
Reading Library Spaces: Using Mobile Assessment to Complete Your Library's Story

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Introduction

More and more, space on many college and university campuses is at a premium, and libraries are expected to show their value not only in terms of the services they provide, but also as a physical location. But are traditional library metrics providing us with a complete picture of how patrons are using the library? Do they tell the whole story? Gate counts and circulation statistics have often been used in library space assessment, but these broad measures, while useful for indicating how many people are in the building at any given point or how many materials are circulating, do not give a granular picture of how specific spaces in the library are used or what patrons are doing there.¹ Ethnographic methods such as interviews, photo diaries, focus groups, customer journey maps, or observations are useful for giving a more nuanced picture of library use but are often time consuming.² Newer technologies like GIS (geographic information system), video analysis, or heat mapping require specialized knowledge or technology and a fair amount of analysis to be useful.³ Surveys or censuses of activity in the library can provide useful snapshots but are not useful for longitudinal research unless repeated.⁴ Behavioral mapping (also known as seating sweeps/studies) and other more granular space observations can address many of these problems and be facilitated and simplified with the use of mobile technology.⁵

In this paper, we will detail the use of Suma, an open-source mobile web application, by the learning technologies team at Albert R. Mann Library at Cornell to inform and evaluate recently implemented space redesigns. Over the past two academic years, we have gathered valuable data on the use of our spaces, technology, and furniture, for a holistic view of what is happening in the library. We have also collaborated with students and faculty conducting their own assessments of the library to deepen our understanding of student study space preferences. We will share a selection of data from our most recent year of Suma use, discuss the initiatives we

have developed, and show the changes we have made or are in the process of making that may help others who are considering utilizing this versatile tool. We will discuss the potential applications for Suma, as well as methods for improving an open-source assessment tool to enable easy data collection, and show how this information, coupled with other library data and external assessments, can be used to inform space and service decisions.

Suma

Suma is an open-source, web-based assessment toolkit developed by North Carolina State University (NCSU) Libraries for the purpose of collecting and analyzing observational data about library spaces and services. It allows for fast, mobile data collection, provides data analysis and visualization capabilities for non-technical users, and promotes observational data analysis as an integral part of service and space design and day-to-day planning. Suma adds value to gate counts and other traditional assessment methods by allowing us to: track observational data on how populated specific spaces are; tally, through customizable categories, what patrons are doing in specific spaces; and collect data over time, giving us insight into how space and service needs change.

We first began using Suma in our library during the spring 2014 semester. Initially, we used Suma for a number of initiatives, some of which were more successful than others. We attempted to do headcounts throughout the entire library six times a day, seven days a week, and relied heavily on student employees to do the data gathering. However, headcount collection dropped off midway through the semester (as the library and our student assistants became busier), and we were not able to restart it consistently. Through trial and error, we have found Suma to be most useful when we are trying to answer a specific question. For example, another early initiative was tracking the usage of our graduate study rooms. We had complaints from graduate students that our 24-hour loan period

for these rooms was excessive, as most graduate students were either working in the mornings and then leaving the rooms unoccupied for the rest of the day, or vice versa. By tracking the usage of these rooms four times a day, seven days a week over the course of a semester, we discovered that, despite being checked out, the study rooms were sitting empty almost 50% of the time. These findings resulted in us changing the loan period from 24 to 8 hours, and the following semester, the circulation statistics for these rooms increased by over 20%.

Our most intensive and longest running assessment has been a space usage initiative on the library's second floor. We began looking at our study spaces and user behavior a year before a major renovation of the study spaces, and then continued to track space usage for another year and a half post-occupancy. Suma made this longitudinal assessment of user behavior possible, and allowed us to see how users were interacting with the space, furniture, and technology we had installed during the renovation. Overall, it has been gratifying to observe the increase in usage and see that patrons are using the spaces and furniture the way we designed them to be used.

Results

Examining the 2015–2016 academic year—from August 31, 2015, to May 23, 2016—is instructive in terms of general trends on the second floor. Students and staff collected data according to the schedule shown in Figure 1, with no observations between December 21, 2015, and January 27, 2016, during winter break. Looking at the data for the fall semester, outliers like fall break the week of October 10–14, Thanksgiving break on November 26, and spring break the week of March 26–April 4 are also readily apparent (see Figure 2).

General trends included the increasing usage of the second floor during the fall, reaching a high of 650 people or groups on December 7 (the second to last day of study period before exams began), and the relatively reduced usage of the space during the spring semester, which saw a high of just 470 before spring break. In terms of areas of the second floor that saw the most usage, the main part of our second floor, with individual quiet and collaborative study, was most used (27,605); however, our reading room (Deans' Room) for quiet individual and collaborative work also saw a fair amount of use at 6,750 people or groups (see Figure 3). Patrons working individually were most common (28,412 people) as opposed

to only 14,196 groups of two to four. Studying was far and away the most common activity, though socializing and “chilling”—e.g., watching movies, playing games, texting—also occurred frequently (see Figure 4). Our group tables for two or more people were our most popular furniture, followed by our soft seating such as couches and ottomans. Laptops were by far the most used technology (see Figure 4).

Improving Spaces and Services

These findings have resulted in us making sure that our furniture is arranged for groups of two to four, as well as making sure that our study spaces are arranged in “zones” for different types of activity, e.g., quiet study, collaborative work, socializing. Additionally, the premium on space during study periods, especially in the fall, has led us to begin investigating pop-up study furniture solutions that might alleviate space pressure during high traffic times.

We are not the only ones making plans to improve our library. During the fall 2016 semester, we were approached by students in a natural resources class called “Indigenous Ways of Knowing” who were working on a project that focused on the second floor of Mann Library. They were also interested in learning more about how students were using the spaces and “interacting with their environment,” and they collected data through observations and short interviews. Amazingly, they even created a heat map of the second floor to provide data visualizations of the most popular study spaces. In exchange for our assistance—providing them with an overview of the assessment work we did for the second floor renovation—the student group was more than happy to share their results with us, giving us access to even more data than what we had collected with Suma, but which certainly corroborated our own findings.

Mann Library has also collaborated several times with classes and students from the Design and Environmental Analysis (DEA) department to assist with many aspects of the space renovation process, from programming documents and design, to furniture recommendations, to observations and interviews. Two extensive observation projects run with the aid of DEA students helped Mann Library to make changes to the library's collaborative area and quiet reading room, and demonstrated the importance of observation when making space changes. Their observations gave us valuable insight into creating and refreshing our spaces such as

student desire for natural light, the lack of signage and wayfinding so that students know collaborative space exists, and the idea that activity tends to breed activity—people need to feel comfortable being creative and talking about ideas in a space so that behavior is modeled for others to replicate.

Improving Suma

After our experiences using Suma over the past two years, we had suggestions for improvements to the data collection tool. We shared our frustrations with the limitations of the application with our user experience lead, who actually walked around with a number of staff who were collecting the data to see if there were consistent patterns of behavior among the users. The following customization plans were based on feedback and direct observations of our staff and student assistants using the data collection client (see Figure 5 for original interface):

1. Optimize screen real estate for counting.
 - a. Minimize scrolling and push initiative and location selection off screen.
2. Add a multiplier button.
 - a. Data collectors inherently scan space and group counts by likeness. This button allows collectors to record multiple counts simultaneously.
3. Ensure the current count is always visible and have a managed list of the most popular activities/configurations.
 - a. This functionality fixes the scrolling problem introduced with a fixed header and footer.
4. Add a non-destructive undo button.
 - a. The undo button was changed to restore submitted values so they can be altered without losing the count.

Collaboration with NCSU and the Suma Community

Our user experience lead felt very strongly that, because this was an open-source application, any improvements or customization we made to Suma should be contributed back to the project for use by the rest of the community and should align with the core team's project roadmap. Together with the original developers from NCSU, a new architecture for the client app has been developed (AngularJS), as well as support for non-WebKit browsers via a new DB abstraction (PouchDB). There is also a fork on the GitHub repository (<https://github.com/cazzerson/suma>) where those who want to contribute code to the project can do

so by contacting the project organizers. For more information on how to get involved with the greater Suma community, visit the Suma project page: <http://www.lib.ncsu.edu/dli/projects/spaceassesstool/>.

Future with Suma

Training Documentation, Sampling Weeks, and Cross-Tabulation

Once library staff and students were properly trained in how to use Suma and what language was being used to describe particular scenarios, the data collection became much easier and much more reputable (see full training manual at <https://cornell.box.com/v/sumatraining>). After more than a full year of data collection post-renovation, we have decided that we now have a baseline to compare future data against and that we are able to transition in fall 2016 from collecting daily data to sampling weeks that will be representative of the semester. We can also export the raw data from Suma and combine it with other sources such as gate counts to see what ratio of people in the entire building end up on the second floor (which is our main collaborative work floor) to gauge our need for more collaborative work space.

Desktops

With the ability to shift from daily Suma counts of space usage to sampling weeks, we can now devote our student and staff time to other initiatives where we have been hoping to gather observational data. One area that we have had anecdotal data about, but nothing concrete, is the use of our desktop computers in the library, in particular, desktops with dual monitors. We think these machines are still heavily used, largely due to the variety of specialized software, but we would like to have actual data that can confirm or deny these suspicions.

Graduate Study Areas

Suma was extremely helpful in determining the loan period for our graduate study rooms, and we anticipate that it will be just as helpful in evaluating the occupancy levels of our graduate study area on the library's third floor. Our graduate study area is a designated zone for grad students with desks and lockers that can be reserved for a semester at a time. Once checked out, we do not know the frequency of desk use and whether that use varies by time of day, time of the semester, etc. Utilizing Suma to help collect this information will help us to make decisions on loan periods or adjustments to our policies.

Docking Stations

Another area that would be a perfect use for Suma would be the monitoring of the docking stations that we have throughout the library. Students often have a computer but lack a larger or dual screen to work with, so the library invested in four PC docking stations and four Mac docking stations with the hope of alleviating demand for the PCs and Macs that we provide. Anecdotally, we know that sometimes the docking station desks are being used just as study desks and the equipment is pushed to the side. Other times we see the docking stations used as they are intended. Using Suma would help us to move from anecdotes to actual data so that we can determine whether to continue this service, provide fewer or more machines, or provide only one type of docking station.

is being used and what your users’ experiences are in those spaces. These are not intended to replace more traditional metrics, but rather, to enhance them and provide a more complete picture of your library. Our use of the mobile assessment application Suma has allowed us to collect and quantify this observational data over time, so we can see not only how users’ needs change, but also how well our furniture, spaces, and technology are meeting those changing needs. Additionally, our collaborations with students and faculty have given us access to even more data, and have helped us learn what their concerns and questions are regarding our spaces. Our work with our user experience lead and NCSU developers will hopefully lead to improvements to Suma that will benefit anyone hoping to use this versatile tool to collect observational data that can impact services, staffing levels, spaces, and policies.

Conclusion

In this paper, we have tried to illustrate how simple observations can tell you a lot about how your library

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Figure 1: SUMA Observation Schedule for 2015–2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	11:00 AM	11:00 AM	11:00 AM	11:00 AM	11:00 AM	
2:30 PM	2:30 PM	2:30 PM	2:30 PM	2:30 PM	2:30 PM	2:30 PM
5:30 PM	5:30 PM	5:30 PM	5:30 PM	5:30 PM	5:30 PM	5:30 PM
8:30 PM	8:30 PM	8:30 PM	8:30 PM	8:30 PM		
11:00 PM	11:00 PM	11:00 PM	11:00 PM	11:00 PM		

Figure 2: Daily Counts from August 31, 2015 to May 2016

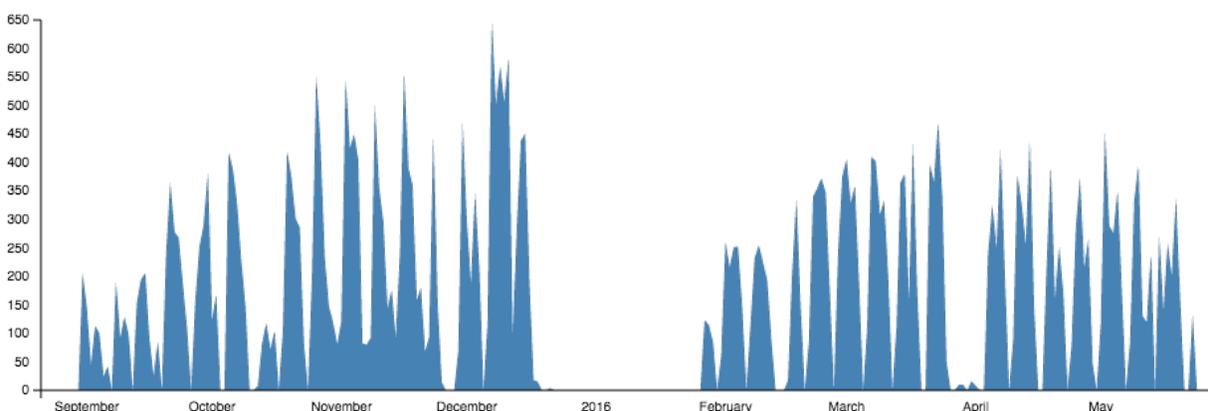


Figure 3: Usage of Second Floor By Area



Figure 4: Activities on the Second Floor 2015-16

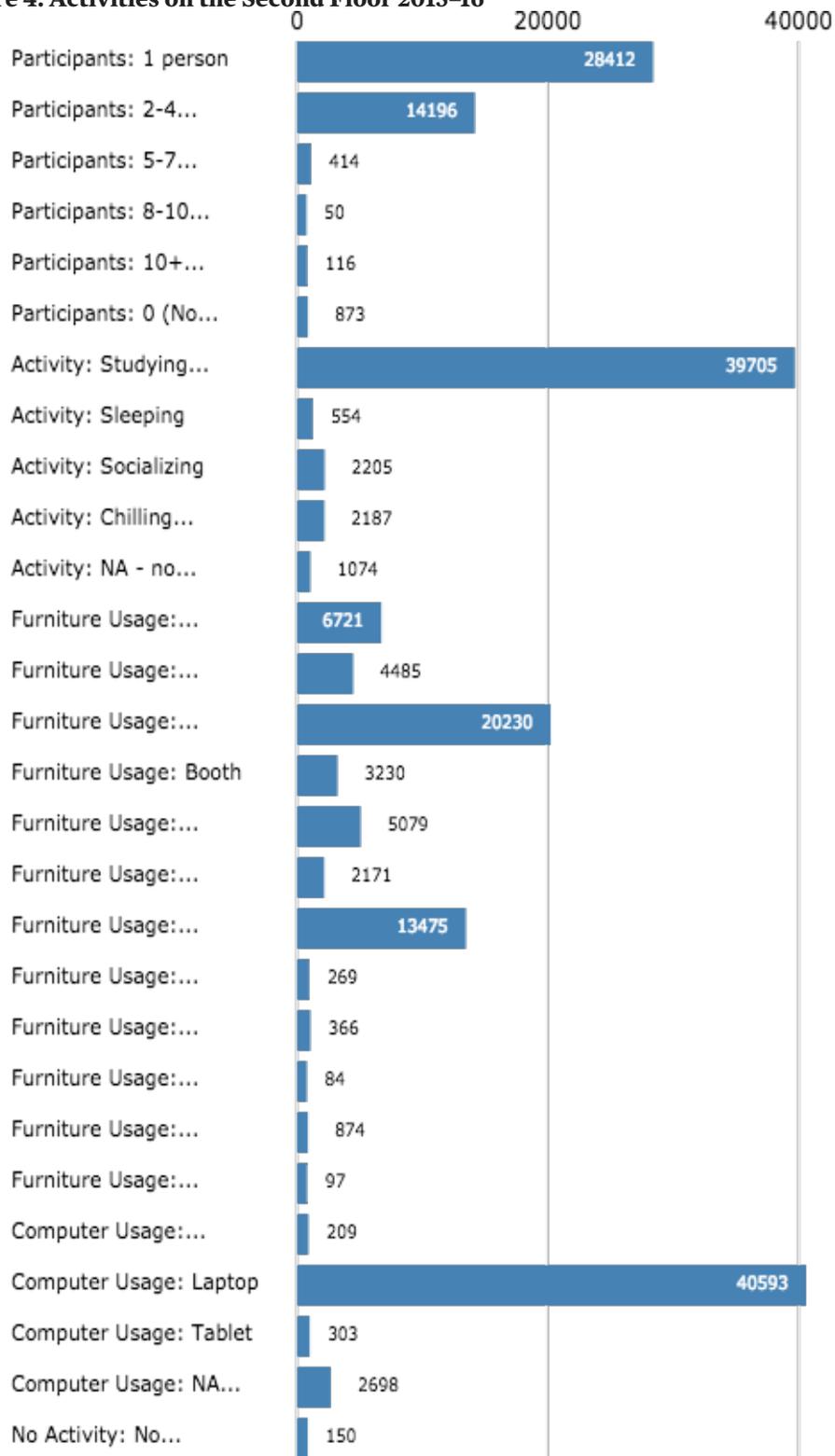
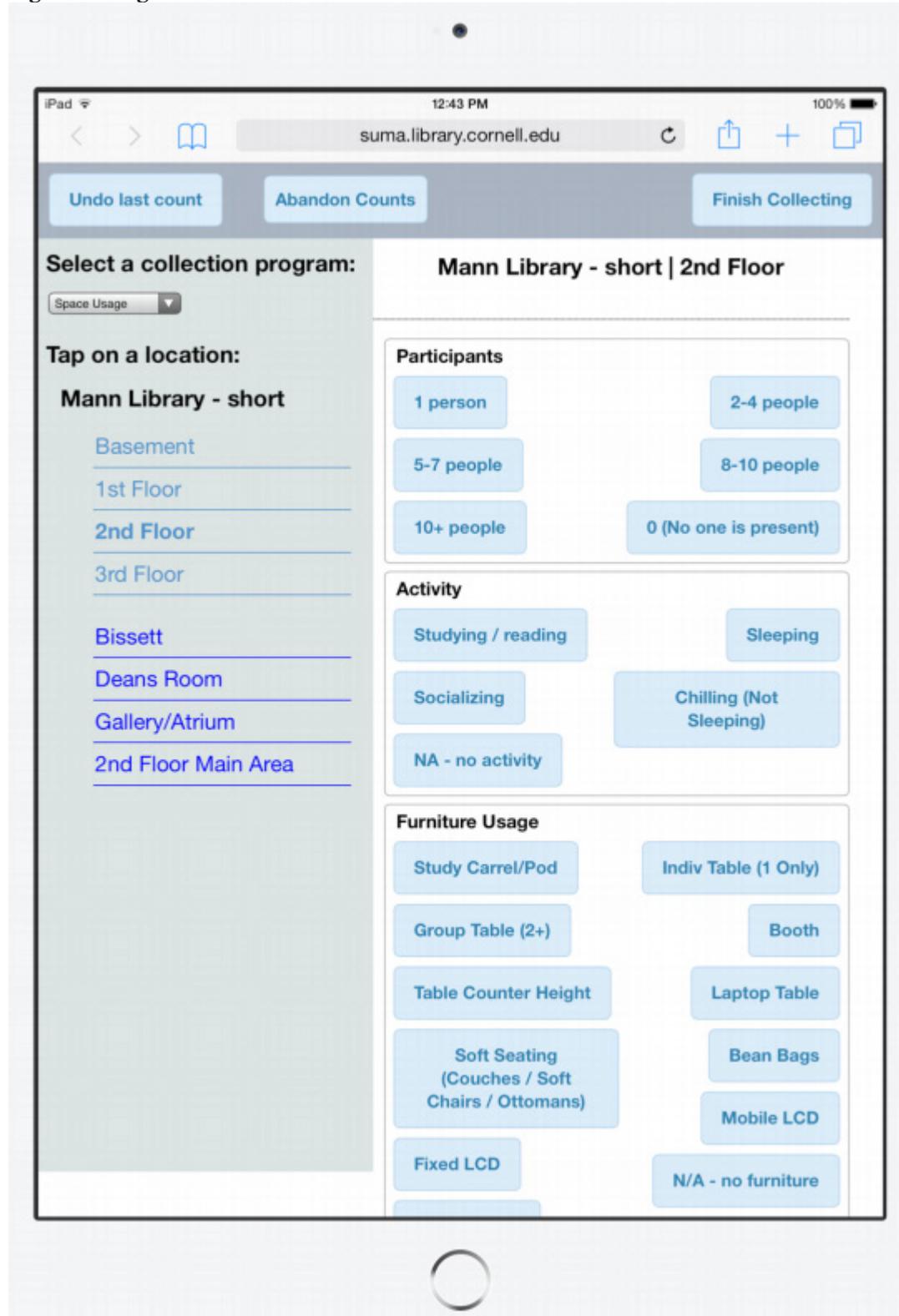


Figure 5: Original Suma Interface



Endnotes

1. Susan Thompson, "Using Mobile Technology to Observe Student Study Behaviors and Track Library Space Usage," *Journal of Access Services* 12, no. 1-2 (2015): 1-13, doi:10.1080/15367967.2015.972754; Christopher Stewart, "Building Measurements: Assessing Success of the Library's Changing Physical Space," *The Journal of Academic Librarianship* 37, no. 6 (2011): 539-41, doi:10.1016/j.acalib.2011.09.002.
2. Michael Khoo, Lily Rozaklis, and Catherine Hall, "A Survey of the Use of Ethnographic Methods in the Study of Libraries and Library Users," *Library & Information Science Research* 34, no. 2 (2012): 82-91, doi:10.1016/j.lisr.2011.07.010.
3. Jingfeng Xia, "Visualizing Occupancy of Library Study Space with GIS Maps," *New Library World* 106, no. 5/6 (2005): 219-33, doi:10.1108/03074800510595832.
4. Susan E. Montgomery, "Library Space Assessment: User Learning Behaviors in the Library," *The Journal of Academic Librarianship* 40, no. 1 (2014): 70-75, doi:10.1016/j.acalib.2013.11.003.
5. Thompson, "Using Mobile Technology," 1-13; Gricel Dominguez, "Beyond Gate Counts: Seating Studies and Observations to Assess Library Space Usage," *New Library World* 117, no. 5/6 (2016): 321-28, doi:10.1108/NLW-08-2015-0058; Joyce Chapman, Jason Casden, and Kim Duckett, "The Suma Project: An Open-Source, Mobile Tool Enabling Observational Data Collection and Analysis," Poster presented at the Library Assessment Conference, Charlottesville, VA, October 2012.