Does Using Item Sampling Methods in Library Service Quality Assessment Compromise Data Integrity or Zone of Tolerance Interpretation?: A LibQUAL+® Lite Study

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Does Using Item Sampling Methods in Library Service Quality Assessment Compromise Data Integrity or Zone of Tolerance Interpretation?: A LibQUAL+® Lite Study

Abstract

The present study was conducted to investigate the psychometric integrity of scores on the new LibQUAL+® Lite protocol. Specifically, we conducted analyses of LibQUAL+® Lite data to evaluate (a) the reliability and (b) the validity of LibQUAL+® Lite scores, and (c) the behavior of the zones of tolerance boundaries in the LibQUAL+® Lite context. In the present study we collected randomized control trial (RCT) data at 16 diverse institutions from around the world. A total of 13,383 participants provided data.

KEYWORDS; item sampling, library service quality, reliability, validity, factor analysis, zones of tolerance

As Rowena Cullen (2001) noted, "focusing more energy on meeting... [library] customers' expectations" (p. 663) is critical in the contemporary environment, in part because

the emergence of the virtual university, supported by the virtual library, calls into question many of our basic assumptions about the role of the academic library, and the security of its future. (pp. 662-663)

In this environment, as Danuta Nitecki (1996) has observed, "A measure of library quality based solely on collections [counts] has become obsolete" (p. 181).

The LibQUAL+® protocol is a "total market survey" intended to help library staff understand user perceptions, and thereby improve library service quality and better meet users' information needs. A total-market survey is one of the 11 ways of listening to users elaborated by Leonard Berry (1995).

To date, LibQUAL+® has been used to collect service quality assessment perceptions from 1,294,674 participants at 1,164 institutions around the world. LibQUAL+® has been implemented so far in 17 language variations: American English, Afrikaans, British English, French (France), Chinese, Danish, Dutch, Finnish, French Canadian, German, Greek, Hebrew, Japanese, Norwegian, Spanish, Swedish, and Welsh.

Thompson (2007) described the origins of the LibQUAL+® protocol. The development of the protocol, and evidence for the integrity of LibQUAL+® scores, have both been quite extensively documented in the refereed journal literature (cf. Cook, Heath & B. Thompson, 2001, 2002; Cook & Thompson, 2001; Heath, Cook, Kyrillidou & Thompson, 2002; Thompson & Cook, 2002; Thompson, Cook & Heath, 2001, 2003; Thompson, Cook & Kyrillidou, 2005; Thompson, Cook & R.L. Thompson, 2002) and elsewhere in two dissertations (Cook, 2002; Kyrillidou, 2009).

LibQUAL+® was developed within a philosophy perhaps best communicated by a set of three quotations. First, in the words of French philosopher and moralist François de La Rochefoucauld (1613-1680), "Il est plus nécessaire d'étudier les hommes que les livres" (p. 51, line 106). Second, in the words of Bruce Thompson (2006a), "We only care about the things we measure" (p. 1), so we do not seriously care about service quality unless we listen to library users in various systematic ways. Third, within a service quality orientation, "only customers judge quality; all other judgments are essentially irrelevant" (Zeithaml, Parasuraman & Berry, 1990, p. 16).

Item Sampling

When we collect library service quality assessment perception data from our users, we ought to take into account the overall cost of the information we collect. Two fundamental considerations bear upon this accounting.

First, a major cost in surveying users about their perceptions is the time that users invest in completing the survey. For example, if all 43,000 students at Texas A&M University spent 10 minutes completing a service quality survey, a total of approximately 7,167 person hours were spent producing the

assessment information! Obviously, a common way to mitigate these costs is to not collect data from all library users, but rather do so only for a random sample of the users. Every quadrennial election in the United States, national polling organizations gather data from only 2,000 or 3,000 potential voters to discern with surprising accuracy what the likely presidential election outcome for all 133,000,000 voters may be. Clearly, such person sampling methods have great potential utility.

Second, we can minimize these costs by using fewer items in our assessment protocols, which thereby shortens response times. An important incidental benefit of shorter response times is higher response rates (Cook, Heath & R.L. Thompson, 2000).

Item sampling (also known as split-questionnaire design, and matrix sampling; Popham, 1993) is an assessment technique in which "a) all users answer a few, selected survey questions (i.e., three core items), but (b) the remaining survey questions are answered ONLY by a randomly-selected subsample of the users. Thus, (a) data are collected on all questions, but (b) each user answers fewer questions, thus shortening the required response time" (Thompson, Kyrillidou & Cook, 2009b, p. 8).

Gonzalez and Eltinge (2007) provided an overview of the origins of item sampling, and the fields where it has been applied. For example, item sampling has been applied in the context of the Consumer Expenditure Quarterly Interview Survey (CEQ), an ongoing panel survey of spending within U.S. households. Item sampling has also been used in the 2000 Decennial Census, within Internal Revenue Service (IRS) applications in the 1980s, and in the 1995 Cancer Risk Behavior Survey.

An heuristic example may be useful in making the idea of item sampling (Childs & Jaciw, 2003) fully concrete. Presume that a library service quality assessment instrument had 6 items, with 2 items measuring each of 3 subscales (i.e., Affect of Service [AS], Information Control [IC], and Library as Place [LP]), but that rather than ask all 7 library users to answer all 6 items, each user completed only a subset of items. Note that in real situations we normally would have more than 6 items if we were invoking item sampling, because with only 6 items we might just as well collect data from all 7 users on all 6 items.

In our example, all 7 users are asked to complete 3 of the items, called linking items, one from each of the 3 subscales, because these 3 items are deemed the most important of all the survey items (i.e., LP01, AS02, and IC04). Each of the 7 library users is also asked to complete 2 items randomly selected from among the remaining 3 items (i.e., 6 - 3 linking items). In this manner, each user completes exactly 5 items, but data are collected on every item (here 6).

In the example below, Carol completed only items LP01, AS02 LP03, IC04, and IC06. Shawn completed the same 5 items as Carol. Deborah completed only items LP01, AS02, IC04, AS05, and IC06. Everyone completed linking items LP01, AS02, and IC04.

	Survey Items						Total
User	**LP01**	**AS02**	LP03	**IC04**	AS05	IC06	Items
Carol	X	X	X	X		X	5
Deborah	X	X		X	X	X	5
Geri	X	X	X	X	X		5
Kathy	X	X	X	X		X	5
Murray	X	X		X	X	X	5
Wendy	X	X	X	X	X		5
Shawn	X	X	X	X		X	5
n	7	7	5	7	4	5	

LibQUAL+® Lite

The LibQUAL+® Lite protocol is a form of the LibQUAL+® protocol on which each participant completes only 8 of the 22 core items. This results in dramatically shorter survey completion times, and also improved survey response rates (see Kyrillidou, 2009; Thompson, Kyrillidou & Cook, 2009a; 2009b).

Three linking items are completed by all Lite participants (i.e., item 13 of the 22 core items, which is an item from the Affect of Service subscale [AS13]; item 10, which is an item from the Information Control subscale [IC10]; and item 3, which is an item from the Library as Place subscale [LP03]). Each Lite participant also completes 5 additional items randomly selected from the remaining 19 LibQUAL+® core nonlinking items (i.e., 22 - 3 = 19). Specifically, each Lite participant also completes 2 items randomly selected from the remaining 8 Affect of Service nonlinking items (i.e., 9 - 1 = 8), 2 other items randomly selected from the remaining 7 Information Control nonlinking items (i.e., 8 - 1 = 7), and 1 item from the remaining 4 Library as Place nonlinking items (i.e., 5 - 1 = 4).

Purpose of the Present Study

The psychometric integrity of scores from the original LibQUAL+® long-form protocol has been thoroughly investigated (cf. Cook & Thompson, 2001; Thompson & Cook, 2002; Thompson, Cook & Heath, 2001, 2003; Thompson, Cook & R.L. Thompson, 2002). The present study was conducted to investigate the psychometric integrity of scores on the new LibQUAL+® Lite protocol. Specifically, we conducted analyses of LibQUAL+® Lite data to evaluate (a) the reliability and (b) the validity of LibQUAL+® Lite scores and (c) the behavior of the zones of tolerance boundaries in the LibQUAL+® Lite context.

Participants

In the present study we collected randomized control trial (RCT) data at 16 diverse institutions from around the world. LibQUAL+® was administered in several different languages (e.g., English, Hebrew) across these 16 institutions. A total of 13,383 participants provided data. The study participants included (a) undergraduate students (64.0%), (b) graduate students (26.4%), and (c) faculty (9.8%). The average number of participants from whom data were collected at each of the 16 libraries was 836.4, with the institutional sample sizes ranging from 251 to 2,536.

Each library randomly selected the participants to whom they sent invitations to participate, and then each user who responded was randomly assigned to receive either the full LibQUAL+® protocol, or the LibQUAL+® Lite protocol. The personnel at each library selected what percentage of participants would receive Lite, and these percentages ranged from 50% to 90%.

Results

Score Reliability

Thompson (2003) explained the concept of score reliability using the metaphor of a bathroom scale, noting that

> many of us begin our day by stepping on a scale to measure our weight. Some days when you step on your bathroom scale you may not be happy with the resulting score. On some of these occasions, you may decide to step off the scale and immediately step back on to obtain another estimate. If the second score is half a pound lighter, you may irrationally feel somewhat happier, or if the second score is slightly higher than the first, you may feel somewhat less happy. But if your second weight measurement yields a score 25 pounds lighter than the initial measurement, rather than feeling happy, you may instead feel puzzled or perplexed. If you then measure your weight a third time, and the resulting score is 40 pounds heavier, you probably will question the integrity of all the scores produced by your scale. It has begun to appear that your scale is exclusively producing randomly fluctuating scores. In essence, your scale measures "nothing." (p. 4)

Scores are (perfectly) unreliable when the scores measure nothing (i.e., fluctuate randomly). Unreliable scores are useful in casinos, or when we want to randomly select survey participants. But perfectly unreliable measurement of library user service quality perceptions would be perfectly useless, because randomly fluctuating scores cannot reasonably be considered to measure the library reality. If we ask library user Martha to rate the Oxford University Bodleian Library at 10am on April 11, 2010 using a 9-point scale, and she rates the library 7, and we ask her to repeat the rating at 10:01am, we reasonably expect her second rating to be 7, or approximately 7, because we cannot conceive that the Bodleian Library has changed appreciably within only one minute.

> The APA Task Force on Statistical Inference emphasized that
> It is important to remember that a test is not reliable or unreliable. Reliability is a property of the scores on a test for a particular population of examinees... Thus, authors should provide reliability coefficients of the scores for the data being analyzed even when the focus of their research is not psychometric. Interpreting the size of observed effects requires an assessment of the reliability of the scores. (Wilkinson & APA Task

Force on Statistical Inference, 1999, p. 596)
Similarly, the Joint Committee on Standards for Educational Evaluation (1994), which developed the first standards for professional conduct that were ever certified as American standards by the American National Standards Institute (ANSI), emphasized that, "the generalizability of previous favorable reliability results may not be simply assumed. Reliability information should be collected that is directly relevant to the groups and ways in which the information gathering procedures will be used..." (p. 154).

Table 1 presents the Cronbach's (1951) alpha coefficients for both LibQUAL+® Lite and long-form total and subscale scores. These coefficients approach 1.0 as the items have greater internal consistency (see Thompson, 2003). If scores were unreliable, the alpha coefficient would be near-zero. However, although alpha is in a squared metric, alpha can also be negative, or can even be less than -1.0, which would be especially troubling.

INSERT TABLE 1 ABOUT HERE

Item analysis can also be employed to investigate the performance of individual items (see Thompson & Levitov, 1985). Table 2 presents item-analysis statistics for the LibQUAL+® Lite data. Alpha-if-deleted statistics are one key indicator of item quality. An item that is performing badly is an item for which the alpha coefficient improves when the item is discarded from the total score. Conversely, the best item is the item for which the alpha coefficient most worsens when the item is discarded.

INSERT TABLE 2 ABOUT HERE

Table 2 also presents the "corrected" item-total correlation coefficients, also called corrected item discrimination coefficients. These are correlations between scores on an individual item, each in turn, with a score computed from the remaining LibQUAL+® core items. More favorable corrected discrimination are positive and larger in magnitude.

Score Validity

If scores measure something (as opposed to nothing), then questions of score validity arise. Score validity raises issues as to whether the scores measure the correct something the scores are intended to measure, and only what the scores are intended to measure.

The present study used factor analysis to investigate the validity of LibQUAL+™ Lite scores. Factor analysis and construct validity have long been associated with each other. For example, historically "construct validity has [even] been spoken of as... 'factorial validity'" (Nunnally, 1978, p. 111). Nunnally (1978) emphasized that "factor analysis is intimately involved with questions of validity" (Nunnally, 1978, pp. 112).

Table 3 presents the varimax-rotated pattern/structure coefficients from a principal components analysis of the LibQUAL+® Lite data (see Thompson, 2004). The expected three-factor

structure was retrieved for the LibQUAL+® Lite data.

INSERT TABLE 3 ABOUT HERE

Zones of Tolerance Stability Across Protocols

Three Service Quality Assessment Interpretation Frameworks.
One way to conduct library service quality assessments is to
collect survey ratings data from users. Presume that ratings were
collected on a 1 to 9 rating scale, with 9 being the most
favorable rating of perceived service quality, and that a mean was
computed across all the survey items for each user. Then the mean
of these means might be computed to be 6.3. Is 6.3 a favorable
rating, and if so, how favorable?

One way to interpret the 6.3 is to compare the 6.3 against
the rating scale midpoint of 5.0. From this perspective, 6.3 seems
like a somewhat favorable rating. However, this basis for
interpretation is quite limited.

Three interpretation frameworks can be invoked to help
interpret library service quality assessment data. Some service
quality assessment protocols actually invoke a combination of
these three frameworks, so that library personnel can determine
whether different interpretation frameworks corroborate each other
with respect to conclusions.

First, service quality data can be interpreted by
benchmarking against the results achieved by peer institutions,
assuming that one or more peer institutions contemporaneously
completed the same protocol, and results are openly shared across
libraries. This interpretation framework has the appeal that
institutions may also be able to identify libraries with extremely
favorable results, and libraries can then share best practices
with each other.

Second, service quality data can be interpreted
longitudinally at a given library, if the library has administered
the protocol previously. For example, with a mean rating of 6.3,
the library may offer the interpretation, "6.3 is better than last
year's mean rating of 6.0, and it may not be entirely clear what
6.3 or 6.0 mean, but certainly we are doing better."

Third, service quality data can be interpreted within "zones
of tolerance," if on each item the participants were asked to rate
not only the current level of perceived service quality, but also
on each item the desired level of service quality, and what level
of service would be acceptable, although only minimally. The
difference between the desired rating and the minimally-acceptable
rating is the zone of tolerance.

We prefer mean perceived ratings (e.g., 6.3) to be above
minimally-acceptable means (e.g., 5.4). This difference is called
the adequacy gap (i.e., 6.3 - 5.4 = 0.9). We also would like the
mean perceived ratings ideally to approach or even exceed the mean
desired ratings (e.g., 6.5). The difference between the perceived
ratings and the desired ratings is called the superiority gap
(e.g., 6.3 - 6.5 = -0.2). In this example the zone of tolerance
has a width of 1.1 (i.e., 6.5 - 5.4 = 1.1).

Research has previously been conducted to explore the effects

of item sampling strategies in the library service quality assessment context (cf. Kyrillidou, 2009; Thompson, Kyrillidou & Cook, 2009a, 2009b). However, these previous studies focused on only the perceived service quality scores. The present study was undertaken to explore item sampling impacts on the desired and the minimally-acceptable ratings that create the zones of tolerance used to help interpret the service quality perception data. *If perception scores on the LibQUAL+® protocol tend to be somewhat more positive than perception scores of the long protocol, but the zones of tolerance also shift slightly higher on the Lite form, then gap scores remain comparable across the LibQUAL+® Lite and long forms.*

Descriptive Statistics for Desired and Minimum Ratings. Appendix B presents means, standard deviations, and n's for LibQUAL+® total, subscale (Affect of Service, Information Control, Library as Place), and the 3 linking items (AS13, IC10, and LP03) for both the long and the Lite protocols at each of the 16 institutions on the Desired ratings. Appendix C presents means, standard deviations, and n's for LibQUAL+® total, subscale (i.e., Affect of Service, Information Control, Library as Place), and the 3 linking items (i.e., AS13, IC10, and LP03) for both the long and the Lite protocols at each of the 16 institutions on the Minimum ratings. All LibQUAL+® total, subscale, and item scores are scaled from 1 to 9, with 9 being the highest rating.

Confidence Intervals About Means. The most apples-to-apples comparison of differences in score means due solely to random protocol assignment occurs on the three linking items (i.e., AS13, IC10, and LP03), *because all respondents in both protocol groups completed these 3 items*. For other scores, different subsets of people were involved for every different set of comparisons. Thus, on the Lite protocol some of the same people on a given campus responded to nonlinking item #1 and nonlinking item #2, but some of the people randomly asked to respond to item #1 were not asked to respond to item #2, and *vice versa*.

Figure 1 presents 95% confidence intervals about means on linking item **AS13** for **Desired** ratings on the Long (leftmost) and the Lite (rightmost) forms across the 16 institutions. If protocol form itself had no effect in the ratings at a given institution, the two means would be equal, and the confidence intervals would overlap.

INSERT FIGURE 1 ABOUT HERE

Figures 2 and 3 present 95% confidence intervals about means on linking items **IC10** and **LP03**, respectively, for **Desired** ratings on the Long (leftmost) and the Lite (rightmost) forms across the 16 institutions. Figures 4 through 6 present 95% confidence intervals about means on linking items **AS13**, **IC10** and **LP03**, respectively, for **Minimum** ratings on the Long (leftmost) and the Lite (rightmost) forms across the 16 institutions.

INSERT FIGURES 2 THROUGH 6 ABOUT HERE

Standardized Effect Size Differences. One way to quantify the degree of difference in two means is to compute the effect size called Cohen's $\underline{d}$ (see Thompson, 2006b, 2008). Cohen's $\underline{d}$ can be computed as $(M_{LITE} - M_{LONG})$ $[(SD_{LITE}^2 + SD_{LONG}^2) / 2]^{0.5}$. If means for LibQUAL+® Lite and the LibQUAL+® long protocol were equal, Cohen's $\underline{d}$ = 0. The Cohen's $\underline{d}$ will be positive when the long protocol mean is smaller than the Lite mean on a given score, and the Cohen's $\underline{d}$ will be negative when the long protocol mean is larger than the Lite mean on a given score. For example, at institution #3, for the total score, Cohen's $\underline{d}$ was computed to be:

$$(7.425 - 7.418) / [(1.055^2 + 0.869^2) / 2]^{0.5}$$
$$0.007 / [(1.055^2 + 0.869^2) / 2]^{0.5}$$
$$0.007 / [(1.113 + 0.756) / 2]^{0.5}$$
$$0.007 / [1.870 / 2]^{0.5}$$
$$0.007 / 0.935^{0.5}$$
$$0.007 / 0.967 = 0.008,$$

or 0.01 when rounded to two decimal places.

Table 4 presents the Cohen's $\underline{d}$ values for total, the three subscale, and the three linking item (i.e., AS13, IC10, and LP03) means for Desired ratings across the two randomly-assigned protocols at the 16 institutions in our randomized control trial (RCT) experiment. Table 5 presents the Cohen's $\underline{d}$ values for total, the three subscale, and the three linking item (i.e., AS13, IC10, and LP03) means for Minimally-Acceptable ratings across the two randomly-assigned protocols at the 16 institutions in our randomized control trial (RCT) experiment.

INSERT TABLES 4 AND 5 ABOUT HERE

Discussion

Score Psychometric Integrity

The tabled results suggest that LibQUAL+® Lite scores have reasonable psychometric integrity. With respect to score reliability, the alpha coefficients for both Lite and long-form scores are very similar (e.g., 0.955 and 0.956, respectively, for Total scores), as reported in Table 1. Scores on the Library as Place subscale have the lowest alpha coefficients (i.e., 0.867 and 0.861, respectively), but this result is expected given that the Library as Place subscale has only 5 items, as opposed to 9 and 8 items, respectively, for the Affect of Service and the Information Control subscales.

The item analysis statistics reported in Table 2 also are favorable. All 22 alpha-if-deleted statistics are smaller than the alpha (i.e., 0.955) for the LibQUAL+® Lite Total scores, indicating that deletion of any item lowers score reliability. And there is no item which, when deleted, improves score reliability.

Finally, the Table 3 results indicate that the factor structure for the LibQUAL+® Lite data is similar to that repeatedly reported for long-form data (e.g., Thompson, Cook & Heath, 2003). Thus, the same three subscales (i.e., Affect of Service, Information Control, and Library as Place) underlie LibQUAL+® Lite responses.

Score Interpretation: Zones of Tolerance

We have previously documented (cf. Kyrillidou, 2009; Thompson, Kyrillidou & Cook, 2009a, 2009b) that LibQUAL+® Lite service quality perception scores tend to be somewhat lower than scores on the full LibQUAL+® protocol, at least with respect to Information Control and Library as Place. Theoretically, because participants are randomly assigned protocols, the participants at a given institution should rate the same institution similarly, unless the composition of the two participant groups differs due solely to which protocol was randomly assigned.

Indeed, more people who receive the invitation to complete the survey do complete the survey when they receive the invitation for the Lite protocol. Apparently, the participant samples for the Lite protocol include more people who are somewhat less satisfied with library service quality, and therefore the Lite protocol yields somewhat lower perception ratings.

However, the current results reported in Tables 4 and 5 and Figures 1 through 6 suggest that LibQUAL+® Lite service quality desired and minimum ratings also tend to be somewhat lower than scores on the full LibQUAL+® protocol, at least with respect to Information Control and Library as Place. Thus, these results raise the possibility that zone of tolerance widths, and both service quality adequacy and superiority gap scores, may be relatively comparable across the two LibQUAL+® protocols.

Summary

In summary, the present results suggest that at least from a psychometric score-integrity point of view the LibQUAL+® Lite protocol is a reasonable alternative to the original LibQUAL+® long form. LibQUAL+® Lite minimizes the response burden on individual survey participants, lessens overall the amount of person-time costs expended in creating service quality information, and improves response rates, without sacrificing score integrity.

References

Berry, L. (1995). On great service: A framework for action. New York: The Free Press.

Childs, R.A., & Jaciw, A.P. (2003). Matrix sampling of test items (ERIC Digest). College Park, MD: ERIC Clearinghouse on Assessment and Evaluation. (ERIC Document Reproduction Service No. ED482268)

Cook, C.C. (2002). A mixed-methods approach to the identification and measurement of academic library service quality constructs: LibQUAL+™. (Doctoral dissertation, Texas A&M University, 2001). Dissertation Abstracts International, 62, 2295A. (University Microfilms No. AAT3020024)

Cook, C., Heath, F., & Thompson, B. (2001). Users' hierarchical perspectives on library service quality: A "LibQUAL+™" study. College and Research Libraries, 62, 147-153.

Cook, C., Heath, F. & Thompson, B. (2002). Score norms for improving library service quality: A LibQUAL+™ study. portal: Libraries and the Academy, 2, 13-26.

Cook, C., Heath, F., & Thompson, R.L. (2000). A meta-analysis of response rates in Web- or Internet-based surveys. Educational and Psychological Measurement, 60, 821-836.

Cook, C., & Thompson, B. (2001). Psychometric properties of scores from the Web-based LibQUAL+™ study of perceptions of library service quality. Library Trends, 49, 585-604.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16, 197-334.

Cullen, R. (2001). Perspectives on user satisfaction surveys. Library Trends, 49, 662-686.

Gonzalez, J.M., & Eltinge, J.L. (2007). Multiple matrix sampling: A review. In Section on survey research methods: BLS statistical survey papers (pp. 3069-3075). Washington, DC: Bureau of Labor Statistics.

Heath, F., Cook, C., Kyrillidou, M., & Thompson, B. (2002). ARL Index and other validity correlates of LibQUAL+™ scores. portal: Libraries and the Academy, 2, 27-42.

Joint Committee on Standards for Educational Evaluation. (1994). The program evaluation standards: How to assess evaluations of educational programs (2nd ed.). Newbury Park, CA: Sage.

Kyrillidou, M. (2009). Item sampling in service quality assessment surveys to improve response rates and reduce respondent burden: The LibQUAL+ Lite randomized control trial (RCT) (Doctoral dissertation, University of Illinois). Retrieved from https://www.ideals.illinois.edu/bitstream/handle/ 2142/14570/Kyrillidou_Martha.pdf?sequence=3

de La Rochefoucauld, F. (1613-1680). Maximes posthumes page 51, line 106.

Nitecki, D.A. (1996). Changing the concept and measure of service quality in academic libraries. Journal of Academic Librarianship, 22, 181-190.

Nunnally, J.C. (1978). Psychometric theory (2nd ed.). New York: McGraw-Hill.

Popham, W.J. (1993). Circumventing the high costs of authentic assessment. Phi Delta Kappan, 74, 470-473.

Thompson, B. (2003). Understanding reliability and coefficient alpha, really. In B. Thompson (Ed.), Score reliability:

Contemporary thinking on reliability issues (pp. 3-23). Newbury Park, CA: Sage.

Thompson, B. (2004). Exploratory and confirmatory factor analysis: Understanding concepts and applications. Washington, DC: American Psychological Association.

Thompson, B. (2006a, June). Measuring user perceptions of library service quality: An introduction to LibQUAL+™. Paper presented at the Czech and Slovakian Library Information Network (CASLIN) conference, Prague, Czech Republic.

Thompson, B. (2006b). Research synthesis: Effect sizes. In J. Green, G. Camilli, & P.B. Elmore (Eds.), Handbook of complementary methods in education research (pp. 583-603). Washington, DC: American Educational Research Association.

Thompson, B. (2007). The origins/birth of LibQUAL+®. Retrieved from http://www.coe.tamu.edu/~bthompson/libbirth.htm

Thompson, B. (2008). Foundations of behavioral statistics: An insight-based approach. New York: Guilford.

Thompson, B., & Cook, C. (2002). Stability of the reliability of LibQUAL+™ scores: A "Reliability Generalization" meta-analysis study. Educational and Psychological Measurement, 62, 735-743.

Thompson, B., Cook, C., & Heath, F. (2001). How many dimensions does it take to measure users' perceptions of libraries?: A "LibQUAL+™" study. portal: Libraries and the Academy, 1, 129-138.

Thompson, B., Cook, C., & Heath, F. (2003). Structure of perceptions of service quality in libraries: A LibQUAL+™ study. Structural Equation Modeling, 10, 456-464.

Thompson, B., Cook, C., & Kyrillidou, M. (2005). Concurrent validity of LibQUAL+™ scores: What do LibQUAL+™ scores measure? Journal of Academic Librarianship, 31, 517-522.

Thompson, B., Cook, C., & Thompson, R.L. (2002). Reliability and structure of LibQUAL+™ scores: Measuring perceived library service quality. portal: Libraries and the Academy, 2, 3-12.

Thompson, B., Kyrillidou, M., & Cook, C. (2009a). Equating scores on "lite" and long library user survey forms: The LibQUAL+® Lite randomized control trials. Performance Measurement & Metrics, 10, 212-219.

Thompson, B., Kyrillidou, M., & Cook, C. (2009b). Item sampling in service quality assessment surveys to improve response rates and reduce respondent burden: The "LibQUAL+® Lite" example. Performance Measurement & Metrics, 10, 6-16.

Thompson, B., & Levitov, J.E. (1985). Using microcomputers to score and evaluate test items. Collegiate Microcomputer, 3, 163-168.

Wilkinson, L., & The APA Task Force on Statistical Inference. (1999). Statistical methods in psychology journals: Guidelines and explanations. American Psychologist, 54, 594-604.

Zeithaml, V.A., Parasuraman, A. & Berry, L.L. (1990). Delivering quality service: Balancing customer perceptions and expectations. New York: Free Press.

Table 1

Cronbach's α for LibQUAL+® Lite and Long Form Scores

Score	Long	Lite
Affect of Service	0.939	0.943
Information Control	0.903	0.897
Library as Place	0.861	0.867
Total	0.956	0.955

Table 2
Item Analysis Statistics for LibQUAL+® Lite Data

		Item-Total Statistics		
Name	Item	Corrected Discrimination	R^2	α if Deleted
AS01	Employees who instill confidence in users	0.700	0.635	0.952
IC02	Making electronic resources accessible from my home or office	0.635	0.563	0.953
LP03	Library space that inspires study and learning	0.636	0.673	0.953
AS04	Giving users individual attention	0.765	0.794	0.952
IC05	A library Web site enabling me to locate information on my own	0.657	0.605	0.953
AS06	Employees who are consistently courteous	0.723	0.855	0.952
IC07	The printed library materials I need for my work	0.652	0.655	0.953
LP08	Quiet space for individual activities	0.594	0.693	0.954
AS09	Readiness to respond to users' questions	0.765	0.818	0.952
IC10	The electronic information resources I need	0.642	0.557	0.953
AS11	Employees who have the knowledge to answer user questions	0.709	0.750	0.952
LP12	A comfortable and inviting location	0.636	0.538	0.953
AS13	Employees who deal with users in a caring fashion	0.718	0.685	0.952
IC14	Modern equipment that lets me easily access needed information	0.708	0.642	0.952
AS15	Employees who understand the needs of their users	0.777	0.878	0.952
IC16	Easy-to-use access tools that allow me to find things on my own	0.665	0.727	0.953
LP17	A getaway for study, learning, or research	0.675	0.689	0.953
AS18	Willingness to help users	0.753	0.858	0.952
IC19	Making information easily accessible for independent use	0.671	0.676	0.953

IC20	Print and/or electronic journal collections I require for my work	0.668	0.564	0.953
LP21	Community space for group learning and group study	0.645	0.666	0.953
AS22	Dependability in handling users' service problems	0.722	0.724	0.952

Table 3
Varimax-rotated Pattern/Structure Coefficients for
LibQUAL+® Lite Data

| Name | Item | Factor | | | $\underline{h}^2$ |
		I	II	III	
AS13	Employees who deal with users in a caring fashion	0.805	0.237	0.200	74.4%
AS18	Willingness to help users	0.801	0.255	0.246	76.7%
AS06	Employees who are consistently courteous	0.796	0.215	0.246	74.1%
AS09	Readiness to respond to users' questions	0.733	0.345	0.250	71.9%
AS11	Employees who have the knowledge to answer user questions	0.725	0.350	0.156	67.3%
AS15	Employees who understand the needs of their users	0.714	0.305	0.338	71.8%
AS04	Giving users individual attention	0.710	0.309	0.324	70.4%
AS01	Employees who instill confidence in users	0.684	0.328	0.212	62.0%
AS22	Dependability in handling users' service problems	0.592	0.452	0.222	60.5%
IC10	The electronic information resources I need	0.234	0.746	0.188	64.6%
IC16	Easy-to-use access tools that allow me to find things on my own	0.264	0.701	0.246	62.1%
IC20	Print and/or electronic journal collections I require for my work	0.281	0.691	0.237	61.2%
IC05	A library Web site enabling me to locate information on my own	0.340	0.682	0.156	60.5%
IC19	Making information easily accessible for independent use	0.358	0.641	0.208	58.2%
IC02	Making electronic resources accessible from my home or office	0.283	0.637	0.237	54.2%
IC14	Modern equipment that lets me easily access needed information	0.259	0.567	0.481	62.0%
IC07	The printed library materials I need for my work	0.269	0.561	0.372	52.6%
LP03	Library space that inspires study and learning	0.174	0.227	0.840	78.7%
LP08	Quiet space for individual activities	0.242	0.163	0.753	65.2%

LP17 A getaway for study, learning, or research	0.273	0.276	_0.734_	68.9%
LP12 A comfortable and inviting location	0.337	0.222	_0.647_	58.0%
LP21 Community space for group learning and group study	0.225	0.368	_0.637_	59.2%

Note. Pattern/structure coefficients greater than |0.4| are presented in italics.

Table 4
Cohen's d̲ Standardized Effect Size for
Mean Differences in **Desired** Ratings

ID	Total	Service Affect	Information Control	Library as Place	All Respondents AS13	IC10	LP03
3	0.01	0.08	-0.12	-0.14	0.14	-0.09	-0.23
4	-0.24	-0.17	-0.17	-0.18	-0.11	-0.24	-0.26
5	-0.07	0.01	-0.16	-0.28	0.07	-0.25	-0.31
84	-0.14	-0.05	-0.09	-0.22	0.23	-0.24	-0.36
107	-0.23	-0.16	-0.30	-0.28	-0.09	-0.41	-0.28
433	-0.11	-0.03	-0.25	-0.20	-0.02	-0.31	-0.17
440	0.00	0.03	0.06	-0.11	0.04	-0.06	-0.14
446	-0.24	-0.10	-0.34	-0.19	0.06	-0.41	-0.09
450	-0.26	-0.13	-0.32	-0.32	0.03	-0.33	-0.31
453	-0.06	0.02	-0.16	-0.03	0.13	-0.18	-0.03
459	-0.05	0.10	-0.17	-0.22	0.10	-0.13	-0.19
461	-0.03	0.00	-0.14	-0.04	0.03	-0.17	-0.15
467	0.08	0.18	-0.05	0.04	0.13	-0.07	-0.01
1443	-0.46	-0.29	-0.47	-0.47	-0.07	-0.35	-0.47
1857	-0.09	-0.01	-0.16	-0.11	0.06	-0.12	-0.15
1861	-0.04	-0.03	-0.03	-0.04	0.01	-0.08	-0.03

Note. Negative Cohen's d̲ values are presented in bold.

Table 5
Cohen's d̲ Standardized Effect Size for
Mean Differences in **Minimum** Ratings

ID	Total	Service Affect	Information Control	Library as Place	All Respondents AS13	IC10	LP03
3	-0.06	0.09	-0.21	-0.16	0.03	-0.32	-0.23
4	-0.14	-0.05	-0.15	-0.17	-0.08	-0.34	-0.26
5	-0.07	0.07	-0.15	-0.29	-0.01	-0.34	-0.32
84	-0.05	0.07	-0.12	-0.20	0.20	-0.35	-0.27
107	-0.12	0.03	-0.25	-0.17	-0.01	-0.49	-0.18
433	0.02	0.11	-0.14	-0.08	0.05	-0.34	-0.08
440	-0.03	0.10	-0.05	-0.22	0.06	-0.11	-0.14
446	-0.08	0.10	-0.24	-0.12	0.12	-0.43	-0.07
450	-0.10	0.04	-0.18	-0.23	0.12	-0.30	-0.19
453	-0.03	0.07	-0.13	-0.02	0.13	-0.22	0.02
459	-0.15	0.01	-0.26	-0.26	-0.02	-0.29	-0.23
461	-0.08	0.03	-0.22	-0.09	0.02	-0.26	-0.10
467	-0.18	0.00	-0.28	-0.22	-0.11	-0.40	-0.20
1443	-0.09	0.02	-0.16	-0.16	0.12	-0.06	-0.24
1857	-0.09	0.04	-0.22	-0.14	-0.01	-0.30	-0.12
1861	-0.14	-0.10	-0.16	-0.18	-0.08	-0.28	-0.16

Note. Negative Cohen's d̲ values are presented in bold.

FIGURE CAPTIONS

Figure 1
95% Confidence Intervals About Means on Linking Item **AS13** for
Desired Ratings on Long (Leftmost) and Lite (Rightmost) Forms
Across 16 Institutions

"c:\lq_gr_2\AS13_des"

Note. The 95% confidence intervals about the means are presented
for each of the 16 institutions (i.e., 3, 4, 5, 84, 107, 433, 440,
446, 450, 453, 459, 461, 467, 1443, 1857, 1861) with CIs for the
Long form present leftmost and CIs for the Lite form presented
rightmost within each of the 16 pairs of confidence intervals.

Figure 2
95% Confidence Intervals About Means on Linking Item **IC10** for
Desired Ratings on Long (Leftmost) and Lite (Rightmost) Forms
Across 16 Institutions

"c:\lq_gr_2\IC10_des"

Note. The 95% confidence intervals about the means are presented
for each of the 16 institutions (i.e., 3, 4, 5, 84, 107, 433, 440,
446, 450, 453, 459, 461, 467, 1443, 1857, 1861) with CIs for the
Long form present leftmost and CIs for the Lite form presented
rightmost within each of the 16 pairs of confidence intervals.

Figure 3
95% Confidence Intervals About Means on Linking Item **LP03** for
Desired Ratings on Long (Leftmost) and Lite (Rightmost) Forms
Across 16 Institutions

"c:\lq_gr_2\LP03_des"

Note. The 95% confidence intervals about the means are presented
for each of the 16 institutions (i.e., 3, 4, 5, 84, 107, 433, 440,
446, 450, 453, 459, 461, 467, 1443, 1857, 1861) with CIs for the
Long form present leftmost and CIs for the Lite form presented
rightmost within each of the 16 pairs of confidence intervals.

Figure 4
95% Confidence Intervals About Means on Linking Item **AS13** for
Minimum Ratings on Long (Leftmost) and Lite (Rightmost) Forms
Across 16 Institutions

"c:\lq_gr_2\AS13_min"

Note. The 95% confidence intervals about the means are presented
for each of the 16 institutions (i.e., 3, 4, 5, 84, 107, 433, 440,
446, 450, 453, 459, 461, 467, 1443, 1857, 1861) with CIs for the
Long form present leftmost and CIs for the Lite form presented
rightmost within each of the 16 pairs of confidence intervals.

Figure 5
95% Confidence Intervals About Means on Linking Item **IC10** for
Minimum Ratings on Long (Leftmost) and Lite (Rightmost) Forms
Across 16 Institutions

"c:\lq_gr_2\IC10_min"

Note. The 95% confidence intervals about the means are presented
for each of the 16 institutions (i.e., 3, 4, 5, 84, 107, 433, 440,
446, 450, 453, 459, 461, 467, 1443, 1857, 1861) with CIs for the
Long form present leftmost and CIs for the Lite form presented
rightmost within each of the 16 pairs of confidence intervals.

Figure 6
95% Confidence Intervals About Means on Linking Item **LP03** for
Minimum Ratings on Long (Leftmost) and Lite (Rightmost) Forms
Across 16 Institutions

"c:\lq_gr_2\LP03_min"

Note. The 95% confidence intervals about the means are presented
for each of the 16 institutions (i.e., 3, 4, 5, 84, 107, 433, 440,
446, 450, 453, 459, 461, 467, 1443, 1857, 1861) with CIs for the
Long form present leftmost and CIs for the Lite form presented
rightmost within each of the 16 pairs of confidence intervals.

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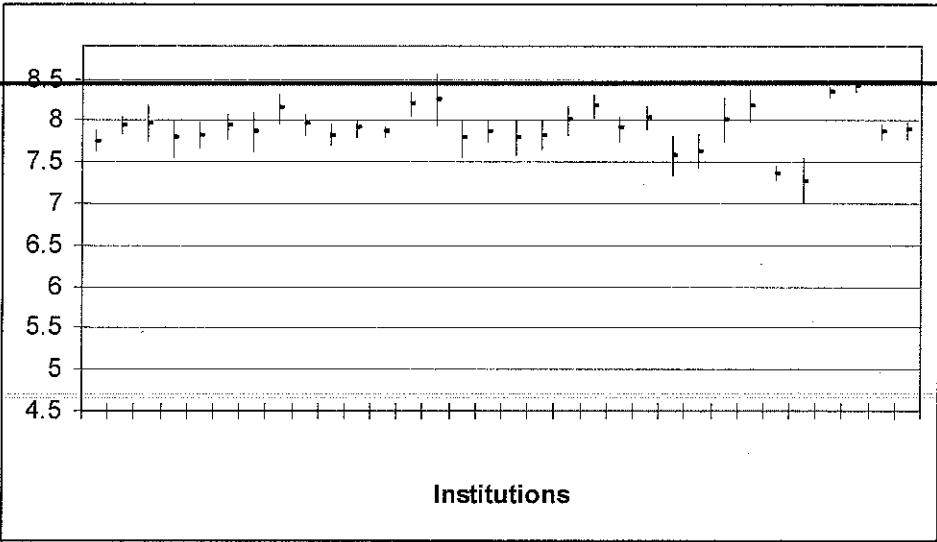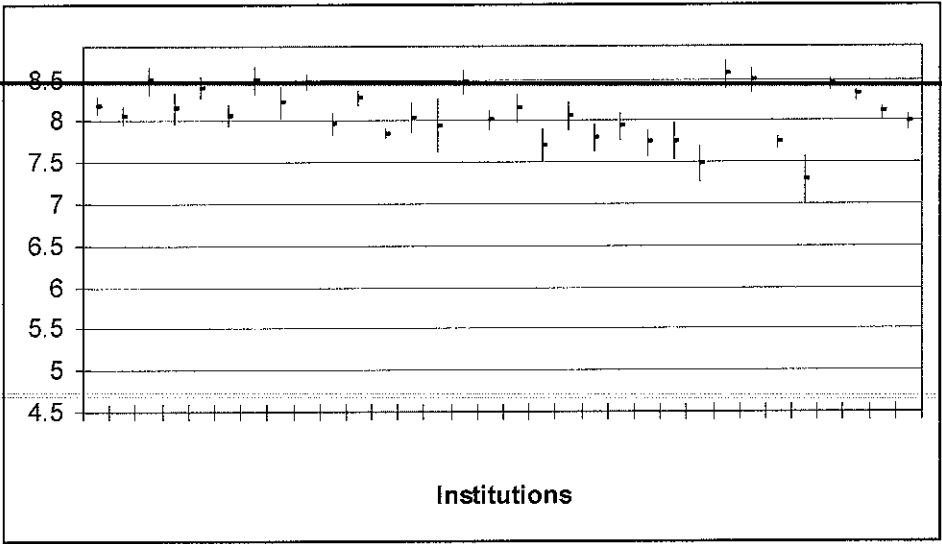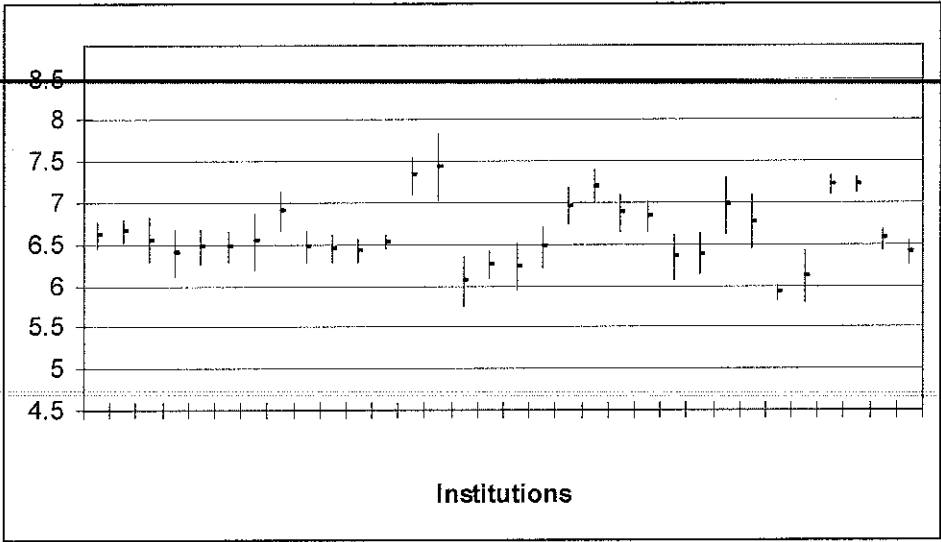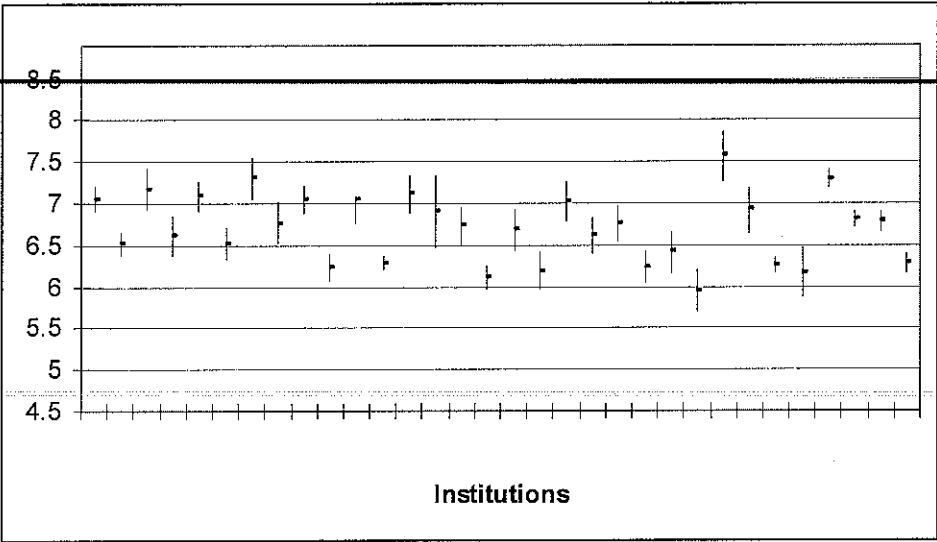
APPENDIX A:

Pearson r Matrices for Lite (Bottom Triangle) and Long (Top Triangle) Protocols

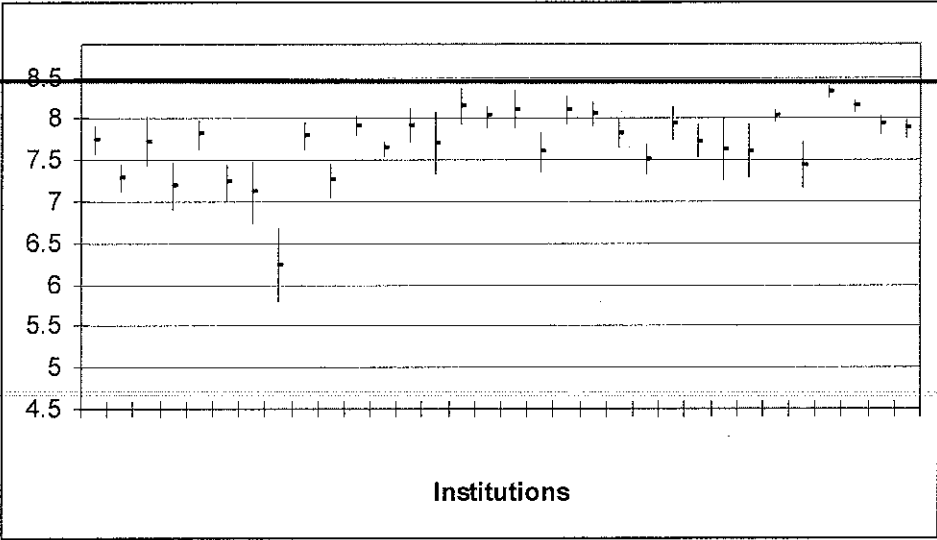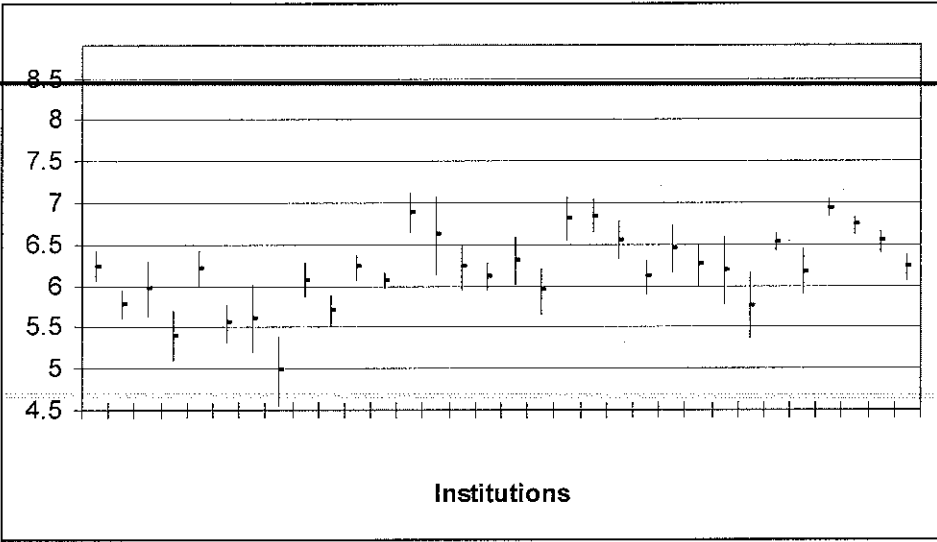|	AS01	IC02	LP03	AS04	IC05	AS06	IC07	LP08	AS09	IC10	AS11	LP12	AS13	IC14	AS15	IC16	LP17	AS18	IC19	IC20	LP21	AS22
AS01		.403	.540	.391	.412	.499	.422	.342	.511	.384	.472	.408	.502	.390	.491	.392	.352	.501	.388	.370	.341	.477
IC02	.437		.367	.528	.345	.388	.419	.309	.434	.554	.437	.334	.391	.462	.409	.491	.325	.386	.475	.485	.252	.403
LP03	.370	.342		.416	.402	.472	.422	.374	.538	.365	.478	.404	.523	.371	.516	.372	.350	.516	.384	.364	.373	.473
AS04	.605	.528	.416		.378	.447	.460	.328	.476	.551	.484	.381	.451	.535	.479	.568	.353	.456	.542	.523	.281	.492
IC05	.492	.345	.402	.466		.391	.446	.584	.419	.350	.411	.511	.401	.392	.381	.370	.539	.389	.366	.345	.465	.393
AS06	.543	.388	.472	.696	.489		.517	.401	.602	.449	.581	.460	.604	.494	.549	.490	.390	.578	.468	.443	.367	.554
IC07	.476	.419	.422	.498	.436	.517		.517	.527	.516	.526	.454	.495	.506	.505	.517	.453	.497	.511	.519	.384	.504
LP08	.411	.309	.374	.469	.341	.437	.437		.472	.376	.427	.526	.412	.414	.386	.389	.599	.401	.369	.362	.505	.420
AS09	.647	.434	.538	.673	.534	.527	.517	.450		.540	.649	.492	.622	.532	.621	.539	.434	.629	.523	.514	.408	.597
IC10	.397	.554	.365	.483	.524	.516	.402	.322	.474		.559	.425	.489	.584	.524	.602	.410	.493	.591	.614	.327	.524
AS11	.615	.437	.478	.571	.490	.581	.447	.368	.740	.456		.534	.638	.593	.639	.573	.482	.636	.582	.537	.407	.634
LP12	.442	.334	.404	.516	.445	.460	.487	.459	.502	.378	.403		.555	.524	.508	.460	.576	.500	.462	.423	.514	.507
AS13	.623	.391	.523	.672	.459	.604	.500	.371	.674	.431	.648	.437		.579	.702	.524	.470	.709	.536	.492	.440	.616
IC14	.426	.462	.371	.534	.516	.494	.411	.468	.510	.581	.503	.508	.461		.606	.646	.500	.567	.617	.570	.422	.588
AS15	.604	.409	.516	.667	.482	.549	.434	.497	.704	.459	.639	.496	.676	.498		.602	.470	.695	.585	.550	.417	.638
IC16	.511	.491	.372	.524	.566	.490	.557	.317	.444	.518	.469	.447	.428	.565	.512		.485	.555	.690	.632	.386	.585
LP17	.463	.325	.350	.466	.398	.390	.539	.605	.459	.399	.455	.567	.419	.554	.430	.465		.511	.504	.473	.566	.489
AS18	.681	.386	.516	.759	.404	.578	.497	.351	.657	.449	.637	.470	.703	.476	.716	.410	.470		.610	.543	.458	.664
IC19	.493	.475	.384	.490	.520	.468	.511	.369	.564	.591	.582	.462	.536	.617	.585	.690	.504	.610		.663	.409	.612
IC20	.452	.485	.364	.522	.538	.443	.436	.428	.486	.614	.514	.376	.451	.474	.518	.558	.432	.447	.499		.374	.548
LP21	.366	.252	.373	.462	.417	.367	.461	.505	.410	.327	.332	.514	.406	.583	.601	.478	.536	.523	.452	.421		.476
AS22	.588	.434	.407	.609	.619	.569	.478	.440	.628	.490	.592	.428	.588	.439	.506	.488	.466	.667	.562	.498	.447	

Note. The 6 underlined values for the Lite protocol were imputed from the Long data, because no Lite protocol respondents receive these 6 combinations of items.

APPENDIX B: Descriptive Statistics for Total, Subscale, and Three Linking Items for Both the Long and Lite Protocols

Library		Total			Service Affect			Info Control			Lib as Place			AS13			IC10			LP03		
		M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD	n
3	Long	7.42	0.87	426	7.75	1.08	422	8.21	0.81	426	7.53	1.35	422	7.75	1.35	400	8.19	1.22	420	7.74	1.70	412
	Lite	7.43	1.06	627	7.84	1.23	617	8.09	1.04	626	7.29	1.86	626	7.95	1.42	606	8.07	1.30	597	7.29	2.07	588
4	Long	8.11	0.92	161	7.99	1.08	160	8.44	0.78	161	7.63	1.51	161	7.97	1.37	158	8.48	1.09	161	7.73	1.83	149
	Lite	7.87	1.11	224	7.76	1.51	216	8.28	1.04	224	7.30	1.99	224	7.79	1.68	206	8.16	1.48	210	7.20	2.10	199
5	Long	7.54	0.97	309	7.84	1.10	308	8.30	0.90	309	7.74	1.27	309	7.83	1.45	302	8.40	1.18	290	7.81	1.53	291
	Lite	7.46	1.18	382	7.86	1.35	374	8.13	1.12	382	7.28	1.91	382	7.93	1.51	362	8.07	1.38	365	7.23	2.12	352
84	Long	7.93	0.90	130	7.99	1.04	130	8.36	0.84	130	7.00	1.69	130	7.86	1.37	125	8.49	0.94	125	7.11	2.06	114
	Lite	7.79	1.01	159	7.94	1.21	158	8.28	0.87	159	6.55	2.28	159	8.15	1.18	144	8.22	1.25	157	6.24	2.64	135
107	Long	7.59	0.90	369	7.93	0.96	367	8.32	0.81	369	7.78	1.30	369	7.96	1.26	361	8.46	0.92	353	7.79	1.61	342
	Lite	7.35	1.12	451	7.74	1.29	442	8.02	1.14	448	7.34	1.80	448	7.83	1.44	427	7.97	1.41	430	7.26	2.08	416
433	Long	7.57	1.08	668	7.82	1.18	665	8.21	0.98	668	7.90	1.18	668	7.91	1.44	658	8.27	1.19	637	7.92	1.50	647
	Lite	7.44	1.17	1868	7.77	1.27	1834	7.94	1.17	1866	7.63	1.51	1866	7.87	1.42	1790	7.85	1.43	1783	7.64	1.71	1757
440	Long	8.05	0.99	230	8.10	1.00	230	8.07	1.06	230	7.99	1.16	230	8.20	1.16	230	8.04	1.38	229	7.92	1.56	225
	Lite	8.05	1.07	69	8.13	1.32	69	8.13	0.99	68	7.83	1.46	68	8.25	1.34	69	7.95	1.30	69	7.70	1.58	69
446	Long	8.11	0.66	130	7.84	0.88	130	8.40	0.61	130	8.11	0.84	130	7.79	1.28	130	8.46	0.86	123	8.15	1.24	129
	Lite	7.92	0.89	430	7.73	1.21	420	8.12	0.94	429	7.90	1.30	429	7.87	1.34	430	8.01	1.25	410	8.03	1.41	428
450	Long	7.95	0.90	165	7.84	1.00	165	8.11	0.89	165	7.98	1.05	165	7.79	1.34	164	8.15	1.04	156	8.11	1.45	160
	Lite	7.68	1.05	236	7.69	1.26	231	7.77	1.16	235	7.54	1.60	235	7.83	1.34	230	7.70	1.56	226	7.60	1.81	225
453	Long	8.04	1.00	225	8.01	1.06	225	8.09	1.02	225	8.03	1.12	225	8.00	1.30	224	8.06	1.28	219	8.10	1.28	220
	Lite	7.98	1.08	318	8.03	1.21	317	7.91	1.20	316	7.99	1.30	316	8.17	1.30	317	7.80	1.52	313	8.05	1.33	314
459	Long	7.86	0.99	287	7.78	1.11	287	8.05	0.99	287	7.87	1.13	286	7.91	1.29	286	7.94	1.40	273	7.83	1.57	283
	Lite	7.80	1.01	342	7.89	1.15	340	7.87	1.14	342	7.59	1.41	342	8.04	1.32	340	7.74	1.47	338	7.51	1.67	337
461	Long	7.62	1.23	187	7.54	1.31	187	7.80	1.27	187	7.81	1.31	187	7.58	1.62	187	7.75	1.53	182	7.95	1.40	186
	Lite	7.57	1.18	224	7.55	1.39	219	7.62	1.30	224	7.75	1.36	224	7.63	1.55	221	7.48	1.63	214	7.73	1.52	220
467	Long	8.09	0.86	99	7.92	1.17	99	8.47	0.69	99	7.63	1.41	99	8.02	1.29	97	8.56	0.85	90	7.63	1.83	91
	Lite	8.16	0.85	152	8.12	1.06	149	8.43	0.82	152	7.70	1.65	152	8.18	1.11	133	8.49	0.92	141	7.61	1.89	127
1443	Long	7.72	0.90	936	7.53	0.99	936	7.77	0.96	936	7.88	0.97	936	7.37	1.38	936	7.75	1.22	902	8.04	1.15	930
	Lite	7.28	0.94	96	7.22	1.08	96	7.29	1.05	96	7.36	1.16	96	7.27	1.37	96	7.29	1.38	95	7.44	1.38	96
1857	Long	8.34	0.69	819	8.33	0.76	819	8.46	0.69	819	8.25	0.88	817	8.35	0.97	817	8.44	0.93	785	8.33	1.08	803
	Lite	8.27	0.76	1090	8.32	0.87	1082	8.33	0.83	1088	8.14	1.10	1069	8.41	0.95	1069	8.32	1.02	1070	8.15	1.26	1050
1861	Long	7.94	1.10	815	7.90	1.16	815	8.02	1.12	815	7.92	1.30	813	7.87	1.50	813	8.10	1.27	795	7.93	1.61	801
	Lite	7.88	1.18	759	7.85	1.35	757	7.97	1.17	758	7.85	1.53	758	7.88	1.52	753	7.99	1.37	753	7.88	1.63	742

APPENDIX C:
Descriptive Statistics for Total, Subscale, and Three Linking Items for Both the Long and Lite Protocols Minimum Scores

Library		Total M	SD	n	Service Affect M	SD	n	Info Control M	SD	n	Lib as Place M	SD	n	AS13 M	SD	n	IC10 M	SD	n	LP03 M	SD	n
3	Long	6.17	1.16	426	6.50	1.30	422	7.00	1.20	426	6.17	1.57	422	6.61	1.72	400	7.06	1.61	420	6.24	1.90	412
	Lite	6.09	1.32	627	6.63	1.54	617	6.72	1.41	626	5.88	1.90	606	6.67	1.75	597	6.52	1.73	611	5.77	2.11	588
4	Long	6.64	1.29	161	6.54	1.43	160	7.05	1.22	161	6.03	1.86	158	6.55	1.72	146	7.18	1.59	161	5.97	2.12	149
	Lite	6.44	1.44	224	6.46	1.89	216	6.86	1.47	224	5.70	2.13	206	6.40	2.09	210	6.61	1.79	221	5.40	2.23	199
5	Long	6.10	1.32	309	6.39	1.46	308	6.90	1.31	309	6.26	1.62	302	6.48	1.88	290	7.09	1.58	301	6.20	1.86	291
	Lite	6.00	1.46	382	6.49	1.72	374	6.69	1.55	382	5.74	1.96	362	6.47	1.94	365	6.52	1.79	375	5.55	2.15	352
84	Long	6.66	1.33	130	6.69	1.50	130	7.17	1.29	130	5.68	1.90	125	6.54	1.97	125	7.31	1.46	130	5.61	2.22	114
	Lite	6.59	1.24	159	6.80	1.44	158	7.01	1.28	159	5.27	2.23	144	6.90	1.56	157	6.77	1.63	158	4.97	2.50	135
107	Long	6.10	1.37	369	6.38	1.46	367	6.89	1.42	369	6.15	1.72	361	6.47	1.78	353	7.05	1.56	360	6.07	1.96	342
	Lite	5.92	1.44	451	6.42	1.66	442	6.52	1.52	448	5.84	1.92	427	6.45	1.83	430	6.22	1.80	436	5.70	2.09	416
433	Long	6.06	1.47	668	6.32	1.55	665	6.76	1.48	668	6.34	1.60	658	6.43	1.88	637	6.90	1.70	654	6.22	1.89	647
	Lite	6.08	1.50	1868	6.49	1.66	1834	6.54	1.55	1866	6.21	1.79	1790	6.53	1.88	1783	6.29	1.83	1835	6.06	1.99	1757
440	Long	7.10	1.48	230	7.15	1.51	230	7.15	1.53	230	7.02	1.58	230	7.33	1.72	229	7.11	1.78	224	6.88	1.83	225
	Lite	7.05	1.58	69	7.31	1.70	69	7.07	1.62	68	6.70	1.34	69	7.43	1.75	69	6.91	1.74	64	6.61	1.97	69
446	Long	6.38	1.04	130	6.10	1.21	130	6.71	1.03	130	6.32	1.15	130	6.06	1.69	123	5.73	1.33	129	6.22	1.58	129
	Lite	6.29	1.24	430	6.24	1.54	420	6.43	1.31	429	6.15	1.59	430	6.26	1.78	410	6.11	1.57	418	6.11	1.74	428
450	Long	6.38	1.40	165	6.29	1.42	165	6.56	1.39	165	6.37	1.57	164	6.24	1.82	156	6.68	1.58	155	6.31	1.85	160
	Lite	6.24	1.42	236	6.34	1.67	231	6.31	1.46	235	5.96	1.90	230	6.46	1.85	226	6.19	1.74	228	5.94	2.11	225
453	Long	6.98	1.46	225	6.97	1.52	225	7.04	1.46	225	6.89	1.63	224	6.96	1.76	219	7.02	1.79	219	6.81	1.93	220
	Lite	6.93	1.52	318	7.08	1.67	317	6.84	1.59	316	6.86	1.83	317	7.20	1.82	313	6.62	1.88	303	6.84	1.91	314
459	Long	6.72	1.46	287	6.69	1.51	287	6.87	1.50	287	6.68	1.61	286	6.87	1.86	273	6.76	1.86	273	6.55	1.94	283
	Lite	6.51	1.45	342	6.71	1.58	340	6.48	1.53	342	6.23	1.78	340	6.83	1.85	338	6.24	1.78	335	6.10	1.93	337
461	Long	6.37	1.48	187	6.29	1.55	187	6.56	1.52	187	6.52	1.65	187	6.34	1.87	182	6.42	1.74	178	6.44	1.99	186
	Lite	6.26	1.47	224	6.35	1.64	219	6.22	1.59	224	6.38	1.69	221	6.38	1.91	214	5.95	1.90	215	6.25	1.88	220
467	Long	6.95	1.33	99	6.75	1.54	99	7.41	1.28	99	6.40	1.70	97	6.97	1.69	90	7.57	1.51	97	6.18	1.99	91
	Lite	6.69	1.58	152	6.74	1.87	149	7.01	1.53	152	5.98	2.09	133	6.77	1.97	141	6.92	1.73	151	5.76	2.23	127
1443	Long	6.25	1.20	936	6.10	1.26	936	6.31	1.27	936	6.36	1.28	936	5.92	1.59	901	6.26	1.48	901	6.53	1.59	930
	Lite	6.15	1.09	96	6.12	1.33	95	6.12	1.15	96	6.16	1.23	96	6.11	1.56	95	6.17	1.52	93	6.17	1.40	96
1857	Long	7.16	1.32	819	7.14	1.39	819	7.32	1.31	819	7.01	1.47	817	7.22	1.63	785	7.29	1.54	773	6.94	1.64	803
	Lite	7.04	1.30	1090	7.20	1.45	1082	7.02	1.39	1088	6.79	1.58	1069	7.21	1.60	1070	6.81	1.61	1065	6.73	1.75	1050
1861	Long	6.62	1.45	815	6.59	1.50	815	6.69	1.51	815	6.57	1.59	813	6.56	1.84	795	6.78	1.71	794	6.54	1.93	801
	Lite	6.41	1.56	759	6.44	1.72	757	6.45	1.60	758	6.26	1.89	753	6.40	1.97	753	6.28	1.82	749	6.22	2.02	742