

RUNNING HEAD: Item Sampling Methods

Does Using Item Sampling Methods in Library Service Quality

Assessment Affect Zone of Tolerance Boundaries?:

A LibQUAL+® Lite Study

Martha Kyrillidou

Association of Research Libraries

Colleen Cook

Texas A&M University

Bruce Thompson

Texas A&M University and Baylor College of Medicine

Martha Kyrillidou is director of statistics and service quality programs at the Association of Research Libraries, Washington, DC. She may be contacted at: martha@arl.org.

Colleen Cook is dean of libraries and holder of the Sterling C. Evans Chair, Texas A&M University, College Station, TX. She may be contacted at: ccook@tamu.edu.

Bruce Thompson is distinguished professor of educational psychology and CEHD distinguished research fellow, and distinguished professor of library science, Texas A&M University, College Station, TX, and adjunct professor of allied health sciences, Baylor College of Medicine, Houston, TX. He may be contacted via e-mail at: bruce-thompson@tamu.edu.

Paper presented at the 2nd Qualitative and Quantitative Methods in Libraries (QQML 2010) International Conference, Chania (Crete), Greece, May 25-28, 2010.

**Does Using Item Sampling Methods in Library Service Quality
Assessment Affect Zone of Tolerance Boundaries?:
A LibQUAL+® Lite Study**

Abstract

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. 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.

In 1999, the Association of Research Libraries, under the leadership of the then chair of the ARL Statistics and Measurement Committee, Carla Stoffle, Dean of Libraries at the University of Arizona, convened a meeting in Tucson to discuss the need for new metrics for library service quality assessment in a changing information environment. The 1990s saw the realization of an information dream come true, the machine dreamed of by Vannevar Bush, Memex (Smith, 1981, 1991), was being realized in the form of web browsers from the early prototypes of the Mosaic browser at the University of Illinois at Urbana Champaign to the later versions of Mozilla Firefox and Internet Explorer that were universally available by the late 1990s.

So, it was in February 1999 that the small group of concerned research library directors and administrators came together and realized that the issues had to be framed before new library assessment solutions could be realized. The meeting participants were running large research libraries with responsibilities for being good stewards of the public trust and the funds they were managing on behalf of their research institutions. By the end of the year, thoughtful perspectives were articulated and one of the identified areas of investigation focused on measuring library satisfaction and user service quality perceptions in a package of tools conceptualized as the "New Measures" initiative (Kyrillidou & Crowe, 1998).

By 2009, Google Incorporated has moved beyond being simply a search engine to aspiring to be the largest library in the world by digitizing the collections of the large research libraries. Volumes, monographs and journals are no longer what they used to be as library collections have been transformed into digital bits and bytes. In this new environment, print books may be barriers to learning; pedagogy is moving away from the 3Rs; visual and spatial learning are increasing in importance; textual information is viewed as being too linear for some learners; and different representational realities are demanding more attention.

Item Sampling

When we collect 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) provide 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 the 50 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, Donna completed only items LP01, AS02, LP03, IC04, and IC06. Susan completed the same 5 items as Donna. Eileen completed only items LP01, AS02, IC04, AS05, and IC06. Everyone completed linking items LP01, AS02, and IC04.

User	Survey Items						Total Items
	LP01	AS02	LP03	IC04	AS05	IC06	
Donna	X	X	X	X		X	5
Eileen	X	X		X	X	X	5
Ida	X	X	X	X	X		5
Molly	X	X	X	X		X	5
Nancy	X	X		X	X	X	5
Nancy Lynn	X	X	X	X	X		5
Susan	X	X	X	X		X	5
<u>n</u>	7	7	5	7	4	5	

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., $6.5 - 5.4 = 1.1$).

Purpose of the Present Paper

The present study was conducted as an randomized control trial (RCT) experiment in which participants were randomly assigned to receive (a) all 22 items on a library service quality assessment protocol or (b) a subset of 8 items (i.e., 3 linking items, and 5 items randomly selected for each given user).

Theoretically, the ratings of a given library at a given institution should closely approximate each other across participants randomly assigned either the full or the item sampling protocol. Any observed differences would be due solely to the presence or absence of the item sampling protocol.

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.

Methods

LibQUAL+®

For our study we used data collected with the LibQUAL+® protocol. 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 & 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).

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).

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 scale [AS13]; item 10, which is an item from the Information Control scale [IC10]; and item 3, which is an item from the Library as Place scale [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., $5 - 1 = 4$).

Participants

In the present study we collected 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

Appendix A 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 B 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 d (see Thompson, 2006b, 2008). Cohen's 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 $d = 0$. The Cohen's d will be positive when the long protocol mean is smaller than the Lite mean on a given score, and the Cohen's 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 d was computed to be:

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

or 0.01 when rounded to two decimal places.

Table 1 presents the Cohen's d values for total, the three subscale, and the three linking item (i.e., AS13, IC10, and LP03) means across the two randomly-assigned protocols at the 16 institutions in our randomized control trial (RCT) experiment.

INSERT TABLES 1 AND 2 ABOUT HERE

Discussion

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 1 and 2 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.

References

- 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.
- 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.
- 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
- Kyrillidou, M., & Crowe, W. (1998). In search of new measures. ARL Bimonthly Report, 197, 8-10.
- de La Rochefoucauld, F. (1613-1680). Maximes posthumes page 51, line 106.
- Popham, W.J. (1993). Circumventing the High Costs of Authentic Assessment. Phi Delta Kappan, 74(6), 470-473.
- Smith, L. C. (1981). Memex as an image of potentiality in information retrieval research and development. In R. N. Oddy et al. (Eds.), Information retrieval research (pp. 345-69). London: Butterworths.
- Smith, L. C. (1991). Memex as an image of potentiality revisited. In J.M. Nyce & P. Kahn, From Memex to hypertext: Vannevar Bush and the mind's machine (pp. 261-286). Boston: Academic Press.
- 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.
- Zeithaml, V.A., Parasuraman, A. & Berry, L.L. (1990). Delivering quality service: Balancing customer perceptions and expectations. New York: Free Press.

Table 1
Cohen's d 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 d values are presented in bold.

Table 2
Cohen's d 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 d 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

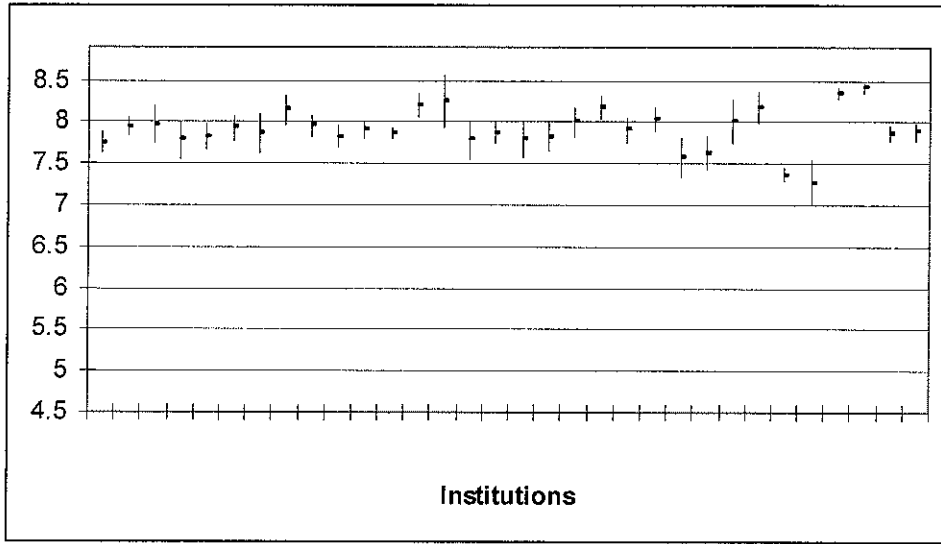
"c:\lq_gr_2\IC10_min"

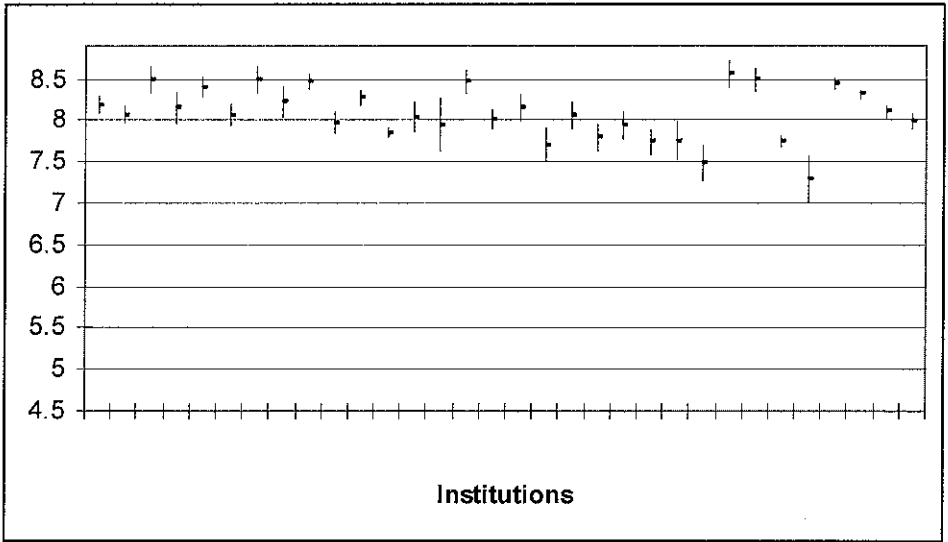
Note. The 95% confidence intervals about the means are presented for each of the 16 institutions (i.e., 3, 4, 5, 84, 107, 433, 440, 446, 450, 453, 459, 461, 467, 1443, 1857, 1861) with CIs for the Long form present leftmost and CIs for the Lite form presented rightmost within each of the 16 pairs of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

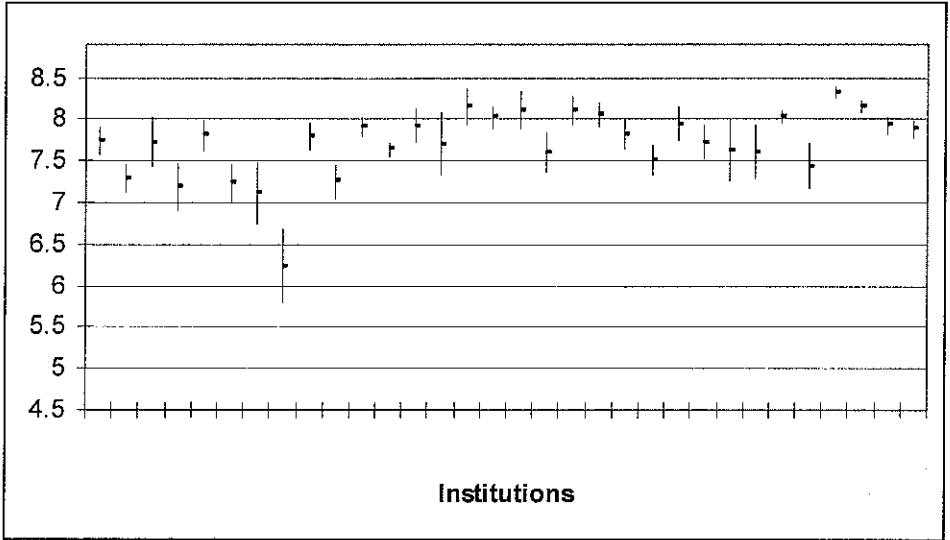
Figure 6
95% Confidence Intervals About Means on Linking Item **LP03** for
Minimum Ratings on Long (Leftmost) and Lite (Rightmost) Forms
Across 16 Institutions

"c:\lq_gr_2\LP03_min"

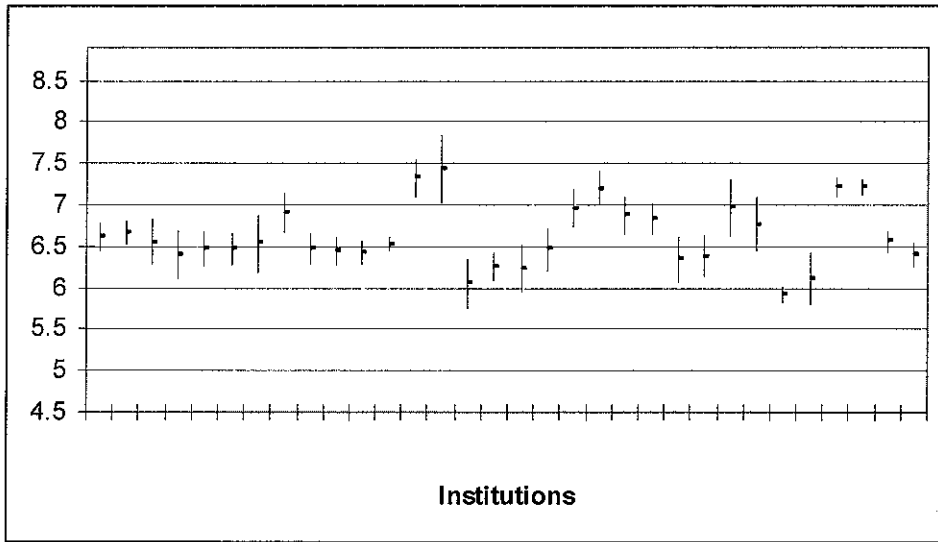
Note. The 95% confidence intervals about the means are presented for each of the 16 institutions (i.e., 3, 4, 5, 84, 107, 433, 440, 446, 450, 453, 459, 461, 467, 1443, 1857, 1861) with CIs for the Long form present leftmost and CIs for the Lite form presented rightmost within each of the 16 pairs of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



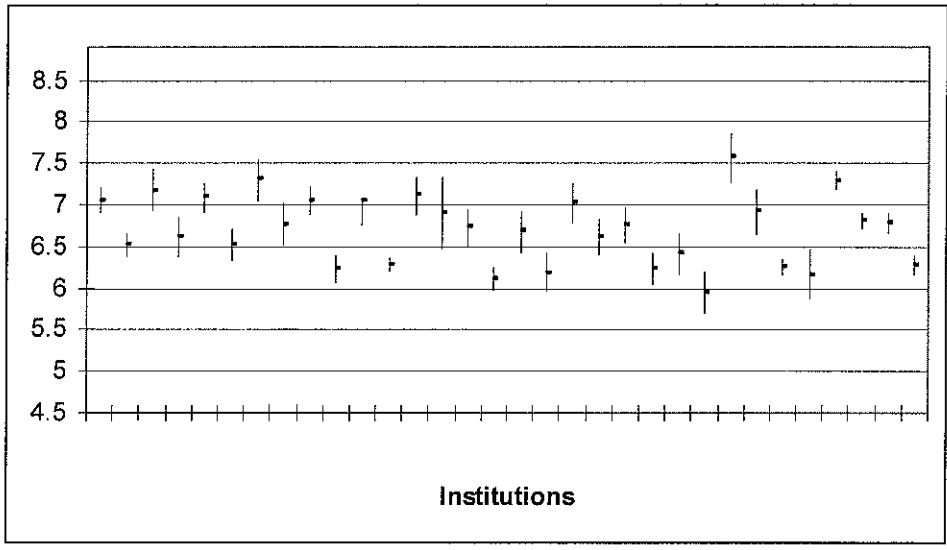




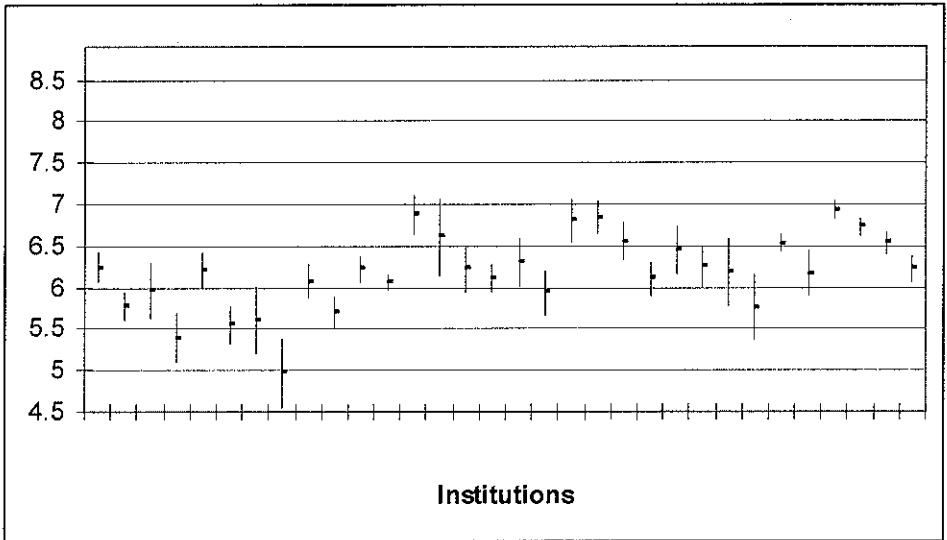
4



5



6



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

Library	Total		Service Affect		Info Control		Lib as Place		AS13		IC10		LP03								
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD							
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	606	7.95	1.42	597	8.07	1.30	611	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	158	7.97	1.37	146	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	206	7.79	1.68	210	8.16	1.48	221	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	302	7.83	1.45	290	8.40	1.18	301	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	362	7.93	1.51	365	8.07	1.38	375	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	125	7.86	1.37	125	8.49	0.94	130	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	144	8.15	1.18	157	8.22	1.25	158	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	361	7.96	1.26	353	8.46	0.92	360	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	427	7.83	1.44	430	7.97	1.41	436	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	658	7.91	1.44	637	8.27	1.19	654	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	1790	7.87	1.42	1783	7.85	1.43	1835	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	229	8.04	1.38	224	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	69	8.25	1.34	69	7.95	1.30	64	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	123	8.46	0.86	129	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	430	7.87	1.34	410	8.01	1.25	418	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	164	7.79	1.34	156	8.15	1.04	155	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	230	7.83	1.34	226	7.70	1.56	228	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	224	8.00	1.30	219	8.06	1.28	210	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	317	8.17	1.30	313	7.80	1.52	303	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	273	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	340	8.04	1.32	338	7.74	1.47	335	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	182	7.75	1.53	178	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	221	7.63	1.55	214	7.48	1.63	215	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	97	8.02	1.29	90	8.56	0.85	97	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	133	8.18	1.11	141	8.49	0.92	151	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	902	7.75	1.22	901	8.04	1.15	930
Lite	7.28	0.94	96	7.22	1.08	95	7.29	1.05	96	7.36	1.16	96	7.27	1.37	95	7.29	1.38	93	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	785	8.44	0.93	773	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	1070	8.32	1.02	1065	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	795	8.10	1.27	794	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	753	7.88	1.52	753	7.99	1.37	749	7.88	1.63	742

**APPENDIX B:
Descriptive Statistics for Total, Subscale, and Three Linking Items for
Minimum Scores 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						
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	6.73	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	210	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	1059	7.21	1.60	1070	6.81	1.61	1065	6.73	1.75	1050

Item Sampling Methods -18-

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
