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How to Get More From Your Quantitative LibQUAL+™ Dataset: Making Results Practical

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How to Get More from Your Quantitative LibQUAL+™ Data Set: Making Results Practical

Purpose

This research paper outlines three analytic tools utilized in the analysis and interpretation of LibQUAL+™ quantitative data.

Design/methodology/approach

D-M scores, value rankings, and split-file cross-tabulations were used to assess the service items from the 2004 LibQUAL+™ quantitative data. The D-M score is methodologically superior to other methods used in that it is a single score that takes into account all three LibQUAL+™ perception/expectation scores as dictated by the theoretical model LibQUAL+™ is based upon.

Findings

We suggest that these tools provide a way to more easily utilize LibQUAL+™ results in taking actions and developing strategic plans designed to improve patrons' perceptions of service quality. These tools also allow for the continuous evaluation of implemented plans.

Practical implications

We discuss how these tools helped produce findings that were informative and in a format that decision makers could easily comprehend and utilize.

Originality/value of paper

This paper outlines three approaches and offers practical recommendation of how to analyze and interpret LibQUAL+™ quantitative data as well as present findings to strategic stakeholders.

Key Words

LibQUAL+™, Quantitative techniques, Library Assessment, Service quality, Computer software

Paper Type

Research paper

Introduction

Who are our customers? What do they want and need? How do they perceive their library? Which services should the library prioritize? The popular and widely used LibQUAL+™ instrument, a standardized web-based questionnaire, is designed to measure patrons' perceptions and expectations of library service quality to answers these and other questions. Although there are some advantages in using the information found in the customized notebook supplied by LibQUAL+™, one of the crucial disadvantages is that the analysis and findings are limited.

Issues unique to a particular library have prompted some institutions to collect additional data through follow-up surveys, interviews, or focus groups to supplement the information provided in the notebook (e.g. Crowley and Gilreath, 2002; Dole, 2002; Haricombe and Boettcher, 2004; Sessions et al., 2002;). However, additional data collection is costly and time consuming and should only occur after existing data have been sufficiently analyzed. Much can be learned by simply conducting an analysis of the quantitative data that is above and beyond that provided by LibQUAL+™. Similarly, an analysis of patterns found in the qualitative comments of respondents collected by the LibQUAL+™ instrument is revealing and should also be used to inform strategic plans (see Dennis and Bower, 2007).

Another disadvantage was realized when we created a number of preliminary reports to describe the performance of our library in which we used the scores provided in our LibQUAL+™ notebook in conjunction with the analytic and presentation techniques found in the literature. Our stakeholders frequently expressed confusion when trying to understand the findings and the resultant confusion negatively impacted the strategic planning/agenda setting process. We found that the use/presentation of two or more of the scores found in the notebook does not make the data easily useful for those appointed to analyze LibQUAL+™ data. Furthermore, the use of multiple scores does not make the data more understandable for stakeholders or the larger university community. In short, if stakeholders do not understand

findings then they cannot properly plan for or take the appropriate actions to address service issues, for understanding the needs of the library is a necessary component of the strategic planning process.

As a result of the difficulty for stakeholders to determine and comprehend performance level from the multiple scores provided by LibQUAL+™, and the need for a more thorough analysis, we are able to report on three analytic tools we utilized in our analysis, interpretation, and presentation of our 2004 LibQUAL+™ quantitative data. We discuss the use of a single score, the D-M score, which allows stakeholders to easily interpret and integrate LibQUAL+™ survey results. This score, guided by theory, integrates all three scores by placing patrons' perceptions of service quality in the context of both minimum and desired expectations. In other words, in congruence with the design of the LibQUAL+™ survey instrument, this statistic also “uses a ‘gap measurement’ protocol to frame user perceptions” (Thompson et al. 2000, p. 165). We also compare methods used to ascertain the relative value or preference of the services provided by the library. And, we discuss expanding the use of cross-tabulations to learn about various user groups not included in the LibQUAL+™ analysis/notebook. We conclude with a discussion on how we used these three tools to concisely present findings to stakeholders. However, before moving into the discussion we provide a picture of our sample and briefly discuss the LibQUAL+™ survey instrument.

Sample Profile and Instrumentation

We use the 2004 LibQUAL+™ data for Western Michigan University (WMU) to present a practical guide describing our analysis and the subsequent dissemination of results. When we administered the survey at WMU we worked to ensure a good response rate by using multiple email contacts that explained the benefits of the survey and requested participation. We also offered incentives (prizes) to participate. As a result, we were able to analysis data collected from 1,625 respondents consisting of 288 Faculty

members, 387 Graduate Students, and 950 Undergraduate Students from WMU [1]. Among the respondents there were 873 (53.7%) females and 752 (46.3%) males. The majority (71.68%) of the respondents was between the ages of 18 and 30; yet nearly half, 49.5% (805), of the respondents were between the ages of 18 and 22.

Table 1

Cross-tabulation of Locally Customized Discipline by User Group

<u>Discipline</u>	<u>User Group Name</u>			Total	%
	Faculty	Graduate	Undergrad		
Aviation	2	0	37	39	2.40
Business / Law	26	21	181	228	14.03
Communications / Journalism	6	7	38	51	3.14
Counselor Ed/ Counseling Psych	7	34	2	43	2.65
Education	28	35	203	266	16.37
Engineering / Computer Science	27	59	98	184	11.32
General Studies	0	1	32	33	2.03
Health & Human Services	26	31	72	129	7.94
History	18	19	22	59	3.63
Humanities	36	31	29	96	5.91
Other	7	21	42	70	4.31
Performing & Fine Arts	11	6	70	87	5.35
Science / Math	52	41	57	150	9.23
Social Sciences / Psychology	42	81	67	190	11.69
Total	288	387	950	1625	100

Table I displays the results for the 14 identified disciplines [1] and demonstrates the representativeness of the sample. Four of the disciplines make up more than 53 percent of the sample; Education (16.4%), Business and Law (14%), Social Sciences/Psychology (11.7%), and Engineering/Computer Science (11.3%). We found that the distribution of the sample was reasonably representative of the population [2]. However, due to the relative number of respondents in the user groups (faculty, graduate

students, undergraduate students) for each discipline, only seven of the disciplines lend themselves to the more detailed analyses by user group: Science/Math, Health & Human Services, Humanities, and the four previously mentioned (Education, Business and Law, Social Sciences/Psychology and Engineering/Computer Science).

Analysis of data by the various constituent groups, such as discipline or user group (e.g. faculty, graduate students, undergraduate students), can provide insight into the impressions of service quality held by various groups. However, to analyze the data by user group, discipline, gender, etc. and make meaningful comparisons, it is imperative to obtain large enough samples to draw solid conclusions [3]. Generally speaking, a sample size of about 400 randomly selected individuals is sufficient to estimate the characteristics of the population of interest (sampling error $\pm 5\%$). Don Dillman (2000, p. 207) provides an excellent table that is helpful in determining necessary sample size.

Library patrons surveyed were asked through the web-based LibQUAL+™ instrument to evaluate service quality. The 27 items from our LibQUAL+™ data set utilized in the quantitative analysis include the 22 core items and 5 items selected from the list of available ‘custom local’ questions. The 27 service quality items were measured using a Likert-type scale of “service level” that ranged from 1 (low) to 9 (high). Respondents were asked to provide three responses to each of the 27 survey items: (1) the *Minimum* level of service that the respondent would expect; (2) the *Desired* level of service the respondents personally want; (3) the *Perceived* level of service quality that respondents believe our Library currently provides.

The LibQUAL+™ instrument requires respondents to provide a perception of service score in the context of two expectation scores for the service items found on the questionnaire. The expectations of customers range from the minimum level of acceptable service quality to the level of service quality desired; this range is known as the zone of tolerance (Zone). The difference between the mean perceived (PER) score and the mean minimum

(MIN) score is known as the adequacy gap (ADQ), while the difference between the mean perceived score and the mean desired (DES) score is known as the superiority gap (SUP).

Our Needs and Solutions

In the following pages we outline the needs encountered during our analysis, interpretation, and presentation of LibQUAL+™ data and the solutions developed to address each need. We discuss the use of a single score, the D-M score, which allows stakeholders to easily interpret and integrate survey results. This score integrates all three scores by framing patrons' perceptions of service quality in the context of both minimum and desired expectations. Next, we discuss and compare methods used to ascertain the relative value or preference of the services provided by the library. Then, our discussion will turn to expanding the use of cross-tabulations to learn about various user groups not included in the LibQUAL+™ analysis/notebook. As a result of the needs outlined below we are able to report on three analytic tools we utilized in the analysis and interpretation of our 2004 LibQUAL+™ quantitative data. We also discuss how the three strategies helped us produce and present findings that were easily digested by decision makers.

McCord and Nofsinger (2002, p. 72) noted that if you engage in “strategic planning, continuous assessment, and [make] significant changes to library services, it will be critical to have the ability to analyze data on site, and with short lead time.” We found that when our analysis moved beyond that supplied by LibQUAL+™ a modest familiarity with a statistical software package (e.g. SPSS® 11.0) and a spreadsheet package (Microsoft® Excel) by members of our team was very helpful. To get the most from your LibQUAL+™ dataset requires scarcely more than a novice skill level with SPSS® and MS® Excel software. We stress that expertise in these software packages is not required in order to use the analytic tools presented here, as it usually takes less than a day to reach an adequate level of proficiency.

What we propose in the following is not *the* way to analyze your LibQUAL+™ dataset, but rather *a* way to analyze the dataset more fully. All three tools presented below were found to be beneficial in uncovering as well as communicating what our customers reported about the library buildings, collection, and services at WMU. Contact authors for a step-by-step presentation on how to conduct the analysis discussed in this paper.

Need # 1

Preliminary reports that utilized any or all of the customers’ perceived, desired, minimum, adequacy gap, and superiority gap mean scores (as given in the notebook) were found by many WMU stakeholders—library and institutional administrators, library employees, colleagues, and patrons—to be confusing, cumbersome and sometimes misleading. Examination of the scores for two service items presented in Table II provides an example to demonstrate how the use of any one or all of the LibQUAL+™-provided scores was found to be confusing and in some cases misleading by our stakeholders.

Table II

Scores of Two Service Items

	MIN	PER	DES	ADQ	SUP	N
AS Employees who are consistently courteous	6.59	7.24	8.01	0.65	-0.78	1604
AS Employees who instill confidence in users	5.55	6.39	7.39	0.84	-1.00	1544

Our conclusion of a similar level of performance for these two items in Table II was not obvious to stakeholders when they examined the scores; especially since sizeable differences in these scores were evident. Nearly all stakeholders concluded, after reviewing the scores (MIN, DES, PER, ADQ and SUP), that the library is performing the “Employees who are consistently courteous” item better because four of the five mean scores are larger. It

appeared that while the WMU LibQUAL+™ team understood gap theory, the constructs of disconfirmation theory (see Heath and Cook 2003, p. 2622), and the three-tier scoring format used to assess the quality of services delivered, most of our colleagues and strategic stakeholders did not understand how to interpret and integrate the multiple scores for each service item.

A number of stakeholders made reference to the literature and asked why we did not just use the superiority gap scores to assess services and inform strategic plans, others asked about the use of only the perceived scores, and a few asked about only using the adequacy gap scores to convey quality of service. Our response came in two parts. First, we informed the stakeholders that our examination of the literature revealed confusion and inconsistency both among and even within reports. Some researchers presented and compared only the perceived scores of items without considering the expectation scores (e.g. Hutchingham & Kenney, 2002; Sessions et al., 2002; Wei et al., 2005), others present multiple scores to explain data (e.g. Dole, 2002), while others compared either adequacy gap or superiority gap scores with out mentioning the other scores (e.g. Cook et al. 2003; Sessions et al., 2002). In short, using the methods presented in the literature necessarily resulted in the frequent use of multiple statistics and was, in many cases, cumbersome to report and interpret.

Second, and most importantly, we emphasized that many of the methods used to analyze LibQUAL+™ data were inconsistent with the theoretical foundations the questionnaire was based upon. We stressed that to fully understand the level of service quality as measured by the LibQUAL+™ instrument we either have to concurrently take into account all three measures of service quality; minimum, perceived, and desired levels of quality were given in the context of one another. Or, we need to simultaneously take into account the two gap measures, superiority and adequacy gap. We cannot use only one of the gap scores because the score only gives a portion of the picture.

To better explain what is meant by a ‘portion of the picture’ we found that a travel analogy worked well. If one wishes to evaluate their travel progress, they would need to take into account where they started from, where they are currently located, and the destination of interest. Of course, we could determine the distance from the starting point to our current location as well as from our current location to the destination, but neither provides a full picture when used alone. Determining that we are 120 miles from our starting point tells us very little about our progress toward the destination. Just as determining that we are 200 miles from our destination gives us inadequate information to determine our distance traveled thus far. We need to take into account all scores to fully understand where we are; we must place our current location within the context of our starting point and the desired destination. The same principles hold for analyzing data from the LibQUAL+™ instrument.

In addition to stressing theoretical concerns, we also informed our patrons that most analytic methods utilized in the literature conflict with how the instrument was designed and responded to by participants. We used the LibQUAL+™ survey instrument itself to clearly demonstrate to stakeholders that the design of the questionnaire required patrons to place current perceptions of service quality within a range of minimum and desired expectations. In other words, the LibQUAL+™ instrument “uses a ‘gap measurement’ protocol to *frame* user perceptions” (Thompson et al. 2000, p. 165, ital. added). This process, “so essential for measuring perceptions of service quality” (Cook et al. 2003, p. 38) is reflected in the instructions on the questionnaire which require respondents to “EITHER rate all three columns OR identify the item as N/A (not applicable)” In sum, we informed our stakeholders that although commonplace in the literature, the use of only one of the provided scores (including gap scores) does not provide a *full* account of our patrons’ assessment of service quality.

We, therefore, found it necessary to develop a different technique for examining data and presenting findings, one that is consistent with the

theoretical foundations LibQUAL+™ is based upon and one that is methodologically appropriate. We also found it necessary that this technique aids in alleviating the difficulties and confusion stakeholders encounter when attempting to determine a performance level from examining the multiple scores provided by LibQUAL+™ (see Table II). In such an endeavor it is essential to bear in mind that a data collection method and the theory it is based upon *always* dictates the type of analytic tools appropriate for analysis, otherwise misleading findings and conclusions regularly result. The advantages of an assessment tool that is grounded in theory, such as LibQUAL+™, can only emerge if the analysis is also well grounded.

Solution # 1: The D-M Score

In the creation of the single score, we were guided by the assertion of Zeithaml et al. (1990, p. 19) that “judgments of high and low service quality depend on how customers perceive the actual service performance in the context of what they expected.” In the same vein, McCord and Nofsinger (2002, p. 70) noted that “the LibQUAL+™ protocol...would allow analysis of current user perceptions within a range of minimum and desired expectations to facilitate understanding.” In other words, perceptions of service delivery are given in relation to expectations and these perceptions should be evaluated in the context of the range of given expectations. Nonetheless, most of the literature reviewed outlined techniques that did not frame user perceptions as dictated by protocol; the techniques did not place perceived mean scores in the context of expectations as measured by the other two scores. Any analysis of perception scores independent from the range of expectations (zone of tolerance) would be theoretically ungrounded and accordingly methodologically inappropriate; the questionnaire design required perceived scores to be given in relation to, and in the context of, both expectation scores.

We fittingly determined that if an analysis is to be used in the development of strategic plans and agenda setting it must utilize techniques that are theoretically and methodologically appropriate; a technique that

simultaneously locates the perceived level of service in relation to the minimum acceptable level of service *and* the desired level of service. Therefore, we developed a single standardized score, the D-M Score, to analyze our data and to easily convey information to our stakeholders. The D-M score, which integrates all three scores, allowed us to place the patrons' perceptions of service quality in the context of *their* expectations [4]. The D-M score not only aids in analysis and presentation of findings but also allows for meaningful and well-organized comparisons. All in all, the D-M score helped us to assess and then convey to stakeholders the relative strengths and weaknesses in the quality of service given at WMU libraries.

Formulas:

$$ADQ\ gap = Perceived - Minimum$$

$$Zone\ of\ Tolerance = Desired - Minimum$$

$$D-M\ Score = (ADQ\ gap / Zone\ of\ Tolerance) * 100$$

The adequacy gap score and the score for the zone of tolerance are needed to calculate the D-M score. The adequacy gap score is calculated by subtracting the minimum mean score from the perceived mean score and the zone of tolerance is calculated by taking the difference between the desired and minimum mean scores (Cook et al., 2001). Next, the D-M score is calculated by dividing the Adequacy gap by the zone of tolerance. Then, multiply the quotient by 100 to have score that will typically range from 0 to 100. The D-M score is the location of the perceived level of service in relation to the minimum acceptable level of service (represented by "0") and the desired levels of service (represented by "100").

The D-M score is usually located in the zone of tolerance and typically has a score between 0 and 100; the higher the D-M score, the better the perception of service quality. A D-M score of 50, which is in the middle of the zone of tolerance, indicates that the perceived score is half way between the minimum level of acceptable service and the desired level of service; adequacy gap and superiority gap scores are of equal size. For instance, a particular service item with a D-M score of 64.40 would indicate that the

library is closer to the desired level of service than to the minimum level of service. In other words, the library is 64.40% of the way to meeting the patron’s desired level of service.

Now to answer the question, ‘which of the services in Table II is the library performing better?’ we turn to Table III where the examination of the D-M score indicates that the Library is performing each of these services almost equally well (45.83 and 45.63 respectively). In fact, it is now easy for stakeholders and analysts alike to determine that the “Employees who instill confidence in users” service item is performed at a very similar level as the other. Only when we frame the perceived score, place in context of the expectation scores, can we make meaningful comparisons. Since measures of dispersion (e.g. variance and standard deviation) are not yet part of the D-M score formula, use caution when drawing conclusions about an item as being better or worse when D-M scores are too close. Items with D-M scores that are separated by less than 5.00 are deemed similar in the level of service quality provided.

Table III

D-M Scores for Two Service Items

	MIN	PER	DES	ADQ	SUP	Zone	D-M Score	N
AS Employees who are consistently courteous	6.59	7.24	8.01	0.65	-0.78	1.43	45.63	1604
AS Employees who instill confidence in users	5.55	6.39	7.39	0.84	-1.00	1.84	45.83	1544

Each library will need to set standards for interpreting the D-M scores. Keeping in mind that a score of 50 is the midpoint in the zone of tolerance or half way between the minimum and desired levels of service, we decided that for our library service items with D-M scores greater than 70 could be viewed as non-problematic and not in need of special attention. Scores above yet close to 50 should be monitored. Items that have D-M scores between 40 and 49 are mildly problematic, and items with D-M scores that range from 15 to 39 are problematic, both require attention. Items with D-M scores that are

below 15 should be viewed as considerably problematic, requiring immediate attention. All in all, the D-M score provided a clear picture to analyst and stakeholder alike of what services the library is doing well and what service components need improvement.

Perceived scores that fall outside the bounds of the zone of tolerance result in scores that have values which are either less than 0 and more than 100. The D-M score will be negative when the perceived score falls below minimum, (just as the adequacy gap is negative). Scores below zero indicate that the library is not doing what is required to meet the minimum service standards of our patrons; a service item with a negative D-M score is in dire need of attention. The D-M score will be greater than 100 when the perceived value is greater than the desired value (positive superiority gap). Scores that exceed 100 indicate that the Library is exceeding the level of service the patrons' desire. A D-M score of 200.00 does not mean the library is performing twice as well as patrons desire; rather, it means that the service provided is being perceived at a level that exceeds the desired level of service by the size of the zone of tolerance (desired + zone). Although the items with D-M scores that fall beyond the zone of tolerance do not need mending, the scores may indicate that limited resources are being allocated inefficiently.

Need # 2

In addition to developing a theoretical and methodologically appropriate analytic tool for the assessment of service quality, the stakeholders at WMU asked that we identify which items were most (and least) preferred/valued. There are a variety of methods that were used for ranking service items presented in the literature. As we found with the analytic methods utilized, there is also inconsistency in the use of these ranking methods; the rationales for the use of these methods for assigning value or importance was also either lacking or nonexistent. We decided that a ranking system, our second tool, would help identify the relative importance/value/preference of the service items. We used a practical

approach to determine the relative value of the services provided by the library. The worth of assigning relative value to service items is apparent; it shows the importance of given services from the perspective of our patrons. Understanding the perspectives of patrons and the value they place on services is fundamental to the formation of practical strategic plans.

Solution # 2: Item Value Ranking

Examination of the literature provided numerous examples of how to determine the value of service items. Sessions et al. (2002, p. 61), for example, determined the “most valued items on the survey” by using a number of methods. They used perceived level of service in one case while in another the adequacy gap scores were used to determine service item desirability. In yet another case they use the superiority gap to rank items. Lessin (2004), however, used a methodologically conscious and consistent method that combined means scores to determine the rank value of service items. Lessin averaged the summed minimum and the desired mean scores for each item and then ranked the items with the highest mean being most valued.

We also believe it appropriate and necessary to use both expectation scores (minimum and desired scores) in assigning relative value to a service item. Instead of using the technique used by Lessin (2004), we ranked the minimum and desired mean scores independently and then averaged the rankings (not the means) for each item to determine the relative value of the service item. The idea of averaging the independent rankings of each expectation score came about by drawing on our experience with athletics. In many sports the value of a player is based on their performance on a variety of separate tasks (e.g. for baseball: homeruns, batting average, and runs batted in-RBI).

To ascertain the relative value or preference of the services provided by the Library the minimum mean scores of the 27 items were rank ordered (See Table IV). The item with the highest mean score received a rank score of “1” while the item with the lowest mean score received a rank score of “27”.

Next, the desired mean scores for each of the items were rank ordered in the same fashion. The two rank scores for each item were summed and then divided by two in order to acquire an overall rank score that range between 1 and 27; a service item with a value rank score of 1 is valued the most while a service item with a score of 27 is valued the least.

Relative Value Formula:

$$(Minimum Rank score + Desired Rank score) / 2 = Overall Rank Score$$

The final step is to rank the items based upon the overall value rank scores, the item with the lowest overall rank score was assigned an item value rank score of 1, the second lowest overall rank score a rank of 2, and so on. In some cases, two or more items will have identical overall rank scores and will therefore receive identical item value rankings. Table IV illustrates the various scores as well as provides examples of items with identical overall rank scores.

For the sake of comparison, we also calculated the relative value of items using the technique outlined here and the one used by Lessin (2004). Table IV has two columns under “Item Value Rank” with ‘BD’ representing the rankings from the approach outlined above and the column headed ‘L’ contains the rankings using Lessin’s approach (the column labeled ‘Lessin’ is the average mean score using his technique). Although we found some minor differences in the value rankings for some items, we encourage the use of either technique because they use both expectation measures (MIN and DES) to determine the relative value of an item.

Table IV

Value Rankings--Business/Law

Item Value Rank			Rank		Rank		Overall Rank		N	Lessin
BD	L		MIN	Score	DES	Score	Score	Score		
1	1	IC	A library Web site enabling me to locate information on my own	6.62	1	8.00	1	1	225	7.31
2	2	IC	Modern equipment that lets me easily access	6.59	2	7.90	3	2.5	225	7.25
3	3	IC	Making information easily accessible for independent use	6.50	4	7.85	4	4	226	7.18
4	5	IC	Easy-to-use access tools that allow me to find things on my own	6.49	5	7.80	5	5	225	7.15
5	4	LP	Quiet space for individual activity	6.59	3	7.75	8	5.5	222	7.17
6	7	LP	Library space that inspires study and learning	6.37	7	7.77	6	6.5	224	7.07
7	6	IC	The electronic information resources I need	6.32	12	7.93	2	7	222	7.12
8	8	LP	A comfortable and inviting location	6.34	10	7.76	7	8.5	223	7.05
9	9	IC	Making electronic resources accessible from my home or office	6.44	6	7.64	12	9	225	7.04
9	10	AS	Employees who are consistently courteous	6.35	8	7.68	10	9	226	7.02
11	11	LP	A getaway for study, learning, or research	6.32	11	7.68	11	11	222	7.00
11	12	IC	Print and/or electronic journal collections I require for my work	6.29	13	7.69	9	11	200	6.99
13	13	AS	Employees who have the knowledge to answer user questions	6.34	9	7.56	15	12	222	6.95
14	14	AS	Employees who deal with users in a caring fashion	6.27	14	7.58	13	13.5	222	6.93
15	16	AS	Willingness to help users	6.17	16	7.57	14	15	223	6.87
16	15	AS	Readiness to respond to users' questions	6.25	15	7.50	16	15.5	221	6.87
17	17	AS	Dependability in handling users' service problems	6.16	17	7.39	17	17	187	6.77
18	18	AS	Employees who understand the needs of their users	6.09	19	7.35	18	18.5	223	6.72
18	19	IC	The printed library material I need for my work	6.09	18	7.27	19	18.5	215	6.68
20	20	LP	Community space for group learning	5.80	20	7.08	20	20	207	6.44
21	21	CL	Teaching me how to locate, evaluate, and use information	5.72	21	7.06	22	21.5	211	6.39
22	22	CL	Efficient interlibrary loan / document delivery	5.66	22	6.93	23	22.5	160	6.29
23	24	AS	Employees who instill confidence in users	5.24	25	7.07	21	23	219	6.16
24	23	CL	Availability of online help when using my library's electronic resources	5.44	23	6.92	24	23.5	211	6.18
25	25	CL	The multimedia (CD / DVD / video / audio) collections I need	5.35	24	6.71	25	24.5	167	6.03
26	26	AS	Giving users individual attention	5.21	26	6.64	26	26	223	5.92
27	27	CL	Library orientations / instruction sessions	5.03	27	6.17	27	27	185	5.60

It is important to keep in mind that this and other methods merely attempt to rank service items and do not attempt to measure item 'value' absolutely. Therefore, caution must be used in giving too much weight to differences between value rankings that are close to one another. The rankings should be viewed as approximations; the further apart the items are from one

another (e.g. items ranked #3 and #9) the more assured you can be that one item is actually valued more than the other. Conversely, items with relative value rankings that are close should not be considered different from one another. These item rankings may be presented independently or they may accompany other statistics, such as the D-M score. All things considered, the item value rankings enabled us to determine the service items that are the most and least valued by our patrons overall and, when the sample size was appropriate, by constituent groups of interest.

Need # 3

Our stakeholders also asked that we provide a more detailed picture of how our library is serving particular constituent groups. Although the LibQUAL+™ notebook contains findings for the major groups on campus, it does not contain results for many of the groups of interest. Having the ability to identify in greater detail who is and who is not being served well by our library allowed our strategic plans to be developed and implemented with greater precision. However, to analyze the data by user group, discipline, gender, etc. and make meaningful comparisons, it is imperative to obtain large enough samples to draw solid conclusions

Solution # 3: Expanding Cross-Tabulations

The third tool we used is an expansion of the cross-tabulation method used by many institutions in their analyses. McCord and Nofsinger (2002) utilized cross-tabulations to examine the assessment of service quality by user type (or user group), frequency of use, library used most often, and campus affiliation to gain more detailed information about their patrons. As long as the sample size is appropriately large enough for the constituent groups of interest, the analysts can easily acquire more detailed information by using a ‘split-file’ function in combination with other methods of data analysis, such as cross-tabulations. In short, the benefit in using the split-file function is that we are able to easily obtain the same type of information for each constituent

group thereby revealing a more comprehensive picture of our patrons' usage patterns.

If a stakeholder wants cross-tabulations for an assortment of constituent groups the analyst does not need to run a cross-tabulation for each group. We found the use of the 'split-file' function in the Statistical Package for the Social Sciences (SPSS[®]) allowed us to easily acquire detailed information above and beyond that provided in the LibQUAL+[™] notebook. This function splits the dataset by the variable(s) of choice; it is as if you are analyzing multiple data sets simultaneously. The use of the split-file function allows one to analyze data more efficiently, thereby saving both labor and time. To use this function you need to locate the split-file button on the tool bar or in the menu under 'Data'. With the split-file window open we suggest that you utilize the help button and read the very brief description to learn how to appropriately use this function. Keep in mind that the size of your sample will dictate the extent that this tool can be utilized; only use variables with sufficient sample size for each constituent group.

We developed a demographic and usage profile of our patrons using a combination of the cross-tabulation and the split-file functions. The cross-tabulation presented in top portion of Table V provides a good amount of information about *overall* usage patterns. Although we split the file by user group to examine library usage patterns of faculty, graduate students, and undergraduates, we only included graduate students in Table V for demonstrative purposes. We defined a frequent user as a patron that utilizes library services, either on the premises or through the library web page at least once per month and more than once per month through the other avenue. Patrons that use the services on premises once per month (or less) and use the services offered via the web page once a month (or less) are deemed infrequent users. Selective users are patrons that use one of the two service avenues more than once per month while using the other less than once per month. Such delineation of groups by usage patterns allows for a more

concise analysis resulting in more focused efforts to improve quality of services.

Table V

Crosstabulation: Use of resources on library premises by Access library resources through a library Web page

<u>Overall</u> How often resources are used on library premises	How often access library resources through a library Web page					Total	%
	Daily	Weekly	Monthly	Quarterly	Never		
Daily	79	70	20	5	3	177	10.90
Weekly	149	390	136	25	19	719	44.27
Monthly	36	209	179	46	17	487	29.99
Quarterly	16	57	72	46	13	204	12.56
Never	5	10	6	10	6	37	2.28
Total	285	736	413	132	58	1624	100
%	17.55	45.32	25.43	8.13	3.57	100	

Graduate Students

	Daily	Weekly	Monthly	Quarterly	Never	Total	%
Daily	36	15	0	0	0	51	13.18
Weekly	62	116	11	3	0	192	49.61
Monthly	10	57	20	1	2	90	23.26
Quarterly	4	13	12	9	1	39	10.08
Never	2	3	4	5	1	15	3.88
Total	114	204	47	18	4	387	100
%	29.46	52.71	12.14	4.65	1.03	100	

The needs of our stakeholders also dictated that we split the data file by other demographic variables to examine such things as the usage patterns of each discipline, each gender, each age group, and so on. Having the ability to identify in greater detail who is and who is not being served well by our library allowed our strategic plans to be developed and implemented with greater precision.

Communicating Results

The LibQUAL+™ administrators are also usually charged with effectively communicating the survey findings back to stakeholders. During the “Is There Life After LibQUAL+™?” session at the 2005ACRL National Conference and ALA Annual Conference, which focused on using LibQUAL+™ results to develop strategic marketing plans, many of the attendees remarked that they found the practical nature of the session very helpful. It was evident that the attendees appreciated assistance with the process of making LibQUAL+™ results useful in producing practical and comprehensible information. Ideally, quantitative findings need to be presented in an easily digestible format that is in sufficient detail to provide insight, even for those with minimal or no formal statistical training; understanding the needs of library patrons is a necessary component of the strategic planning process

Table VI illustrates the combined use the three tools discussed. We are able to compare the D-M scores and value rankings of each service item for selected constituent groups. Examination of the scores for graduate students as an entire group as compared to the university at large illustrates that the quality of service that graduate students are receiving is not at the level we would like, 21 of 27 items have a D-M score below 50 (see column labeled Grad).

Table VI

D-M Scores with Rankings by User Group, Discipline & Usage

	OVERALL		Grad		Social Sciences / Psychology GRADS		Frequent Users GRADS	
	D-M / Rank		D-M / Rank		D-M / Rank		D-M / Rank	
	D-M	Rank	D-M	Rank	D-M	Rank	D-M	Rank
IC A library Web site enabling me to locate information on my own	27.28	1	-0.76	1	21.71	2	-4.87	1
IC Modern equipment that lets me easily access needed information	44.30	2	34.07	4	39.50	7	34.79	4
IC Easy-to-use access tools that allow me to find things on my own	29.51	3	15.18	5	34.43	6	15.94	6
IC Print and/or electronic journal collections I require for my work	6.53	3	-20.28	2	-20.59	1	-19.80	2
IC Making electronic resources accessible from my home or office	28.05	5	4.82	6	19.85	2	5.54	7
IC Making information easily accessible for independent use	39.64	5	29.30	7	37.80	8	29.59	8
IC The electronic information resources I need	31.26	7	1.48	3	13.93	2	-0.47	4
AS Employees who have the knowledge to answer user questions	41.17	8	29.76	10	48.00	11	20.83	11
AS Employees who are consistently courteous	45.63	9	41.81	12	76.19	16	37.68	12
AS Readiness to respond to users' questions	49.91	10	44.06	13	62.71	14	42.30	12
IC The printed library material I need for my work	22.00	11	7.05	9	26.13	9	-2.35	8
AS Dependability in handling users' service problems	41.36	12	24.70	10	33.63	10	18.77	10
LP A comfortable and inviting location	64.40	13	52.32	17	84.30	18	54.73	17
CL Efficient interlibrary loan / document delivery	55.12	13	44.91	8	56.04	5	38.16	3
AS Willingness to help users	52.11	13	49.11	14	63.64	13	44.17	14
LP Library space that inspires study and learning	55.24	16	37.50	15	69.77	19	38.62	15
AS Employees who deal with users in a caring fashion	49.06	17	41.57	17	64.49	14	35.84	20
LP Quiet space for individual activity	64.92	17	53.62	20	84.55	21	50.00	17
LP A getaway for study, learning, or research	54.83	19	39.78	19	73.50	19	36.03	17
AS Employees who understand the needs of their users	44.13	20	36.27	15	47.41	12	32.27	16
CL Availability of online help when using my library's electronic resources	32.97	21	3.98	21	12.07	16	7.27	21
CL Teaching me how to locate, evaluate, and use information	61.16	22	56.98	22	75.23	22	59.09	22
LP Community space for group learning	72.51	23	56.49	26	103.77	26	52.86	26
AS Employees who instill confidence in users	45.83	24	40.15	23	72.22	23	34.83	23
CL The multimedia (CD / DVD / video / audio) collections I need	36.66	25	-1.86	23	37.10	23	0.88	23
AS Giving users individual attention	55.07	26	53.99	23	73.08	23	48.42	25
CL Library orientations / instruction sessions	96.69	27	74.29	27	82.69	26	65.89	27

The examination of the quality of service for the graduate students can be focused even further by expanding cross-tabulations. Respondents within a

constituent group can be compared to the group at large and other constituent groups to determine if particular groups are being underserved. Examination of the Social Science/Psychology discipline, for instance, indicates that these graduate students are receiving a higher quality of service compared to graduate students as a whole. However, graduate students that frequently use library service have scores for most services that were much lower than the other groups. Nonetheless, when examining the 'Library as Place' items we are able to determine that graduate students in the Social Science/Psychology discipline receive a great deal better service for these items than graduate students in general.

Such detailed comparisons are informative, valuable, and warranted when conducting an analysis to be used to develop strategic plans; strategic plans can be tailored so that they focus on improving service for groups inadequately served. Regardless of the standards a particular library sets for interpreting and acting on its own set of scores, the ability to determine which plans are working and which are in need of alteration is vital. If the ultimate goal is to implement tactics that actually improve the quality of service, then libraries should remember to set achievable goals when trying to improve a service.

Conclusion

The tools that we presented in this paper allowed us to extend and deepen the analysis beyond that provided in the LibQUAL+™ notebooks. The three methods (D-M scores, value rankings, and split-file cross-tabulations) allowed us to (1) determine how well we are performing services in relation to the expectations of our patrons, (2) evaluate the relative value of each service item, (3) make internal comparisons of service performance among the various user groups at WMU, and (4) communicate findings clearly and convincingly with stakeholders. The detailed analysis afforded us greater insight resulting in more comprehensive reports for stakeholders to use in the development of strategic plans. Even when an institution does not have

a large enough sample for expanded cross-tabulations, they can make use of the other two tools (D-M score and item ranking) in the analysis of their LibQUAL+™ dataset.

These methods will also allow us the ability to assess and monitor any improvement or deterioration in service quality over time. Although minimum and desired levels of service and perceptions of service delivery all change, the D-M score will place the perception of library service in context. We are, therefore, able to determine if the customers of ‘today’ are better served than the customers of ‘yesterday’. The comparison of our 2004 and 2007 results will provide decision-making stakeholders the necessary information to be knowledgeable about changes in patrons’ service perceptions and expectations. Stakeholders are in turn able to evaluate the effectiveness of the various strategic plans that have been implemented and make the needed changes; and plans can be tailored to meet the various needs of our diverse group of patrons.

In sum, we believe that the use of the tools discussed above will help analysts develop an enhanced understanding of the quality of services provided by a library. The three tools helped us to analyze and convey the state of library services to stakeholders in a format that was easily comprehended; stakeholders were able to interpret the library’s performance in its proper context without difficulty. Finally, we believe these tools will be invaluable in the development and assessment of prospective and existing strategic plans.

Notes

1. General Studies (N = 12), Undecided (N = 11), and University Curriculum (N = 11) were collapsed into one category labeled General Studies (N = 34). Other changes made to the data set prior to this analysis include the removal of *Library Staff* (N = 24), *Research Staff* (N = 3), and *Staff* (N = 26) from the analysis. Subsequently, the user groups that remain in the analysis are *Faculty* (N = 288), *Graduate* students (N = 387) and *Undergraduate* students (N = 950) (See Table I).

2. Information for table located in tables in section 2.4 entitled “Population and Respondents by Customized Discipline” found in the LibQUAL+™ participant notebook. See: Thompson, B. (2000, October), “Representativeness versus response rate: It ain't the response rate!”, Paper presented at the Association of Research Libraries (ARL) Measuring Service Quality Symposium on the New Culture of Assessment: Measuring Service Quality, Washington, DC. Paper included in *New Ways of Listening to Users: LibQUAL+™ ACRL Workshop Reader* (2003, April).

3. The LibQUAL+™ questionnaire is hosted on a website and solicitations for participation are sent via e-mail. Email invites carry with them minimal cost for multiple contacts. Therefore, we suggest using at least 3 contacts. Further, if your college or university has a small population, then it may be advantageous to offer everyone an opportunity to participate. Remember, one of the main reasons we sample is because polling the entire population would be too costly. Technology in the shape of email invitations and web-based questionnaires remove much of the cost associated with survey research and therefore allows researchers to request data from an entire population with minimal to no additional expense. For more information on web-based surveys see Dillman (2002).

4. We found that a colleague from another academic and research library, namely Steve Hiller from the University of Washington, has also developed a theory-based technique for locating perceptions of service quality in relation to both expectation scores.

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