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MEETING ACADEMIC NEEDS FOR INFORMATION:
A CUSTOMER SERVICE APPROACH

ABSTRACT

Should academic libraries seek to improve general satisfaction with their services, or are some services more important than others? This article asserts that faculty and students mainly want information resources. The research analyzes LibQual+™ data to determine which other library resources contribute to information satisfaction among users. The conclusion is that access mechanisms are very important predictors of information resource satisfaction, but library facilities and library staff are negligible predictors. This is true across different groups of users.

Corporations are often asked the question, “What is your business?” The advice frequently given is to concentrate business around core competencies. The business news often relates stories of corporations which sell subsidiaries because their products do not fit well with the overall product line of the company. These companies are defining their business in terms of core products. This paper argues that libraries are in the business of providing the books, articles, and documents that contain the information needed by the user. All operations and resources in the library should support this key goal. The purpose of this research is to establish the relevance of these operations and resources to the ability of the library to deliver the information sources needed by the user. The user group is defined as all users and subgroups within the user group. Relevance will be viewed through the eyes of the user, not through the eyes of the librarian.

The cost of information sources, especially online sources, is perhaps the major issue facing libraries today. In conversations with librarians from different colleges and universities one often hears that meeting the demand for information resources is their biggest challenge. Faculty members and graduate students in particular make requests for more information resources. This point is underlined time and again by the LibQual+™ results.¹ One university librarian stated at a conference that she intended to shift more of her library’s budget away from the library’s other services and into information resources, this decision being based on LibQual+™ results. One could say that this is all perception; library collections and online resources have never been better. But we have arrived at a day when patron demand more than librarian expertise is driving library decision making.

Librarians see the total working relationships of all the units of the library and their necessary role in fulfilling the primary mission of the library. For them the units of the

library are collection development, reference, cataloging, information technology, interlibrary loan, etc. The majority of users, on the other hand, see books, journals, reference sources, online books, online journals, and information resources in general. They also see the library building, the computers in the library, and the people who provide them service. To rephrase the research statement: how do users see the relevance of the library building, the library's computers, and the librarians in meeting their needs for information resources? To pursue this line of inquiry, I have used data from the LibQual+™ survey conducted in 2005 at the Purdue University Libraries. The LibQual+™ survey instrument was not designed to deal with this issue; it was designed to help us increase overall patron satisfaction with the library. On the other hand, the data it provides are a close match to this problem and a basis from which reliable analysis can proceed.

THE CUSTOMER MODEL FOR LIBRARY SERVICES

How important is the opinion of the user in assessing the adequacy of library information sources and library operations? One opinion is stated by Zeithaml et al. who write, "Only customers judge quality; all other judgments are essentially irrelevant."² Saunders makes the point that this view is extreme; librarians are also qualified to make judgments about library quality.³ Yet the views of customers cannot be ignored. The widespread use of the LibQual+™ assessment instrument is a good indicator of just how far academic libraries have migrated to the customer model for library services.

Competition is an integral part of the customer model. LibQual+™ is a child of an older instrument, ServQual. ServQual was developed for service and retail businesses. A manufacturer can be judged by the quality of the goods manufactured. A service industry can only be judged by the quality of the service provided. The issue is succinctly stated by Parasuraman et al.

Intensifying competition and rapid deregulation have led many service and retail businesses to seek profitable ways to differentiate themselves. One strategy that has been related to success in these businesses is the delivery of high service quality.⁴

How can service enterprises differentiate themselves from their competitors? That is the issue; quality service is the answer. The competition for academic libraries does not come from other academic libraries, but from the internet. Search engines like Google give the internet user information. If academic libraries are to differentiate themselves from Google, they must do so by providing a quality of information service that the competition cannot match. This brings us back to the original question, "What is your business?"

THE LIBQUAL+™ SURVEY INSTRUMENT

The LibQual+™ survey instrument is premised on two theories of psychological behavior. The first theory is called, "Expectation Confirmation-Disconfirmation

Theory”.⁵ According to this theory, customers have expectations about a service before using it, and this expectation can be measured. When they actually use the service their level of satisfaction can again be measured. If their expectation equals their satisfaction then their expectations are confirmed and there is no difference in these two measures. If their expectation does not equal their satisfaction, then their expectation is disconfirmed and there is a gap between the two measures. The *gap*, i.e., the difference between the measure of expectation and the measure of satisfaction, is a psychometric measure of the adequacy⁶ of a particular service as viewed by the customer. The second theory has no particular name, but it is based on the assumption of a hierarchical structure of perceptions.⁷ It assumes that patrons can simultaneously evaluate overall satisfaction with the library and satisfaction with particular services within the library which support this overall satisfaction. To evaluate this we use factor analysis to find correlated first order factors in the data from the survey. These first order factors measure the level of satisfaction with the particular library services which support overall satisfaction. These measures of satisfaction, i.e., the factor scores from the first order factors, can then be submitted to a second factor analysis which results in a single factor.⁸ Within the LibQual+™ framework this single second order factor is general overall satisfaction with the library. The first order factors identified by the LibQual+™ survey are “Library as Place,” “Affect of Service,” and “Information Control.” By identifying the first order factors librarians hope that an increase in overall library satisfaction can be achieved by improvements to the various library operations associated with these first order factors.

LibQual+™ was developed by the Association of Research Libraries in conjunction with faculty members at Texas A&M University.⁹ It is composed of 22 core questions, five outcome questions, three general satisfaction questions, and demographic questions. The 22 core questions measure the gaps in library service. Each of the 22 core questions is really three questions. The respondent to the survey will be asked, for example: “When it comes to a gateway for study, learning, and research, 1) my minimum expectation is___, 2) My desired expectation is___, and 3) My perceived level of service is___.” The answer to each of these questions is a number on a nine point scale, a “1” indicating a very low level of satisfaction and a “9” a very high level of satisfaction. There are two gap measures; one is the difference between the perceived level of service and the minimum expectation and the other is the difference between the perceived level of service and the desired expectation. A positive gap implies high satisfaction and a negative gap poor satisfaction. The possible range for gap measures is - 8 to + 8, a 17 point spread. The gap measure used for the analysis in this research is the difference between the perceived level of service and the minimum expectation. This gap was chosen over the other gap for the practical reason that it has a wider spread of values and thus a greater ability to discriminate between finer gradations of the variable.¹⁰

The idea of service proposed in this paper is somewhat different from the service ideas behind the LibQual+™ instrument. The LibQual+™ model seeks to measure the overall satisfaction level of library patrons and then to identify the underlying first order factors within the libraries that are responsible for general satisfaction. The goal is to improve overall customer satisfaction by manipulating the underlying first order factors

which are driving it. Heinrichs et al. regressed these underlying factors against the general satisfaction questions in LibQual+™ and found that the “Affect of Service,” i.e., the staff characteristics of courtesy, knowledge, helpfulness, etc., was the most important first order factor leading to overall satisfaction. Their conclusion is to “use the results of this study to alter resource allocation expenditures in order to improve user satisfaction.”¹¹ But should improving overall patron satisfaction be the goal of the library? If the primary mission of the library is to provide the information resources needed by the user and thereby meet the competition from the internet, then should not the goal of the library be to improve satisfaction with this particular part of our operation? In that case the other aspects of the library’s operation should be viewed in terms of how they can improve the information sources.

THE RESEARCH MODEL

As stated above the goal of this research is to determine the extent to which users associate the operations and resources of the library with their primary need of obtaining information. A related goal is to determine whether this association varies among the different subgroups of users, students and faculty. In order to operationalize the analysis, it was necessary to formulate two regression models. There is no assumption that the regressors, i.e., the independent variables in the equation, are the cause of the responses in the dependent variable. This does not rule out the possibility that they are causal. The assumption is, however, that the regressors can predict the responses found in the dependent variable.

For the first model there are five primary variables plus several control variables. The first primary variable is Information. It measures the adequacy of information resources in the library and is the dependent variable in the regression equation. The other four primary variables are regressors or independent variables. It is our expectation that they will explain or predict the values of the Information variable. The four regressor variables are 1) Access, 2) Facility, 3) Knowledge, and 4) Attitude. The control variables are the outcome variables and the general satisfaction variables. They are added to the regression to neutralize any influence they may have on the beta values of the four primary regressor variables discussed above. See the appendix for the full model. The four regressor variables and the information variable are all measured as the first principle component of the gap measures for the 22 core questions from the LibQual+™ survey. They were constructed from the following LibQual+™ questions.

1. Information. This is a measure of the adequacy of the information resources of the library as evaluated by the user. It is the dependent variable and it uses the gaps from the following questions: “When it comes to”
 - a. “the printed library materials I need for my work.”
 - b. “the electronic information resources I need.”
 - c. “print and/or electronic journal collections I require for my work.”
2. Access. This is a measure of the adequacy of the access mechanisms of the library as evaluated by the user. It is one of the regressors and it uses the gaps from the following questions:

“When it comes to”

- a. “making electronic resources accessible from my home or office.”
- b. “a library web site enabling me to locate information on my own.”
- c. “modern equipment that lets me easily access needed information.”
- d. “easy-to-use access tools that allow me to find things on my own.”
- e. “making information easily accessible for independent use.”

3. Facility. This is a measure of the adequacy of the facilities of the library as evaluated by the user. It is one of the regressors and it uses the gaps from the following questions:

“When it comes to”

- a. “library space that inspires study and learning.”
- b. “a quiet space for individual activities.”
- c. “a comfortable and inviting location.”
- d. “a gateway for study, learning, or research.”
- e. “community space for group learning and group space.”

4. Knowledge. This is a measure of the adequacy of the knowledge of the staff in helping users with their information needs as evaluated by the user. It is one of the regressors and it uses the gaps from the following questions:

“When it comes to:”

- a. “employees who instill confidence in users.”
- b. “employees who have the knowledge to answer user questions.”
- c. “employees who understand the needs of their users.”

5. Attitude. This is a measure of the adequacy of the attitudes and general courtesy and helpfulness of the staff as evaluated by the user. It is one of the regressor variables and it uses the gaps from the following questions:

“When it comes to”

- a. “employees who are consistently courteous.”
- b. “giving users individual attention.”
- c. “readiness to respond to users’ questions.”
- d. “employees who deal with users in a caring fashion.”
- e. “willingness to help users.”

The first principle component from each set of questions is the actual measure of the variable. See the statistical appendix for details on the principle components.

Eight control variables were entered into the regression equation in order to remove their effect as intervening variables. They are based on user responses to five outcome questions and three general satisfaction questions. Each question is answered on a nine point scale of agreement or satisfaction. They are described below:

1. Outcome1 “The library helps me stay abreast of developments in my field(s) of interest.”
2. Outcome2 “The library aids my advancement in my academic discipline.”
3. Outcome3 “The library enables me to be more efficient in my academic pursuits.”
4. Outcome4 “The library helps me distinguish between trustworthy and untrustworthy information.”
5. Outcome5 “The library provides me with the information skills I need in my work or study.”

6. Satisfaction1 “In general, I am satisfied with the way in which I am treated at the library.”
7. Satisfaction2 “In general, I am satisfied with library support for my learning, research, and/or teaching needs.”
8. Satisfaction3 “How would you rate the overall quality of the service provided by the library?”

The second regression model looks at all the same variables used in the first model, but it breaks the respondents into four groups: undergraduate students, graduate students, faculty under the age of 46, and faculty over the age of 45. The purpose of this particular analysis is to determine whether there is any significant variation among these groups and what this might mean for libraries. See the appendix for the full model.

THE DATA

The data for the study come from a LibQual+™ survey conducted by the Purdue University Libraries. Purdue is a research university and is the land grant university for the state of Indiana. It currently enrolls around 37,000 students and has a faculty of around 1,900 at the main campus in West Lafayette, Indiana. The survey was conducted in the fall of 2005. The data matrix from the survey is comprised of 852 respondents and their answers to the 22 core questions, the outcome and satisfaction questions, and a few demographic questions.

An issue faced by the researcher was that of missing data. As the reader may know, if a respondent answers 30 of the 32 questions, but leaves missing just two questions, all 32 answers are removed from the analysis when using regression. Thus, although only 5.6% of the data were missing, this disqualified 41.9% of the 852 respondents for use in the analysis. In order to be able to use data from all 852 respondents, the missing pieces of information were treated as random variables, and estimates of the missing information were based on draws from these random variables. See the statistical appendix for an explanation of the methodology used.

The data may have some bias. The survey was sent to all faculty members and to stratified random samples of students. The bias may come from two sources: 1) not all members of the sample responded to the survey, and 2) the stratification of the sample could introduce bias. There is no way to determine whether bias exists in the data or whether it is large or small. Bias will mainly effect the accuracy of the confidence intervals and the accuracy of the significance levels. The best way to deal with the possibility of bias in the estimators is to be somewhat skeptical of any confidence interval or significance level which is border line. On the other hand, a strong measure of a level of significance or of a confidence interval can be accepted, even in the presence of bias in the data.

RESULTS

The beta values¹², i.e., the B regression coefficients, from the first regression are listed in Tables 1 and 2. Access mechanisms, as measured by the variable, Access, are strong predictors of the adequacy of library information sources. The knowledge base of librarians, as measured by the variable, Knowledge, is a weak predictor. Neither the gap measures for facility adequacy nor attitudinal traits of librarians, the variables Facility and Attitude respectively, had any bearing on user evaluations of the adequacy of information sources. Among the control variables, i.e., the outcome and satisfaction variables, only the satisfaction variables were predictors of information adequacy.

The way respondents evaluate the access mechanisms of the library is a strong predictor of how they will evaluate the information resources of the library. On the average, half of every unit of the user's gap for satisfaction with information sources can be predicted from one gap in the user's satisfaction from access mechanisms. The access mechanisms are those reflected in the survey questions related to the variable, Access, that is, well designed library web pages, up-to-date computers with good functionality, ease of off campus access, intuitive databases, etc. The beta value for Access is .500. It may be on the high side due to the fact that the questions used for both information adequacy and access adequacy were selected in order to maximize the alpha coefficient of the combined questions.

The way respondents evaluate the knowledge of the staff is a weak predictor of how they evaluate the information resources of the collection. The beta value of .131 indicates that some patrons find the knowledgeable help given by staff useful in uncovering the information sources they need. On the other hand, the beta value of .000 for the staff's attitude clearly shows a lack of connection between attitudinal characteristics and user satisfaction with information sources. A test of the difference (.131 - .000 = .131) indicates that there is a significant difference. The p-value is .047 and is significant at the .05 level. This level of significance is somewhat border line, however. Given the possibility of bias in the estimators, one may wish to accept this conclusion with caution.

TABLE 1
Beta estimates for primary variables
First regression model

Regressor variables	Estimates of B for regressors	95% confidence interval	p-value
Access	.500	.445 .544	.000*
Facility	.081	-.022 .059	.377
Knowledge	.131	.052 .211	.001*
Attitude	.000	-.061 .062	.989

$R^2 = .71$ N = 852 *indicates significance at the .05 level

The Outcome and Satisfaction variables were used in the analysis for purposes of control. It was necessary to remove their influence from the variables under study. Still, it is instructive to note how they performed in the analysis. First, none of the Outcome variables were able to predict the user's satisfaction with information sources. Outcome4 and Outcome5 both describe information literacy outcomes. The beta values for these two variables could be an artifact of the effectiveness of the information literacy program at this university, or it could simply be that these are not a good predictors of information adequacy, no matter how strong the information literacy program. Of more interest is the fact that Satisfaction1 had a negative predictive value and Satisfaction2 had a positive predictive value. The question for Satisfaction1 asks about the user's satisfaction with his or her treatment within the libraries. In that sense, it is akin to the questions about the qualities of the staff. The question for Satisfaction2 asks about the user's satisfaction with the library's support for learning and research. This variable appears to be related to both the questions about access and about information resources.

TABLE 2
Beta estimates for control variables
First regression model

Regressor variables	Estimates of B for regressors	95% confidence interval	p-value
Outcome1	-.028	-.071 .014	.192
Outcome2	-.009	-.065 .050	.758
Outcome3	.009	-.045 .062	.746
Outcome4	.029	-.003 .062	.076
Outcome5	.034	-.008 .078	.116
Satisfaction1	-.175	-.226 -.124	.000*
Satisfaction2	.150	.095 .206	.000*
Satisfaction3	.097	.024 .169	.009*

* indicates significance at the .05 level

In the second regression equation we break out the four groups of respondents: undergraduate students, graduate students, faculty under 46 years of age, and faculty over 45 years of age. As Table 3 shows, the four groups all showed a strong association between the adequacy of the access mechanisms and the adequacy of the information resources. The beta value for Access is close to .500 for all four groups. The estimate for the older faculty was somewhat less than for the other three groups. Differences, however, between the estimates for each pair of groups were tested and none of the differences were significant at the .05 level. The difference between the beta values for the younger faculty and the older faculty is .089 (.514 - .425). The p-value was .185, thus not meeting the normal cut off of .05.

TABLE 3
Beta estimates for the Access variable grouped by four user groups
Second regression model

Subgroups	Estimates of B for <u>Access</u>	95% confidence interval	p-value
Undergraduates	.488	.387 .589	.000*
Graduate Students	.494	.420 .569	.000*
Younger Faculty	.514	.407 .621	.000*
Older Faculty	.425	.346 .504	.000*

$R^2 = .72$ N = 852 *indicates significance at the .05 level

Knowledgeable staff appear to have some modest influence on graduate students and faculty in the way they evaluate the adequacy of the library's information sources. But as Table 4 shows there is no influence on undergraduate students. Undergraduate students are more prone to self sufficiency. The fact that the beta values for younger faculty is not significant indicates a wide range of opinions within this group.

TABLE 4
Beta estimates for the Knowledge variable grouped by four user groups
Second regression model

Subgroups	Estimates of B for <u>Knowledge</u>	95% confidence interval	p-value
Undergraduates	- .006	-.167 .155	.943
Graduate Students	.165	.024 .307	.022*
Younger Faculty	.150	-.037 .338	.117
Older Faculty	.147	.003 .291	.045*

$R^2 = .72$ N = 852 *indicates significance at the .05 level

There was little difference between the groups of users for Attitude and Facility. The one exception was older faculty. The beta value for older faculty concerning Facility was .098 with a p-value of .015. Older faculty had a higher beta value for library facilities and a lower beta value for access mechanisms than did the other three groups. This no doubt reflects their more traditional approach to the search for information resources.

For the reader not familiar with regression techniques it might be helpful to explain that beta values measure how well a given regressor variable, i.e., an independent variable, can predict the value of the dependent variable when all of the other regressor variables are held constant. Since the regressor variable, Access, had a beta value of .500, it is a good predictor of the dependent variable, Information. A beta value of .000 for Attitude means that it has no ability to predict Information values. An R^2 of .71 tells us that these four variables do a good job of explaining satisfaction with information sources, but since the R^2 does not equal 1.00, we know that there are other factors not in the regression

equation which could improve our ability to predict. While statistics like beta values provide a mathematical means of making predictions, they in no way prove the existence of a causal link between the regressor variables and Information. An assertion of causality is based on a practical knowledge of the variables being analyzed.

CONCLUSION

The research presented here was predicated on the premise that libraries are in the business of providing information resources and that users are the judges of those resources. Within this premise it makes sense to ask, how can the library improve the user's information satisfaction. One obvious solution is to channel more of the library budget into information resources. But other solutions also exist, which brings us to the research results.

The results of the analysis tell us several things. 1) Patron evaluation of the adequacy of access mechanisms is a good predictor of their evaluation of the adequacy of information resources. 2) Patron evaluation of the adequacy of the librarian's expertise is a weak predictor of their evaluation of the adequacy of information resources. 3) Patron evaluation of the adequacy of the librarian's attitudinal characteristics and of library facilities does not predict patron evaluation of the adequacy of information resources. 4) A breakdown of these relationships by user groups shows consistency across groups. 5) These results apply to one particular university library, but may have relevance for university and college libraries in general.

What does this mean for library policy? Patrons who have a high opinion of the access mechanisms tend to have a high opinion of the library's information sources. Does this mean that an improvement in the library's access mechanisms will induce those with a low satisfaction with the access mechanisms to have a high satisfaction level with access mechanisms and this in turn will lead to a higher satisfaction level with information resources? It seems only reasonable that the quality of access mechanisms, as viewed by the user, has a causal effect on their view of the quality of information sources. If there is a causal effect then investments in better web pages, etc., should have a high return for the library in information satisfaction, given the high beta value for this regressor.

Investment in improved library facilities and better staff training, on the other hand, will probably have little effect on the evaluation of information sources. Even if the knowledge of library staff were to have a causal effect on the user's evaluation of information resource adequacy, and it probably does, the beta value is so small as to imply very minimal effect. Heinrichs et al. found that staff attitudes were the best predictors of overall library satisfaction. They recommended reallocation of expenditures to more personnel development as the best use of resources. This is diametrically counter to the recommendations proposed here. This is because Heinrichs et al. see the goal of the library to be improvement of overall satisfaction. The research presented here argues that the business of the academic library is user satisfaction with information resources and that allocation of budgetary resources should be based on that criterion.

The author is not advocating that library facilities and staff service quality should be ignored. Nor does he support the idea that “Only customers judge quality.” Priorities, however, must be set. Academic libraries are no longer a monopoly. We want our users to discriminate between us and the internet, and that will be based on the quality of our information resources.

The issues raised here are important for the future direction of academic libraries. For that reason I would advise further research. The chain of causal effects remains murky. It would be useful to have a cross university comparison. A simple correlation of the average gap for Information and Access using data from a hundred or more libraries would be useful if it could be supplemented by an independent evaluation of the library web pages for the libraries involved. This could help establish a path for the causal effects.

STATISTICAL APPENDIX

1. Imputation of missing data.

The missing data were estimated using a Markov chain Monte Carlo method. The missing pieces of data were treated as random variables with draws from a posterior distribution. By using this procedure, correct variances and hypothesis tests, including confidence intervals, could be calculated for all of the parameters. It was executed using the MI (Multiple Imputation) procedure in SAS. This method assumes that the data are from a multivariate normal distribution. The nine-point scale used as responses to the questions may only approximate a normal distribution, but with multiple imputation the normality requirement can be relaxed somewhat. The estimate is made separately for each observation. Ten draws were made for each missing datum, giving ten sets of data. For those not familiar with this procedure see Yang C. Yuan, **Multiple Imputation for Missing Data: Concepts and New Development**. www.ats.ucla.edu/stat/sas/library/multipleimputation.pdf. For a more detailed approach see chapter 3 of J. L. Schafer, **Analysis of Incomplete Multivariate Data**, New York: Chapman & Hall/CRC, 1997.

2. Regression

Each regression equation was run ten times, once for each set of data, and the parameters were averaged from the results. The confidence intervals and p-values were adjusted to reflect the fact that the missing data are random variables. This latter step is carried out by the MIANALYZE procedure in SAS.

3. Regression Models. Two regression models were used.

1. For the first model information was regressed against the variables listed below.
Access
Facility

Knowledge
Attitude
Outcome1
Outcome2
Outcome3
Outcome4
Outcome5
Satisfaction1
Satisfaction2
Satisfaction3

2. For the second model information was regressed against all of the variables in the first model plus the variables listed below.

Undergraduate (indicating respondent is an undergraduate student)
Graduate (indicating respondent is a graduate student)
YoungFaculty (indicating that respondent is a faculty member under age 46)
Undergraduate * Access
Graduate * Access
YoungFaculty * Access
Undergraduate * Facility
Graduate * Facility
YoungFaculty * Facility
Undergraduate * Knowledge
Graduate * Knowledge
YoungFaculty * Knowledge
Undergraduate * Attitude
Graduate * Attitude
YoungFaculty * Attitude

The second model was used to calculate beta values for each of the four groups. Each of the three groups in the regression formula take on a value of either “1” or “0”. If, for example, a case is for an undergraduate student, then the variable Undergraduate will be set to “1”, and the other two groups are set to “0”. This has the effect of eliminating all of the interaction variables, e.g., Graduate*Attitude, where the other two groups are set to “0”. The result is beta values for just the undergraduate subgroup. Notice that the group, Older Faculty, is not listed as a variable. One obtains beta values for older faculty when the other three groups are all set to “0”.

4. Principle Components

TABLE 5
Variance Measures for the First Principle Components

First Principle Component For:	Percentage of variance accounted for by 1st PC
Information	73.6%
Access	70.5%
Facility	64.6%
Knowledge	74.6%
Attitude	72.7%

The first principle component for a set of questions can be thought of as the underlying attribute or variable being measured by a set of questions. The score for each question is projected onto the principle component in such a way as to maximize the variance for that underlying variable. When one has a high percentage of the variance from all of the questions being captured by a single principle component, one can be reasonably confident that this principle component is a good measure of the underlying attribute.

NOTES

1. Jim Self, "Bound for Disappointment: Faculty and Journals at Research Institutions," **ARL: A Bimonthly Report on Research Library Issues and Actions from ARL, CNI, and SPARC**, 257(April 2008): 7-11.
2. Valarie A. Zeithaml, A. Parasuraman, and Leonard L. Berry, **Delivering quality service: Balancing customer Perceptions and Expectations**. (New York: Free Press, 1990) 16.
3. E. Stewart Saunders, "The LibQual+™ Phenomenon: Who Judges Quality?" **Reference & User Services Quarterly**, 47 (Fall 2007): 21-24.
4. A. Parasuraman, Valarie A. Zeithaml, and Leonard L. Berry, "SERVQUAL: Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality," **Journal of Retailing**, 64 (Spring 1988): 12.
5. A. Parasuraman, Valarie A. Zeithaml, and Leonard L. Berry, "A Conceptual Model of Service Quality and its Implications for Future Research," **Journal of Marketing** 49 (Fall 1985): 41-50. For a more in depth review of the psychological and theoretical issues involved in service quality measurement see the article by the same authors entitled, "Reassessment of Expectations as a Comparison Standard in Measuring Service Quality: Implications for Further Research," **Journal of Marketing** 58 (Jan 1994): 111-24.
6. What is measured by the gap is sometimes referred to as "satisfaction" and at other times as "quality." There is a literature which argues that satisfaction and quality are not the same thing and that neither term may be appropriate for this measure. See Michael J. Roszkowski, John S. Baky, and David B. Jones, "So which score on the LibQual+™ tells me if library users are satisfied?" **Library and Information Science Research**, 27 (2005): 425. I have chosen the more neutral term "adequacy," although at times I may use the term "satisfaction" or "quality" when it is a better fit for the context.
7. Colleen Cook, Fred Heath, and Bruce Thompson, "User's Hierarchical Perspectives on Library Service Quality: A 'LibQual+™' Study," **College and Research Libraries**, 62 (March 2001): 147-53.
8. *ibid.*
9. All questions on the LibQual+™ Survey are copyrighted 2005 by the Association of Research Libraries. I wish to thank ARL and the authors of the Survey for the permission to use the questions and the data from the survey in this study.
10. Roszkowski et al. conclude that the perception of a desired level of service is a better measure of "satisfaction" than is the gap measure. See Roszkowski et al. "So which score on the LibQual+™ tells me if library users are satisfied." I have chosen the gap for the minimum expected service level for purely practical reasons.
11. John H. Heinrichs, Thomas Sharkey, and Jeen-Su Lim, "Relative Influence of the LibQual+™ Dimensions on Satisfaction: A Subgroup Analysis," **College and Research Libraries**, 66 (May 2005): 264.
12. Since all of the primary variables use gap scores, it was not necessary to standardize the beta values.

