important to note that there was no evaluation of survey recipients prior to dissemination of the survey regarding course instructors' levels of satisfaction. The survey was released to all current academic instructors that had some record of library instruction during the time allotted. In addition, the library has conducted similar surveys over the past five years that did include negative responses from respondents, so there is little reason to believe that course instructors censored their opinions on this particular instruction survey.

A closer look at the nine neutral responses to "Students were better able to complete coursework because of this session," revealed that there were two responses assigned the Library Instructor Compliment code. Within the text of another response, the collection was complimented. Other patterns emerge from these responses, although the researcher should be careful about drawing major conclusions from such a small group (9). Five of the nine neutral responses were from arts and humanities classes. Of those five, only one class was a 100-level course. Seven of the nine neutral responses to this statement were from courses designated at the 300 level or above. This information will be shared with the librarians who teach upper level courses just as information to consider while designing lesson plans/learning outcomes in the future. The neutral responses to the other two statements (2 each) were not analyzed due to the low response in this part of the scale. Two responses are not enough upon which to base any conclusions.

Overview of Code Application for Learning Outcomes

Librarians coded for the question, "Please comment on **concepts or skills** that your students learned during this session." The data yield many interesting trends and insights that aid library instructors in understanding how their teaching integrates into programs across the university. Use of these codes varies greatly by discipline and by level of course as one might expect based on the needs of students in different disciplines at various points in their programs. In fact, the data and resulting observations are very intertwined by these two variables. To present the data in a cohesive manner, the results are discussed by individual code, with an analysis of the use of that specific code by discipline and course level together in order to demonstrate patterns within and across curricula. The codebook designed for this analysis contains 23 codes. Most of the codes relate directly to topics generally covered in information literacy instruction, such as finding and evaluating sources. Librarians also coded for a few additional items, such as "Library Instructor Compliment" where a specific library instructor was mentioned, data instruction, and a variety of technology tools such as web design and blog writing. All 23 codes were used a least once. The most frequently used codes are: Finding Sources n=91, Evaluating Sources n=50, Library Organization (physical library and website) n=34, Search Strategy Development n=31, and Using and Understanding Sources n=27. Specific tools and databases were noted in n=16 of the sessions. The next most frequently used codes were Nature of Information and Primary Sources, which were both coded for 12 sessions, and Data Instruction, which was coded 11 times. Library Instructor Compliment was coded 16 times. While each individual technology code was not used frequently, the technology codes combined were used 16 times. See Appendix 1 for all code frequency applications.

Code Analysis by Discipline and Course Level

In this section, analysis of the five most frequently used codes as well as codes that reveal unexpected findings are presented. As one might expect, the most frequently used code, Finding Sources, was used fairly equally across all disciplines and all levels of courses as demonstrated in Figure 1. However, upon further examination of course levels within identified disciplines, certain patterns emerge. Most disciplines demonstrate decreasing focus on Finding Sources as course level increases, yet health sciences illustrate the opposite pattern of increasing emphasis on Finding Sources as course levels increase (Figure 2). The second most frequently used code, Evaluating Sources, also demonstrates interesting patterns. This topic is taught in a fairly distributed manner throughout the health sciences and social sciences. In the other disciplines, it peaks in 100-level courses and shows a very rapid decline in advanced courses. The topic of Library Organization appears throughout the disciplines with the exception of science courses where it only appears in 100-level courses. Search Strategy Development, the fourth most used code, is well represented across the social sciences and arts/humanities disciplines. It peaks in graduate level health sciences, only appears in the 200 level in engineering/architecture, and again, only features in 300-level sciences. Using and Understanding Sources, the last of the top five codes used, is reflected in most levels of courses in the arts/humanities, sciences, and social sciences. Interestingly, Using and Understanding Sources does not appear in graduate level courses in the sciences or social sciences, while conversely, it only appears in graduate level courses for the health sciences or engineering/architecture.

Several lesser used codes also demonstrate interesting patterns. Students learned about the Nature of Information in a variety of social sciences and arts/humanities sessions across course levels. For science

courses, it was noted only in 300-level courses, and it did not factor into any instruction in engineering/architecture or health sciences. Course instructors report that their students learned about primary sources throughout various levels of arts/humanities and social sciences courses but not in a single science or health sciences course.

Concurrent Learning Outcomes

Librarians analyzed codes to understand which concepts are often learned together in a single instruction session. Unsurprisingly, the two topics that most often occur in the same workshops are Finding Sources and Evaluating Sources (co-occurrence=25). Finding Sources co-occurs with three other topics frequently as well: Search Strategy Development (21), Library Organization (17), and Primary Sources (9). Looking closely at this data and comparing the results to a common understanding of course instructors and course needs, a library instructor would probably conclude that finding sources goes hand-in-hand with understanding how the library is organized, how to create a good search strategy, and how to evaluate what you find, including recognizing primary sources. The data in this analysis are reassuring in that concepts that librarians expect to be taught together are in fact being learned by students during the same instruction session.

Unexpected Findings

There are a number of unexpected findings in the survey data. One such finding is in the application of the code for Academic Integrity. This code appears exclusively in 100-level courses, and 80% of the time in arts/humanities courses with the remaining 20% occurring in social sciences courses. Why do course instructors not report Academic Integrity in upper level courses? Based upon librarian knowledge of lesson plans, this topic is definitely taught in upper level courses. Citing Sources, as a code, does not appear in any health sciences or sciences courses and only in graduate level engineering/architecture courses. It is better distributed throughout social sciences and arts/humanities courses. Course instructors report students learned about obtaining Future Help only in 400-level and graduate level courses regardless of discipline.

Discussion

The data collected and analyzed from this survey of course instructors reinforces much of what library instructors believe about our information literacy program. For the most part, the data match what instructors are teaching and hope students are learning. This feedback from course instructors validates the assumptions that library instructors make about their teaching. For example, the top five used topic codes are reflective of our teaching practices. Finding Sources and Evaluating Sources are vital elements of the vast majority of library instruction sessions and, according to this data, they are often taught together. It is rewarding to see that course instructors believe students learned these concepts well during these sessions. Likewise, Library Organization and Search Strategy Development are highly recognized as learning outcomes.

Using charts, graphs, and other data visualizations truly aid in identifying overall patterns throughout the disciplines and course levels. Having these patterns, they can be combined with library instructor expertise about what was taught and ideally what students should be learning in order to identify gaps as well as strengths of our teaching. For example, one gap that is readily apparent is the low frequency with which the code Future Help is applied. Using knowledge of teaching patterns, it is well documented through lesson plans that Future Help is a concept taught in almost every instruction session. This would hold true for traditional sessions on research instruction as well as technology sessions. So, why do course instructors report that their students so infrequently learned about getting Future Help? Perhaps because this is not a learning outcome that course instructors prioritize or they do not place as much importance on it as library instructors do. Still, it is making instructors pause and examine whether we need to address this differently during our sessions. Equally perplexing are the findings regarding use of the codes Search Strategy Development and Finding Sources. Upon further exploration, it makes complete sense that these concepts appear in upper level health sciences courses because library instructors are frequently asked to teach about conducting systematic reviews. Advanced skills in finding sources and devising excellent search strategies are naturally part of the skill in conducting systematic reviews. Still, it is making instructors pause and examine whether we need to address the concepts differently during our sessions in other disciplines.

It is rewarding to learn that course instructors overwhelmingly state that library instructors are helping students to complete coursework better, meeting learning goals and expectations, and that course instructors would recommend library instruction to other instructors. We will make sure that librarians who teach upper level workshops are aware that, in a small number of cases, course instructors may not feel strongly that library instruction is helping students complete coursework better. Even so, that small portion of responses does not negate the phenomenal conclusion that course instructors think library instructors are enhancing the classroom experience and necessary knowledge is being acquired by students.

Limitations

There are two main limitations to this study which require careful examination. Since response to the survey instrument was voluntary, course instructors chose whether or not to respond. Course instructors of 100-level courses may have responded only once even if they taught multiple sections of a course where they had requested library instruction. Course instructors of 100-level courses are frequently Graduate Student Instructors (GSIs), and their teaching patterns are more varied than tenure-track faculty or instructors with longer teaching appointments. Often, they teach one semester, but perhaps not the subsequent semester. They may be less invested in teaching and less likely to respond. Instructors of upper level courses may have longer-term relationships with the library instructors who teach for them, and thus be more likely to respond particularly for upper level courses. This factor could explain why we have such high response rates from instructors of upper level undergraduate and graduate courses. Another limitation is that the study relies on the memory and impressions of course instructors as to what they believe their students learned during the instruction sessions. Ideally, surveying students' as well as course instructors' opinions on learning would present a more complete set of data from which to draw conclusions.

Conclusions

According to our literature review, course instructors value information literacy and believe that their students generally have low information literacy skills. Course instructors want information literacy to be a learning outcome. It is encouraging to conclude from this study that, in most cases, librarians are meeting these information literacy outcomes. Students are learning the concepts and skills they need to be academically successful in their courses. The outcomes of this study lead to the questions of what it means for course instructors who do not request instruction. How might we use these survey results to market library instruction to those course instructors who do not currently include such instruction in their courses? The data and conclusions drawn from this study will be used to encourage additional course instructors to integrate library instruction into courses that require research or technology skills for student work.

Endnotes

1. Webber, Boon, and Johnston, "A Phenomenographic Study"; Webber, Boon, and Johnston, "A Comparison of UK Academics' Conceptions."
2. Saunders, "Faculty Perspectives on Information Literacy."

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Saunders, Laura. "Faculty Perspectives on Information Literacy as a Student Learning Outcome." *The Journal of Academic Librarianship* 38, no. 4 (2012): 226–36. http://dx.doi.org/10.1016/j.acalib.2012.06.001.

Webber, Sheila, Stuart Boon, and Bill Johnston. "A Comparison of UK Academics' Conceptions of Information Literacy in Two Disciplines: English and Marketing." *Library and Information Research* 29, no. 93 (2005): 4–15.

Figure 1—Finding Sources code used by discipline

Set: Course Demographics, Field: Discipline

Discipline	Percent
Health Sciences	26.6%
Engineering/	15.5%
Arts/Humanities	22.3%
Sciences	17.3%
Social Sciences	18.3%

100.0%

Set: Course Demographics, Field: Level

Level	Percent
100	20.6%
200	16.6%
300	21.2%
400	24.9%
Graduate	16.8%

100.0%
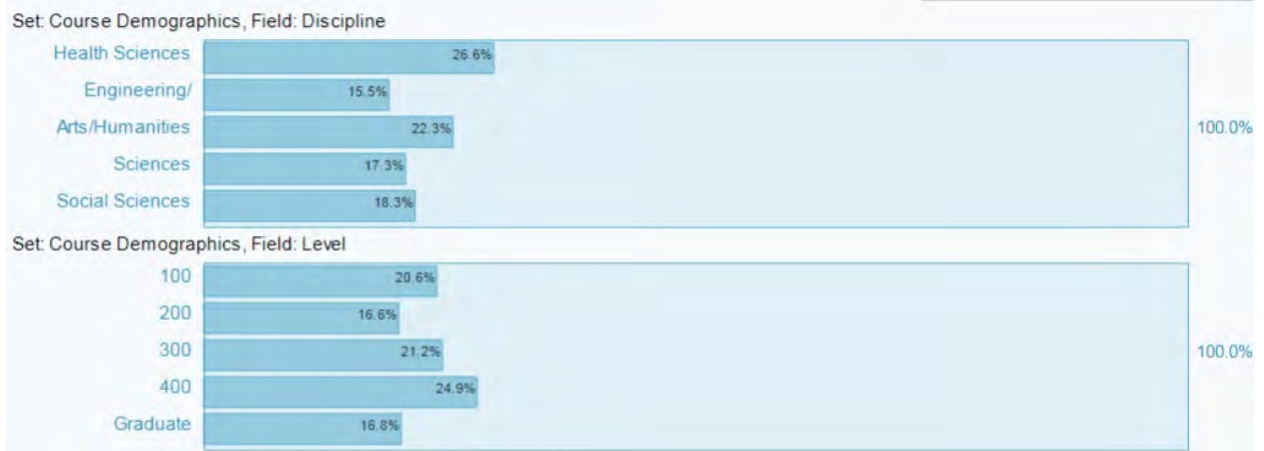
Figure 2—Finding Sources code used by discipline and course level
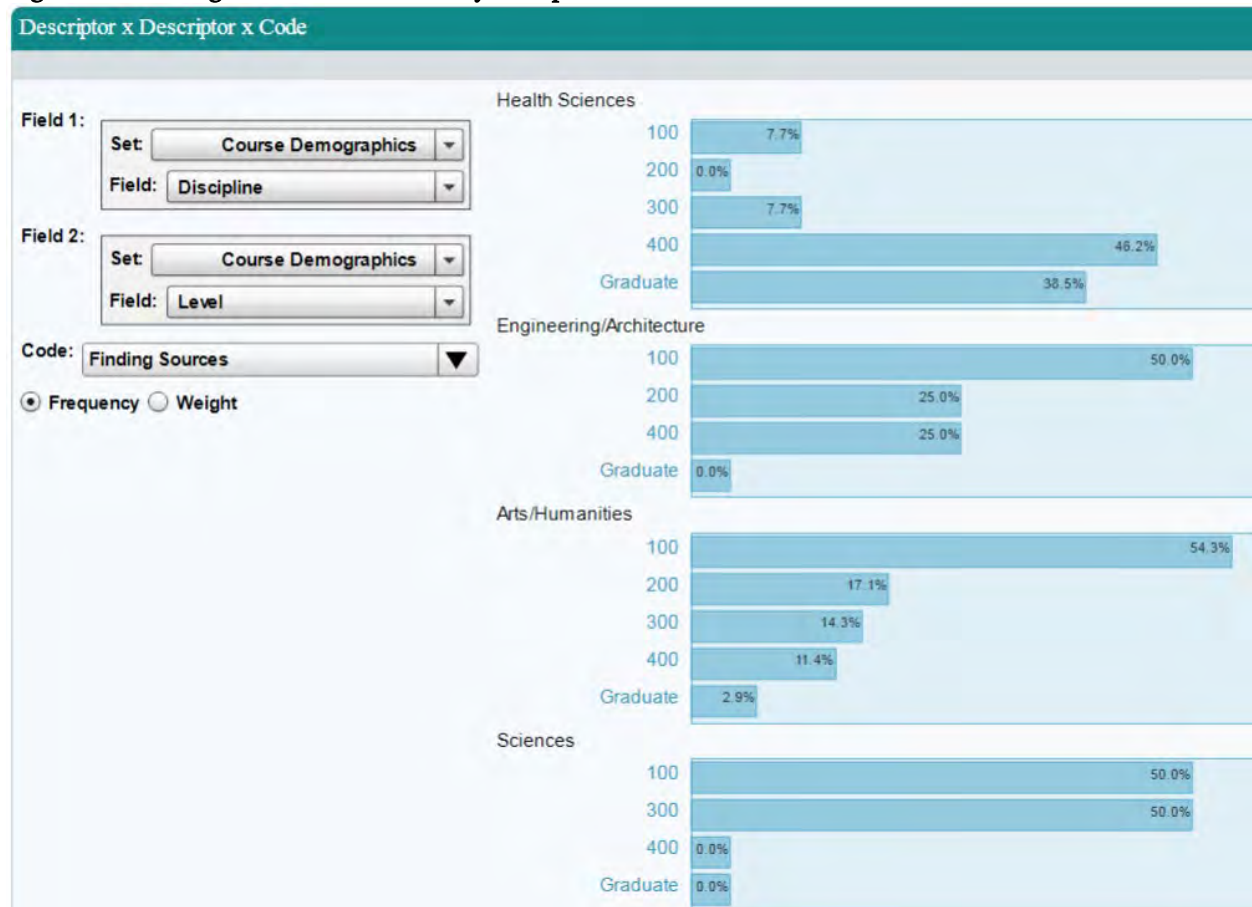
Appendix 1: Code Descriptions

Code	Description
Nature of Information	How information is organized in a "big picture" manner. "Big picture" = How information is produced; Who owns information; The information cycle; etc.
Library Organization	How UM Library is organized either physically or virtually. This would also include when users are introduced to the library and when an overview of the library or library website is mentioned.
Topic Exploration	How a researcher decides on what to study or what to write about (topic)
Search Strategy Development	How a student decides the method/manner in which to search including keywords and limiting searches
Finding Sources	Generic code to be used when the instructor writes that their students learned to find sources/materials for a paper/project
Primary Sources	Intentionally teaches that there is a difference between primary and secondary sources. The word primary is used in this code.
Evaluating Sources	Explicitly states that evaluating sources is taught. This is when a more introductory or "surface" level of evaluation is taught and/or mention is made of choosing between sources. Also, other terms that might indicate evaluating sources would include mention of critical thinking around sources, scholarly/non-scholarly, peer review.
Using and Understanding Sources	Beyond evaluating sources, this code is used when the content includes an actual discussion about what the learner should do with the source and how the learner should incorporate the information in that source into their own knowledge/project. Text that answers the question, "Can I use this source?" might also be incorporated in this code.
Citing Sources	Explicit instruction about citing sources. When coding for Citation Management Instruction, this code should also be applied.
Future Help	Getting follow up assistance. This may include an explicit mention of Ask a Librarian virtual reference in this context.

Code	Description
Blog Instruction	How to use any blog tool. If a specific tool is mentioned, also code for "Tools"."
Video Tool Instruction	How to use any video creation tool. If a specific tool is mentioned, also code for "Tools."
Photoshop Instruction	How to use Photoshop. Since Photoshop is mentioned, specifically code for "Tools" as well.
Web Design Instruction	How to create a website. If a specific tool is mentioned, also code for "Tools."
Citation Management Instruction	How to use bibliographic management tools. If a specific tool is mentioned, also code for "Tools."
Wikipedia Instruction	How to create/edit Wikipedia articles
Poster Design Instruction	How to create a poster. If a specific tool is mentioned, also code for "Tools."
Tools	Specific databases, data sources (like census data, or a mapping tool) is mentioned.
Academic Integrity	Instruction included plagiarism and other academic integrity concepts. Look closely at anything coded "Citing Sources" before automatically adding this code.
Data Instruction	How to find data, how to think about the data you find, data visualization, etc.
Library Instructor Compliment	Respondent explicitly mentions something that the library instructor did well
Special Collections	Explicit mention of instruction around Special Collections, archives, manuscripts, etc.

Code	Description
Other	This code is used when the other codes do not apply, yet the coder feels that there is valuable information conveyed in the text. Those texts that are assigned this code will be examined holistically to find patterns within them and also provide an opportunity to redistribute texts with the "Other" code into other categories.

Appendix 2: Survey Instrument

In fall 2017 or winter 2018, a librarian taught an instruction session for one of your courses. We are assessing **student learning** during these sessions. Your feedback is critical in understanding what concepts and skills students may be learning and if they apply this knowledge. Thank you for taking the time to complete this quick survey.

Please enter the course number(s) for which you had a library session (e.g., English 125, Psych 303):

Thinking back to the instruction session for your course and feedback from students since the session, please mark the appropriate column for each question below.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Students were better able to complete coursework because of this session.					
The instruction session met my learning goals and expectations.					
I would recommend library instruction to other instructors.					

Please comment on **concepts or skills** that your students learned during this session.

Please comment on how you think the session **did or did not affect the quality** of student work in your course.

Information Literacy Assessment for Instruction Improvement and Demonstration of Library Value: Comparing Locally-Grown and Commercially-Created Tests

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Abstract

This paper describes two types of fixed-choice information literacy tests, one locally created and one nationally developed. The Madison Research Essentials Skills Test (MREST) is part of a tutorial-test model for first-year library instruction at James Madison University. Students must pass the test before they can move to sophomore status. This testing process relies on a collaborative model between JMU Libraries, the General Education program, and the Center for Assessment Research Studies (CARS). On the national level, the recently created Threshold Achievement Test for Information Literacy (TATIL) is based on the ACRL Framework for Information Literacy and in four test modules measures both information literacy knowledge and dispositions. TATIL was created by librarians and other educators and can be used to guide instructional program changes, for external and internal reporting and to give students recommendations for improving their information literacy. The decision to use a test and to choose which approach to take can be informed by comparing the benefits and limitations of these testing options.

Tests have been used to assess information literacy for many years. Whether it is a quick test created for local use after instructional sessions, an institutional test to ensure that skills have been acquired or for longitudinal study of student knowledge, or a standardized test offering multi-institutional comparisons of results, this assessment method has a long history and a strong presence in library assessment. This paper explores two types of fixed-choice tests, one locally created and one commercially sponsored, which can be used for program improvement.

Fixed-choice tests are one method among many for assessing achievement and ability. The benefits and limitations of standardized tests are well documented.[1] Despite criticisms, tests are in wide use by colleges and universities, professional organizations, and testing companies. Well-written tests are effective, versatile, and can measure both lower-order and higher-order thinking skills.[2] Fixed-choice tests are relatively easy to administer and use a format that students are familiar with. They offer an efficient way to conduct large-scale assessment and typically provide results both for individual students and for groups of students such as seniors, science majors, or student athletes. Test results facilitate comparisons among groups and across time and ideally suggest improvements to instruction programs that will lead to improved learning outcomes.

Fixed-choice tests come with challenges and assumptions as well. For information literacy testing that is not graded as part of a course, test-takers may lack the motivation to try their best, thereby producing results that do not fully reflect their knowledge and abilities. Test designers can address this challenge with appropriate messages and other techniques. Costs associated with testing can act as a barrier, whether those costs are time, expertise, or money.

Locally-Created Tests: James Madison University's MREST

At James Madison University, first-year library instruction is handled via a tutorial-test model within the General Education program's foundational skills courses. The tutorial, Madison Research Essentials, is a combination of video tutorials followed by practice exercises. The test, Madison Research Essentials Skills Test (MREST), is a requirement that all students must successfully meet or face an administrative hold blocking them from sophomore registration. While the tutorials are conceptually presented to cover the outcomes, the test tries to push students to apply the covered concepts with scenarios that compare to real student information literacy challenges.

Approximately 6,000 first-year and transfer students complete the test annually. Data are analyzed for trends in student achievement and areas for improvement. We use MREST scores and subscales to determine which objectives students are struggling with and we make tutorial changes accordingly. By requiring all students to meet this standard, we are setting a competency standard that must be met by the end of the first academic year.

A shorter version of the MREST, InfoCore is one of a battery of tests given on JMU Assessment Days. Incoming first-year students take assessments as a part of their orientation prior to classes and again after completing three semesters. The InfoCore allows us to compare change over time; students do not arrive at JMU with information literacy skills and we show that they make significant gains from first year to sophomore year. This pre-/post-test model, specifically with the same sample of students, shows the gains JMU students are making in this learning domain. Comparing the same cohort of students from first-year to sophomore shows that we are making gains in each objective, some very significant.

These efforts rely on a collaborative model between JMU Libraries, the General Education program, and the Center for Assessment Research Studies (CARS). JMU offers a PhD in assessment and measurement, which creates access to psychometric experts and graduate students.

We follow this learning cycle model:
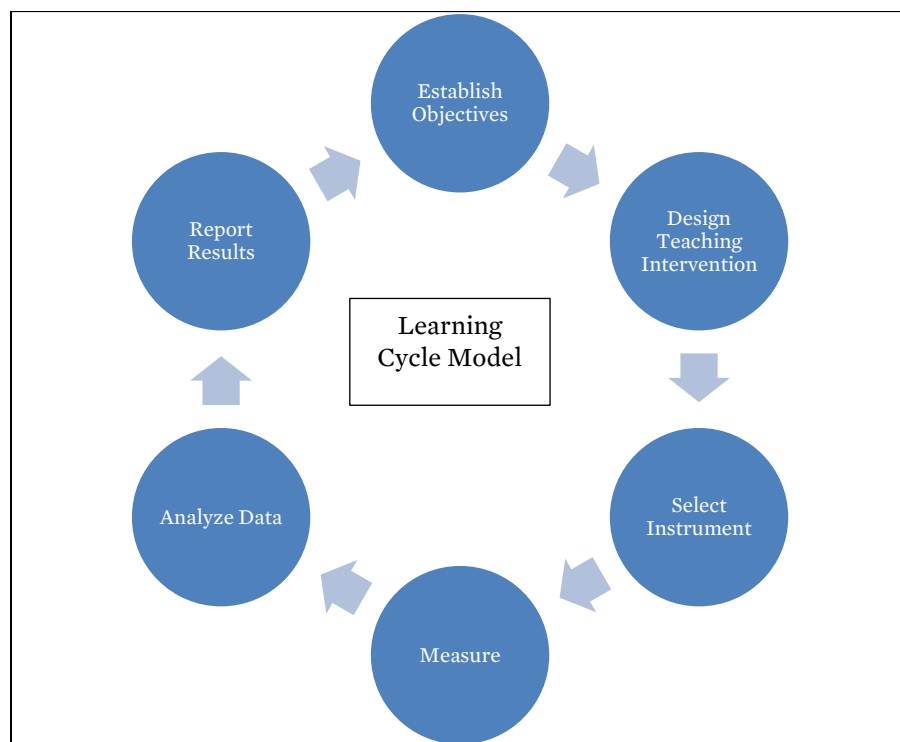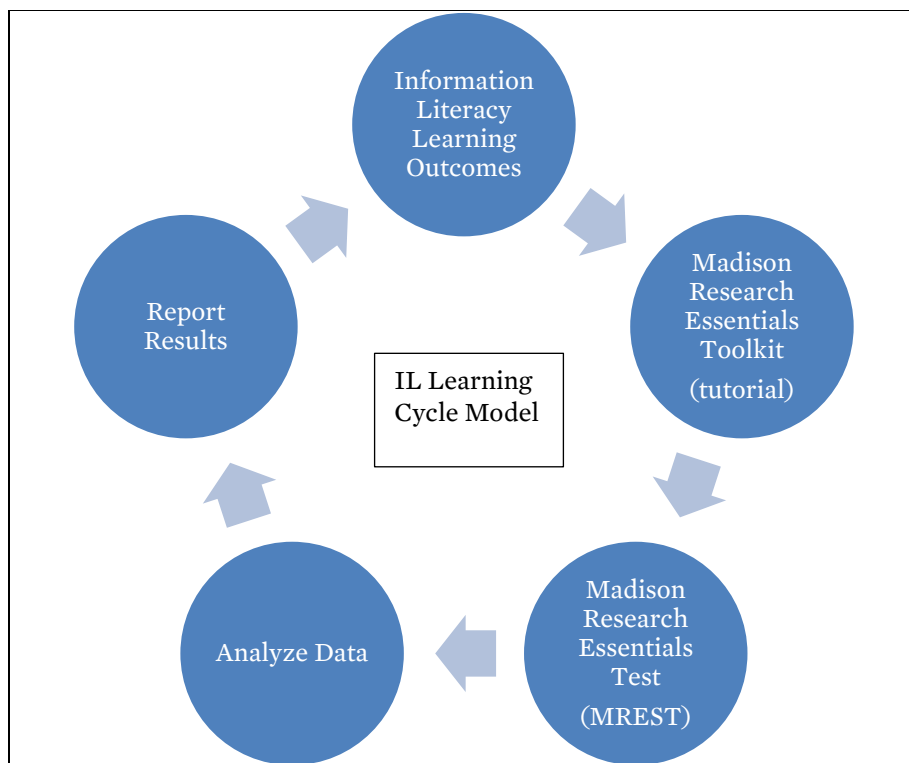
At each level in the cycle, attention is paid to adhering to the outcomes. JMU's information literacy learning outcomes are based on ACRL's Framework for Information Literacy for Higher Education[3] and are a part of the JMU's General Education curriculum. These outcomes are as follows:

- Recognize the components of scholarly work and that scholarship can take many forms.
- Demonstrate persistence and employ multiple strategies in research and discovery processes.
- Identify gaps in their own knowledge and formulate appropriate questions for investigations in academic settings.
- Evaluate the quality of information and acknowledge expertise.
- Use information effectively in their own work and make contextually appropriate choices for sharing their scholarship.
- Use information ethically and legally.

Incoming students are introduced to the outcomes in the Human Communication course that they must complete in their first year. This course was chosen as the most common course of the core for which students rarely arrive with transfer credit (unlike first-year composition). Students are assigned to view a series of tutorials (available here: https://www.lib.jmu.edu/mretoolkit/), which are also embedded into the course management system (Canvas) for all sections of the SCOM100-level courses (75 sections in the fall, 55 sections in spring). Also embedded in the courses are practice exercises that allow instructors to assign grades and give students an opportunity to practice. After completion of the tutorials, students are directed to complete the Madison Research Essentials Skills Test (MREST). The MREST is given in a proctored computer testing lab and is the only location where students can take the test. Students must meet a competency score or pass at the advanced level, and students are provided their scores at the end of the test. Students who do not pass can take the test as many times as they need to until they pass. Interventions are in place for students who require more assistance. Most students meet the standard by their second attempt. The test is delivered via a homegrown testing platform, Green Test System. The creation of this platform was

driven by the need to be able to do item performance analysis to ensure the test is reliable and valid. New content or test items are regularly added to the test platform. New items sit on the test as unscored items for a full year so that our psychometric experts can ensure that items are performing effectively and well. Items that do not meet performance indicators are not put on the scored test. This model allows us to reach every student every year with foundational skills. Students who continue at JMU will meet their liaison librarian when they take a research methods course in their major.

The effort is quite remarkable and takes a distributed team of experts to make it work on such a large scale. The first year librarian is responsible for tutorial design and test item writing. Faculty who teach in the basic communication course share their courses with this librarian and she puts all content into their online courses prior to the beginning of the semester. The Center for Assessment Research Studies is home to a programmer who is responsible for the Green Testing System. This programmer works closely with the team that manages the Assessment Testing Lab. He is also responsible for gathering data to report on how students are doing on the test for year-end reporting. General education administrative staff then upload scores onto student transcripts.

The InfoCore measures similar skills but is not a high-stakes test, as there is no reward for doing well on this test. But we can show what set of skills students arrive with and how they change over the course of three semesters. Student scores consistently go up across all objectives as shown below. (Note, this version of InfoCore was based on the ACRL Competency Standards for Information Literacy for Higher Education.[4])

INFOCORE % Correct by Objective
Fall 2016 – Spring 2018 Cohort
N = 288
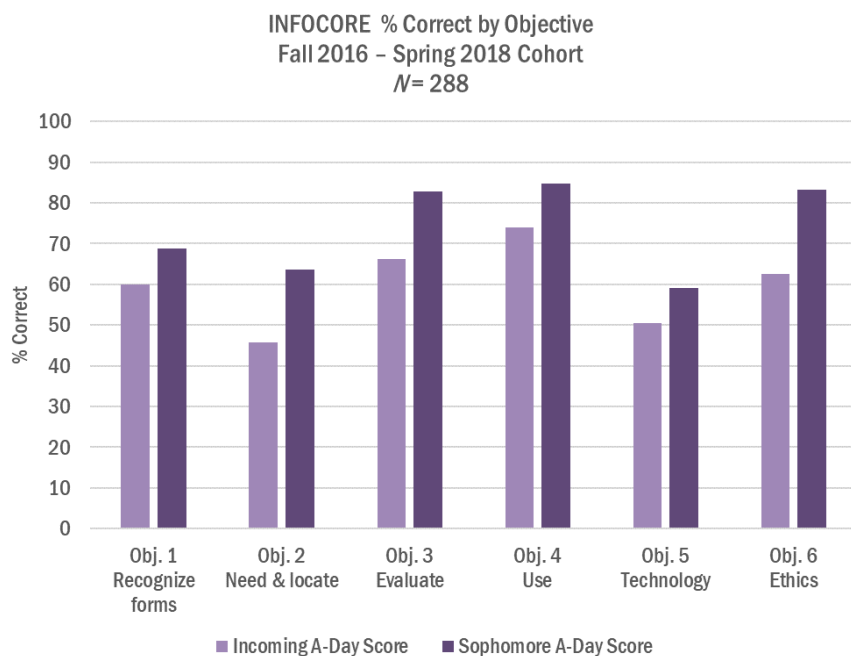
By using some student demographic data, we have been able to find three populations of students who struggle with the MREST; transfer students, international students, and athletes have proven to have more difficulty than average. Interventions have been designed for athletes and international students as they have some special assistance offered to them at JMU. Transfer students are proving more elusive as they typically bounce into majors as they arrive on campus. Our liaison librarians are working with academic departments to help locate those students and provide additional assistance if necessary. We have also discovered where not to apply resources; in 2014, we discovered that students who either never attempt or do not pass the MREST do not return to JMU for their sophomore year. This observation allowed us to make a case for not designing interventions for students who are not able or will not return to JMU.

A team of faculty including the first year librarian, the foundational skills director, and faculty from the Center for Assessment and Research Studies spend about a month analyzing data from the MREST and InfoCore each summer. We have worked hard to make our reports meaningful and easy to digest, and they are used to ask for resources and tweak our process. The work of writing these reports has paid off; we are being used as a model for assessment reports for other parts of campus.

The drawback to using this model of first-year information literacy instruction is that we do not have anything to compare our students to. We have recently been talking to the creators of TATIL (Threshold Assessment Test for Information Literacy) to see how JMU might be able to compare our scores to national averages or to peer institutions.

In 2018, Virginia's State Council for Higher Education (SCHEV) released a new reporting mandate for public institutions in Virginia. Each institution will be required to report on four learning domains that are standard (civic engagement, writing, critical thinking, and quantitative reasoning) but schools can choose to add additional learning domains. JMU has chosen to include information literacy in a suite of reported learning domains and will use information literacy as one of the first reporting domains, along with quantitative literacy. Schools are being encouraged to make their assessment results easy to find and to understand in order to increase transparency for multiple constituencies, including students and parents.

Commercially-Sponsored Tests

Several standardized tests for information literacy have been developed in the past two decades, spurred by the publication of information literacy standards by the Association of College and Research Libraries in 2000. Commercial tests include iSkills from the Educational Testing Service (discontinued in 2016), Information Literacy Test (ILT), Standardized Assessment of Information Literacy Skills (SAILS), and the Threshold Achievement Test for Information Literacy (TATIL, https://thresholdachievement.com). The ILT was developed at James Madison University and is now licensed to and available commercially from Madison Assessment (https://www.madisonassessment.com/assessment-testing/information-literacy-test/). It is not related to the MREST, described above. SAILS tests were created at Kent State University and are available from Carrick Enterprises (https://www.projectsails.org/site/), which also created TATIL. This section of the paper focuses on TATIL because it is the most current test. It was inspired by the threshold concepts, knowledge practices, and metacognitive approach of the ACRL information literacy framework.

The Threshold Achievement Test investigates college students' information literacy on two dimensions: knowledge and dispositions. The test separates the broad construct of information literacy into four subconstructs that are presented in individual test modules.

Development Process for the Threshold Achievement Test for Information Literacy

The creation of TATIL was the work of Dr. April Cunningham, a community college librarian who served as project leader, and an advisory board of librarians and other educators, with support from Carrick Enterprises. Preliminary work included building consensus on what is expected of students' information literacy throughout their college careers, studying the ACRL Framework for Information Literacy for Higher Education to decide what information literacy concepts the test would address, and writing performance indicators. The performance indicators served as the basis for each knowledge test question. Details about the test question development process are available on the Information Literacy Assessment blog (see https://www.informationliteracyassessment.com/?p=1001).

A unique feature of TATIL is the attention given to information literacy dispositions, a key element of the ACRL Framework document. The creation of disposition questions for TATIL began with an analysis of the language of the Framework by Hal Hannon, as described in his blog post here: https://www.informationliteracyassessment.com/?p=739. Dispositions hold great promise for strengthening understanding of student information literacy and promoting the transfer of learning from one information literacy challenge to a novel task or process. In TATIL, dispositions questions are scenarios that include an information literacy challenge with test-takers evaluating a series of possible strategies for addressing the

challenge. There are no correct answers; the way a student responds to the strategies indicates how strongly disposed they are to certain approaches.

TATIL Modules

Each of the four test modules of TATIL focuses on one or two well-defined information literacy constructs. Information about each module, presented below, is reprinted from a blog post by the second author. See https://www.informationliteracyassessment.com/?p=1405.

Module 1: Evaluating Process and Authority

This module combines concepts from two of the ACRL information literacy frames, **Authority is Constructed and Contextual** and **Information Creation as a Process**. It focuses on the process of information creation and the constructed and contextual nature of source authority. It assesses how students understand and value authority, how they define their role in evaluating sources, and how they perceive the relative value of different types of sources for common academic needs. It also explores students' metacognition about information literacy dispositions that underlie their behaviors.

Knowledge Outcomes
- Apply knowledge of source creation processes and context to evaluate the authority of a source.
- Apply knowledge of authority to analyze others' claims and to support one's own claims.

Dispositions
Students who can evaluate sources based on the processes used to create them are more likely to critically examine the authority of information within a given context, rather than simply using a one-size-fits-all judgment of credibility. Since the credibility of a source is not absolute or stable, and varies, for example, by discourse community, students must be (1) mindful about the processes used to create the information, (2) comfortable with the fact that the same sources may be considered authoritative in one context but not in another, and (3) responsible to their academic community in looking beneath surface-level markers of authority. The test assesses how students understand and value authority, how they define their role in evaluating sources, and how they perceive the relative value of different types of sources for common academic needs.

Disposition 1: Mindful self-reflection
Learners who are disposed to demonstrate self-reflection when they are evaluating sources of information consistently question their assumptions about what makes a source authoritative. Example behaviors:

- Looking for features that challenge one's assumptions about the trustworthiness of one's preferred sources.
- Questioning one's own assumptions about the reliability of traditional forms of scholarly authority.
- Recognizing when there are good reasons to change one's position on an issue.

Disposition 2: Toleration of ambiguity
Learners who are disposed to demonstrate toleration for ambiguity when they are evaluating sources of information treat authority as subjective because it is based on the context of the information need. Example behaviors:

- Deciding what to do when authorities disagree.
- Flexibly using traditional and non-traditional information sources at appropriate points in the research process.
- Treating authority as a flexible concept when information needs can only be met with less traditional sources.

Disposition 3: Responsibility to community

Learners who are disposed to demonstrate a sense of responsibility to their community when they are evaluating sources of information are conscientious about how they invoke authority in order to gain credibility with their audiences. Example behaviors:

- Fulfilling one's responsibility to one's discourse community by using sources carefully.
- Recognizing that the sources one is permitted to use will depend on one's discourse community.
- Taking responsibility for critically evaluating and explaining sources' authority to one's audience when stating and standing by their claims.

Module 2: Strategic Searching

This module relates to the ***Searching as Strategic Exploration*** frame. It focuses on the process of planning, evaluating, and revising searches during strategic exploration. It tests students' ability to recall and apply their knowledge of searching. It also explores students' metacognition about information literacy dispositions that underlie their behaviors.

Knowledge Outcomes
- Plan, conduct, evaluate, and revise searches to achieve relevant results.
- Compare and contrast a range of search tools.

Disposition

Students who are strategic searchers are more likely to develop a broad repertoire of search techniques because they learn from trial and error and pick up strategies from observing their professors, librarians, and peers. Since searching involves exploration and uncertainty, students must be persistent in order to sustain their searches despite difficulties and frustrations. A disposition toward productive persistence means that students are more likely to satisfy their information needs and keep searching until they find high-quality sources. The test assesses how students understand and value exploration and how they define their role as a searcher.

Disposition 1: Productive persistence

Learners who are disposed to demonstrate productive persistence during their searches for information approach searching as iterative and not linear by employing alternative strategies and learning from mistakes. Example behaviors:

- Adapting and evolving new strategies rather than clinging to familiar search techniques.
- Handling feelings of frustration that commonly surface during the search process.
- Recovering from a failed search in order to continue searching until the information need is satisfied.
- Taking constructive assignment feedback from instructors as an impetus to continue searching for better sources.

Module 3: Research and Scholarship

This module combines elements from the ***Research as Inquiry*** and ***Scholarship as a Conversation*** frames. It focuses on the knowledge-building process and how scholars build knowledge. The test addresses students' ability to apply the research process to their college work in order to participate in the scholarly conversation and assesses how students understand and value their role within the scholarly community. It also explores students' metacognition about information literacy dispositions that underlie their behaviors.

Knowledge Outcomes
- Understand the processes of scholarly communication and knowledge building.
- Understand stages of the research process.

Dispositions

Students who value the role of the research process in building knowledge are more likely to embrace all challenges of the research process, particularly the difficulties of conflicting information and contingent answers because they see research as a process of asking new and better questions as their research progresses. Since research is an iterative process with uncertain outcomes, students must be (1) mindful about the temptation to have their biases confirmed, (2) persistent through the setbacks inherent within the research process, and (3) responsible to their academic community in honoring scholarly ways of knowing and communicating. The test assesses how students understand and value their role within the scholarly community.

Disposition 1: Productive persistence

Learners who are disposed to demonstrate productive persistence throughout the research process approach inquiry as iterative, adjusting their research question as they learn more. Example behaviors:

- Applying appropriate methods/practices of inquiry regardless of their complexity or negative emotional associations (e.g., frustration).
- Committing to building a knowledge base through background research when exploring an unfamiliar topic.

Disposition 2: Mindful self-reflection

Learners who are disposed to demonstrate self-reflection in the context of research and scholarship consistently question their own assumptions as they are challenged by new knowledge. Example behaviors:

- Spending time exploring a topic with openness and curiosity before committing to a thesis or claim.
- Using critiques from professors, librarians, and peers to improve the quality of their inquiry.

Disposition 3: Responsibility to community

Learners who are disposed to demonstrate a sense of responsibility to the scholarly community recognize and conform to academic norms of knowledge building. Example behaviors:

- Identifying and pursuing appropriate ways to enter the scholarly conversation while still an undergraduate.
- Seeking out and following established models of scholarship and inquiry.

Module 4: The Value of Information

This module is inspired by the ***Information Has Value*** frame. It focuses on the norms of academic information creation and the factors that affect access to information. It tests students' ability to recall and apply their knowledge of information rights and responsibilities. It also explores students' metacognition about information literacy dispositions that underlie their behaviors.

Knowledge Outcomes
- Recognize the rights and responsibilities of information creation.
- Recognize social, legal, and economic factors affecting access to information.

Dispositions

Students who value information in terms of its accessibility and its role in knowledge-building are more likely to recognize the rights of information creators and the effects of commodifying information, rather than taking the information they find for granted and using it irresponsibly. Since the Internet has made it seem that information is free to create, access, and share, students who value information must be (1) mindful to spot and challenge the negative effects of inequitable distribution of information privilege and (2) responsible to their community by giving credit to intellectual work according to established standards. The test assesses how students understand and value their role within the information ecosystem.

Disposition 1: Mindful self-reflection
Learners who are disposed to demonstrate self-reflection in the context of the information ecosystem recognize and challenge information privilege. Example behaviors:

- Considering how to use existing intellectual property to spur creative work without violating the creators' rights.
- Participating in informal networks to reduce disparities caused by the commodification of information.
- Recognizing and suggesting ways to reduce the negative effects of the unequal distribution of information.

Disposition 2: Responsibility to community
Learners who are disposed to demonstrate a sense of responsibility to the scholarly community recognize and conform to academic norms of knowledge building. Example behaviors:

- Accessing scholarly sources through formal channels.
- Avoiding plagiarism in their own work and discouraging plagiarism by others.
- Recognizing the value of their own original contributions to the scholarly conversation.

Uses of TATIL

TATIL has been adopted by institutions to achieve a variety of local assessment goals. For example, TATIL results, including peer institution comparisons, are being used by one university to inform preparations for institutional reaccreditation. A librarian at another university used TATIL in a 2-credit hour information literacy class within the general education curriculum. Results revealed gaps in critical thinking and problem solving, resulting in an expansion of the course to three credit hours. Because TATIL was completed in 2018 and is fairly new, additional uses of the test will emerge. We can predict some types of usage based on experience with the Project SAILS information literacy test: to track progress from first year to graduation, to guide changes to information literacy programs and sessions, to start conversations with classroom faculty, and to satisfy demands for quantitative assessment data for external and internal reporting.

Comparing the Two Testing Approaches

In this paper, we described two information literacy tests with an emphasis on test development and use. Below is a summary of the differences between creating a test locally and using a test created by a national organization.

Locally developed tests

- Align with local outcomes and objectives
- Little or no out-of-pocket expenditures
- When done successfully:
  – can serve as a model for other campus units
  – can reinforce the reputation of the library
  – can underscore the value of the library
  – can highlight the contributions of the library to both IL and campus-assessment priorities
  – may offer clear direction for addressing any deficiencies

Commercially sponsored tests

- Require little local testing expertise
- Reflect national standards and practices
- May align with local outcomes and objectives
- Provide context through benchmarking
- May offer a community of users

Questions to guide testing decisions

1. What are your specific assessment goals? What questions are you trying to answer?

2. What information do you need in order to answer those questions?

3. What will you do with the results?

4. How will this assessment project benefit a class, a program, or the institution?

5. Who are your potential campus partners?

6. What resources are available? Consider local expertise in test development and evaluation, staff time, and funding.

7. Given answers to these questions, which assessment tools come the closest to meeting your needs? How can you account for any gaps between what the tools provide and what you need?

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Endnotes

1. See, for example, Allison Erlinger, "Outcomes Assessment in Undergraduate Information Literacy Instruction: A Systematic Review" College & Research Libraries 79, no. 4 (May 2018): 442–79.
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Developing Library Learning Outcomes: Reflecting on Instruction across the Library

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Abstract

In this paper, we will discuss the process by which we mapped, reviewed, and revised our library learning outcomes. We started by surveying all library staff who teach students in classes, workshops, one-on-one sessions, and other venues on a regular basis. We wanted to be as inclusive as possible while limiting our scope to recurring instruction with measurable learning goals, even if those goals were not previously articulated as outcomes. We mapped those outcomes to our existing library learning outcomes to identify strengths and gaps between course- and library-level outcomes. We then organized the course level outcomes into new themes. Throughout our process, we referred to the ACRL Framework for Information Literacy, the Guidelines for Primary Source Literacy, and several digital literacy frameworks. This paper will include the final library learning outcomes we developed, as well as specific examples we provided to help library staff identify how the outcomes apply to their specific instruction. We will discuss our plans for managing the annual assessment of these learning outcomes through our Library Assessment and Research Committee. Last, we will share our experience communicating the impact of our new outcomes with stakeholders both within the library and across the university.

Introduction or Background

Like many academic libraries, our teaching and instruction efforts at DePaul University Library support a wide range of academic departments, introductory and advanced courses, and multiple face-to-face and online formats. We offer programmatic instruction in foundational courses, advanced subject-specific instruction through our liaison program, and specialized workshops and training in a variety of information, primary source, and digital literacy topics. Despite—or perhaps because of—this diversity in instruction, the library recognized a need for a set of holistic learning outcomes to provide a strategic direction for our instruction and assessment efforts across the library.

During the 2017–18 academic year, DePaul University engaged in a campus-wide effort to review program-level learning outcomes in all academic and co-curricular areas. The goal of this project was to ensure all programs had a set of 3–6 learning outcomes that were clearly articulated, measurable, and mapped to the curriculum. This provided the perfect opportunity for the university library to revise our learning outcomes with support from our university's Office of Teaching, Learning and Assessment and buy-in from both library administration and library staff across departments. This process enabled all library staff to reflect on our learning objectives in *every* course we teach in the library, to incorporate professional standards and frameworks in our learning outcomes, and to identify gaps in our outcomes and instruction. It also allowed us to articulate the value of the library to both academic and co-curricular areas throughout the university and demonstrate how the library contributes to student learning.

The library serves on the university's Assessment Advisory Board, which includes representation from all academic departments, as well as the University Center for Writing Based Learning and Student Affairs. The library also serves on the newly formed Co-Curricular Learning Outcomes Assessment Committee, which includes the University Center for Writing Based Learning, Supplemental Instruction, Financial Fitness, and others. Our unique position on both the academic and co-curricular assessment groups has raised awareness of the assessment and instruction work we do in the library. It has also provided us the opportunity to share our experiences, to learn about assessment efforts across the university, and has given us a seat at the table to make decisions about university-wide assessment practices. As part of our membership on those committees, we are required to maintain program-level learning outcomes and to complete an assessment of each learning outcome at least once during our ten-year accreditation cycle. The revision of our learning

outcomes reinforced our commitment to serving on those committees, outcome-based instruction, and ongoing assessment of our work.

Literature Review
Why Write Learning Outcomes?

Learning outcomes have become an integral part of library instruction. There is a wealth of literature on the importance of establishing course-level learning outcomes. Megan Oakleaf, for example, argues, "Learning outcomes are essential for good teaching; they establish the content of instruction, provide a framework for designing pedagogy, and drive meaningful assessments."[1] Learning outcomes ensure instruction programs follow a meaningful plan and have an applied purpose for the student.

They also provide an opportunity to clearly articulate the purpose of the library instruction program to students, faculty, and administrators across the university. These conversations, as well as library participation in institutional assessment efforts, raise awareness of library instruction and assessment and demonstrate their value. Instructors who are familiar with "definitions of information literacy of any type are much more likely to incorporate information literacy concepts into their teaching and to assess for information literacy competencies."[2] In this effort, it is critical that librarians continue to facilitate conversations with faculty about the value of information literacy instruction. Framing our work through learning outcomes provides an opportunity to do so in terms with which faculty are familiar.

Finally, the development of learning outcomes and assessment of information literacy competencies is increasingly required for accreditation purposes. Sanders analyzed the role of information literacy in regional accrediting bodies and found that they "all seem to place a high value on the skills associated with information literacy."[3] In addition to the implicit value of learning outcomes instruction and assessment thereof for libraries and their instruction programs, there may also be external requirements that libraries continue to pursue these endeavors. Ziegenfuss, Harp, and Borrelli suggest that "institutional culture and context" has a direct impact "on the ability of an organization to come together around designing, assessing, and disseminating SLOs."[4] The inclusion of information literacy in accreditation requirements has increased institutional pressure to develop and assess learning outcomes in library instruction, as well as related content within the courses, providing opportunities for librarians to collaborate with faculty in course and assignment development.

How to Write Learning Outcomes

We set out to revise our learning outcomes at a time of significant change in the way our professional organizations define and implement learning strategies. We knew we wanted to bring in three tenants of literacy to learning outcomes: information literacy, primary source literacy, and digital literacy. When the Framework for Information Literacy for Higher Education was released in 2015, librarians got to work identifying how to translate these knowledge practices or dispositions into learning outcomes. In the introduction to the framework, the task force explicitly states, "Neither the knowledge practices nor the dispositions that support each concept are intended to prescribe what local institutions should do in using the Framework; each library and its partners on campus will need to deploy these frames to best fit their own situation, including designing learning outcomes."[5] As such, we looked to the framework as a guide and reference, but adapted it to our local needs. We similarly brought in examples from the Guidelines for Primary Source Literacy and the digital literacy learning outcomes listed in our university's College of Computing and Digital Media programs.

While there is no single recommended procedure for developing learning outcomes in libraries, there are a few helpful resources available. Falcone and McCartin recommend a 3-step process for developing learning outcomes: brainstorm, draft, and be critical. They suggest using sticky notes with specific local examples or concepts from the Framework on a board to identify themes and organize the specific outcomes under them. They emphasize the importance of the reflection and editing process and encourage libraries to be inspired by the Framework without pressure to incorporate every piece of it.[6] Similarly, Megan Oakleaf lays out a "roadmap" to develop learning outcomes from the framework following the basic formula, "The student will

be able to + Active Verb."[7] This formula is a requirement of our university's Assessment Advisory Board as well. To assist with the development of active verbs, we regularly referred to the well-known Bloom's Taxonomy.

Methodology

As we undertook this yearlong project, we wanted our review and revision process to be as comprehensive as possible. We determined that our new learning outcomes should not only reflect what we were currently doing, but also be proscriptive in areas where we wanted to expand our teaching efforts. To meet these expectations, our plan rolled out in several phases: data collection, mind mapping, determination of themes, and finally synthesis and construction of new outcomes.

The first phase was data collection. We cast a wide net, querying the entire library staff with the following two questions: (1) What classes/workshops do you teach? and (2) What are the learning outcomes for those classes? We asked people to exclude one-time classes as well as learning opportunities for faculty and staff, as we were only gathering information about ongoing student learning. We did not provide training or further instruction on writing course-level learning outcomes, as we wanted to capture how our library instructors describe the outcomes for their own classes without interference.

The email was sent to everyone for two reasons: to make sure we did not unintentionally miss anyone, and for marketing and communication purposes. We wanted to ensure the entire library was aware that revising our learning outcomes was a university-wide initiative and we wanted library-wide buy-in from the beginning. We followed up with those staff who we knew were involved with instruction, including our instruction librarians who teach in first-year writing courses, our subject librarians who work with advanced and graduate level students, special collections librarians, and our information technology librarian, who was involved in designing instruction around our makerspace.

From this group, we collected course-level learning outcomes where there had been established curricula and expectations, understanding that these expectations may not have been formally described as "learning outcomes." We gathered approximately 215 individual learning outcomes from 15 unique staff members. In committee meetings, we de-identified the learning outcomes from the librarians who submitted them and removed them from the context of the class in which they were used. Many of the outcomes were identical (or almost identical) to each other, with phrasing like: "the student will be able to distinguish between popular and scholarly sources," or "the student will be able to conduct article searches in **Database X** using appropriate limiters and advanced search options." We removed these duplicate and almost-duplicate statements, gathered together outcomes with similar themes, and identified overarching ideas that ran through the individual learning goals. The committee devised categories to organize the goals with terms including: search, evaluate, and inquire. Many of these themes fit in well with the outcomes that we already had. However, some were new, and needed thought and structure to incorporate into our framework.

In order to help us categorize our new learning objectives, we looked to standards from national organizations including the Association of College and Research Libraries' **Framework for Information Literacy for Higher Education**, the Society of American Archivists' **Guidelines for Primary Source Literacy**, as well as various other organizations' sample outcomes for Digital Literacy, like Media Smart's **Digital Literacy Fundamentals**, and digital literacy learning outcomes listed in our College of Computing and Digital Media programs.

After each committee member reviewed the learning outcomes as well as the professional guidelines, we separately came up with our own organizational structure and then worked together to refine our product until we were satisfied. We drafted the language of the final learning outcomes together over the course of two working meetings. By this point, we had a clear idea of what we hoped to articulate and a structure of course-level outcomes to refer to, so we were easily able to find consensus among the group. As we composed the outcomes, we repeatedly referred to Bloom's Taxonomy to ensure our outcomes were

measurable and matched the level of complexity we could aspire to, but also that we could reach in a one-shot session.

The process that began in the fall of 2017 resulted in the adoption of five new learning outcomes in the spring of 2018.

Final Product

Our work resulted in five high-level learning outcomes that apply to all areas of library instruction. We also included specific examples under each outcome to demonstrate how the course-level outcomes library staff had provided and our professional standards fit into those broader outcomes (see Appendix A). The final learning outcomes are:

- Students engaging with university library services, workshops, and events will be able to:
    – Explain the socio-political landscape of information, including who creates it, who controls it, and where to find it.
    – Articulate the value of information inquiry.
    – Develop effective search strategies for finding information.
    – Evaluate the appropriateness of information sources based on their format, structure, and purpose.
    – Compile information ethically, following the standards of a scholarly discipline.

Implementation

With outcomes that more accurately reflect what the library was both currently doing, as well as what the instruction program should prospectively be working toward, we then set out to publicize the new learning outcomes both internally and externally.

In order to promote our new outcomes externally—to faculty and administrative stakeholders outside the library—we began with a presentation for the library review board, an organization of faculty members who advise on various library-related initiatives. The presentation described how the library was part of the campus-wide initiative for revising all department-level learning outcomes as well as presenting the outcomes themselves and the assessment plan. Then, we wrote a library blog post for the faculty newsletter describing the project, reaching a larger audience beyond the library review board. We additionally added the learning outcomes to our library website with full reports for all learning outcome assessment projects that the library completed for our old learning outcomes and space to add our future assessments of the new outcomes. All of these efforts reinforced the fact that the library is actively involved with teaching students, and that teaching is an essential service provided by librarians.

Internally, we organized a workshop for library staff over the summer, requiring attendance for all instruction librarians, but also inviting any other interested staff. Committee members led guided discussions in groups of five or six for each of the learning outcomes. Questions were asked whether any of the outcomes were confusing or surprising, or if people could share moments in their own teaching where these outcomes were used. Attendees moved through the different groups, spending 15 minutes in a discussion of each of the five library learning outcomes. The goals of the workshop were to familiarize everyone with the new outcomes, and to address any fears or uncertainties around them.

While many of our final outcomes were familiar to our instruction staff, adhering to the university requirements that each of the outcomes be assessed at least once in 10 years means that all of our librarians who are involved in instruction need to be aware of the outcomes and actively thinking about ways to assess our work with each class taught. Through these sessions, both internal and external, we emphasized that we were part of a larger university-wide plan to revise our learning outcomes, just as academic departments had undertaken to revise their learning outcomes.

Next Steps

According to university guidelines, each outcome must be assessed at least once in a ten-year cycle. Oversight of this part of the project has been folded into the work of the Library Assessment and Research Committee (LARC), a standing library committee. Chaired by the assessment and marketing librarian, LARC is charged with—among other things—coordinating, advising, and assisting with library assessment and research initiatives. LARC is committed to soliciting projects from departments and librarians involved in teaching, and to assist with the data gathering and reporting out as needed. The committee includes diverse representation across the library and will ensure the annual learning outcomes assessment project is conducted by different individuals or departments each year. In addition to ensuring the work is fairly distributed among library staff, this shared responsibility will increase awareness of the ways the learning outcomes are implemented in instruction, as well as familiarity and confidence with assessment best practices.

In order to keep the new outcomes at the front of the minds of the instruction librarians, we will discuss the outcomes and assessment projects at relevant meetings and workshops. The Winter Instruction Workshop is a yearly event for the instruction librarians to come together to discuss any new trends in instruction and new technologies for the classroom experience. Putting the revised learning outcomes on the agenda for this workshop will help keep instruction librarians focused on these department-level goals.

With a project like this, it is always possible that the work will be forgotten, and that instruction—which can seem to run on autopilot during the busy times in the academic year—will continue as it has in the past. In order to ensure this does not happen, we have established systems and committees in place that can counter those trends of inertia.

Endnotes

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Appendix A: DePaul University Library Learning Outcomes with Examples

Students engaging with University Library services, workshops and events will be able to:

1. **Explain the socio-political landscape of information, including who creates it, who controls it and where to find it.**

   a. Identify the unique ways libraries and repositories organize, preserve and provide access to information.

   b. Describe their responsibilities as consumers and creators of digital content.

   c. Seek guidance from experts, such as librarians (ACRL 2016)

   d. Understand that archives and special collections exist and are there to be used (SAA Guidelines for Primary Source Literacy)

   e. Understand the policies and procedures that affect access to primary sources and that these differ across repositories, databases, and collections (SAA Guidelines for Primary Source Literacy)

   f. Understand how knowledge and information is created and disseminated within a specific discipline

   g. Understand the methodology behind how data is collected

2. **Articulate the value of information inquiry.**

   a. Develop an appropriately scoped inquiry

   b. Recognize that research is an iterative process

   c. Break down complex inquiries into discrete steps/pieces

   d. Revise their inquiry based on information acquired

   e. Use background sources, prior knowledge, statistics or data, and other contextual information to explore the topic.

3. **Develop effective search strategies for finding information.**

   a. Identify key tools and research methods for information gathering within a discipline.

   b. Apply different types of searching language appropriately (keywords, controlled vocabulary, Boolean).

   c. Prioritize which information tool (e.g., databases, etc.) will be able to provide the most appropriate content in their research inquiry.

   d. Adapt their search strategy based on the information system they are using to optimize its capability.

   e. Use archival finding aids to find and locate primary sources within an archival collection (SAA Guidelines for Primary Source Literacy)

4. **Evaluate the appropriateness of information sources based on their format, structure, and purpose.**

    a.   Evaluate reliability, validity, accuracy, timeliness, and point of view

    b.   Differentiate between popular, scholarly, and trade publications

    c.   Distinguish between primary and secondary sources

    d.   Understand the importance of the chronology, creator, audience, format, and visual attributes of a primary source. (SAA Guidelines for Primary Source Literacy)

    e.   Understand how authority is constructed.

    f.   Understand components of citation

5. **Compile information ethically, following the standards of a scholarly discipline.**

    a.   Create a narrative from multiple sources. (SAA Guidelines form Primary Source Literacy)

    b.   Organize and store information from multiple sources in a deliberate way.

    c.   Explain the importance of using information, including data, ethically and legally.

    d.   Understand that all information is building on previous information and that they contribute to that cycle.

Where Do We Grow from Here? Assessing the Impact of a Digital Media Commons on Student Success

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Assessing the impact of library spaces and instructional support services on student success is a fraught task for many reasons. "What is student success?" "How do we measure it?" "What objectives are driving the data collection process?" and "How will the data collected be used?" are all questions that foreground any attempt at measuring the correlation between a library space or service and a student's successful matriculation. But, as fraught with risk as the process of measuring that correlation may be, assessment is a necessary component for charting the growth and institutional effectiveness of any program, space, or service offered to a modern library user, especially in the fiscally conservative arena of academic libraries.[1] In our case, we must measure the University of North Carolina at Greensboro's Digital Media Commons (DMC) to chart a path for its growth. For this study, we are not drawing a direct correlation between library instruction and/or use with student grades or retention statistics. Instead, this study seeks to gauge perceived user experiences, taking a patron-driven approach to planning and pedagogy. Approaching its seventh year of existence, the DMC must respond to the rapidly changing instructional environment for which we originally hoped the space and service would be an innovative intervention. The paper presented here is an assessment project conducted to measure patron perceptions of the effectiveness of the DMC's space, instructional support, and customer service performance for the academic years 2017–18 and 2018–19. This mixed-methods study uses qualitative and quantitative data to measure user experience, the perceived value of our service and its impact on our patrons, and the effectiveness of our teaching model in relationship to professors' desired student learning outcomes. The assessment tools used to measure the DMC's effectiveness were: a faculty survey administered during the 2017–18 academic year, a customer service survey administered directly to DMC patrons during the spring and fall semesters of 2018, and two student focus groups facilitated fall 2018. The results garnered from this study will help us improve our users' experience and chart future space and facilities planning. What follows is an overview of the mission and history of the Digital Media Commons that will provide context for this assessment project, followed by a presentation of the results for each measurement studied. This article will conclude with a summary of our preliminary findings along with suggestions for future research and program development.

Background for Study

The DMC is an instructional support service and digital technology commons located in Jackson Library at UNCG. Charged with a mission to provide space and access to digital composition resources for university users across campus, the DMC supports its broad mission and patron base by providing space, technology, and expertise for creative activities including greenscreen filming, studio photography, podcasting, and 3D scanning and modeling. The DMC also checks out digital production technology, provides individual and group instruction on how to use and choose digital composing technologies, and provides face-to-face troubleshooting assistance for some of the most commonly used digital composing software products in academia.

The DMC was opened in 2012 and was originally conceived of the year prior as a collaboration between the University Libraries and the Multiliteracy Centers then operated by the now defunct Communications Across the Curriculum (CAC) Program at our university.[2] A survey of students conducted in 2010 indicated that, although they often had assignments requiring videos and other media, there was no support on campus to assist them. The University Libraries provided the space, technology, and staffing for a digital technology center (now known as the DMC) and CAC provided staff and technology for a digital literacy center (now known as the Digital ACT [Action, Consultation, and Training] Studio or DACTS). The library's digital technology center was to provide functional literacy ("how-to") assistance and access to emerging digital design technologies, and the digital literacy center would provide rhetorical and critical literacy ("how does this look?") feedback consultations to university users engaging with technology as academic users.

Together, these two services, open to all students, faculty, and staff on campus, were supposed to use the DMC to help UNCG become more effective digital composers. This two-pronged approach envisioned Selber's[3] functional, critical, and rhetorical literacies as two separate services that needed the same physical space to operate but could use two entirely separate service models to do so. The problems engendered by this oversimplified initial plan were written about by multiple authors and partially remedied by a space redesign in 2015 that gave the digital literacy center space to brand itself separately, and foregrounded writing and digital studio pedagogy into its design and programmatic service model.[4] The 2015 renovation also allowed the DMC to add two new active learning spaces to its existing footprint and explore the pedagogy of making through its service offerings.[5]

Since this 2015 renovation, DMC service activities have expanded dramatically and there is much to be learned from that transition. The DMC's workshop offerings have expanded with the introduction of 3D making and production workspace to the department. Since its opening day, the DMC has operated on a patron-driven service model that has created a responsive learning environment and work-culture for UNCG patrons. In the past, we conducted an unpublished self-study by a library graduate assistant,[6] given students pre- and post- workshop surveys, conducted patron focus groups, solicited faculty surveys, and used desk statistics to chart our path. This study, however, is the first effort to assess thoroughly to determine the impact of the Digital Media Commons on student success and improve it as a space and instructional support service focused on digital literacy. The data will be used to align the DMC with the university library's developing master space plan and coordinate the department's instructional support efforts with the library's broader information and digital literacy initiatives. The data presented here may also be useful to peer institutions and researchers interested in assessing active learning spaces focused on digital literacy and instructional technology.

Faculty Survey

The assessment began with a survey of faculty who had brought their classes to the DMC for instruction in fall 2017 or spring 2018. The survey sought to determine what kind(s) of projects they assigned to their class and the learning goals of the project, if the project met their expectations, and their satisfaction with the instruction session. It then asked if they recommended or required their students to follow up in the DMC by using equipment spaces or scheduling a consultation with staff and if they would use the DMC services again.

The survey was sent to a total of 28 instructors and 12 responded. Results indicate a variety of types of projects, with presentations and videos being the most common:

What type of media was required for the assignment?

Video	Presentation	Web Page	Audio	Text/Image	3D Object	E-portfolio	Other
4	5	4	2	4	1	0	3
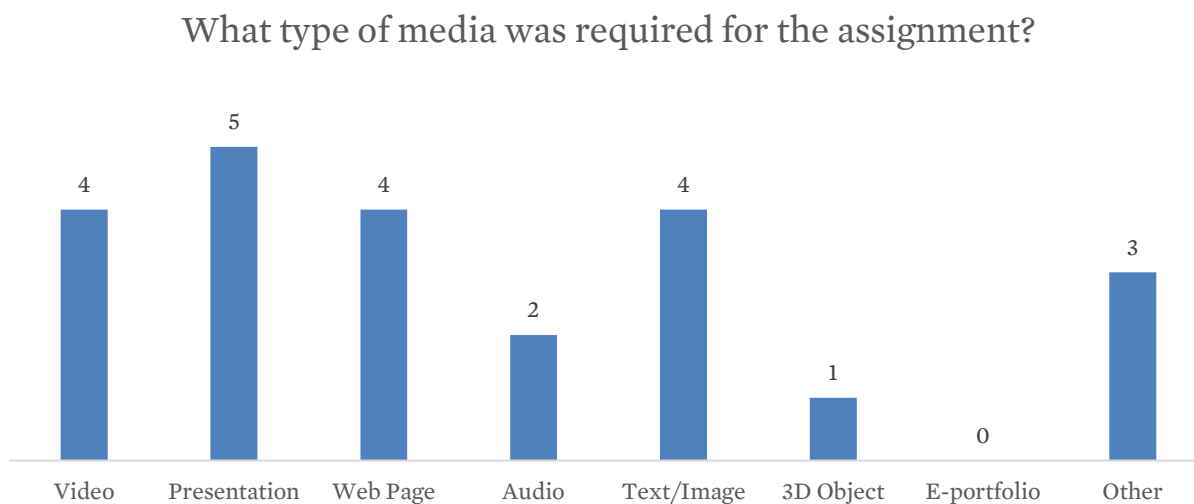
Response to the question about requiring or recommending follow-up from DMC staff or using the equipment indicates that most recommend a consultation and do not often suggest other services.

What type of follow-up did you recommend or require from students?
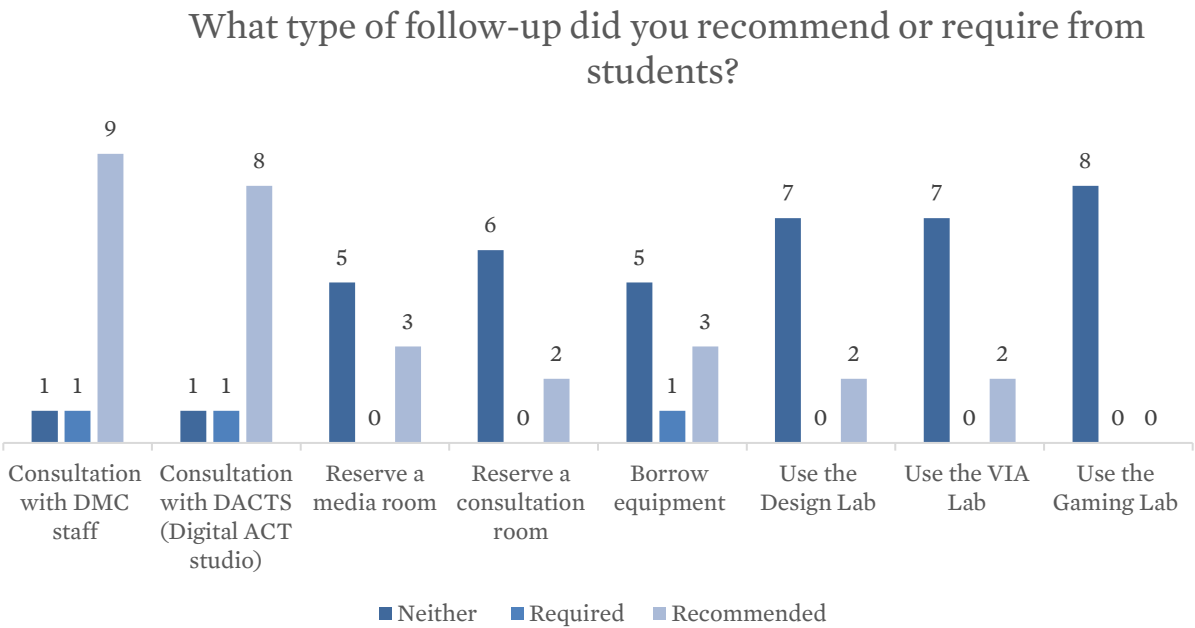
Faculty provided positive feedback about the quality of their students' projects, with the majority indicating that students met or exceeded expectations in most applicable categories:

Did students meet expectations?
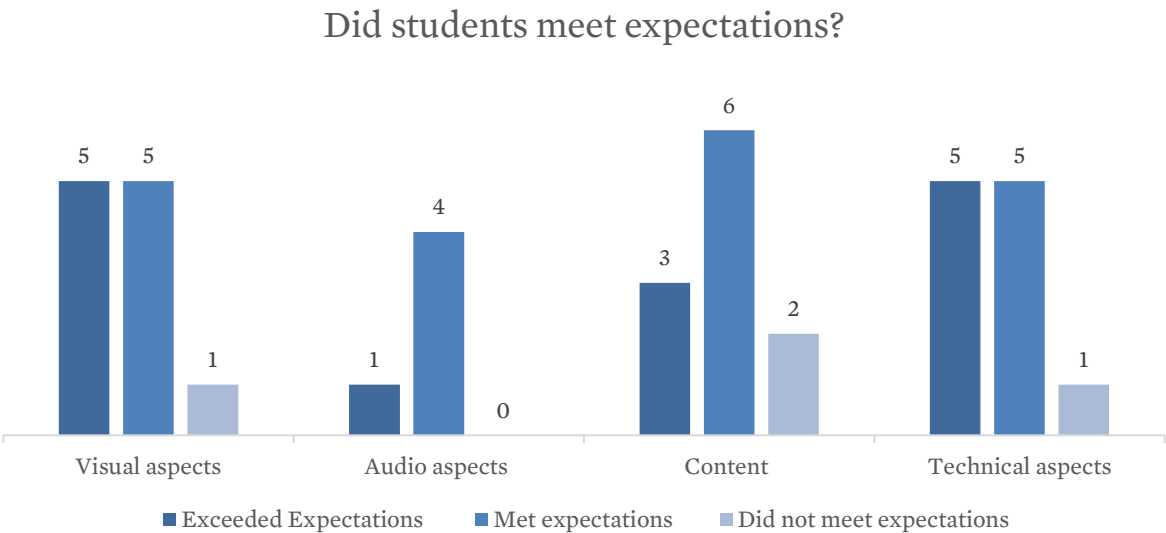
Faculty were also mostly positive about the quality of the presentations provided by DMC staff, with most agreeing that the session was effective or very effective:

Please provide feedback on the instruction session(s) you received from DMC
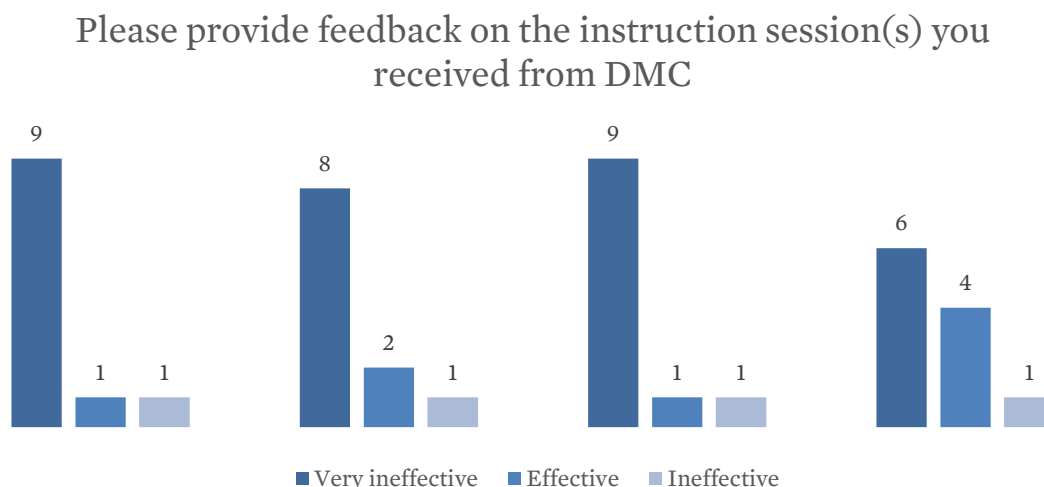
Comments about the instruction sessions included:

"The session with the DMC was central to the success of my students."

"Invaluable to this—I could not teach the class in this way if it weren't for the DMC."

Additional comments included:

"DMC and DACTS staff bent over backwards to support my course and the work of the students."

"One of the best resources for faculty and staff at UNCG!"

Customer Service Survey

A customer service survey was conducted during several weeks in spring 2018 and fall 2018. The survey used Qualtrics Mobile and was loaded onto an iPad. DMC staff asked customers to complete the survey at the service desk and also roamed the area to ask people sitting in the area to take it. We learned that incentives are not only needed to urge people to take surveys, but also for student employees to remember to conduct it! During the fall survey, student employees were incentivized to administer the survey rather than incentivizing patrons to take the survey. Student employees were charged with soliciting at least one survey per shift. The staff member with the highest amount of surveys submitted for each week of the fall survey won a $10 lunch at Chick-fil-a. The result was a noticeable increase in the number of surveys submitted.

Three hundred people completed the survey, which asked what assistance they received, what kind of spaces, technology, or equipment they used, what kind of project they were working on, and to rate their interaction with the staff. Demographic information was also collected, including the subject area of their project and their class standing.

Results show that 30 percent of respondents who needed help with projects were working on a digital project for class. Interestingly, 25 percent were there for general study or to use the computers. Many who

used the "other" option—indicating they were checking out equipment—indicated that we should have added that as an option.

Kind of Project

Category	Value
Other	15
Job interview	2
Thesis or dissertation	4
Book or article	6
Conference or workshop presentation	10
Personal research	31
Performance or creative work	47
Class digital project	58
General study	65
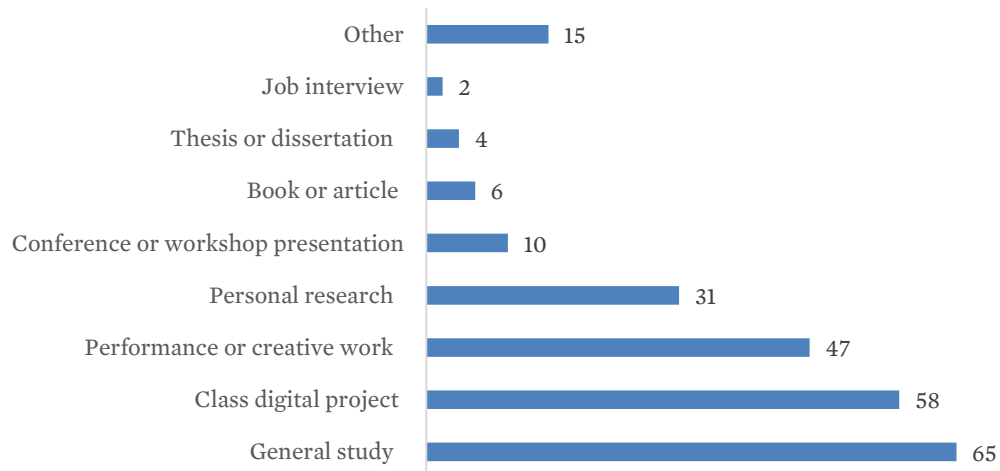
Similarly, when asked what spaces or technology students used, almost half (46%) were using the area for general study and the computers. These results correspond to those from the next question, which asked what kind of project they were working on. The highest number were using the area for general study, followed by a class digital project, performance or creative work, and personal research.

Space, Technology, Equipment Used

Category	Value
Other	30
Design Lab	5
Video Lab	17
Gaming Lab	22
Group study room	27
General Study Space	30
DMC Computers	30
Presentation Practice Room	30
Small Media Room	30
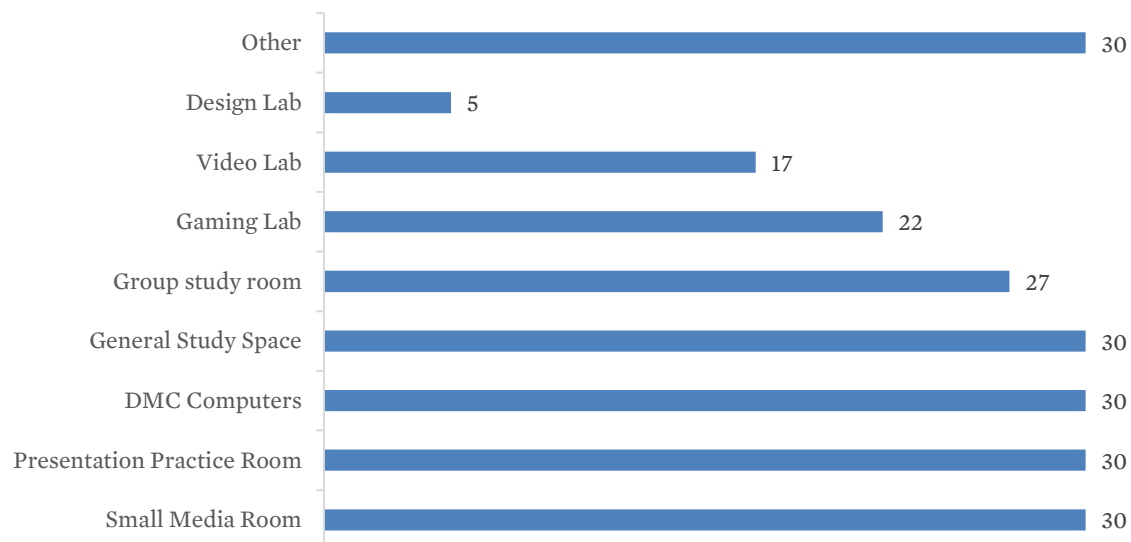
The quality of customer service in the DMC received very positive feedback. Over 80% responded "agree" or "disagree" to most of the questions asked:

Interaction with Staff
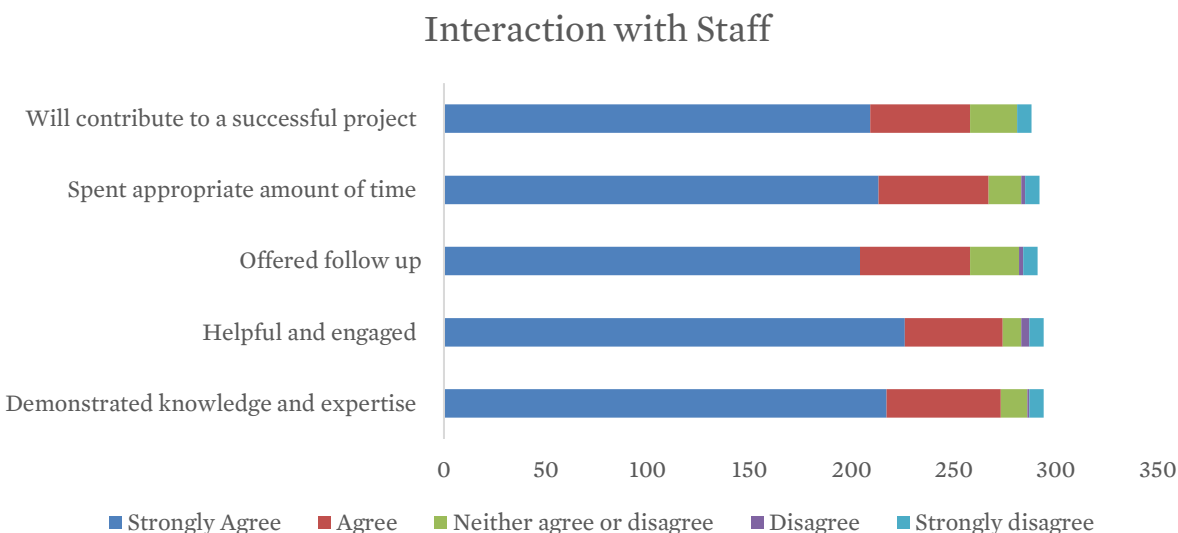
Demographic results indicate that the vast majority (77%) of DMC users are undergraduates followed by graduate students (16%). Very few staff or faculty come to the area as general patrons. For subject areas, sciences (21%) and business students (19%) were the highest subject areas for the projects, followed by health sciences (14%) and performing and visual arts (12%).

General comments and suggestions from customers included:

> "Thank you for all of your help! You guys made me feel like being a novice isn't a bad thing."

> "I recommend the DMC and the workers are very helpful when you are having trouble."

> "Overall this had been a productive experience."

> "It was professional, prompt and helpful. The space needs a new scanner and printer."

Focus Groups

For the next phase of the study, we conducted focus groups to probe further into information gained in the customer survey and learn the "why" in addition to the "what." We sought to determine students' perceived impact of the DMC services and instruction on their ability to develop quality media projects for a variety of purposes, including class projects, skills for future success, and entrepreneurial efforts. Specifically, we wanted to determine:

- How and why students use the DMC spaces and services
- How DMC spaces and services impact academic success
- How DMC spaces and services impact preparing for careers or graduate school
- What changes, if any, need to be made to improve the DMC spaces and services

We held two focus groups during fall 2018. We recruited participants through a variety of methods including emails, social media, digital signs and posters, and whiteboard notices in the DMC. Participants signed up using a Google form that collected their email so that reminders could be sent. Twelve students attended the first session and four the second. For incentives, we provided pizza and students could also enter a drawing

for one of four $25 gift cards. One person facilitated the focus groups and another took notes. The sessions were also recorded and transcribed.

The participants were primarily undergraduates from all class levels and a wide variety of majors. The question protocol included questions mapped to the research question that asked which spaces they use and how and why they use them, what kind of projects they completed using the DMC services, and how the DMC contributed to their success. (See Appendix I.) We also conducted a "sticky-note" exercise where students wrote a specific project they completed in the DMC on a note and posted on a white board. The following discussion helped drill down how the DMC affects their academic success and helps them learn new skills that they can use in their future careers.

We developed a code book (Appendix II) and three raters hand-coded the focus group transcripts. Each rater highlighted themes they read within the responses of focus group participants according to a color corresponding to that response category (i.e., Technology = Pink, Spaces = Blue, Discovery = Orange, etc.). In many instances, several themes were present in one response. Multiple themes were noted in each response when present. Each rater highlighted responses according to their own interpretation of the transcript. Later, all three raters came together to compare notes and create a master text.

The results of the coding highlighted several trends that were previously only distinguishable through anecdotal observation and participation in the service. Students said they use the DMC "to get my work done," "collaborate," and "get a good grade on the project." For students, the DMC is not only an important destination for study and assistance with media production, it is a choice destination on campus because it provides for a host of functional literacy needs. Five key themes came to the fore:

- The DMC has a knowledgeable staff and congenial service atmosphere.
- Students appreciate its variety of collaboration and group spaces.
- The DMC's variety of furniture and technology are popular.
- Students appreciate the diversity the space engenders.
- Students suggest better marketing of the DMC space and services.

Students stated that they think the DMC's help had a positive impact on their grade. Students cited DMC class instruction and individual assistance as helpful. In several instances, students suggested that the DMC fostered collaboration and creativity in their own work. Several students expressed a desire for more in-depth help with tasks related to video production, website design, and Adobe creative design tools. They were glad to have space to film and have troubleshooting assistance during the digital design and production process. They expressly mentioned wanting Apple technology integrated into the space alongside PC platforms, and more digital design classes integrated into their core curriculum.

Students from both groups said they would like to improve "awareness" of the DMC as a space and service. Remarks from both groups also trended toward discovery and wayfinding issues related to the space from outside the library. Students in both groups expressed a desire that the DMC be more visible inside the library. Several participants cited learning about the DMC's services by chance of being in the space or while they needed immediate help. Participants also noted a desire that the library promote the DMC more effectively across campus. Students noted both the space and its services as features of campus life that they would like to become common knowledge.

Conclusions and Next Steps

This assessment study provided much useful information about the impact and importance of the Digital Media Commons on our students. It is obvious from the assessment results that the DMC offers an effective digital literacy instruction program and learning space that draws students in and keeps them going there. Faculty rate DMC staff instructors and instruction methods positively. Most "agree" or "strongly agree" that direct instruction provided by DMC staff improved their implementation of their multimedia assignments and the quality of the final products their students turned in. Most strongly encouraged their students to

follow up with the DMC after the group workshop, but few required their students to follow up with our service. Student perceptions of the DMC as a space and service suggest that many of them did in fact follow up to use the DMC for additional direct instruction and as a preferred general study space. The group spaces, small media rooms, double computer screens, white boards, and a variety of furniture provide opportunities for students to both study alone and in groups. Although many of these attributes are available elsewhere in the library, the fact that many of them are in one place seems to appeal to students. In addition to the spaces, the unique services and resources that the DMC provides, including assistance with a variety of media projects and the space and technology for creating them, contribute much to students' success.

The results also indicated that use of the space leans more toward general use than taking advantage of the specialized services and resources. Next steps will include better marketing of the DMC services to increase their visibility. Having the evidence that it contributes to student success will figure into this marketing. Expanding the instructional program will also be a priority. The next staff hire is one that will focus specifically on instruction.

The information from this assessment study will help inform future renovation and addition plans. It is essential to keep the type of learning spaces that the DMC provides. It is also important that the DMC services and resources be more visible than they are now.

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Endnotes

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6. Chelsea DeAngio, and Kathryn Crowe, "Assessing the Digital Media Commons: Evaluating New Library Spaces and Services at UNC Greensboro" (presentation, Southeastern Library Assessment Conference, Atlanta, GA, October 2013), https://scholarworks.gsu.edu/cgi/viewcontent.cgi?article=1005&context=southeasternlac.

Appendix I
Digital Media Commons Research Question
Focus Groups
Determine students' perceived impact of the Digital Media Commons services/instruction on their ability to develop quality media projects for a variety of purposes including class projects, interviews, entrepreneurial efforts, and personal interests. These projects can include videos, podcasts, posters, digital presentations, 3D objects, infographics, e-portfolios, and websites.

Determine how and why students use the DMC's spaces and services.

Determine what changes, if any, need to be made to improve the DMC's spaces and services.

Determine how DMCs spaces and services impact academic success.

Determine how DMC spaces and services impact preparing for careers or graduate school.

Focus Group Questions

1. Which DMC spaces do you usually use and why/how?

2. What DMC technology have you used and why/how?

3. Do you like to use the DMC area? Why? Why not?

4. What kind of projects have you completed with DMC assistance? Have students write these on a sticky note. Sort by type of project. Place notes on a white board for discussion.

Please describe these projects for which you used the DMC. How did the DMC services help you develop a successful project?

5. How has the DMC assistance with these projects contributed to your academic success such as making a better grade in class or learning useful skills to apply to your academic work?

6. How has the DMC assistance helped you with preparing for your career, getting a job or acceptance into graduate school?

7. Are there changes or improvements you'd like to see in the DMC's spaces or services? If so, please explain.

8. Have you ever attended a DMC instructional workshop for a class assignment? Did the instruction improve your ability to complete the assignment successfully?

Appendix II
Digital Media Commons
Focus Group Code Book

Code	Explanation	Keywords
Technology	References to use of technology, equipment or software provided in the DMC	Computers, screens, software, charging stations, Adobe, Final Cut Pro, MovieMaker, Tech checkout
Spaces	References to furniture and how students use the DMC spaces	Rooms, furniture, group spaces, individual spaces study spaces, whiteboards
Services	Reference to instruction sessions, individual assistance, training	Class sessions, training sessions, help, individual assistance, making videos, PPT, poster, presentation, DACTS
Atmosphere	References to the learning/study atmosphere in the DMC	Quiet, collaboration, diversity, social aspect, welcoming, creating community
Success	References to perceptions of how DMC services impact academic or future career success	Grades, resume, cover letter, skill set, successful project
Discovery	References to how students found or discovered the DMC	Referral, finding the DMC
Improvements	References to how the DMC could be improved	Suggestions for furniture, software, other spaces, power
General Comments	General comments about the University Libraries	Hours, "upstairs," cleanliness, printing, temperature, reserving a room

Benchmarking Reference Data Collection: The Results of a National Survey on Reference Transaction Instruments with Recommendations for Effective Practice

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Introduction

This paper reports the results of a 2016 national survey on how reference data are collected and used, conducted by the Evaluation of Reference and User Services (ERUS) Committee, of the Reference Services Section, of the Reference & User Services Association division of the American Librarian Association. Results include how academic libraries capture reference transactions and the extent to which the recorded data conforms to official definitions. We identify standard practices, recognize innovations, and offer recommendations. From our findings, readers will discover trends, opportunities, and tools for better documenting the value of reference services.

Why is it important to learn how reference data are collected and used?

Reference services in academic libraries are in transition. Negotiating multiple challenges requires evidence to guide decision-making. Therefore, it is important for those responsible for sustaining and improving reference service to understand how colleagues across the country gather and organize such evidence. Ideally, data about reference services will allow for cross-institutional studies. That is, academic libraries need a snapshot of current practices to inform the profession of where we were, where we are, and where we are going.

There has not been a national examination of how reference data are collected since the Association of Research Libraries (ARL) published a SPEC Kit on practices among its members in 2002.[1] That study was precipitated by a "sharp reduction in the number of transactions recorded." At that time, nearly all academic libraries marked reference transactions with tick marks and about half of academic libraries collected transaction data only during sample periods. Now, according to our survey, fewer than 10% of academic libraries record transactions manually and 94% collect data at all times. The SPEC Kit sampled only ARL libraries and had a 62% response rate (n=77). The current study had 142 responses from academic libraries of all types. Response rate cannot be calculated because there is no way to know how many institutions the invitation reached. Table 1 compares the two studies.

Table 1. Comparing SPEC Kit 268 and current study

	SPEC Kit 268 (2002)	ERUS Survey (2016)
Population/sample	ARL members (n=124); 77 responses (62%)	Email recruiting; 142 responses from academic libraries
Libraries collecting data	96%	95%
Regular collection	51%	99%

	SPEC Kit 268 (2002)	ERUS Survey (2016)
Method of collection	(Select all that apply) 99% hand tabulated 25% online data entry 4% clicker 8% other	75% commercial platform 6% hand tabulated 8% online spreadsheet 11% other (freeware, clicker, in-house database)

Academic librarianship has experienced a "refolution" in the last 25 years, from the card catalog to the online catalog to *the* catalog to discovery layers. We transitioned from print indexes to CD-ROMs to the information superhighway to online databases. We went from using indexes and tables of contents to Boolean searching using facets and limiters; bibliographic instruction to information literacy; and from identifying sources to developing search strategies. At the reference desk, we used to answer a lot of questions, mostly basic ones about how to use the library. We taught patrons how to start with the ***Encyclopedia Britannica*** and the ***Readers' Guide to Periodical Literature*** to identify a few related resources. Now, we get fewer, more complicated questions, which require our professional expertise. Librarians are needed to help identify the most relevant sources and retrieve the full text.[2] We went from a designated reference desk to a variety of options for providing research encounters, and from personal interactions to asynchronous research help.[3] Most pertinent to this discussion, we moved or are moving from tally marks to online forms, allowing detailed information to be gathered at multiple service points and from individual work spaces.[4]

Why is it important to capture and analyze reference data?
Ask yourself why you keep reference statistics. In addition to the data that is required by administrators, professional associations, and accrediting bodies, the information we collect should help us understand how best we can assist our patrons, in terms of both staffing and training. It should be used to demonstrate to our stakeholders how much value we provide our communities and open the door to programmatic evaluation. However, research, guidance, and professional discussion about how to collect meaningful evidence on reference practice are limited.[5] The excellent report on ***The Value of Academic Libraries*** included only two paragraphs specifically on reference services.[6] In the literature review of the article, it discusses how librarians can improve graduation rates through one-on-one interactions with students through "individualized research assistance and personal attention."[7] Professional organizations currently lack a forum for academic reference librarians to have in-depth conversations about tracking and measuring the value of reference interactions.

Our results contribute to a culture of data-driven decision-making and fill a gap in the literature. With good reason, the overwhelming majority of libraries focus solely on quantitative data. To complement that information, we will suggest qualitative measures that further demonstrate the value of professional librarians to stakeholders. For example, we will explore how librarians can document use of the ***[Framework for Information Literacy for Higher Education](#)*** to enhance research interactions and bolster our teaching profile on campus.[8]

What did we want to learn from our survey?
Have libraries taken advantage of the opportunities provided by online transaction recording methods? Is there consistency among libraries? Are forms designed to capture the value added by interacting with a trained librarian or to capture the impact of reference interactions on patrons' learning outcomes? What are best practices for academic libraries?

Methods

To find answers, the ERUS committee created a survey using Qualtrics, including basic demographic information, such as library type (figure 1). Then, our team requested participation through library-related Listservs (brass-l, libref-l, medref, pla, pla-eval, rss-eforum, rss-l, rusavr) and Facebook sites (ALA, RUSA, ALA Think Tank). By using a variety of posting forums, we sought to ensure participation from across the profession. We requested that librarians upload the forms they use for capturing reference interaction information (see figures 1 and 2 for sample screen shots). We also inquired about changes libraries have made regarding what data they collect, and we asked respondents to indicate the most useful statistics gathered (see figure 3). See appendix for the survey instrument.

Figure 1. Sample screen shot (complex form)

Figure 2. Sample screen shot (streamlined form)

Results

We received 232 responses, primarily from academic (61%) and public (31%) libraries. This paper focuses on data from the 142 academic libraries. We analyzed the data in two ways: (1) self-reported responses to our questions and (2) the transaction forms submitted, of which there were 62 usable samples. We learned that just over 94% of academic libraries that responded collect data on reference interactions at all times, 5% collect data during sample periods, and less than 1% do not collect reference data.

Before evaluating the reference-transaction forms, we anonymized the submissions, removing institutional information and assigning numeric identifiers. Of the academic libraries that responded to a question about data capture method, the most common was a commercial app (n=40), followed by freeware (n=18), and a printed sheet (n=4). The most common commercial solution used was SpringShare RefAnalytics (n=28) (see figure 1), followed by Gimlet (n=10) and Desk Tracker (n=2). Among libraries using a free solution, 14 could not be identified (see figure 2); three used Zoho Creator, and one used Google Forms.

Most libraries (72%) reported that they had changed their data gathering approach in the past 10 years. Figure 3 shows the reasons libraries gave for changing their approach. Qualitative analysis of the comments provided show a distinction between what has changed in libraries' approach and the reasons for the changes.

Figure 3. Reasons libraries reported for making changes in transaction data
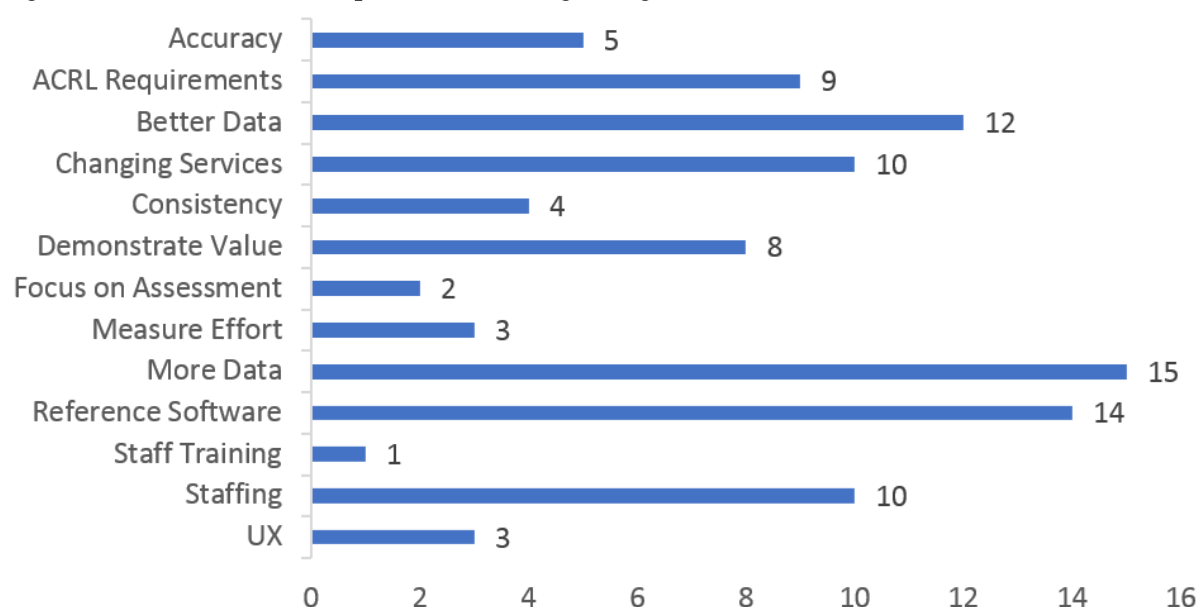
Libraries reported the following changes in the data collected:

- Better definitions
- Different categories
- More detail
- New location or service
- Started collecting data
- Paper to online
- New online system
- Sample to continuous collection

Motivations for these changes included the following:

- Accuracy/consistency
- Accreditation standards/external reporting
- Change in institution (e.g., corporate culture, merger, staffing model)
- Assessment/documenting impact or value
- Needs analysis, monitoring change
- Equipment

- Service improvement/training
- Staffing levels

Examination of the 62 forms submitted showed that most did not clearly distinguish reference questions from other kinds of inquiries. Libraries used an inconsistent multitude of categories, as depicted in figure 4. "Directional" was the most common question type, followed by "Reference." For the most part, there was no clear distinction between reference questions and other types of inquiries without post-sorting data. Forms did not appear to conform to the RUSA or ARL definitions of reference, but a few forms linked to a definition.[9] The study did not examine instructions for service providers, which might have provided the definition. Rather, forms included a range of question types that fall into the definition of reference, such as "ready reference," "brief reference," "extended reference," and "in-depth reference."

Figure 4. Word cloud of question types used in 62 sample forms

These options would require more complicated processing of data to extract the data to respond to Association of College & Research Libraries (ACRL) surveys and other external stakeholders. Given that most forms also included a duration field, it is not clear why the forms separate brief from in-depth questions. However, the value options provided under duration varied wildly in their precision, and some forms conflated the length of interaction with its difficulty. For example, some forms provided two options, 0–5 minutes and 5+ minutes, while others were more granular in options. The large proportion of forms that used text entry fields rather than a drop-down list for data points such as library departments further complicated data analysis.

Of the 62 forms analyzed, 7 were labeled for use at one specific service point and 55 gathered data from a range of service points such as "Circulation," "Consolidated Service Desk," "Office," "Roving," or "Embedded Classes." The unique circumstances of providing services in these locations might have complicated design of the forms. Most forms (n=57) also noted contact mode: in person, phone, email, chat, SMS/text, etc. Three forms did not collect contact format, and two forms were unclear.

As noted, most reference data gathered by respondents were quantitative, counting interactions and/or documenting their duration (55%). As the ARL definition stipulates, duration is not an appropriate indicator of whether an interaction is a reference question. Nor is it necessarily a signal of quality service. An experienced librarian might take minutes to find information that a novice will take much longer to locate. How staff spend their time is not the same as whether they are using time effectively or are in need of professional development.

The most common qualitative measure was the READ (Reference Effort Assessment Data) Scale.[10] It is reasonable to wonder how fully the measure is understood, as well as whether staff apply it consistently. Do librarians follow the guidelines for recording responses or do they treat it as an indicator of personal effort. Like duration, the READ Scale might be affected by individual experience and skill—was the inquiry one that would be simple for a subject matter expert and difficult for a novice? Moreover, most of the examples given for levels one and two do not merit inclusion as reference inquiries, based on organizational definitions.[11]

Another common qualitative category was to classify patrons by status or affiliation (n=28). For most on-demand interactions, unlike appointments or embedded services, it is unlikely to be clear whether someone is an undergraduate student, graduate student, staff member, professor, or person unaffiliated with the institution. Thus, these data might consist largely of guesses or missing data.

Only a few respondents used a form designed to capture the value added by interacting with a trained librarian or how the interaction may have influenced a patron's learning outcomes. One attempt to gather this qualitative measure: "Was their actual information need different from their original question?" This measure appears to get at the need for an effective reference interview to ascertain the patron's underlying research need.[12] However, staff members who neglect to conduct an effective reference interaction would not be able to answer the question correctly. Another example: "Did you do follow-up work on this question off-desk?" How likely is it that a reference provider will go back into the system to modify their response?

Discussion and Recommendations for Best Practice

This study shows that nearly all academic libraries have left behind the paper tally sheet in favor of capturing reference statistics online. A major benefit of online data collection is that we can record all our reference interactions, regardless of where they occurred. This is important in a context where librarians provide services as liaisons or embedded librarians in locations beyond the desk and outside the library. Designing online data collection forms, whether a commercial format or homegrown system, requires thoughtful assessment of how the data will be analyzed and used. Two tensions can be inferred from the forms collected for this study: a tension between maximizing the details of local practice and streamlining the form, and a tension between locally informative data and cross-institutional consistency.

To find the sweet spot in these tensions, determine what you want to measure and use design thinking when creating your form. Start with the end in mind. What information are you required to collect? What is most important to you for longitudinal decision-making? If any of the information you are gathering is incidental to these kind of questions, you do not need to collect it. What is actionable, noteworthy, or required? Focus on documenting reference assistance and its impact on patrons rather than expecting the form to also guide collection development (which sources staff use or recommend most often), training priorities (which tools are used most often), or instruction design (what patrons do not know). If a form is supposed to do everything, can the form be useable (will people complete it) and data be truly useful?

To streamline the form, consider eliminating elements that will not contribute to decision-making and service improvement, rather than focusing on what is easy data to gather. For example, duration, mode of contact, and patron type are common fields that might not yield benefits that outweigh the time it takes to gather them. In terms of duration, how much time it takes to adequately help someone may be of use when explaining our value to administrators, but is it worthwhile documenting duration for each question? Instead, the library could sample key weeks and station an observer to accurately measure the duration of interactions, rather than relying on guesses from busy service providers. Knowing how much time was spent

giving assistance, as opposed to simply staffing, may be worth exploring, but guesstimating does not provide actionable data. In terms of contact mode, does it matter if a question came via the telephone or in person? Will you change staffing based on this? In terms of patron type, how often do people self-identify as an undergraduate student, graduate student, faculty member, etc.? That is, how often are these guesses for in-person questions? And, once again, would you change staffing based on this?

The software that frees us from the limitations of printed forms provides us with opportunities to reconsider what data to collect, corresponding to our various missions and priorities. Once you have determined which data are most important, strive for consistency:

- Link to definitions of categories and have regular refreshers in meetings about the meaning and importance of gathering such data accurately.
- Use drop-down lists to standardize data such as departments.
- Conduct periodic audits of data for set periods to look for spikes or drop-offs in question types for particular reference shifts that might indicate a need for further training.

Academic librarians seldom should supply answers. We have a pedagogical imperative to teach skills. Qualitative data helps to communicate what librarians do with students, how we help them learn, and how librarians enhance the research experience.[13] We must demonstrate expertise and unpack the "black box" of the research interaction. To do so effectively, college and university librarians require more opportunities to discuss how to manage these challenges on a professional level with our institutional peers.

With the increase of research consultations and the integration of information literacy principles into reference interactions, it may be more useful to focus on collecting rich data about those interactions, especially given the level of resources expended in scheduling and preparing for individual meetings with patrons. The reference consultation can be an opportunity to demonstrate the extent to which librarians helped students across thresholds highlighted in the ***Framework***. If expectations increase about documentation of research consultations, it might be wise to have librarians add 15 minutes to appointment periods to allow for note-taking. As we envision what ideal transaction forms might include in terms of value-added qualities, we might look to what Radford University has done when mapping instructional activities to aspects of the ***Framework*** and make similar connections to what happens in a research consultation.[14]

Limitations and Future Research

The design of the survey instrument led to more interpretation than is desirable. The study was also limited by the screenshots, which often used dropdown lists that only showed "select a value" rather than the complete list. The survey did not request instructions from staff about how to enter reference statistics. Such documentation might have clarified the definition of reference used.

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Acknowledgements

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Appendix A. Survey Instrument

What type of library do you work in?

○ Academic

○ Public

○ School

○ Special

○ Other [   ]

Does your library collect data on reference interactions?

○ Yes, at all times

○ Yes, for sample periods

○ No

How are data gathered?

○ Entered online to a reference statistics platform (DeskTracker, RefAnalytics)

○ Typed on a shared online spreadsheet

○ Written on printed forms

○ Other [   ]

Please upload your data collection form (document, PDF, screenshot, spreadsheet, etc.)

How to take a screenshot:
- Mac
- PC

> Drop files or click here to upload

Why do you think these changes were made?

[   ]

What is the most useful data you record? Why? How is it used?

[   ]

Appendix B. Example of an Easy-to-Use LibAnswers Service Transaction Form
This example merely serves as an example of how we might capture data differently; it has not been tested.

1. If it is not a reference question, select from the pre-defined entries, then Submit.

2. If it is an on-demand reference question, select a response based on Guidelines for Behavioral Performance of Reference and Information Service Providers,[15] then Submit.

3. If it is a scheduled research consultation, indicate with Yes and select which department or discipline the person is from, then Submit.

Implementing Standardized Statistical Measures and Metrics for Public Services in Archival Repositories and Special Collections Libraries

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Abstract

Developed by a three-year task force composed of members of the Association of College and Research Libraries' Rare Books and Manuscripts Section and the Society of American Archivists, the "Standardized Statistical Measures and Metrics for Public Services in Archival Repositories and Special Collections Libraries" report provides these types of institutions—for the first time—with commonly accepted guidelines for quantifying use and measuring impact. In response to the report, Louisiana State University Libraries began efforts to apply the newly approved measures and metrics in the special collections unit. We first evaluated the existing statistical data collected in past years, moving away from paper and pencil tallies toward robust software solutions, primarily through two applications: SpringShare's LibApps platform and Aeon, a request and workflow management software for special collections. We identified new areas of reporting to implement in 2018. We initiated the changes and launched the final version of the reporting measurements on July 1, 2018, to coincide with the new fiscal year. This paper presents one potential approach to implementing the Standardized Statistical Measures and Metrics task force report.

Introduction

The recent creation and approval of public services measures and metrics specifically tailored to special collections and archival institutions fills a long-term need for the field. While organizations like the Association of Research Libraries (ARL) have collected and published statistical data from research libraries for decades,[1] there is no single dataset available for special collections. In recent fiscal years, ARL has encouraged the submission of special collections data related to expenditures, staffing, and the number of library presentations and participants, with an open suggestion to submit additional data at each institution's discretion.[2] The statistics currently reported to ARL, however, do not tend to fit the unique needs of special collections and archives or fully represent our multifaceted areas of impact. In addition, without agreed-upon and precisely defined methods of measurement, special collections and archives have thus far faced difficulties in attempting to analyze data across institutions nationwide.

In 2012, Joyce Chapman and Elizabeth Yakel examined efforts in the field (both past and present) to gather, analyze, and apply operational data and strongly advocated for the need to "achieve consensus on definitions for qualitative metrics to facilitate comparisons between institutions."[3] Chapman and Yakel echoed many librarians' and archivists' desires to implement data-driven decision-making and evidence-based practices in the workplace, but noted the lack of publications or publicly available information documenting these efforts.[4] As the conversation around standardized measures grew, members of the special collections and archives community presented at conferences; wrote articles for journals, newsletters, and blogs; and shared ideas on this topic in person and via social media. This was all with the intention of determining (1) how to accurately measure special collections data and, by extension, meaningfully assess our work, and (2) how to demonstrate the impact of special collections and archives.[5]

In 2014, the Society of American Archivists (SAA) and ACRL's Rare Books and Manuscripts Section (RBMS) formed a joint task force to establish standardized statistical measures for public services. After a community survey and several opportunities for public feedback, the ACRL and SAA governing bodies approved the standards in October 2017 and January 2018 respectively. According to the task force members, the standards provide archivists and librarians with a set of "precisely defined, practical measures based upon commonly accepted professional practices that can be used to establish statistical data collection practices to support the assessment of public services and their operational impacts at the local institutional level."[6]

Many institutions have moved into an implementation phase following the approval of the report. Further conversations about creating a national repository to store special collections data continue at various levels within SAA and RBMS.[7] At LSU, the creation of industry-wide standards for public services statistics has prompted attention to greater accuracy in record keeping and inspired valuable discussions about how to use the data we collect to improve our services. This paper also considers LSU's continued challenges in data collection and highlights some of the many ways the data is being applied to decision-making.

Implementation in Practice: Improving Data Collection

In February 2018, I joined the Louisiana State University Libraries as head of public and research services in special collections. In this role, my charge was to coordinate assessment efforts for special collections. My arrival presented an opportunity to review the statistical efforts already in place, as well as to begin tracking additional measures and metrics recommended in the task force report. In surveying the current state of data collection, I found some public services measures tracked via paper forms in the reading room, then input on spreadsheets. Other valuable measures were not tracked at all—though primarily due to a lack of staffing in public services.

LSU Special Collections was already tracking seven of the eight basic measures[8] detailed in the Standardized Statistical Measures and Metrics report: user association, reference questions received, visits, items checked out, events, instruction sessions, and exhibits. We were not actively tracking data related to the final basic measure—web page views—though it would be possible to gather this data, if needed. The unit was also collecting about 15 of the 40 advanced measures detailed in the report, with spotty data collection available for other recommended metrics. I created a new spreadsheet template to track monthly statistics by fiscal year and organized and color-coded the data fields according to the eight basic categories of measurement in the report.

While gaps in data collection did exist, LSU Special Collections was actively using two platforms capable of generating robust public services statistics: Aeon and Springshare's LibApps. Aeon, developed by Atlas Systems and currently used by at least 70 research institutions in the US, is a highly customizable workflow management software for special collections and archives.[9] Features include online patron registration and requesting, item routing and tracking, and an activities module for staff management of instruction sessions, exhibits, and other special events using collection materials. LSU launched Aeon in July 2015. LibAnswers, primarily used by LSU to track reference transactions, is one of the tools in the SpringShare suite.[10] LSU also utilizes the LibGuides and LibInsight modules. More than 5,700 libraries across the world use SpringShare products. LSU Libraries began using the SpringShare products in January 2015.

With the ability to customize Aeon and LibAnswers to fit our needs, I set about ensuring our systems could generate the recommended measures and metrics. Aeon functions as a large database, storing a wealth of patron information and collection usage data that can be queried either through custom SQL searches or through a series of standard reports related to reading room use (e.g., characteristics of all users or new users, frequency of collection use, checkouts per day/month/year). Aeon users also receive access to AtlasBI, which offers real-time business intelligence reports that are easy to filter as well as a variety of options for creating data visualizations. (See Figure 1.)

Figure 1. LSU Special Collections data from the AtlasBI reading room analytics dashboard, July 2018.
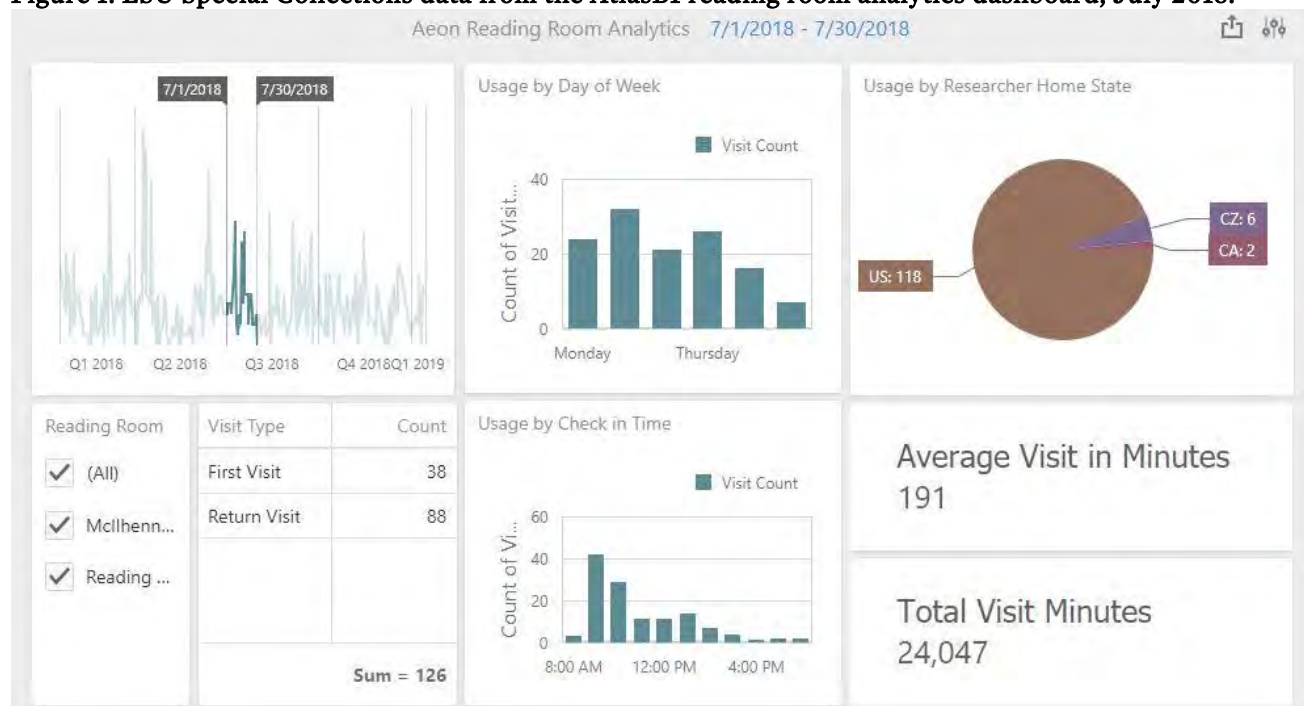
LSU Special Collections staff had also created two custom Aeon reports prior to my arrival, both of which aid in generating useful metrics: one report tracks the number of interlibrary loan requests in a given time frame and the second counts the total number of collection units requested in the reading room.[11] The second report produces more accurate circulation figures, as it takes into account a single Aeon transaction that may represent multiple volumes, reels, or serials. I primarily used the AtlasBI interface and the standard reports to generate the necessary statistical measures from Aeon. The multitude of reporting options within the Aeon software meant I did not need to spend time customizing new reports, but focused instead on running the monthly reports for all of the newly added data points from the task force report.

Despite having access to SpringShare's LibAnswers product, LSU Special Collections was not utilizing the platform fully. The reference transaction form used from January 2015 to early 2018 captured a limited number of data points, making any long-term, meaningful analysis difficult. The form included the question type (a holdover from the main library's reference form), the outcome (e.g., answered, forwarded to other staff member or library), the interaction type (i.e., communication method), and the desk location where a reference transaction occurred. (See Figure 2.)

Figure 2. LSU Special Collections' LibAnswers reference transaction form, used from 2015 to 2018.

I identified two primary functions needing improvement when evaluating this tool: (1) the ability to record and track specific questions and their corresponding replies, and (2) the inclusion of remote reference into the manual transaction form.

To address the first item, we added question and answer boxes to the reference transaction form. The Q&A boxes were not enabled because the special collections form was based on the form first used by LSU's main library. The addition of open text boxes in these fields allow patrons and staff to include detailed questions and answers. Staff can paste entire email exchanges into the answer field as keyword-searchable text. I also added to the form new fields corresponding with two advanced measures recommended in the Reference Transactions section of the task force report (time spent responding to a question and question purpose), plus patron affiliation and collection type used. (See Figure 3.)

I easily corrected the second action item by adding field options for email and international email under Interaction Type and sharing the new policy with staff. Prior to my arrival at LSU, all remote reference email exchanges received via email were printed and filed alphabetically by the last name of the correspondent. This method is a reliable and low-tech option for tracking reference requests, but it limits the staff's ability to query the data or identify statistical trends. The inclusion of remote reference transactions into the same dataset as the in-person and phone queries already tracked in LibAnswers created a comprehensive body of data. Library staff can now add information to the LibAnswers reference dataset in two ways—by replying to tickets submitted online by patrons, or by manually filling out a transaction form recording references received in person, by phone, and through personal email messages.

Figure 3. LSU Special Collections' updated LibAnswers reference transaction form, implemented July 1, 2018.

Continued Challenges in Data Collection

LSU Special Collections staff faced several problem areas during the implementation, some of which continue to impact our data gathering. One drawback to using the LibAnswers reference transaction form for data collection is the inability to make changes to data points. Rearranging, renaming, or deleting values from the menu options on the transaction form will generate incorrect data points for all previously entered transactions. For example, if the options for Interaction Type were originally listed in the following order: In-Person, Letter, Phone, but changed to: Email, Email International, In-Person, Letter, Phone, then past transactions assigned as "In-Person" now display as "Email" in the database. To eliminate confusion, we can download and save the current dataset and start fresh with perfected fields and values at the start of the next fiscal year. Staff looking for legacy data would need to consult the saved spreadsheet.

We also encounter difficulties in accurately counting certain statistical measures despite our improved methods of collection. Quantifying the impact of remote users of special collections is particularly complicated and requires combining reports from both platforms. LibAnswers provides the number of reference transactions received from phone calls, letters, or email, and Aeon tracks interlibrary loan requests and duplication orders. These numbers give us the total number of remote transactions, but not the total number of unique remote patrons served. Researchers' names are not always recorded in LibAnswers, and cross-referencing names between the two systems would require staff time and labor beyond what is realistic to expend.

Achieving accuracy in quantifying the total number of reference transactions presents its own challenges. The task force report includes the following stipulations about data collection of reference transactions:

"Count questions from users working in the Reading Room if the response requires staff to employ their knowledge or one or more information sources. Count reference questions concerning different topics from the same individual as separate questions. Exclude follow-up emails, multiple social media interactions, or other reference consultations on the same question."[12] Intellectually, these guidelines present a clear and accurate way to quantify reference transactions. In practice, however, reference inquiries handled by multiple staff members potentially result in double counting, as well as inquiries with several follow-up exchanges. Public services staff previously tallied each response to a patron regardless of whether it was a follow-up or a new question, so the task force guidelines have introduced a change in practice for this measurement.

Current and Future Applications of the Data Collected

LSU Special Collections staff have now been tracking the new public services measures and metrics since July 2018. Gathering data using consistent and agreed-upon metrics naturally leads to the application of such data within the institution. The robust and comprehensive dataset derived from the new standards can inform a wide range of internal decisions. Given the recent approval of these standards and the time it takes to collect enough data to analyze it for trends, it may be too soon to expect new published studies describing the impact of the standards. At LSU, however, we envision using our data in some of the following ways.

Within public services units, it is common to adjust staffing by applying data from reading room operations. In the special collections field, patron visits can be unpredictable. Yet, with longer periods of data collection, trends can emerge. The number of daily visits to the reading room, the average number of hours researchers spend in the reading room per day of the week, and the busiest hours per week all help determine whether to add or reduce staff in the reading room, whether the library should be open on weekends, and perhaps which specific staff members to assign to which shifts. We could use reading room data to examine what time of day most undergraduate students visit Special Collections with the intention of offering workshops tailored to their research needs at those times.

The standards also provide extensive information related to collection use, including the number of items checked out by patrons in the reading room, items used by staff for reference requests, exhibits, instruction, and internal operations, and the number of reproduction requests or interlibrary loan requests received or completed. Utilizing these forms of data collection allow us to track the most used books or archival collections for the purpose of establishing digitization and processing priorities. Likewise, statistics on collection usage can also reveal what researchers are not requesting. We can generate reports listing each item (according to book or collection title) checked out more than 10 times within a given timeframe. Gaps in the results may correspond to a major acquisition that has not been promoted to the public or a valuable collection yet to be processed. This kind of data provides special collections staff with the evidence they need to make important decisions about internal priorities and to establish or update unit goals.

Use of special collections statistics to create user personas is currently underway to aid the LSU Libraries' website redesign project. As a member of the website redesign working group, I worked with a colleague to compile data available in Aeon for each of Special Collections' user groups (undergraduate students, graduate students, faculty, staff, and independent researchers).[13] We tracked the number of unique visitors and total number of visits each group made to the reading room, as well as the number of collection items checked out in each format. Using information gathered from personal encounters with researchers, we wrote persona narratives describing typical member behaviors and actions from the five user groups. The scenarios will be used by LSU's web design vendor to analyze each department's needs and inform how the redesigned website will better serve our visitors.

Conclusion

The recent approval of the "Standardized Statistical Measures and Metrics for Public Services in Archival Repositories and Special Collections Libraries" is an important step forward in establishing consistent data collection methods across the field. While the implementation of the standards may vary across institutions, we must create better ways to report statistics in ways that map accordingly with the recommended

measures and metrics in the SAA-ACRL/RBMS task force report. Data submitted from special collections and archives to bodies like ARL are often subsumed within the larger library system's data, preventing any sort of comparison among institutions. Improved national reporting will allow organizations to find natural peers in terms of staff size, collection size, annual visitors, and so forth.

Finally, while some argue that statistics can be used to reduce resources or staffing if certain benchmarks are not met, these types of statistical measures also help special collections and archives better serve researchers. The end goal to any type of data collection should be to empower institutions to make decisions that benefit both staff and library users. There is always a danger seeing only raw data and neglecting what the numbers truly convey. Tanya Zanish-Belcher, director of special collections and archives at Wake Forest University and the 2017–2018 president of the Society of American Archivists, asserts that, "numbers, statistics, and surveys are tools which can help us tell our story and share our value with others who may not understand the complexity and significance of what archivists do."[14] The Standardized Statistical Measures and Metrics will undoubtedly help archivists and special collections librarians find peers and identify similarities across the field, but they also have the power to show our user communities, stakeholders—and ourselves—that our organizations are as unique as the collections we steward, and we all have a story to tell.

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Endnotes

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9. For more information about the Aeon software, see https://www.atlas-sys.com/aeon/.
10. For more information about SpringShare's LibAnswers platform, see https://springshare.com/libanswers/.
11. The task force deems a "collection unit" a generic term that can equate to volume, archival unit, container, item, or piece. "This generic designation permits Repositories to perform circulation transactions and statistical counts in ways that are most sensible and practical locally, without attempting to require all institutions to count transactions in precisely the same way," SAA-ACRL/RBMS Task Force, "Standardized Statistical Measures and Metrics," 67.
12. SAA-ACRL/RBMS Task Force, "Standardized Statistical Measures and Metrics," 14.

13. The undergraduate, graduate student, faculty, and staff patron statuses in Aeon include members of LSU's community as well as members of other colleges and universities. Every patron not associated with a higher education institution is categorized as "Independent Researcher."
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Assessing Need and Evaluating Programs for a Health Science Center Library's Wellness Initiative

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Overview
What is wellness?

Wellness is a multifaceted and holistic concept that stems from the patient-centered healthcare paradigm.[1] It refers to a dynamic process, in which individuals become aware of the importance of healthy living and consciously make choices towards a fulfilling life. Hettler's Dimensions of Wellness model encompasses six elements: emotional, intellectual, occupational, physical, social, and spiritual (Figure 1). Recent models tend to include two additional components—environmental wellness and financial wellness (Figure 2). Newer frameworks also emphasize the interconnectedness of wellness dimensions (Figure 3), intersectional wellness (Figure 4), and the impact of health disparities on wellness.
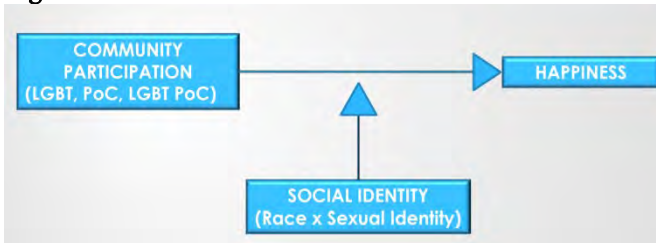
Figure 1[2]

Figure 2[3]

Figure 3[4]

Figure 4[5]

Why is wellness important in the health sciences?

A number of significant barriers to wellness have been identified within the health sciences education and practice. Among health sciences students, these barriers include heavy workloads and scheduling due to concurrent educational and clinical demands; high-level academic assessment criteria; time-consuming relationship building requirements with peers, faculty, clinical staff, and patients; information overload; a competitive culture in which self-care and social support are often de-prioritized; numerous academic and clinical deadlines; and a pervasive stigma surrounding help-seeking for mental health.[6]

Similar wellness barriers have been identified for residents and clinicians, including long working hours leading to poor work-life balance; the irregular structure and long length of shifts; inconsistent breaks; unavailability of healthy food options; lack of autonomy over scheduling; low morale due to reduced funding and staffing levels; stressful relationships with supervisors; information overload; continuing professional development demands; the frequently changing healthcare system; and inconsistent access to mental health services, coupled with privacy concerns over personal health information.[7]

Personal and professional impact of wellness barriers

Such barriers to wellness adversely impact both the personal and professional lives of students, residents, and clinicians. Recent studies report high incidences of stress, tension, emotional exhaustion, anxiety, depression, depersonalization, burnout, and suicide.[8] Current measures of the prevalence of mental health problems include the rates of depressive symptoms among medical students (27.2%); suicidal ideation in medical students (11.1%); depression among first-year residents (25%); and physician suicides (300–400 a year in the US).[9] Further negative outcomes are insufficient sleep, malnutrition, dehydration, low levels of physical activity, and substance or alcohol abuse.[10]

Within a professional and academic context, research evidence indicates a strong association between wellness barriers and sub-optimal performance. Negative professional outcomes for residents and clinicians involve burnout (characterized by emotional exhaustion, depersonalization, and ineffectiveness); slower cognitive processing (impeding clinical reasoning, clinical skills, and knowledge acquisition); absenteeism; low career satisfaction; workplace turnover; professional misconduct (attributed to diminished honesty, integrity, altruism, and self-regulation); prescribing errors; and an overall decrease in patient safety and satisfaction.[11] Among students, academic performance is adversely impacted through declines in cognitive

function, emotional regulation, and resilience; impaired attention, short-term memory, and alertness; increased incidences of misconduct (cheating and plagiarism); and reduced empathy and compassion (limiting students' potential to facilitate psychosocial and patient-centered care).[12]

In response, many new accreditation and professional practice guidelines now include competencies related to wellness.[13] Higher education and healthcare organizations are also beginning to recognize the importance of interventions targeting resiliency, self-care, self-compassion, and stress reduction.[14]

How did the HSC Libraries get involved?

In November of 2016, the HSCL's interim directors attended the Association of American Medical Colleges' (AAMC) Annual Meeting (Learn, Serve, Lead), where multiple programs on wellness and resilience were offered. Roundtables and presentations highlighted the need for such interventions for students and residents, and programs housed in medical and other health professional colleges were discussed. While there was great enthusiasm at the conference for wellness strategies, libraries were not included in any of these interventions. As the HSC Libraries had endeavored over the last several years to make the library a more welcoming and relevant place for its students and other clients through intellectually stimulating programming and renovation to create a student-centered space, it was obvious to these interim directors that wellness programming easily fit into the library's new priorities. While the HSCL supports six UF colleges (Dentistry, Medicine, Nursing, Pharmacy, Public Health and Health Professions, and Veterinary Medicine), the library is a college-neutral space, welcoming members of all six colleges and dedicated to offering programs and services customized to respond to the needs of its clients. Upon return from the conference, the serving interim met with two library faculty, one with extensive national experience in the area of wellness in medical schools, and the other a relatively new librarian with a keen interest in the topic. These library faculty were charged with leading a new Wellness Team made up of HSCL faculty and staff to identify the wellness-related needs of clients and developing interventions to meet those needs.

HSCL Wellness Assessment

After the formation of the HSCL Wellness Team, which included both librarians and circulation staff, in late 2016, the team quickly realized that, to develop effective programming and services for HSC Library users, an assessment of the wellness programming needs must be conducted. Various departments at the University of Florida host wellness activities, such as the Student Health Care Centers, GatorWell, the Counseling and Wellness Center, and GatorCare. The library's wellness programming needed to complement, not conflict with, the programming of these other departments. Through this initial assessment, the team wanted to understand library users' conceptions of what wellness is, which currently existing programming library users were already participating in, what wellness activities they would like to be made available, as well as their specific scheduling needs.

Assessment Methodology
Survey Design and Distribution

The first iteration of the survey, developed in February 2017, was a simple half-sheet paper questionnaire with a consent form on one side and the survey questions on the other (Figure 5). Four questions were included, three short-answer and one multiple choice; there was also a note at the bottom requesting that users with additional feedback or those who would like to be involved in developing library wellness programming could contact this paper's lead author via email. The questionnaire was completely anonymous; therefore, an IRB exemption was applied for and approved by the University of Florida Institutional Review Board. The paper questionnaires were displayed inside the main entrance of the library with a collection box for completed surveys. The paper version of the survey included visuals that included some example wellness activities, with the intention of inspiring participants, although the visuals may have biased responses.

While the survey was advertised by both information desk staff and library faculty, the number of responses was low considering the number of users served by the HSC Library—39 responses in total. As a result, the team decided that creating an online version of the questionnaire would be a more efficient method of

collecting responses. A revision was submitted to the IRB for this new questionnaire in May 2017, which was again approved as exempt. The online version of the questionnaire was created and distributed through the Qualtrics survey software. It included the same four questions from the original survey, plus two additional wellness questions; one multiple choice asking about how often wellness programming should be made available, and one short answer asking for any additional comments. In addition to these changes, another bank of three demographic questions were introduced, asking respondents about their status (such as undergraduate student, faculty, or resident), their affiliation (specifically which college they were associated with), and their location (UF has multiple campuses and offsite locations). By asking these questions, the team sought to discover any particular trends among specific types of patrons, so that wellness services could be tailored accordingly. The team reasoned that the online nature of the survey meant that these additional questions were less burdensome to answer than they would have been in the original paper format, and thus would not inhibit the number of responses collected. The online questionnaire was sent to all Health Science Center colleges and departments via email announcements, social media postings, and an announcement on the library website. It was found to be more effective at eliciting responses, collecting 226 responses in total.

Figure 5: Initial Print Wellness Assessment Instrument, Question Side

Analyses of Survey Responses

Two analyses were conducted of the survey responses. The first was a simple word/phrase frequency analysis of survey responses, looking for obvious common trends, in order to be able to develop wellness programming in a timely manner while still utilizing the survey data.

A thematic analysis of the short answer responses was conducted with guidance from the National Network of Libraries of Medicine Outreach Evaluation Resource Center's booklets on Planning and Evaluating Health Information Outreach Projects (Olney, 2013). Two librarian Wellness Team members separately read through the survey responses and noted recurring themes, then met to discuss their findings and create a list

of categories and subcategories of conversation. After identifying categories, the team members re-examined the survey responses and coded them accordingly. Any discrepancies in interpretation of what categories were assigned to certain responses were resolved through discussion.

Survey Analysis Results
Frequency Analysis
The questions asked users about wellness in relation to three different contexts: the activities that represent the concept of wellness in general, library users' current participation in wellness programming either at the university or on their own, and suggestions for wellness programming at the HSC Library. Table 1 shows some of the clear trends we found in the survey data. The results demonstrated that a few activities are strongly associated with the concept of wellness and wellness programming, particularly in the context of the library. Yoga (55 appearances) and therapy animals (53) were by far the most commonly mentioned activities, with meditation (23) and creative activities (23) receiving many mentions as well. This gave the Wellness Team a clear direction in which to focus their program development.

Table 1: Survey Data Frequency Analysis Results

| Common Responses:	#
Yoga	55
Therapy animals	53
Meditation	23
Creative activities such as coloring	23
Exercise equipment	9
Free coffee and healthy snacks	8

Thematic Analysis
The thematic analysis of all coded responses is displayed in Figure 6. The top three responses describing the activities related to the concept of wellness in general were physical health (mentioned by 60% of users), mental health (58%), and relaxation (46%). When respondents answered the question of what wellness activities they currently participate in, the answers were similar, with the substitution of balance-related activities for relaxation activities: 54% coded as physical health, 39% described activities related to work/life balance (such as "getting away from work," "not studying," "taking breaks"), and 30% mentioned mental health activities. When asked what wellness programs at the HSC Library would interest them, users still listed mental health activities most frequently (44%), but therapy animals were the second most popular activity (39%), and balance and relaxation activities tied for third at 26%.

While an understanding of the most common responses was essential for designing library wellness programming, the variety of responses was also worthy of note, as the new ideas revealed evolving concepts of the place of the library in promoting wellness. Several suggested activities indicated a conception of the library as a community space, like a public library. Group exercise programs, running clubs, cooking or baking classes, and healthy eating tips are not generally thought of in the context of an academic health science library, but they may well be in the future. Similarly, the number of responses related to the specific space of the library as a place that needs to be welcoming and comforting/-able was interesting, with responses like "art exhibits," "massage chairs," "pillows and blankets," "soothing music," "aromatherapy," and "flowers" revealing how important environment is considered for several of our users' conceptions of wellness.

A few responses did indicate a negative idea of wellness, and at least a handful of responses indicated that wellness programming was not a good use of the library's time or money. "In my opinion, the two sleep pods

are kind of a waste of money. If you need to nap in grad school you're not working hard enough" was a response to an earlier installation in the library of two "energy pods" designed for twenty-minute power naps. When asked what suggestions they had for library wellness programming, one user responded, "None, please keep the library a library." Such responses questioning the role of the library in wellness were rare but noted.

Figure 6: HSCL Wellness Survey Coded Responses
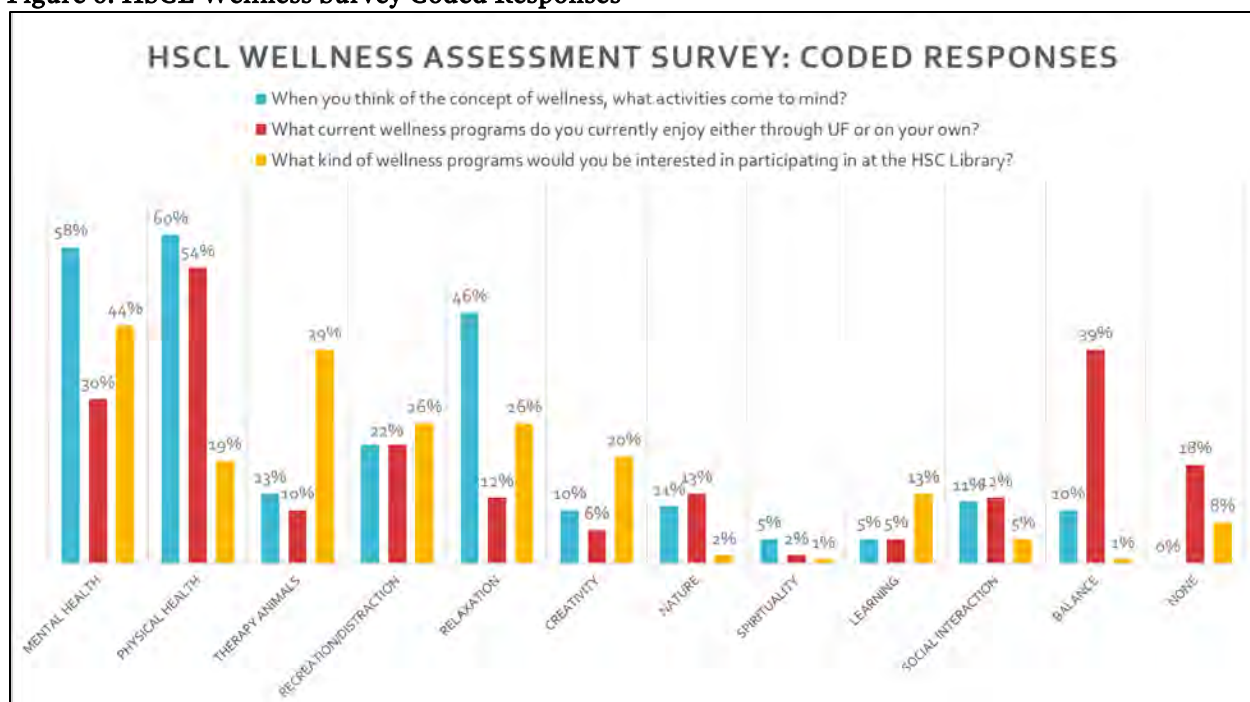
Wellness Initiative
Creating a Proposal

Based on the survey results, the team drafted a plan for wellness activities and resources in July 2017. The plan included descriptions of importance, space requirements, cost, and evaluative measures for each proposed resource or activity. The proposal was submitted to library administration for review and approval. The list of proposed activities and their approval status is displayed below:

Table 2: Wellness Initiative Proposal Activities

Scheduled Programs	Status
Meditative exercise	Pursuing space, funding
Therapy dogs	Started in Fall 2017
Meditation	Started in Fall 2017
Pop-up Park	Pursuing funding
Coffee and healthy snacks during exams	Started in Fall 2017

Activities Available at Any Time	Status
Creative expression (coloring books, art supplies)	Started in Fall 2017
Art exhibition	Will start Spring 2019
Exercise equipment	Tested in Spring 2018
Puzzles	Started in Spring 2017

HSCL Wellness Initiative
Wellness Programs 2017—2018

The wellness programs offered by the library began with a puzzle that was put out during the annual 352 Creates Day, a locally organized event to encourage all members of the community (within the 352 area code) to integrate creative wellness activities into their daily lives. The event hosted by the HSC Library involved coloring, origami, button-making, poetry, and other creative activities; however, the most popular part was the puzzle laid out next to the central staircase on the first floor. To encourage continued engagement, a regular rotation of different puzzles was instituted and a small sign was made to encourage library visitors to "Puzzle with Friends!" Next to the puzzle table on the first floor, we have the wellness book collection, which includes titles on integrative medicine, stress reduction and meditative practice, consumer health, narrative medicine, and nature healing. Due to user preference, this is a print collection. The same shelves that house the wellness book collection also hold the portable art kit: a tool bag holding coloring sheets, origami sheets, markers, colored pencils, and crayons.

On a weekly basis, we offer quiet meditation sessions for those already familiar with meditation. Attendees are free to practice any form of quiet meditation they choose. The room is spacious enough for participants to do this practice seated in a chair or on the floor, or even lying down if they prefer. The facilitator dims the lights and simply instructs attendees to close their eyes and get comfortable, then leads them in a few deep, cleansing breaths (i.e., breathing deeply into the belly on the inhale and releasing any stress or tension as they exhale), and invites them to begin meditating. After 20 minutes have passed, she rings a chime signaling the end of the meditation session. Additionally, twice-monthly instruction in a basic mantra meditation technique is provided for those who would like to participate but do not know how to meditate. In addition to brief verbal instructions, students are given a written handout for future reference in case they want to continue the practice at home.

Twice a semester, during fall and spring midterms and finals weeks, the HSC Library offers a series of activities to inspire students to take a momentary break. The Wellness Team sets up a one-day pop-up coffee station where librarians offer the students free coffee or tea and snacks such as bananas, apples, and granola bars. The event is not advertised, but all library visitors are welcome to help themselves to the complimentary healthy snacks to support their studying.

Finally, twice during fall and spring semesters and once in the summer, the library also supports visits from a therapy dog, Beau. Originally accompanied by his late partner, Mac, Beau now visits on his own for shorter periods. He also volunteers as a therapy dog in the hospital and in a range of other venues. He has experience being around a range of individuals, including healthcare providers and students. His regular visits are appreciated by library visitors and the library is regularly asked for weekly therapy dog visits and visits from other therapy animals.

To encourage library visitors to participate in wellness activities at all times, the HSC Library has also introduced two MetroNap Energy Pods. These reclining chairs with hoods offer timed 20-minute naps with relaxing music and soothing lights. The Energy Pods are located on the second floor of the library and are visible from the central staircase, so it is easy to track their near-constant use. Given the popularity of these pods, the Wellness Team has also begun tracking interest in under-desk exercisers and stationary bicycle

desks through a pilot of select exercisers. The plan is to use the feedback submitted by testers in the library to purchase additional exercisers for circulation.

Immediate Feedback from Participants

Feedback regarding these events has been largely positive. Students love the therapy dogs and are very enthusiastic in their response to the coffee events. The weekly meditation sessions have a small but appreciative following, which includes some staff and faculty members, many of whom have stated they would attend every week if their schedule allowed. Some comments from participants include:

Table 3: Immediate feedback from participants

Program	Feedback
Therapy Dogs	"The Therapy Dogs that visit the Health Science Library always help destress my days. Throughout the weeks of working and studying for classes, having the opportunity to see them lets me have fun and helps me forget the stressful things in my life; even if it is for a short amount of time. Mac and Beau are always happy, seeing them reminds me of my dogs back home and how much love they can bring to a person. They help forget the many things on a person's mind and they have such an inviting aura that it makes it easy to pet them and just relax. Beau, Mac and their owners help bring an atmosphere of calmness that help students, including myself, to relax and forget about our worries. I am always happy whenever they have the time to come and visit us."
Therapy Dogs	"I really appreciate every Therapy Dog's Day. A therapy dog can lift moods in the library, especially during exams. I feel so warm and at ease when I pet the dog."
Coffee and Therapy Dogs	"Exam times can be stressful, but taking a break to grab a drink or a snack at the table the librarians set up was a change of pace. I enjoyed talking to the librarians and resting for a bit before diving back into studying. I loved spending time with the therapy dogs. They helped me to relax because there is nothing better than petting a dog. These events made studying at the library more inviting and were a fantastic surprise."
Meditation	"I really needed this"
Meditation	"I feel so much better when I do this"
Puzzles	During finals in Fall 2017, a group of dental students who finished a puzzle together after an exam insisted that they have their photo taken with the completed puzzle.

HSCL Wellness Program Evaluation
Survey Design and Distribution

After a year of introducing wellness programs in the library, the Wellness Team decided to release an evaluation survey to better understand the parts of the Wellness Program that were working, the parts of the

Wellness Program that were desired by the library audience, and the parts that either needed better advertising, modifications, or cancellations.

The survey was composed of eleven questions: seven focused on the present and future efforts of the Wellness Team and four were demographic questions. In particular, the team was curious to learn more about how to better advertise new and existing wellness programs and what wellness services the students, staff, and faculty would like to see next from the HSC Library. The evaluation question types included five multiple-choice answer questions and two open answer questions regarding how services could be improved and what wellness programs the respondent desired to see in the future. The survey was not tested on the audience in advance, but was reviewed several times by the Wellness Team and other library faculty experienced in creating surveys.

The questions were entered in the University of Florida Qualtrics and distributed online via the library website homepage and emails disseminated by liaison librarians in all six HSC colleges. The survey was released in April, which, in hindsight, was not an optimal time as many of the HSC Colleges' programs are on the nine-month calendar and end in May, so the students and faculty were more focused on the future wellness activities of their summer breaks than on the wellness-related survey. After a disappointing response rate over the summer, the Wellness Team decided to readvertise the survey in one last big push in August when the regular school year resumed and closed the survey in September.

Preliminary Analysis

In the end, the survey received 56 responses. Of those 56, the majority of responses came from undergraduate students at 43% (24), professional students at 16% (9), and graduate students at 14% (8). Only 11 responses came from faculty and staff. Of the six colleges, 57% of responses were from the College of Nursing (31), 9% were from the College of Veterinary Medicine (5), 7% were from the College of Public Health and Health Professions (4), and both the College of Pharmacy and College of Medicine had 11% of responses (6).

The questions regarding the current wellness program focused on what services the respondents were aware of, which ones they had participated in, and whether the programs supported their wellness needs.

Table 4: Wellness Program Evaluation Question: Awareness of Library Wellness Services

Which wellness services in the library were you aware of before? Please select all that apply. (n=56)	Percent	Number
MetroNap energy pods	68%	38
Therapy dog visits during midterms and finals	45%	25
Puzzles	39%	22
Weekly meditation and biweekly meditation instruction	32%	18
Complimentary coffee and healthy snacks during midterms and finals	21%	12
I was not aware of any wellness programs in the library	16%	9
Coloring kit	7%	4
Wellness book collection on the first floor	2%	1

Of the wellness services that respondents were aware of, the MetroNap pods—large furniture installations placed prominently on the second floor of the library to facilitate a timed nap—were the most consistently visible and most widely known at 68% (38). The therapy dogs and meditation had been widely advertised by email and signage in the library and on the library website, and were also in the top four at 45% and 32%

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respectively. The puzzles are available on the first floor of the library, near a central staircase, and are easily visible but not widely advertised; 39% of respondents were aware of them. Surprisingly, only 2% of respondents were aware of the wellness book collection, which is physically adjacent to the puzzles, but not widely advertised. Sixteen percent of respondents were not aware of any wellness programs in the library.

Table 5: Wellness Program Evaluation Question: Participation in Library Wellness Services

Which wellness services in the library have you participated in/utilized? Please select all that apply. (n=56)	Percent	Number
I have not participated in/utilized any wellness services in the library	48%	27
Therapy dog visits during midterms and finals	32%	18
Puzzles	16%	9
Complimentary coffee and healthy snacks during midterms and finals	14%	8
Metronap energy pods	14%	8
Coloring kit	2%	1
Wellness book collection on the first floor	2%	1
Weekly meditation and biweekly meditation instruction	2%	1

While only 16% of survey respondents were not aware of wellness programs, 48% of respondents had not participated in any of them. The programs that respondents had participated in were the programs highly visible and available regularly in the library, like the MetroNap energy pods and the puzzles, or the programs that were occurring frequently during midterms and finals, such as the therapy dog visits and complimentary coffee and healthy snacks.

Addressing future wellness programs in two open-ended essay questions, the survey asked what could be improved regarding the existing wellness programs and what respondents would like to see in future wellness programs. While further in-depth analysis and coding are needed, a preliminary examination of the data suggests that the big issue is accessibility of the current programs. Comments asked for more meditation and therapy dog sessions, offering programs at different times, and having active programs like meditation instruction available 24/7 via recordings or online for distance students.

Future Plans

Further analysis of the survey evaluation is underway and the Wellness Team is already planning changes for future programs. The survey team saw the lack of awareness of certain programs as a call to increase advertising for programs that had not been heavily promoted previously. The Wellness in the HSC Library LibGuide will be expanded to include more resources for our distance users, like authoritative apps or freely available online instruction in meditation. Additionally, the Wellness Team is talking to the new library director about expanding wellness programming and equipment in a designated section of a multipurpose room.

The thought is that after offering changes in programming and advertisements in alignment with those suggested by the evaluation survey, an annual evaluation survey would be established for release in the spring semester, when all HSC Colleges and their programs are on campus. Through this repeated survey, the library can better modify or discontinue wellness programs and build better future ones, discovering the trends in wellness needs over the course of several years.

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Notes

1. Hettler, "The Six Dimensions of Wellness Model."
2. Hettler, "The Six Dimensions of Wellness Model."
3. "Windows to Wellness," University of Florida.
4. "Programs," SAMHSA.
5. Johns et al., ***Intersectional wellness***.
6. Cvejic, Huang, and Vollmer-Conna, "Can You Snooze Your Way to an 'A'?"; Tharani, Husain, and Warwick, "Learning Environment and Emotional Well-Being"; Ayala et al., "What Do Medical Students Do for Self-Care?"; Rotenstein, et al., "Prevalence of Depression"; McConville, McAleer, and Hahne, "Mindfulness Training for Health Profession Students"; Dyrbye and Shanafelt, "A Narrative Review on Burnout Experienced by Medical Students"; Shiralkar, Harris, Eddins-Folensbee, and Coverdale, "A Systematic Review"; and Elani et al., "A Systematic Review of Stress in Dental Students."
7. Dyrbye and Shanafelt, "A Narrative Review on Burnout Experienced by Medical Students"; Hamidi, Boggild, and Cheung, "Running on Empty"; Gergen Barnett, "In Pursuit of the Fourth Aim in Health Care"; Hall et al., "Healthcare Staff Wellbeing"; and Carvour et al., "A Patient-Centered Approach."
8. Tharani, Husain, and Warwick, "Learning Environment and Emotional Well-Being"; Ayala et al., "What Do Medical Students Do for Self-Care?"; Gergen Barnett, "In Pursuit of the Fourth Aim in Health Care"; Brand et al., "Whole-System Approaches"; Hall et al., "Healthcare Staff Wellbeing"; McConville, McAleer, and Hahne, "Mindfulness Training for Health Profession Students"; Dyrbye and Shanafelt, "A Narrative Review on Burnout Experienced by Medical Students"; Wilkinson, Whittington, Perry, and Eames, "Examining the Relationship between Burnout"; Carvour et al., "A Patient-Centered Approach"; Mensah and Anderson, "Barriers and Facilitators"; Shiralkar, Harris, Eddins-Folensbee, and Coverdale, "A Systematic Review"; Guillaumie, Boiral, and Champagne, "A Mixed-Methods Systematic Review"; and Hamidi, Boggild, and Cheung, "Running on Empty."
9. Rotenstein, et al., "Prevalence of Depression"; and Carvour et al., "A Patient-Centered Approach."
10. Cvejic, Huang, and Vollmer-Conna, "Can You Snooze Your Way to an 'A'?"; Hamidi, Boggild, and Cheung, "Running on Empty"; Gergen Barnett, "In Pursuit of the Fourth Aim in Health Care"; Dyrbye and Shanafelt, "A Narrative Review on Burnout Experienced by Medical Students"; Carvour et al., "A Patient-Centered Approach"; and Shiralkar, Harris, Eddins-Folensbee, and Coverdale, "A Systematic Review."
11. Tharani, Husain, and Warwick, "Learning Environment and Emotional Well-Being"; Gergen Barnett, "In Pursuit of the Fourth Aim in Health Care"; Brand et al., "Whole-System Approaches"; Hall et al., "Healthcare Staff Wellbeing"; Dyrbye and Shanafelt, "A Narrative Review on Burnout Experienced by Medical Students"; Wilkinson, Whittington, Perry, and Eames, "Examining the Relationship between Burnout"; Carvour et al., "A Patient-Centered Approach"; Mensah and Anderson, "Barriers and Facilitators"; and Guillaumie, Boiral, and Champagne, "A Mixed-Methods Systematic Review."
12. Tharani, Husain, and Warwick, "Learning Environment and Emotional Well-Being"; McConville, McAleer, and Hahne, "Mindfulness Training for Health Profession Students"; Dyrbye and Shanafelt, "A Narrative Review on Burnout Experienced by Medical Students"; and Shiralkar, Harris, Eddins-Folensbee, and Coverdale, "A Systematic Review."
13. Dyrbye and Shanafelt, "A Narrative Review on Burnout Experienced by Medical Students."
14. Cvejic, Huang, and Vollmer-Conna, "Can You Snooze Your Way to an 'A'?"; Ayala et al., "What Do Medical Students Do for Self-Care?"; Gergen Barnett, "In Pursuit of the Fourth Aim in Health Care"; Rotenstein, et al., "Prevalence of Depression"; McConville, McAleer, and Hahne, "Mindfulness Training for Health Profession Students"; Dyrbye and Shanafelt, "A Narrative Review on Burnout Experienced by Medical Students"; Wilkinson, Whittington, Perry, and Eames, "Examining the Relationship between Burnout"; Dobkin and Hutchinson, "Teaching Mindfulness in Medical School"; Carvour et al., "A Patient-Centered Approach"; Mensah and Anderson., "Barriers and Facilitators"; Shiralkar, Harris, Eddins-Folensbee, and Coverdale, "A Systematic Review"; and Guillaumie, Boiral, and Champagne, "A Mixed-Methods Systematic Review."

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One Year In: Using a Mission-Driven Assessment Plan to Enact Change in an Academic Library Makerspace

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Overview

The Foundry is an interdisciplinary makerspace located in the Fine Arts Library (FAL) branch of the University of Texas Library (UTL) System. It had a soft opening in the fall of 2016. The space was created in partnership with the College of Fine Arts with a primary goal of making the creative process and creative practice accessible to any UT student, staff, or faculty member. To date, The Foundry is the only makerspace on campus that is open to any student, staff, or faculty member irrespective of departmental affiliation.

The approximately 4,000 square foot space provides access to mills, 3D printers, a laser cutter, a textiles area, a large format printer/cutter, a video wall, virtual reality (VR) headsets, a 3D scanner, and a recording studio. There are two full-time staff that support the space: a professional librarian and a media support technician. There are also a large group of student staff that provide coverage and assistance to patrons on the floor.

Between fall 2016 and fall 2017, The Foundry was primarily focused on developing workflows for how patrons would begin to utilize the space. This was in addition to allowing staff time to acclimate to and become proficient in the use of the equipment. During this time, an access and service model for the space began to take shape, as well as a mission statement, an assessment plan, and an onboarding plan for student staff. This time provided an opportunity for The Foundry to begin to design a standardized approach to teaching in the space, which would ensure consistent service provision and established learning goals on the equipment. This standardized approach includes an inclusive teaching and learning practices document, which is required reading for anyone teaching in the space.

The Foundry provides multiple points of entry for faculty, students, and staff. Faculty can request course integrated support for their students; students can walk in to use the space or can sign up for a certification through the campus learning management system, Canvas; and UT staff are welcome to use the space in the same way that students access services. Course integrated support does include providing exposure tours, but the preferred model of integration is one that aligns services with course learning goals and outcomes. This process includes a faculty consultation, during which Foundry staff develop a customized course support plan. Identifying learning outcomes, modifying assignment design and deadlines in partnership with faculty, and allocating blocks of time in the space for the class to work are all prioritized during the consultation. Faculty can also elect to use the space as a teaching space, in which they instruct their students on the equipment, or they can request that the Foundry librarian provide instructional support for the class. This support model is akin to the standard information literacy or research instruction session, with a primary focus on providing digital pedagogy support and advancing digital literacy efforts.

Student use of the space can generally be broken down into two primary paths. There are students that are completing assignments for courses, and there are independent learners that are interested in acquiring specific skill sets. In order to begin using The Foundry, students must first determine whether or not the specific piece of equipment that they want to use requires certification. Currently, all of the equipment in The Foundry requires certification except the 3D scanner, VR headsets, and the printer/cutter. A certification requires students to attend a 30–60 minute primer on the equipment. The focus of a certification is to acquaint patrons with the space, to provide them with an overview of safety protocol, to introduce them to the physical components of the equipment, and to provide them with a basic overview of the software that controls the equipment. Generally speaking, students are provided with the option to have hands-on exposure during a certification.

Certifications are provided by student staff, classified, and professional staff. Employees from across UTL can teach in the space if they have the necessary skill set, and desire to contribute time to the space. Staff shares allow the space to be staffed by a variety of individuals with highly unique qualifications.

Between fall 2017 and fall 2018, having established stable workflows for patron engagement and having established a strong assessment plan, The Foundry began to shift its focus to campus outreach. The 2016–17 academic year provided Foundry staff with an opportunity to pilot course integrated support and certification provision. The following year, Foundry staff began to refine workflows and began targeting specific departments on campus as a result of 2016–17 assessment data. The goal of this outreach was to increase course-integrated use of the space. Much like learning labs and communal teaching spaces that are owned and managed by academic libraries, The Foundry is viewed as a learning lab, and Foundry staff believe the success of the space is dependent upon faculty designing assignments that require students to use the equipment.

While it was clear from the outset that assessing The Foundry would be essential, deciding how to do so raised more questions than answers during the planning stages of the space. Examples of how other academic libraries approached makerspace assessment were few and far between. Without best practices to rely on or benchmarks to compare against, assessment planning focused on practicalities and institutional needs. While the bulk of organized assessment planning for The Foundry takes place through a holistic plan that fits into an institutional assessment framework to be detailed below, supplemental measures, such as equipment usage tracking, aid in operational decision-making. While the official assessment plan is highly structured and written well in advance of its implementation, supplemental measures are often added and discarded on the fly. Using both levels of assessment allows for flexibility while keeping us on track with our mission and goals. This paper will share findings from the first full year of following a holistic plan and discuss how these findings are being used to gauge success and change service models as needed.

Review of the Literature

Literature on assessing makerspaces within higher education, particularly within academic libraries, is sparse. Most studies focus on either evaluation or assessment of a single aspect of a makerspace such as a particular service[1] or aspect such as curricular integration.[2] A few papers at the recent International Symposium on Academic Makerspaces focused on data collection, but none addressed assessment at a broader scale.[3] This paper argues that approaching assessment in a holistically systematic manner, rather than simply collecting metrics on equipment usage and space headcounts, helps maintain focus on the intended purpose of a makerspace and has the added benefit of providing administrators with stories about the impact of the space.

Developing the Foundry Assessment Plan

Institutional assessment at the University of Texas takes place through a "Continuous Improvement Framework" through which campus operating units write and implement yearly assessment plans composed of aligned goals, outcomes, strategies for achieving the outcomes, assessment methods, and achievement targets. Around the time that The Foundry was being designed and built, the University of Texas Libraries began participating in this campus-wide outcomes-based institutional assessment framework. It naturally followed that the framework was used to guide initial assessment of the makerspace. As detailed in a previous publication, The Foundry staff started with a mission statement, then devised goals and outcomes that would support the unit's mission and align with UTL and institution-wide missions.[4]

The three broad goals of The Foundry are: (1) advance undergraduate, graduate, and faculty understanding of makerspace technology and the application of innovative production methods in educational and professional environments; (2) support interdisciplinary, constructivist learning and cooperation through strategic campus partnerships; and (3) develop and steward a safe, inclusive makerspace that represents the diverse population of faculty, students, and staff at UT. Outcomes that fall under these goals focus on (1.1) student creation; (1.2) exposure to makerspace technology; (1.3) integration of The Foundry into curriculum; (2.1) interdisciplinary constituency; and (3.1) learning environment. These goals and outcomes focus on

mission-centric foundational and transformational aspects of The Foundry rather than on day-to-day operations, which helps to ensure that decisions are made with broad context and purpose in mind.

Outside of the holistic assessment plan, input and output measures such as equipment certification numbers are collected and analyzed as needed. Rather than a yearly cycle, these measures are gathered and analyzed in a more ad hoc manner and can be changed or discontinued as needs dictate.

2017—18 Foundry Assessment Plan Methods and Results

Goals	Outcomes	Assessment Methods	Targets	Results
Advance undergraduate, graduate, and faculty understanding of makerspace technology and the application of innovative production methods in educational and professional environments.	Students will create products using makerspace technology. Students will be exposed to uses of makerspace technology in varied educational and professional environments. Faculty will partner with Foundry librarians to identify ways to integrate makerspace technology into the curriculum.	Focus group surveys with student staff, Qualtrics survey administered through Canvas, and Instagram social media contest. Qualtrics survey administered through Canvas and faculty survey. Course-integrated instruction data and faculty surveys.	60% of users achieve goal of "using a piece of equipment in The Foundry to make something" on Qualtrics survey. 60% of faculty strongly agree that exposure to Foundry resources expanded student understanding of the potential application of makerspace tech in their field/discipline. 5 course-integrated partnerships each semester (tours, use of technology, presentation request).	Achieved. 88.9% of the 27 patrons that answered this question on the patron survey achieved their goal. Not applicable. This assessment method was utilized once during the spring 2017 pilot. There were no results received to the survey. This assessment method/strategy will be eliminated from the 18–19 plan. Achieved. 47 course-integrated interactions in total. FA2017 = 8 unique, SP2018 = 13 unique.
Support interdisciplinary, constructivist learning and cooperation through strategic campus partnerships.	An interdisciplinary constituency will utilize The Foundry. There will be broad college and departmental representation.	Course-integrated instruction data, hiring data, events survey data, workshop attendee data, EID data.	2–3 non-CAET learning/event partnerships each semester. Student staff from at least 3–5 different departments.	Achieved. 16 non-AET partnerships. Student staff from College of Fine Arts (6). College of Liberal Arts (2), School of Architecture, School of Engineering (3), College of Natural Sciences (2).

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Goals	Outcomes	Assessment Methods	Targets	Results
Develop and steward a safe, inclusive makerspace that represents the diverse population of faculty, students, and staff at UT.	Patrons will view and experience The Foundry as a safe, inclusive learning environment.	Focus group surveys with student staff; Qualtrics surveys administered through Canvas course.	70% of users feel welcome in the space. 60% of users satisfied/very satisfied with service.	Achieved. 60.8% of the 34 patrons that answered the question feel "extremely welcome," 21.6% feel "somewhat welcome" in the space. 73.5% of the 34 patrons that responded to the question felt "extremely pleased" with the quality of service they received during their last visit.

The Foundry Mission Statement: To provide access to an interdisciplinary, constructivist, inclusive learning space that encourages students, faculty, and staff to explore the practice of making.

Data Collection and Methodology

As a service of the UTL system, The Foundry serves and engages a wide range of patrons, primarily UT affiliates, but often prospective students and community visitors. The Foundry engages in continuous assessment throughout the academic year via a mixed methods assessment plan that includes patron surveys, student staff focus groups, and analysis of patron service usage and demographic data. Ethnic, gender, departmental, and other demographic data about the population that utilizes The Foundry is sourced from the campus learning management system, Canvas, once per year. That data is then joined with UT data and allows for a more specific demographic view of the patrons to emerge. The Foundry has an open enroll Canvas course which provides information about services offered and allows patrons to sign up for classes, receive event notifications, and read about the equipment in the space. The Foundry assumes that most patrons utilizing the space are also enrolled in the Canvas course. It is possible for a patron to use the service and not join the Canvas course, but this is fairly unlikely.

In addition to patron data, The Foundry gathers data from a patron survey, conducted once per year in spring; student staff focus groups, also conducted annually in spring; and from instruction and events data, which is maintained throughout the year. Qualtrics is utilized for patron surveys, focus groups are moderated by the head of assessment for UT Libraries. All quantitative and qualitative data is aggregated and anonymized prior to analysis.

Patron equipment certifications are another unit of assessment. These occur when a patron is certified to use a piece of equipment, such as a 3D printer. Monitoring certification levels ensures that the service is being utilized and demonstrates that ongoing investment in the service is warranted.

Results

As part of the Continuous Improvement Framework cycle, results from assessment methods included in the 2017–18 assessment plan were compiled and analyzed at the conclusion of the spring 2018 semester to determine whether outcomes were achieved. These findings were then used to inform the creation of actionable next steps intended to improve The Foundry. Assessment methods revealed that four out of five outcomes were achieved during the first assessment cycle, with the fifth outcome determined to need different methods in order to be assessed.

The first three outcomes focused on ensuring that students and faculty were using The Foundry to enhance learning through both individual exploration and curricular integration. Two of three outcomes were achieved. The user survey revealed that almost 90% of respondents achieved the goal of "using a piece of equipment in The Foundry to make something," fulfilling outcome 1.1. Outcome 1.2 was unable to be assessed during this round due to lack of responses to the faculty survey. The third outcome under this goal was fully achieved, with 21 unique faculty partnerships recorded throughout the year.

The second goal and accompanying outcome focused on supporting interdisciplinary learning and was also achieved. Student data showed usage from a variety of disciplines, Foundry staff formed partnerships with faculty from outside the School of Design and Creative Technology, and student workers represented four different schools and colleges. Course-integrated use is slowly growing. The space attracts new academic partnerships each semester while retaining courses that previously used the space. Departmental use of the space is diverse, although there are some departments which utilize the space more heavily.

The final goal under the assessment plan was to develop and steward a safe, inclusive space that represents the diverse population on campus. This goal's accompanying outcome was also achieved. Data from 2017 to 2018 show that the Foundry is serving a diverse constituency. Usage by gender is largely evenly split, and the ethnicity of patrons using the space mimics campus level demographics, based on the 2017–2018 Statistical Handbook.[5] Usage is steady and slowly growing, and events continue to draw in new patrons.

Although outcomes that were successfully assessed were all achieved, the Continuous Improvement Framework requires actionable next steps to be identified based on assessment findings. Next steps are intended to "close the loop" on the assessment cycle and are where the improvement portion of the framework comes into play. Since successfully achieving outcomes signaled that large programmatic changes were not needed, smaller improvements that do not tie directly to the plan outcomes were identified. The student staff focus group revealed that students felt the staff workroom was too messy and that some students were receiving relevant work information (such as information on policy changes) before others. These were simple fixes—the staff workroom has been cleaned and communication is now reinforced in person with student staff. Other action items included increasing outreach announcements through Canvas to try and raise the percentage of patrons who feel welcome in the space and purchasing a dress form for the textiles area as requested by patrons.

Efficacy of methods

Assessment methods used as part of the 2017–18 assessment plan were largely successful and resulted in data that provides a multifaceted view of the ways in which patrons engage with services provided by The Foundry. Faculty data presents an opportunity for improving data collection. When supporting faculty through course integrated partnerships, there are two reliable measures of their satisfaction: return visits/utilization of services year after year, and anecdotal feedback at the end of the semester, often gathered through in-person conversation or through an email exchange. It is difficult to capture this data in aggregate form, however, that does not detract from the validity or value it adds to the overall picture of services provided.

The current iteration of the assessment plan (2018–2019) includes the following modifications from the 2017–2018 version:

- Removed Target: "60% of faculty strongly agree that exposure to Foundry resources expanded student understanding of the potential application of makerspace tech." Replaced with Target: "3 unique workshops offered each semester to any patron without charge."

- Assessment methods: added measures for workshop data, course-integrated tour data, and accompanying strategies (course-integrated tours, open tours available for anyone, workshops).

- Removed "Instagram social media contest" as an assessment method.

Aside from faculty assessment data, there were largely no major challenges involved in deploying the assessment. The results are not only useful but inform almost every major operational decision that is made. More granular data is engaged with monthly, and population level data is engaged with twice per year on average. Those involved in deploying the plan believe the results are an accurate reflection of what is occurring in the space. Additional measures such as ILS data on equipment checkouts may be desired, but are not currently feasible. Limitations within the system make it prohibitively time-consuming to collect data that would likely yield useful information. In the future, collecting this data may be revisited.

An outcomes-based assessment plan is only one possible way to approach makerspace assessment. This kind of assessment prioritizes long-term planning over short-term adjustments, which has both positives and negatives. On the positive side, outcomes assessment ensures that staff keep larger goals in mind and annually ensures that current practices are aligned with the mission of the service or space. In the day-to-day tasks involved with running a service, it is easy to lose focus on values-based goals, such as inclusion, but outcomes assessment brings these initiatives to the forefront. On the other hand, yearly outcomes-based assessment plans do not prioritize short term ad hoc assessments that might yield useful information or the gathering of metrics that might prove useful down the road. Balanced assessment will likely include both kinds of practice, with yearly plans as well as time budgeted for assessment needs that arise spontaneously.

Conclusion

Looking ahead, The Foundry will continue to monitor population-specific demographic and space usage data. This is key to advancing the mission of The Foundry to reduce barriers to makerspace access, and to create and maintain a diverse and inclusive makerspace learning environment. Input and output measures will continue to be utilized as needed. We anticipate that operations will continue to improve as a result of holistically analyzing both day-to-day usage data, as well as population level data.

There is little in the field about broadly assessing makerspaces in academic libraries. We hope that this paper adds to the conversation by outlining the opportunities and challenges afforded by approaching makerspace assessment through an outcomes-based framework. As makerspaces continue to proliferate within academic libraries, we would like to see the literature evolve to discuss the use and efficacy of specific methods and metrics for values alignment and operational decision-making.

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Endnotes

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