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SERVICE QUALITY IN ACADEMIC LIBRARIES: AN ANALYSIS OF LibQUAL+™
SCORES AND INSTITUTIONAL CHARACTERISTICS

by

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A dissertation submitted in partial fulfillment of the requirements
for the Degree of Doctor of Education
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ABSTRACT

This exploratory study considered the problem of assessing quality in academic libraries. The research question that framed the investigation asked whether service quality scores from the LibQUAL+™ instrument were related to the following college or university characteristics: institutional type, enrollment level, or the level of investment made in libraries. Data regarding Carnegie classification, FTE enrollment, and library expenditures were collected for 159 college and university libraries that participated in LibQUAL+™ during 2006. Descriptive statistics, bivariate correlations, and regression analyses were calculated and the Bonferroni adjustment was applied to significance levels to compensate for errors caused by repeated calculations using the same data.

Several statistically significant relationships were found; notably, negative correlations were found between each of the LibQUAL+™ scores and total library expenditures. The study suggested that higher expectations among library users in large, research libraries led to slightly lower LibQUAL+™ scores. Implications for practice included that survey results should only be used as one component of an assessment strategy, and practitioners might consider the potential role of library marketing or public relations efforts to influence user expectations. Recommendations were made for future research including replicating some aspects of this study with a more representative sample, analyzing respondent comments as well as score data, and exploring whether

there are reliable differences in results for different types of institutions or among groups of respondents (students and faculty, or faculty by discipline).

To my parents, with love and gratitude

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CHAPTER ONE: INTRODUCTION

This dissertation is a report of an exploratory study of service quality scores obtained in 159 college and university libraries, and the relationships of those scores with the following characteristics: institutional type, institutional size, or the level of investment made in libraries. This first chapter will introduce the background of the study, identify the problems that the research questions were intended to address, describe the study's methodology, and outline its professional significance.

Background

Libraries exist to collect the record of human experience and to provide intellectual and physical access to that record. For academic libraries in particular, there is a responsibility to preserve scholarly communications as well as the primary resources upon which scholarship often depends. During the past two decades, myriad challenges and opportunities for libraries have been presented as a result of the rapid development and deployment of information technologies. This environment has spurred librarians to reconsider and redefine collections, services, organizational structure, the skill sets required of library staff, and the attributes of library facilities. A task force of the University of California Libraries recognized this state of change in libraries.

The continuing proliferation of formats, tools, services, and technologies has upended how we arrange, retrieve, and present our holdings. Our users expect

simplicity and immediate reward and Amazon, Google, and iTunes are the standards against which we are judged (University of California Libraries, 2005, p. 7).

Library decision makers must therefore determine how to meet new and evolving expectations for library services and materials. Clearly, libraries are operating from vastly different assumptions about the ways in which they might best carry out their responsibilities than they did a few, short years ago.

While library practice is changing, it remains based in a commitment to service. Collections of books and other information resources without accompanying access tools, instruction, or other library services are mere warehouses, not libraries. Librarians in all types of libraries work to ensure that their organizations provide high quality service in support of the goals of the library's parent institution. It would be rare indeed to discover an academic library, for example, that did not consider service quality an important aspect of carrying out its mission to support teaching, learning, and research in the college or university in which it operates. But how do library administrators know whether their libraries are meeting the new expectations of users or providing high quality service?

Customer Satisfaction and Service Quality

In the for-profit sector, customer satisfaction measurement and management has long been a common practice, and contemporary service quality assessment has its roots in customer satisfaction measurement. During the past 40 years, the concept of customer satisfaction has changed a number of times. From the corporate image studies of the 1960s to the total quality approach in Western economies in the late 1980s (which had been embraced in Japan more than 40 years earlier), several approaches to customer satisfaction led to the contemporary conceptual model of service quality (Crosby, 1993, p. 389-392).

The first phase of customer satisfaction measurement took the form of corporate image studies in the 1960s. Customer satisfaction and perception of quality were often included indirectly in image surveys as questions about company characteristics such as progressiveness or involvement in the community. The second phase saw the birth of product quality studies beginning in the late 1960s. The primary measurement was the adequacy–importance model that created an index of satisfaction to explain customer attitudes. The index was created by “summing (across attributes) measures of satisfaction with product performance multiplied by measures of feature importance” (Crosby, 1993, p. 390).

Beginning in the 1970s, a new phase was evidenced by some early customer satisfaction studies that were implemented in regulated industries, notably by AT&T.

Without market-based performance indicators, monopolies sought to justify rate increases by garnering favorable customer satisfaction measures. The 1980s marked the next major evolution in thinking about customer satisfaction. The increased competition in the American automobile market from foreign companies gave rise to syndicated automotive studies, such as the J. D. Powers & Associates studies (Crosby, 1993, p. 391).

The current focus of customer satisfaction measurement can be traced most directly to the 1980s, when the total quality movement captured the attention of businesses in Western economies and businesses recognized the need for a model that addressed the fundamental shift to a service-based, rather than product-based, economy. There was no longer a specific, tangible product to assess, and businesses turned to customer perceptions of whether their expectations were being met or exceeded (Crosby, 1993, p. 392).

The Gaps Model of Service Quality

The marketing research group of Parasuraman, Zeithaml, and Berry (1985) developed an approach to customer satisfaction measurement in the 1980s called the Gaps Model of Service Quality. The Gaps Model assessed customer satisfaction by identifying the differences, or gaps, between customer expectations and customer perceptions of service (Parasuraman et al., 1985; Parasuraman, Berry, & Zeithaml, 1991). In this model, customer expectations are established by the customer, who defines the

minimum acceptable and the desired levels of service. The customer then describes his or her perception of the level of service he or she received and the gap is thereby defined by the difference between perceived level of service and desired level of service.

Hernon and Nitecki (2001) noted that service quality definitions vary across the literature and are based on four underlying perspectives.

1. Excellence, which is often externally defined.
2. Value, which incorporates multiple attributes and is focused on benefit to the recipient.
3. Conformance to specifications, which enables precise measurement, but customers may not know or care about internal specifications.
4. Meeting or exceeding expectations, which is all-encompassing and applies to all service industries (p. 690).

Most marketing and library science researchers, however, have focused on the fourth perspective (Hernon & Nitecki, 2001), and the Gaps Model of Service Quality uses that perspective as a framework to identify the gaps created when performance either exceeds or falls short of meeting customer expectations. In fact, the Gaps Model expands the fourth perspective to five, with the addition of “gaps that may hinder an organization from providing high quality service” (Hernon, 2002, p. 225).

In the Gaps Model customer *expectations* are viewed as subjective and based on the extent to which customers believe a particular attribute is essential for an excellent service provider. Customer *perceptions* are judgments about service performance.

Furthermore, expectations are not viewed as static; they are expected to change and evolve over time. Herson (2002) wrote that

the confirmation/disconfirmation process, which influences the Gaps Model, suggests that expectations provide a frame of reference against which customers' experiences can be measured . . . customers form their expectations prior to purchasing or using a product or service. These expectations become a basis against which to compare actual performance (p. 225).

The measurement of service quality using the Gaps Model, therefore, focuses on the interaction between customers and service providers and the difference, or gap, between expectations about service provision and perceptions about how the service was actually provided (Parasuraman et al., 1985; Parasuraman et al., 1991). The difference between the minimum acceptable and the perceived levels of service is the adequacy gap; larger adequacy gaps indicate better performance. The difference between the desired and perceived levels of service is the superiority gap; ideally, these scores would be identical so a perfect score is zero. As the superiority gap score gets further from zero, either positive or negative, it indicates poorer performance.

Measuring Library Quality

The recent emphasis on assessment in higher education has affected every facet of post-secondary institutions. Administrators in college and university libraries are no exception; they need assessment tools that provide data for continuous improvement,

documentation of assessment, and evidence of the thoughtful use of assessment data for accreditation organizations.

The traditional measure of academic library quality has been collection size. In fact, many institutions still organize special events to commemorate the acquisition of a library's millionth volume. Rather than providing a census of its collections, however, the Middle States Commission on Higher Education now requires the institution to demonstrate the "availability and accessibility of adequate learning resources, such as library and information technology support services, staffed by professionals who are qualified by education, training, and experience to support relevant academic activities" ("Characteristics of excellence," 2006, p. 43). Colleges and universities are therefore required to determine adequacy without prescriptive measures such as volume counts or numbers of professional staff. The other regional associations have similarly broad statements, leaving librarians and institutional effectiveness staff to figure out a new approach (Gratch-Lindauer, 2002, p. 15). This shift in the assessment of libraries has been described as a "move beyond the rearview mirror approach" (Crowe, 2003, ¶ 5) of simply reporting what libraries acquired or how many users walked through the front gates in a given year.

This emphasis on assessment for accountability has motivated librarians to seek out more meaningful measures of quality. Rather than focusing solely on inputs such as collection size or staffing level, the first new library measures were output measures that sought to describe what libraries produced with their inputs. That is, in the 1990s

librarians began to report outputs such as the number of items borrowed or the number of reference questions answered (Kyrillidou, 2002, pp. 43-44). Those measures alone, however, still fell short of addressing whether library services were sufficient. As colleges and universities created student learning outcomes beginning in the late 1990s, librarians also created measures that were based on outcomes, or the extent to which student and faculty contact with libraries affected them and contributed to the mission of the university (Hernon, 2002; Kyrillidou, 2002). New instruments and protocols, however, were needed for libraries to meet demands for accountability, measure service quality, and generate data for effective library management.

LibQUAL+™

Service-based industries in the private sector began using an instrument called SERVQUAL for assessing customer perceptions of service quality in the 1980s. SERVQUAL was developed by Parasuraman et al. (1985) and grounded in their Gaps Model of Service Quality. In 1995, 1997, and 1999, the Texas A&M University Libraries, seeking a useful model for assessment, used a modified SERVQUAL instrument. Their experience revealed the need for an adapted tool that would use the Gaps Theory underlying SERVQUAL and better address the particular requirements of libraries (Thompson, 2007). In 1999 the Association of Research Libraries (ARL) partnered with Texas A&M University to develop, test, and refine the adapted

instrument. As a result of their collaboration, LibQUAL+™ was “initiated in 2000 as an experimental project for benchmarking perceptions of library service quality across 13 libraries” (Kyrillidou, 2006, p. 4). During 2006 the LibQUAL+™ survey was administered in 298 institutions.

This study analyzed data collected from the two administrations of LibQUAL+™ during 2006. A description of the instrument will facilitate an understanding of the investigation. With each administration, the LibQUAL+™ instrument was improved and it is currently composed of 22 questions and a comment box (see the complete instrument in Appendix A). As shown in Table 1, the results for each library include three dimension scores derived from responses to the 22 questions. There is also an overall, weighted score.

Table 1

LibQUAL+™ Dimensions and their Component Items

Dimension	Components
Service Affect	1. Employees who instill confidence in users
	2. Giving users individual attention
	3. Employees who are consistently courteous
	4. Readiness to respond to users' questions
	5. Employees who have the knowledge to answer user questions
	6. Employees who deal with users in a caring fashion
	7. Employees who understand the needs of their users
	8. Willingness to help users
	9. Dependability in handling users' service problems
Information Control	1. Making electronic resources accessible from my home or office
	2. A library Web site enabling me to locate information on my own
	3. The printed library materials I need for my work
	4. The electronic information resources I need
	5. Modern equipment that lets me easily access needed information
	6. Easy-to-use access tools that allow me to find things on my own
	7. Making information easily accessible for independent use
	8. Print and/or electronic journal collections I require for my work
Library as Place	1. Library space that inspires study and learning
	2. Quiet space for individual activities
	3. A comfortable and inviting location
	4. A getaway for study, learning or research
	5. Community space for group learning and group study

The three dimensions measured by LibQUAL+™ are service affect, information control, and library as place. The perceptions of customers about library staff competency and helpfulness are derived from nine questions that compose the service affect dimension score. The information control dimension is derived from eight questions and focuses on whether the library's collections are adequate to meet customer needs and

whether the collections are organized in a manner that enables self-reliance for library users. Finally, the library as place dimension is derived from five questions that address user perceptions regarding the facility's functionality and adequacy for academic activities. All of the scores are scaled from 1 to 9 with 9 being the highest rating, so that scores can be compared (Thompson, Cook, & Kyrillidou, 2006b).

Reliability and Validity

A number of studies have examined the LibQUAL+™ instrument for score reliability (Cook, Heath, Thompson, & Thompson, 2001a; Cook, Heath, Thompson, & Thompson, 2001b; Thompson, Cook, & Thompson, 2002) and validity (Thompson, Cook, & Kyrillidou, 2006a). In a key study by Heath, Cook, Kyrillidou, and Thompson (2002), validity coefficients replicated closely across different types of post-secondary libraries, leading them to conclude that “*LibQUAL+™ scores may be valid in reasonably diverse library settings*” [italics original] (p. 38). This study explored that conclusion as it relates to institutional size, institutional type, and level of investment by the institution in its library.

Since 2000 LibQUAL+™ has been administered in every state except Alaska and South Dakota (M. Davis, personal communication, May 16, 2007), and

. . . in various language variations in Canada, Australia, Egypt, England, France, Ireland, Scotland, Sweden, the Netherlands, and the United Arab Emirates. The 2005 cycle saw administration in several South African universities. And the summer of 2005 brought training in Greece (Thompson, Cook, & Kyrillidou, 2005, p. 517).

The instrument has consistently tested as psychometrically valid and the protocol has “a universality that crosses language and cultural boundaries at the settings where LibQUAL+™ has been implemented to date” (Thompson et al., 2005, p. 517).

Research Questions

In this section, the research questions that framed the investigation are enumerated and the underlying assumptions are explained. For this exploratory study of 2006 LibQUAL+™ scores, the overarching research question was whether, and to what extent, LibQUAL+™ scores were related to the following college or university characteristics: institutional type, institutional size, or the level of investment made in libraries. Institutional type was represented by Carnegie basic classification, institutional size was represented by 12-month FTE enrollment, and investment in libraries was represented by annual library expenditures. An analysis of LibQUAL+™ scores and these institutional characteristics was performed with data from 159 American colleges or universities that participated in the 2006 administration of LibQUAL+™.

LibQUAL+™ results include scores for minimum, perceived, and desired levels of service for each of the 22 items included in the survey. The scores are combined to

produce an adequacy gap and superiority gap for each question and for each of the three dimensions. The adequacy gap is the difference between the minimum and perceived scores, and the superiority gap is the difference between the desired and perceived scores. Large adequacy gap scores indicate that respondents perceive services to exceed their minimum expectations. A large superiority gap score, however, may indicate the library is expending resources to provide a level of service beyond the level that its users desire. In addition, superiority gap scores below zero indicate the library is not meeting its customers' desired service level.

The following questions were designed to result in data that addressed the research question.

1. What were the 2006 LibQUAL+™ scores for American college and university libraries?

The central tendency of the LibQUAL+™ data, in terms of means and confidence intervals, and shape of the distribution, or normality of kurtosis and skewness, was anticipated to indicate that the sample was representative of the population.

2. What were the characteristics of the American college and university libraries that administered LibQUAL+™ in 2006?

A description of the independent variables at the sample institutions was anticipated to indicate a normal distribution and central tendency for data regarding Carnegie classifications, enrollment, and library expenditures.

3. To what extent, if any, were scores for the information control dimension related to institutional type as expressed by the Carnegie basic classification?

Libraries in research universities, unlike their counterparts in primarily undergraduate institutions, are intended to support significant graduate programs and research activity. In such libraries students and faculty will find rich, well-organized collections. In contrast, libraries that support solely undergraduate work have collections that support the curriculum but are not likely to have the resources required to support faculty research. Information control dimension scores, therefore, were anticipated to be related to institutional type.

4. To what extent, if any, are scores for the library as place dimension related to library expenditures per FTE student?

Since building, maintaining, and updating library buildings, furnishings, technology infrastructure, and equipment requires an ongoing investment of resources, it was proposed that higher library expenditures would result in better facilities, appropriate study spaces, and robust technology. Therefore, a relationship between scores for the library as place dimension and library expenditures per student was anticipated.

5. To what extent, if any, are scores for service affect related to institutional size as expressed by FTE enrollment?

Small institutions are commonly thought to foster more interpersonal contact between students and faculty. Research in student engagement supports this idea and indicates that student-faculty interaction at small colleges occurs more frequently and in

different ways than at large institutions. At small institutions students interact with faculty daily “through residence halls, faculty being on campus every day and having an open door policy, an active advising system that usually involve[s] faculty rather than staff advisors, a sense of egalitarianism between students and faculty, and ethic of care on the part of faculty” (Kezar, 2006, p. 100). The high level of faculty-student interaction typically found at small institutions was expected to be related to higher service affect scores.

6. To what extent, if any, was institutional investment in the library, as expressed by library expenditures, related to scores for each of the three dimensions, or to overall LibQUAL+™ scores?

Finally, in addition to exploring the potential relationship between library expenditures and scores for library as place, it might be argued that budgetary support for the library is related to most aspects of library personnel, library operations, and library collections. Therefore, higher expenditures were expected to be related to higher scores in all of the LibQUAL+™ dimensions.

Methodology

In this section the data collection and analysis procedures that were followed in the study are described. Data were collected and analyzed for the purpose of exploring the potential relationships posed in the research questions.

Data Collection and Analysis

Of the 298 institutions that participated in the 2006 administrations of LibQUAL+™ (ARL, 2006), institutional score reports for academic libraries (in colleges or universities) were selected for the sample if they used the American English version of the survey, self-identified as colleges or universities, and were willing to make their score reports available to other participants in the 2006 administration of LibQUAL+™. The resulting sample was composed of score reports for 159 institutions.

The independent variables for the research questions were the institutional characteristics that were investigated as potential correlates or predictors of LibQUAL+™ scores. Institutional type was expressed by the Carnegie Basic Classification, institutional size was expressed by FTE enrollment, and level of investment in libraries was expressed by library expenditures. Published data related to the independent variables were collected from the Academic Library Survey administered biennially by the National Center for Educational Statistics (NCES) Library Statistics Program, and from the Carnegie Foundation for the Advancement of Teaching. The dependent variables in this investigation were the perceived scores for the three dimensions of LibQUAL+™ and the overall, weighted LibQUAL+™ score.

The research questions that framed the investigation were addressed with descriptive statistics, calculations of bivariate correlations (Spearman's rho), and bivariate regression analyses. Table 2 summarizes the research questions, data sources, and analytical tools that were employed to address each question.

Table 2

Data Sources and Analytical Tools that Addressed the Research Questions

Research Question	Data Source	Analytical Tools
1. What were the 2006 LibQUAL+™ scores for American college and university libraries?	LibQUAL+™ score reports	Descriptive statistics
2. What were the characteristics of the American college and university libraries that administered LibQUAL+™ in 2006?	National Center for Education Statistics (NCES) Academic Library Survey	Descriptive statistics
3. To what extent, if any, were scores for the Information Control dimension related to institutional type as expressed by the Carnegie basic classification?	LibQUAL+™ scores, Carnegie Basic Classification	Regression; correlation
4. To what extent, if any, were scores for the library as place dimension related to library expenditures per FTE student?	LibQUAL+™ score reports, NCES	Regression; correlation
5. To what extent, if any, were scores for service affect related to institutional size as expressed by FTE enrollment?	LibQUAL+™ scores, NCES	Regression; correlation
6. To what extent, if any, is institutional investment in the library, as expressed by library expenditures, related to scores for each of the three dimensions, or to overall LibQUAL+™ scores?	LibQUAL+™ scores, NCES	Regression; correlation

Delimitations and Definitions

Service quality, in LibQUAL+™ and for the purposes of this investigation, is a construct defined as “the result of the consumer’s comparison of expected service with perceived service” (Parasuraman et al., 1985, p. 47). In contrast, product quality can be “measured objectively by such indicators as durability and number of defects” (Parasuraman Zeithaml, & Berry, 1988, p. 13).

The sample of college and university score reports was limited to those institutions that administered the American English version of the 2006 LibQUAL+™ survey. Since those institutions chose to administer the survey, it should be noted that the sample was drawn from a self-selected subset of the population. This subset and the sample may not be representative of the population of all American academic libraries.

Findings of the study cannot be generalized to institutions that administered the survey in other languages, including British English. Furthermore, since the study analyzed data related to college and university libraries, findings cannot be generalized to other types of libraries.

Significance of the Study

The LibQUAL+™ survey is the first instrument that claims to have produced national benchmarks for library service quality with reliability and validity. It has

provided academic librarians with data intended to inform service quality improvements and meet the demands of assessment requirements. Consequently, LibQUAL+™ results have been analyzed in a variety of ways to assess and improve library services, programs, and facilities.

This study explored whether there were relationships among institutional size, institutional type, level of investment in libraries, and LibQUAL+™ scores. These research questions were posed because the answers were anticipated to offer a greater understanding of the meaning of LibQUAL+™ scores. Furthermore, this analysis was significant to the library profession because it added to librarians' understanding of LibQUAL+™ results, extended librarians' knowledge of factors that are correlated with the scores, and may have provided significant information for college and university decision makers.

Summary

This chapter introduced the problem of meaningful assessment in academic libraries, outlined the conceptual framework for the study, enumerated the research question and sub-questions, described the methodology, and discussed the potential significance of the study.

Chapter Two provides a review of the literature that guided the study. Chapters Three and Four explain the investigation's methodology in more detail and describe the

results of the data analyses, respectively. Finally, Chapter Five contains a discussion of the findings, conclusions, implications for practice, and recommendations for future research. Chapter Five is followed by the List of References, Appendix A, which contains a sample of the LibQUAL+™ instrument, and Appendix B, which includes scatterplots for research question six.

CHAPTER TWO: REVIEW OF THE LITERATURE

Chapter One introduced the present study by describing the problem this investigation was designed to address, outlining the study's methodology, and explaining its professional significance. Chapter Two will examine the relevant literature and present the conceptual framework underlying this investigation. The bodies of literature on customer satisfaction measurement, service quality assessment, and the LibQUAL+™ protocol for library service quality assessment, provide the basis for this study.

Customer Satisfaction and Service Quality

Consumer satisfaction research “matured into a respectable research stream” (Oliver & DeSarbo, 1988, p. 495) in the mid-1960s. Several approaches to customer satisfaction have emerged since then that contributed to the conceptual model of service quality used in contemporary measurement efforts (Crosby, 1993; Herson, 2002).

From the corporate image studies and product quality studies beginning in the late 1960s, measurement approaches emerged based on customer expectations or values. The adequacy–importance model, for example, was one such measurement that moved from just measuring consumer satisfaction with product performance to enriching those product performance measures with consumer values. It added ratings of the importance of each product feature. The level of satisfaction with performance was then multiplied

by the product feature importance to create an index of consumer satisfaction (Crosby, 1993, p. 390; Cohen, Fishbein, & Athola, 1972, p. 459).

Expectancy Disconfirmation Theory

One of the primary areas of exploration in the emerging field of consumer satisfaction research in the 1960s was from the perspective of expectancy disconfirmation theory. Expectancy disconfirmation is a process theory that creates a framework for examining the formation of customer expectations and the subsequent confirmation or disconfirmation of those expectations through comparisons with product performance (Oliver & DeSarbo, 1988). Consumers are thought to compare post-purchase performance to their expectations prior to purchase “using a “better-than, worse-than heuristic” (Oliver & DeSarbo, p. 495) to arrive at a judgment of simple confirmation if the product performs as expected. If performance is better than anticipated, there is a positive disconfirmation of the consumer’s expectations; if the performance is worse than anticipated, there is a negative disconfirmation (Figure 1).

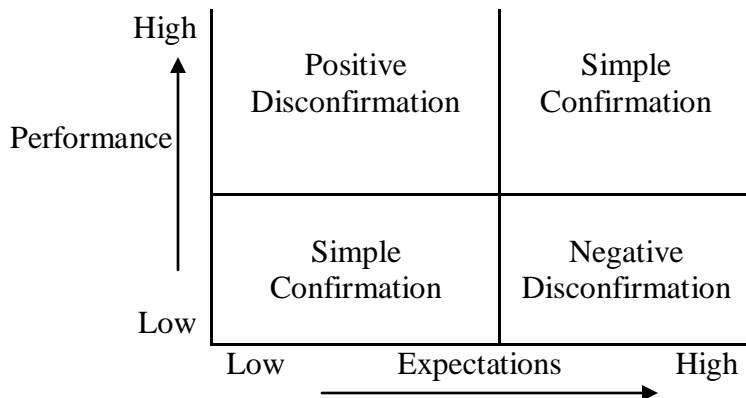


Figure 1. Expectancy Disconfirmation Theory

The Service-Based Economy

In the 1980s, consumer satisfaction theorists and businesses alike began to realize that, in terms of the gross national product and employment statistics, the economy in the United States had become dominated by service industries (Crosby, 1993, p. 391). For the purposes of customer satisfaction measurement, there was no longer just a physical product to assess in terms of durability or number of defects. The commercial sector was beginning to recognize the need for a new customer satisfaction model that addressed the fundamental shift to a service-based economy and it turned to examining customer perceptions of whether their expectations were being met (Crosby, p. 392).

Total Quality Management

Crosby (1993) contends that the contemporary emphasis on quality is “largely attributable to the quality movement in business” (p. 392) that took hold in the United States in the mid-1980s. The success of foreign companies in the American market in the late 1970s and the 1980s was unprecedented. The success of Japanese companies in particular, such as Toyota and SONY, led many American companies to look at how the Japanese had become so successful.

Since the end of World War II, Japanese companies had focused on quality and embraced Total Quality Management (TQM). American companies subsequently looked for ways to integrate TQM into their own organizations (Crosby, 1993, p. 392). TQM requires every part of a company to be organized in terms of a single, integrated philosophy encompassing quality through teamwork, productivity, customer understanding, and customer satisfaction (Crosby; Ishikawa, 1984/1985, p. 37). A critical perspective in TQM is that only the customer may judge quality (Crosby; Ishikawa). In a paradigm where the customer judges quality, measuring customer satisfaction and customer perceptions of quality, not just product performance, becomes significant.

The Gaps Model of Service Quality

As TQM became popular in the United States, the marketing researchers Parasuraman et al. (1985, 1991) developed the Gaps Model of Service Quality. The Gaps Model is based on the expectancy disconfirmation perspective with a focus on service quality rather than product quality (Parasuraman et al.). In his review of quality assessment, Herson (2002) wrote that

“the confirmation/disconfirmation process, which influences the Gaps Model, suggests that expectations provide a frame of reference against which customers' experiences can be measured. . . . customers form their expectations prior to purchasing or using a product or service. These expectations become a basis against which to compare actual performance” (p.225).

The Gaps Model is described by Herson (2002) as a way to measure customer perceptions of service quality by identifying gaps, or differences, between customer expectations and customer perceptions of service. In the Gaps Model, customer expectations are viewed as subjective judgments based on the extent to which customers believe a particular attribute is essential for an excellent service provider. Expectations are affected by experience and are not expected to remain the same over time. In this model, customer perceptions are the judgments about how well service was performed (p. 225).

To deploy the Gaps Model, a survey instrument is used and customers are asked to define the minimum level of service they will accept and the level of service they

desire. Customers are then asked to describe their perceptions of the service that was actually provided. The gaps between perceived performance level and customer-defined desires or expectations can be used to identify and target areas for improvement (Parasuraman et al. 1985).

Hernon's (2002) examination of the Gaps Model identifies five types of gaps created by discrepancies between:

1. Customer expectations of service and management's perspective on these expectations;
2. Service quality specifications and management's perspective of customer expectations;
3. Service quality specifications and service delivery;
4. Service delivery and external communication to customers about that delivery; and
5. Customers' expectation of service and perceived service delivery (p. 225).

The fifth type of gap, between customers' expectation of service and perceived service delivery, is the one used by Parasuraman et al. (1985) in defining the framework for SERVQUAL, the instrument they created to assess service quality in the for-profit sector.

SERVQUAL

The SERVQUAL instrument is a multi-item scale that was developed to assess customer perceptions of service quality in retail businesses (Parasuraman et al. 1988). It

is based in the Gaps Model of Service Quality, which is grounded in expectancy disconfirmation theory.

Customers Define Quality

The SERVQUAL instrument was designed from data gathered in an exploratory customer study by Parasuraman et al. (1985). The exploratory customer study conducted focus-group interviews of customers in four distinct markets: retail banking, credit cards, securities brokerage, and product repair and maintenance. The focus-groups were designed to discover the elements that form the concept of service quality from the customers' perspective. Using a focus-group methodology reflects the TQM focus on quality as well as the precept that "only customers judge quality; all other judgments are essentially irrelevant" (Zeithaml, Parasuraman, & Berry, 1990, p. 16).

The definition of service quality that emerged from the customer focus groups was "the extent of discrepancy between customers' expectations or desires and their perceptions" (Zeithaml, et al., p. 19). The investigators also found that "the criteria used by consumers [in all four markets] in assessing service quality fit into 10 potentially overlapping dimensions . . . tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding/knowing the consumer, and access" (Parasuraman et al. 1985, p. 47).

Refining SERVQUAL

The first version of the SERVQUAL instrument was composed of 97 scale items designed by Parasuraman et al. (1985) to gather data that would address those 10 dimensions. In the next phase of development, SERVQUAL was administered and data were collected for the 97 items. The investigators performed a factor analysis and applied reliability testing. Using Cronbach's alpha coefficient, with alpha values ranging from .72 to .83 across the 10 dimensions, the instrument was refined to 54 items (Parasuraman et al. 1988, p.19). Factor analysis of the resulting 54 items changed the factor loadings, suggesting reassignment of some items and deletion of others. Each time the factors were changed, the factor analysis was repeated and this iterative process ultimately resulted in 22 items loading on five dimensions (Table 3).

Table 3

SERVQUAL Dimensions and their Components

<u>Dimension</u>	<u>Components</u>
Tangibles	Physical facilities, equipment, and appearance of personnel
Reliability	Ability to perform the promised service dependably and accurately
Responsiveness	Willingness to help customers and provide prompt service
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence
Empathy	Caring, individualized attention the firm provides to customers

The final five dimensions in SERVQUAL included three of the initial dimensions: tangibles, reliability, and responsiveness, as well as two new, combined dimensions: assurance and empathy (Parasuraman et al.1988, pp. 20-23).

Library Quality Assessment

Historically, academic library quality has been expressed in terms of collection size. The “ultimate goal of bringing together a perfectly customized collection of books for the purposes of fulfilling users’ needs” (Kyrillidou, 2002, p. 43) drove collection sizes higher and led to assessing a library’s quality by the “magnitude of its resources” (Kyrillidou, p. 43). In this environment, libraries relied upon collecting statistics and analyzing input measures.

Input measures, the financial, human, and material resources available to the library organization, have been measured in some form by research libraries since 1908 (Kyrillidou, 2002). With the increasing emphasis on assessment and accountability, coupled with the changes in libraries and library collections made possible by information technology, librarians began to seek new measures of quality that would be more meaningful.

From Inputs to Outcomes

In the first phase of seeking out new measures, librarians shifted from focusing solely on what libraries had acquired, and developed measurement models beyond simple inputs. In the 1990s, library measurement expanded to include output measures: the activities that libraries produced from inputs, such as the number of items borrowed or questions answered (Kyrillidou, 2002, p. 43). Library professional associations, including the Association of Research Libraries (ARL) and the Association of College and Research Libraries (ACRL), as well as the National Center for Education Statistics (NCES) continue to collect collection- and activity-based data from academic libraries. NCES maintains an academic library comparison tool on its website for the purpose of comparing such data among institutions in the United States (*Academic Libraries: 2004*, 2006, November).

Input and output measures are useful yardsticks, but they do not capture the full extent of the impact a library has on its institution. In its 1998 report, the ACRL Task Force on Academic Library Outcomes Assessment captured the limitations of such measures, noting that “measurement of inputs, or the specification of quantities of them by standards, is viewed by some [librarians] as a primitive, or at least insufficient way” of assessing libraries (ACRL, section II, ¶ 5). The Task Force argued for libraries to develop outcomes-based measures.

In the late 1990s the movement to hold schools, colleges, and universities accountable for establishing and meeting outcomes was becoming formalized by accreditation requirements and pressure from State legislatures for accountability (Gratch-Lindauer, 2002). Educators had been using learning outcome measures for about 15 years at that time, but until the 1990s, most of them had not been required to use formal outcome measures in accreditation reports or legislative budget requests (Gratch-Lindauer).

Libraries tapped into this activity on campus and began to develop outcomes and outcomes-based performance measures (Gratch-Lindauer, 1998). Library outcomes were intended to measure “the ways in which library users are changed as a result of their contact with the library’s resources and programs” (ACRL, 1998, section II, ¶ 2) as well as document how libraries contribute to meeting institutional outcomes (Hernon, 2002; Kyrillidou, 2002).

Service Quality from the User Perspective

It is only since the beginning of the 21st century that libraries have engaged in directly measuring service quality from a user perspective (Kyrillidou, 2002, p. 43). As recently as 2001 the library assessment literature did not, for the most part, consider direct measurement of quality. For example, as late as 2001, Shim, McClure, and Bertot observed, in a report on measures and statistics for ARL, that “to accurately indicate the

success or quality of an academic library, measurement should be implemented at three key levels: outcome level, use/capacity level (output), and resources level (input)” (2001, section 3, ¶ 3). In other words, prominent library science researchers were still relying on measures that assessed quality indirectly.

Of the measurement methods Shim, McClure, and Bertot (2001) identified, there was no instrument or protocol for directly measuring service quality in a library, and there was certainly no instrument to measure service quality across libraries for benchmarking purposes. Pritchard (1996) offers a cogent description of the measurement challenge that faced librarians.

The difficulty lies in trying to find a single model or set of simple indicators that can be used by different institutions, and that will compare something across large groups that is by definition only locally applicable—i.e., how well a library meets the needs of its institution. Librarians have either made do with oversimplified national data or have undertaken customized local evaluations of effectiveness, but there has not been devised an effective way to link the two (section 2, ¶6).

As library practitioners and scholars worked to develop meaningful measures for libraries, the need for reliable and meaningful assessment instruments intensified.

LibQUAL+™

In their quest to discover better measures, the Texas A&M University Libraries turned to marketing research in the 1990s to identify instruments for measuring library service quality. At that time the SERVQUAL instrument had been widely used in the

private sector for about 10 years; moreover, SERVQUAL's creators, Parasuraman et al. (1985), were members of the Texas A&M University faculty (Thompson, 2007). The Texas A&M University Libraries used SERVQUAL three times, in 1995, 1997, and 1999, to track perceptions of library service quality from samples of its library users. Through that experience, the assessment team recognized that the instrument could be improved for libraries by adapting it to address the concepts most critical to library service and removing "items not considered relevant by some library users (e.g., the attire of service staff)" (Thompson, ¶ 2).

The Texas A&M University group approached ARL about working jointly to adapt SERVQUAL for libraries and they collaborated to apply for a grant from the Fund for the Improvement of Post-Secondary Education (FIPSE). The FIPSE award funded the effort to develop a modified protocol, which they called LibQUAL+™.

Developing LibQUAL+™

ARL was poised to work on such a project as it had recently proposed the *New Measures Initiative*. The New Measures Initiative was created by ARL's Statistics and Measurement Committee and its Research Library Leadership and Management Committee in October, 1999 at an ARL membership meeting (Blixrud, 2001). The new measures were intended to assist libraries in moving away from data that just described a library's inputs and outputs and towards data and programs that could "help libraries

measure their performance over time both to benchmark with peers and to improve their own operations” (Blixrud, p. 1).

The Initiative began with a focus on “higher education outcomes assessment, utility of service effectiveness measures across libraries, usage measures for electronic resources, identification of cost drivers, and applying the results of an Interlibrary Loan and Document Delivery Performance Measures cost study” (Blixrud, 2001, p. 3). As a result, supporting and developing the LibQUAL+™ project was precisely the kind of project in which the ARL New Measures Initiative was prepared to engage.

LibQUAL+™ was administered for the first time in 2000 across a group of 13 research libraries. Subsequently, the instrument was further modified and adapted, with FIPSE support, to render it appropriate for other types of libraries such as those in smaller colleges and public libraries (Thompson, 2007). Since then, LibQUAL+™ has been used by an increasing number and widening variety of libraries each year to track user perceptions of service quality. In 2006, 298 libraries, including public, community college, business, and medical and law libraries, participated in LibQUAL+™, and more than 176,000 individual responses were collected from those libraries for analysis (ARL, 2006).

As outlined in Table 4, the LibQUAL+™ instrument has been refined a number of times and the current iteration, composed of 22 items that load on three dimensions, has been administered since 2003 (Davis & Kyrillidou, 2007, slide 9).

Table 4

Refinement of LibQUAL+™ Dimensions

	2000	2001	2002	2003-2007
No. of items	41	56	25	22
Dimensions	Affect of Service	Affect of Service	Affect of Service	Affect of Service
	Library as Place	Library as Place	Library as Place	Library as Place
	Reliability	Reliability	Personal Control	Information Control
	Provision of Physical Collections	Self-Reliance	Information Access	
	Access to Information	Access to Information		

In addition to the 22 scale items, LibQUAL+™ has a box for comments, and 100 ancillary items (see the complete instrument in Appendix A). Each participating library may choose up to five of the ancillary items for inclusion in the institution's survey to address local interests. These ancillary items do not contribute to the dimension scores. The comment box has become an important source of qualitative data. About 40% of respondents use the comment box, primarily to add detail to their answers and offer suggestions to address problems (Thompson, Kyrillidou, & Cook, 2007).

Acting on LibQUAL+™ Data

A review of the LibQUAL+™ literature reveals a body of work that reports on the decisions made and actions taken at individual libraries in response to LibQUAL+™ results. Such articles document how LibQUAL+™ is affecting practice in all types of libraries, as well as how individual libraries are interpreting LibQUAL+™ results and using the data to effect service quality improvements.

Several articles report applications and uses of LibQUAL+™ in libraries. The vast majority of such articles report individual institutional LibQUAL+™ results and point to the need for additional investigation of findings through complementary methods such as focus groups. The most frequently reported specific use of LibQUAL+™ data is linking them to a library planning process (Begay, Lee, Martin, & Ray; 2004; Shorb & Driscoll, 2004; Haricombe & Boettcher, 2004). Another institution reported using the data to redesign its public service units (Knapp, 2004), and another library found that its LibQUAL+™ results helped identify some very distinct user groups, each with its own set of needs and expectations (Peterson, Murphy, Holmgren, & Thibodeau, 2004). Another segment of the practice-based research literature is aimed at exploring the relationship between service quality and customer satisfaction. Examining one institution's results, Heinrichs, Sharkey, and Lim (2005), for example, investigated the influence of the LibQUAL+™ dimensions on aspects of user satisfaction at Wayne State University. Multivariate regression analysis revealed a significant impact of the

dimensions on user satisfaction, and moderated regression showed the moderating impact of demographic variables. The authors claimed their results could “be used to alter resource allocation expenditures to improve user satisfaction” (p. 248).

Interpreting LibQUAL+™ Results

There is also a growing body of scholarly work composed of studies that explore the integrity of the LibQUAL+™ protocol and the meaning of LibQUAL+™ scores. A number of validity and reliability tests have confirmed its integrity (Thompson, Cook, & Thompson, 2002) and the analyses and interpretive frameworks that continue to emerge for LibQUAL+™ results are adding to the knowledge base about the meaning of LibQUAL+™ scores.

Thompson, Cook, and Kyrillidou (2005) analyzed the validity of the LibQUAL+™ dimensions and total scores through an examination of their relationships with self-reported outcomes scores and library satisfaction scores. The results suggested that LibQUAL+™ scores primarily measure satisfaction rather than outcomes.

Thompson, Cook, and Kyrillidou (2006a, ¶ 9-10) have also identified several studies that confirmed the integrity of LibQUAL+™ scores with a number of approaches including structural equation modeling (Thompson, Cook, & Heath, 2003), reliability generalization (Thompson & Cook, 2002), taxonomic analysis (Arnau, Thompson, & Cook, 2001), and latent trait item response theory (Wei, Thompson & Cook, 2005).

Zones of Tolerance

One way of interpreting LibQUAL+™ scores uses *zones of tolerance* as a framework. The zone of tolerance for an item is defined as the “distance between ‘minimally-acceptable’ and ‘desired’ service levels” (Cook, Heath, & Thompson, 2003, p. 116) for that item. Thompson et al. (2007) used the zones of tolerance framework in an analysis of responses from 297,158 individuals, gathered from 2004 through 2006, to explore “how tolerant library users are with respect to the library services described in the 22 LibQUAL+™ core items (p. 3). The purpose of the study was to determine whether there is a relationship between tolerance of deviation from desired performance and the level of desirability assigned to the library service indicator by customers. That is, the study asked whether people are less tolerant of deviation from performance for highly desirable service indicators (Thompson et al., p. 5). The results indicated that the zone of tolerance was stable across time within user groups and that the “zones were not uniformly narrower for items ranked either very high or very low in desirability” (p. 6).

LibQUAL+™ Score Norms

In another approach to interpretation, Cook, Heath, and Thompson (2002) described using LibQUAL+™ norms tables or percentile ranks for service quality benchmarking. An institution may choose to use the overall score norms for

benchmarking, select a subset of libraries to serve as a peer group for benchmarking, or take a longitudinal approach by establishing performance goals and measuring itself against its own score norms over time (p. 17).

In a related study, Thompson, Cook, and Kyrillidou (2006a) assert that demonstrating stability in the LibQUAL+™ score norms helps library staff accept benchmarking conclusions from LibQUAL+™ data. The study demonstrated the stability of LibQUAL+™ score norms over five years (2001-2005) and across two language versions of the survey, American English and British English. It is worth noting that, as described previously in Table 4, the instrument underwent changes during this time period as well.

Validity and Reliability

The LibQUAL+™ survey is the first assessment instrument that is claimed to produce reliable and valid national benchmarks for library service quality. A number of studies have supported the instrument's score reliability (e. g., Cook, Heath, Thompson, & Thompson, 2001a; Cook, et al., 2001b; Thompson, Cook, & Thompson, 2002). LibQUAL+™ has also consistently tested as psychometrically valid (Thompson, Cook, & Kyrillidou, 2006a; Thompson, et al., 2005, p. 517).

Roszkowski, Baky, and Jones (2005) criticized one aspect of validity by examining LibQUAL+™ scores from a slightly different perspective. In a 2005

investigation, they analyzed data from 709 respondents at one institution that participated in LibQUAL+™ during 2003. The study found that the perceived performance rating was a more valid indicator of user satisfaction than the superiority gap score. This criticism of the LibQUAL+™ protocol focused on the validity of the superiority gap score, which is the difference between users' perceived and desired levels of performance. The investigators argued that user-defined desired levels of performance are irrelevant and only user perceptions of actual performance are valid measures of library service.

In a study by Heath, Cook, Kyrillidou, and Thompson (2002), validity coefficients replicated closely across different types of post-secondary libraries, from which they concluded that LibQUAL+™ scores may be valid in different types of library settings (p. 38). The study described in this report investigates that conclusion by exploring whether and to what extent there are relations between LibQUAL+™ scores and the following key characteristics: institutional size, institutional type, and level of investment by the institution in its library.

Only one study (Kyrillidou & Heath, 2004) was identified in the literature review that specifically explored potential relationships between LibQUAL+™ scores and institutional characteristics. However, this previous study used an earlier version of the LibQUAL+™ instrument with four dimensions (rather than three dimensions) and used a different set of institutional characteristics for the independent variables than those in the present study. Kyrillidou and Heath (2004) found a “moderate negative relation of the ARL Membership Criteria Index with LibQUAL+™ scores” (p. 4). The ARL

Membership Criteria Index is composed of volumes held, gross volumes added, current serials, total staff, and expenditures. In other words, the Index is composed of traditional input and output measures of library quality. Kyrillidou and Heath concluded that students and faculty members in libraries at large research institutions have higher expectations for library collections, which results in lower LibQUAL+™ scores. The negative relationship found between the ARL Membership Criteria Index and LibQUAL+™ scores occurred, they asserted, because such library users “are highly skilled, have specialized and diverse information needs . . . [and] are clearly more demanding and harder to please” than library users at other types of institutions (Kyrillidou & Heath, 2004, p. 5).

Conceptual Framework

This literature review served as the basis for the conceptual framework underlying this study. It is clear that demands for assessment are directed at post-secondary institutions and their libraries by internal and external constituencies including governing boards, state and federal agencies (in the case of publicly-funded institutions), accreditation organizations, and administrators who need data for decision making. In addition, library users bring expectations to the library about services and resources based on their understanding of the institution as well as their experience and skill in using libraries. Figure 2 illustrates the relationships among several concepts that constitute the

factors relevant to evaluating academic library service quality with the LibQUAL+™ survey.

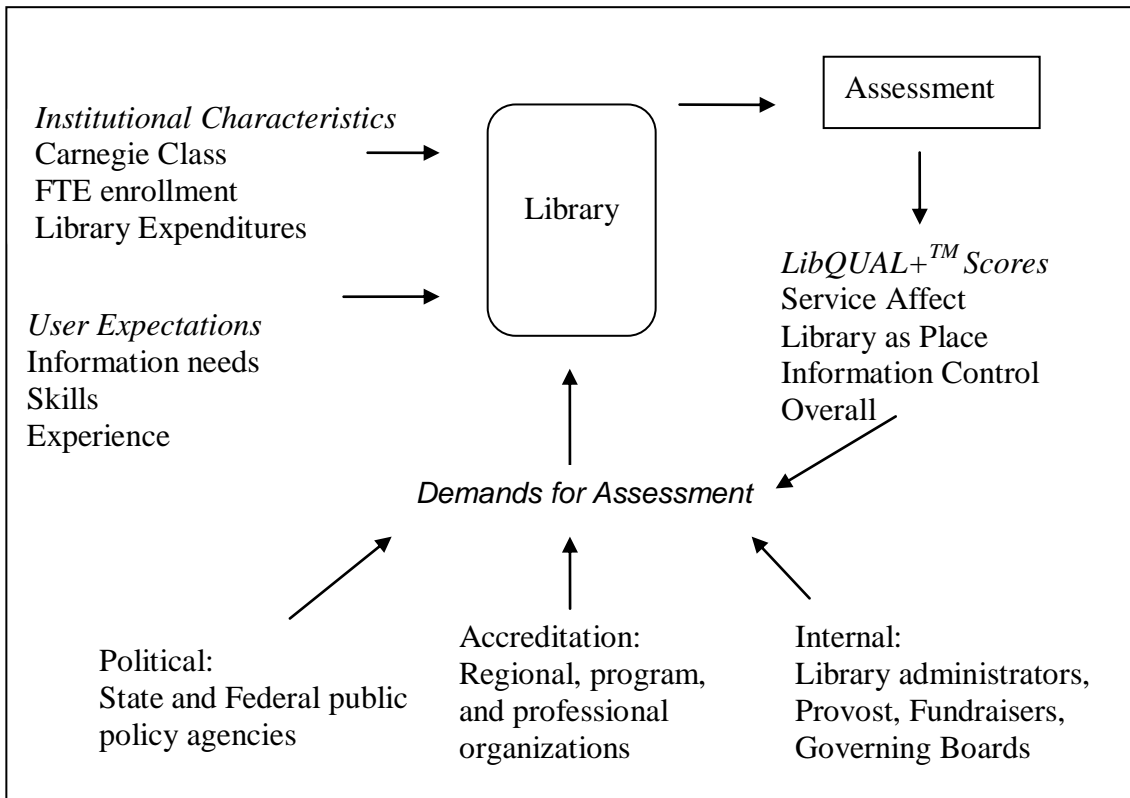


Figure 2. LibQUAL+™ Service Quality Assessment Factors

Significance of the Study

Librarians report to ARL that they have used the survey data to inform decision-making, identify best practices, analyze service deficits, and allocate resources (Cook,

Heath, & Thompson, 2003). The exploration reported in this paper of whether, and to what extent, there were relationships among institutional size, institutional type, level of investment in libraries, and LibQUAL+™ scores, is significant because it provides a greater understanding of the meaning of LibQUAL+™ results. A positive relationship between library expenditures and LibQUAL+™ scores, for example, can be used as evidence in a compelling case to upper-level administrators for an increase to the library budget. A relationship between enrollment and service affect scores, on the other hand, may not justify particular actions, but will increase understanding about some of the factors that contribute to an institution's results on the service affect dimension. In the case of a growing institution for example, it may alert administrators that when enrollment rises above 5,000, service affect scores may dip because the institution has reached a size that predictably affects user perceptions, not necessarily because the staff is behaving differently.

Summary

Chapter Two contained the review of the relevant research and professional literature that formed the foundation for this study. In addition, this chapter established the conceptual framework for this investigation, and explained how this study extended the scholarly conversation about the meaning of LibQUAL+™ assessment results. In Chapter Three the methodology employed in this study will be described.

CHAPTER THREE: METHODOLOGY

Chapter Two presented the examination of the relevant literature and also presented the conceptual framework for this investigation. In Chapter Three, the methodology for this study will be described including definitions used in the study, how the sample was selected, limitations and delimitations of the research design, data sources and collection methods, and statistical analysis methods.

Definitions

The purpose of this study was to explore and expand on the current understanding of the meaning of LibQUAL+™ scores in college and university libraries. Specifically, this study addressed whether the scores were related to characteristics that express institutional mission, institutional size, or level of investment in libraries.

The definition of service quality that underlies the LibQUAL+™ protocol is the definition that was used in the present study. Service quality was defined as “the result of the consumer’s comparison of expected service with perceived service” (Parasuraman et al. 1985, p. 47).

Variables

The independent variables that were investigated for potential relationships with LibQUAL+™ scores were institutional type, institutional size, and investment in libraries. For this investigation, institutional type was defined as the classification assigned by the Carnegie basic classification, institutional size was defined as 12-month FTE enrollment, and institutional investment in libraries was defined as total annual library expenditures.

The dependent variables in this investigation were the mean perceived scores for the three dimensions of LibQUAL+™ (service affect, information control, and library as place) and the overall, weighted LibQUAL+™ score.

Sample and Population

This study investigated potential relationships between institutional characteristics and LibQUAL+™ scores in American colleges and universities. According to the National Center for Education Statistics (NCES), the population of post-secondary, degree-granting institutions that confer at least four-year degrees is 2,217 (2006, p. 24). The sample of institutions for this investigation was a nonrandom, convenience sample.

Selecting the Sample

The sample was limited to an existing group of American college and university libraries that opted to participate in the LibQUAL+™ survey during 2006. Furthermore, institutional score reports were included in the sample only if all of the following conditions were met.

1. The institution agreed to share its results.
2. The institution used the American English version of the survey.
3. The institution placed itself in the “Colleges and Universities” category.

Selection of institutions for the sample began with institutional type. Of the 298 institutions, 216 institutions had self-identified as College or University libraries (Table 5).

Table 5

2006 LibQUAL+™ Participants by Library Type

Institution Type	No.
Academic Health Sciences	10
Academic Law	6
College or University	216
Community College	29
European Business	16
Family History	1
Hospital	1
National Health Service (England)	10
Public	4
Research Centers Libraries	1
State	3
University/TAFE	1
Total	298

In the next step, 55 participating institutions were removed from the sample because they were from countries other than the United States (Table 6).

Table 6

2006 LibQUAL+™ Participants by Country

Country	No.
Australia	2
Canada	11
Denmark	2
Finland	4
France	2
Ireland	2
Netherlands	5
Norway	2
South Africa	8
Sweden	2
Switzerland	2
UK	34
USA	222
Total	298

Finally, two more libraries were removed from the sample because complete data for this study could not be obtained. In both cases, the libraries participated in LibQUAL+™ as single institutions but did not report individual institutional statistics to the NCES Academic Library Survey; NCES data were subsumed in the reports of a parent institution.

Size and Representativeness

Of the 298 institutions that participated in the 2006 administration of LibQUAL+™, the sample was composed of 159 institutions that met all of the selection criteria. The resulting sample of 159 institutions is an adequate sample size since it is generally considered acceptable to have a minimum of 30 cases in each group for a correlational study (Gay & Airaisian, 2003, p. 312).

For an exploratory, goodness-of-fit analysis, a one-sample Kolmogorov-Smirnov test was computed for the independent variables: library expenditures, FTE enrollment, Carnegie basic classification, and library expenditures per FTE. The test results were significant for all of the independent variables (000 - .005), which indicated that the distribution was significantly different from a normal distribution. Since the distribution did not meet the assumption of normality, the data analysis required nonparametric procedures. The one-sample Kolmogorov-Smirnov test was also computed for the dependent variables, which had distributions that were not significantly different from a normal distribution.

Limitations and Delimitations

Since the sample of score reports included in the study is a convenience rather than a random sample from a self-selected group of institutions, it may not be representative of all academic libraries. In addition, the findings of this investigation

cannot be generalized to institutions that administered the survey in other languages, including British English. Finally, since the study analyzed data related to college and university libraries, findings cannot be generalized to other types of libraries.

Data Acquisition

The data analyzed in this study were originally collected and published by the Association of Research Libraries (ARL), the Carnegie Foundation for the Advancement of Teaching, and the National Center for Education Statistics (NCES). A number of validity and reliability tests have confirmed the integrity of the LibQUAL+™ protocol (Thompson, Cook, & Thompson, 2002).

Data were retrieved from the publications of these organizations to enable an analysis designed to address whether, and to what extent, there were relationships between LibQUAL+™ scores and the following characteristics of colleges and universities: institutional type, institutional size, or level of investment in libraries. The following research questions were posed as a framework for the study.

1. What were the 2006 LibQUAL+™ scores for American college and university libraries?
2. What were the characteristics of the American college and university libraries that administered LibQUAL+™ 2006?

3. To what extent, if any, were scores for the information control dimension related to institutional type as expressed by the Carnegie basic classification?
4. To what extent, if any, were scores for the library as place dimension related to library expenditures per FTE student?
5. To what extent, if any, were scores for service affect related to institutional size as expressed by FTE enrollment?
6. To what extent, if any, was institutional investment in the library, as expressed by library expenditures, related to scores for each of the three dimensions, or to overall LibQUAL+™ scores?

The data for the dependent variables were LibQUAL+™ scores that were collected for this study from the LibQUAL+™ score reports of libraries in the sample. The data for the independent variable, “institutional type” were collected from the Carnegie Foundation’s (2006) published basic classification of each institution. The library expenditures and 12-month FTE enrollment data were obtained from the NCES publication, *Academic libraries: 2004* (2006, November).

Statistical Analysis

The first two questions were addressed by conducting descriptive statistics procedures that summarized the distribution of LibQUAL+™ scores and institutional characteristics for the libraries in the sample. Frequencies for all values of each variable

were determined; mean and median scores were calculated as measures of central tendency. Variability was described by variance and standard deviation calculations, and outliers were identified.

For the remaining four questions, correlations and regressions were performed to discover whether, and to what extent, the relationships existed. Simple linear correlation, (Pearson r), nonparametric correlation (Spearman's ρ), and bivariate linear regression were used to assess the potential relationships of the independent variables with the dependent variables.

Summary

In this chapter the methodology of the study was described, definitions were provided to clarify meaning, the sampling process was detailed, limitations and delimitations of the study were noted, the sources of data were identified, and statistical methods were described. In Chapter Four, the results of the investigation will be reported.

CHAPTER FOUR: DATA ANALYSIS

Chapter Three presented details of the methodology used in this study including the sources and methods of data collection and the statistical procedures used to address each of the research questions. Chapter Four will present a summary of the research problem, the development of the LibQUAL+™ instrument, and the methods utilized in this study. The major sections of this chapter will present the results of the data analyses that were computed for each of the research questions.

Problem and Approach

The recent emphasis on assessment in higher education has prompted university administrators, including library administrators, to develop new ways of evaluating services and programs. Libraries are service-oriented organizations, yet the traditional measure of academic library quality has been collection size. The emphasis on formal assessment in recent years has motivated librarians to seek out more meaningful measures of service quality. There is a need for assessment tools that produce data that can be used to inform improvement, as well as document assessment practices for accreditation organizations, funding agencies, and governing boards.

The LibQUAL+™ Instrument

In the 1990s, the Texas A&M University Libraries began using a survey instrument called SERVQUAL, which had been designed to measure customer perceptions of service quality in the private sector (Parasuraman et al. 1985). After administering the instrument three times to assess library service quality, the Texas A&M University Libraries entered into a partnership with the Association of Research Libraries (ARL) to develop, test, and adapt the instrument for academic libraries. That collaboration created the LibQUAL+™ survey, which was first administered in 2000 by the ARL across 13 research libraries as an experimental project for benchmarking perceptions of service quality (Kyrillidou, 2006, p. 4).

Since that first administration, the LibQUAL+™ survey has become an increasingly popular tool. In 2006, there were 298 libraries that participated in LibQUAL+™. The instrument has been improved and refined and it is currently composed of 22 questions and a comment box. Each question is answered on a scale from 1 to 9, with 9 being the highest rating (Thompson, Cook, & Kyrillidou, 2006b). Table 7 shows how the responses to the 22 questions are grouped to measure three dimensions of library service quality: service affect, information control, and library as place (see the complete instrument in Appendix A).

Table 7

LibQUAL+™ Dimensions and Corresponding Survey Questions

Dimension	Components (item #)
Service Affect	Employees who instill confidence in users (1) Giving users individual attention (4) Employees who are consistently courteous (6) Readiness to respond to users' questions (9) Employees who have the knowledge to answer user questions (11) Employees who deal with users in a caring fashion (13) Employees who understand the needs of their users (15) Willingness to help users (18) Dependability in handling users' service problems (22)
Information Control	Making electronic resources accessible from my home or office (2) A library Web site enabling me to locate information on my own (5) The printed library materials I need for my work (7) The electronic information resources I need (10) Modern equipment that lets me easily access needed information (14) Easy-to-use access tools that allow me to find things on my own (16) Making information easily accessible for independent use (19) Print and/or electronic journal collections I require for my work (20)
Library as Place	Library space that inspires study and learning (3) Quiet space for individual activities (8) A comfortable and inviting location (12) A getaway for study, learning or research (17) Community space for group learning and group study (21)

The *service affect dimension* is concerned with the perceptions of customers about library staff competency and helpfulness; the *information control dimension* is concerned with whether the library's collections are adequate to meet customer needs and organized in a manner that enables self-reliance for library users; and the *library as place dimension* is concerned with the library facility's functionality and adequacy for academic activities.

Purpose and Design of the Study

Considering the increasing level of participation in the LibQUAL+™ survey, and the relatively small body of research about the meaning of LibQUAL+™ results, this study was completed for the purpose of adding to the library profession's understanding of the meaning of LibQUAL+™ scores. Previous research found that validity coefficients for LibQUAL+™ replicated closely across different types of post-secondary libraries in one study, leading the authors to conclude that "*LibQUAL+™ scores may be valid in reasonably diverse library settings*" [italics original] (Heath, Cook, Kyrillidou, & Thompson, 2002, p. 38). This study explored an aspect of that conclusion by seeking to determine whether institutional characteristics would impact LibQUAL+™ scores.

The data analysis was designed to address whether, and to what extent, there were relationships between LibQUAL+™ scores and selected institutional characteristics of American colleges and universities. Specifically, this study examined the following institutional characteristics for potential relationships with the 2006 LibQUAL+™ scores.

1. Institutional type as defined by the Carnegie basic classification,
2. Institutional size as defined by 12-month FTE enrollment, and
3. Institutional investment in libraries, as defined by annual library expenditures.

Methodology

The sample was composed of libraries in American colleges and universities that conferred at least 4-year degrees and participated in LibQUAL+™ during 2006. This was a sample of convenience that included a total of 298 participating libraries. Initially, 82 libraries were removed from the total sample of 298 libraries because they did not identify themselves as libraries in colleges or universities. (The survey is also used by public libraries, state libraries, hospital libraries, and other, specialized libraries.) From the remaining 216 institutions in the sample, 55 additional participating institutions were removed because they were from countries other than the United States. The remaining 161 libraries became the initial sample.

During the data collection phase of the study, two additional institutions were removed from the sample because complete data required for this study could not be obtained. In both cases, the libraries had participated in the LibQUAL+™ survey as independent institutions. However, during data collection it was discovered that neither library reported statistics as an independent institution to the Academic Library Survey administered by the National Center for Education Statistics (NCES). NCES data for both of the libraries were subsumed in the reports provided to NCES by their parent institutions. The remaining 159 libraries formed the final sample that was used in this study.

The research questions that framed the study were addressed by using SPSS (Statistical Package for the Social Sciences) for Windows to analyze the data. The calculations produced descriptive statistics, calculations of bivariate correlations (Spearman's rho), and bivariate regression analyses. The independent or predictor variables were annual library expenditures, FTE enrollment, Carnegie basic classification, and library expenditures per FTE.

The design of this study employed an approach that required multiple calculations using the same set of variables. For this reason, the Bonferroni adjustment was applied to the significance levels to reduce the chance of a Type I error. The conventional .05 significance level was divided by four to account for the four questions (research questions 3 through 6) that were addressed. Subsequently, data were accepted and interpreted as statistically significant at the .013 level or lower (D. L. Hahs-Vaughn, personal communication, September 19, 2007; StatSoft, 2007, glossary, sec. B).

Results

The results of this study are presented in detail in the following section. Results are organized by the research questions and summarized at the end of this chapter.

Research Question One

Research question one asked, “What were the 2006 LibQUAL+™ scores for American college and university libraries?”

To address this question, scores for each of the three LibQUAL+™ dimensions, and for the overall, weighted LibQUAL+™ score, were analyzed and descriptive statistics were calculated. Measures of central tendency and variability were computed for the mean, perceived 2006 LibQUAL+™ scores for the 159 sample libraries. The resulting values are summarized in Table 8.

Table 8

Descriptive Statistics for LibQUAL+™ Scores (n=159)

	Service Affect	Info Control	Lib as Place	Overall
M	7.17	6.89	7.11	7.10
Mdn	7.18	6.90	7.14	7.09
SD	0.28	0.49	0.32	0.28
Range	3.66	3.17	2.75	1.93
Skewness	-0.25	-0.67	-2.25	-0.26
Kurtosis	1.32	1.56	12.36	1.20

Note: Scale is 1 through 9, with 1 being the lowest score.

A review of the results revealed that the mean scores for the sample institutions were consistent with those reported by ARL for all colleges and universities that participated in the survey (Association of Research Libraries, 2006, p. 1). The mean scores for all of the responses (n = 113,122) in colleges and universities on a scale of 1 to

9, with one being the lowest score, were: 7.15 for service affect, 7.13 for information control, 6.87 for library as place, and 7.08 for the overall score (ARL, 2006, p. 1).

The small differences between the mean scores in the sample and the mean scores for all colleges and universities were within one standard deviation. Since the sample was composed of nearly 74% of the colleges and universities that administered the survey, this was not a surprising result.

The median and mean scores for the sample institutions were also very close to one another, and all of the means were lower than the median scores. This indicated that the distribution was slightly, negatively skewed. While a perfectly shaped distribution would have skewness and kurtosis calculations of zero, the measures recorded for three of the variables were within the absolute value of two (Table 8) and, therefore, within the normal range (Lomax, 2001, p. 224). Skewness for the library as place dimension variable, however, was measured beyond the normal range at -2.25, and kurtosis for the library as place dimension variable was 12.36, which indicated that library as place dimension scores did not have a normal distribution.

Research Question Two

Research question two asked, “What were the characteristics of the American college and university libraries that administered LibQUAL+™ in 2006?”

To address this question, an analysis was conducted to produce descriptive statistics for total library expenditures, 12-month FTE enrollment, and library expenditures per FTE (the institutional characteristics that were scale measures). All of the 159 institutions in the sample had valid scores for this analysis and no cases were missing. Table 9 summarizes the results.

Table 9

Descriptive Statistics for Scale Institutional Characteristics (n=159)

		Expenditures	FTE	\$ per FTE
M		\$7,686,309.51	11,746.29	\$615.60
Mdn		\$3,697,694.00	8,790.00	\$458.05
S D		\$8,718,309.13	9,989.02	\$507.38
Skewness		1.71	1.42	4.88
Kurtosis		2.61	1.75	37.41
Range		\$44,391,143.00	46,680.00	\$4,927.00
Percentiles	10	\$955,138.00	2,490.00	\$259.87
	20	\$1,576,024.00	3655.00	\$326.81
	30	\$2,327,108.00	4,762.00	\$364.58
	40	\$2,709,323.00	6,362.00	\$405.49
	50	\$3,697,694.00	8,790.00	\$458.05
	60	\$5,023,144.00	10,981.00	\$537.48
	70	\$8,862,921.00	13,923.00	\$668.70
	80	\$13,711,449.00	18,896.00	\$869.83
	90	\$21,544,004.00	28,298.00	\$1,067.24

Note. \$ per FTE = library expenditures per FTE.

The mean measures were greater than the medians for the institutional characteristics described in Table 9, and the variables were, therefore, positively skewed. The standard deviations for the institutional characteristic variables also indicated wide ranges of data, and that was confirmed by the range figures.

This result was consistent with the values of the percentiles. For example, there was a much greater difference between the 50th percentile for library expenditures and the 90th percentile for library expenditures ($\$21,544,004 - \$3,697,694 = \$17,846,310$) than there was for the difference between the 50th percentile value for library expenditures and the 10th percentile value for library expenditures ($\$3,697,694 - \$955,138 = \$2,742,556$). These descriptive statistics indicated that the three institutional characteristic variables described in Table 9 were not normally distributed in the sample.

The Carnegie basic classification also served as an institutional characteristic variable; it was treated separately, however, because it was an ordinal variable. Unlike the other independent variables, which had specific values on a known scale with a specified zero, an ordinal variable indicates only whether a score is larger than or smaller than other scores. A description of the Carnegie basic classifications that were used in this study is presented in Table 10.

Table 10

Definitions of the Carnegie Basic Classifications

Category	Description
1. Baccalaureate/Associate's	10% - 49% of undergrad degrees conferred = bachelor's
2. Baccalaureate—diverse programs	Institutions not in classification 1 or 3
3. Baccalaureate—Arts & Sciences	50% - 100% of undergrad degrees conferred = bachelor's and arts and sciences majors $\geq 50\%$
4. Master's—smaller programs	50 - 99 master's and < 20 doctorates conferred, Or < 50 master's conferred, and majority enrollment = grad/professional, and grad/professional > undergrad degrees conferred
5. Master's—medium programs	100 - 199 master's degrees conferred
6. Master's—larger programs	≥ 200 master's degrees conferred
7. Doctoral/Research Universities	Lowest level of research activity
8. Research Univ. (high res. act.)	Middle level of research activity
9. Research Univ. (v. high res. act.)	Highest level of research activity

Each classification was assigned a number from 1 through 9, with 1 being assigned to those institutions that award the lowest-level degrees in the sample, Baccalaureate/Associate's colleges. The complete list of Carnegie basic classifications includes categories not presented here such as special focus institutions, tribal colleges, and two-year degree-granting institutions.

Mean FTE enrollment for each of the Carnegie basic classifications used in the analysis, distribution of the classifications across the population, and distribution among those classifications for colleges and universities in the sample are presented in Table 11.

Table 11

Population and Sample Enrollment and Distribution of Carnegie Classifications

Classification	Mean Enrollment	Sample		Population	
		No.	%	No.	%
1. Baccalaureate/Associate's Colleges	2,232	32	20	120	7
2. Baccalaureate—Diverse	1,655	27	17	360	21
3. Baccalaureate—Arts & Sciences	1,833	12	8	286	17
4. Master's—smaller programs	2,733	52	33	128	7
5. Master's—medium programs	3,893	16	10	190	11
6. Master's—larger programs	8,115	8	5	347	20
7. Doctoral/Research Universities	10,221	7	4	83	5
8. Research Univ. (high research activity)	16,444	3	2	103	6
9. Research Univ. (very high research activity)	24,638	2	1	96	6

Note. Sample n = 159; population n = 1,713

Taken together, the 76 institutions classified in categories 4 through 6, master's programs, composed the largest group within the sample; 71 institutions were classified in the baccalaureate group, and 12 institutions were classified as research universities. The largest sub-group in the sample was composed of the 52 master's colleges with smaller degree programs. In the sample, 87% of the institutions were classified in categories 1 through 5; in the population, 88% of colleges and universities were classified in categories 1 through 7.

Research Question Three

Research question three asked, “To what extent, if any, were scores for the information control dimension related to institutional type as expressed by the Carnegie basic classification?”

A bivariate correlation coefficient was computed for the two variables. Since the Carnegie classification variable was an ordinal measure and neither of the variables met the assumption of normal distribution, a nonparametric correlation was computed using Spearman’s rho. The Spearman’s rho correlation coefficient was .392 with a two-tailed significance test score of .000. This was a statistically significant, positive linear correlation. A scatterplot was created to visually examine the relationship and an interpolation line was added to clarify patterns between the variables (Figure 3).

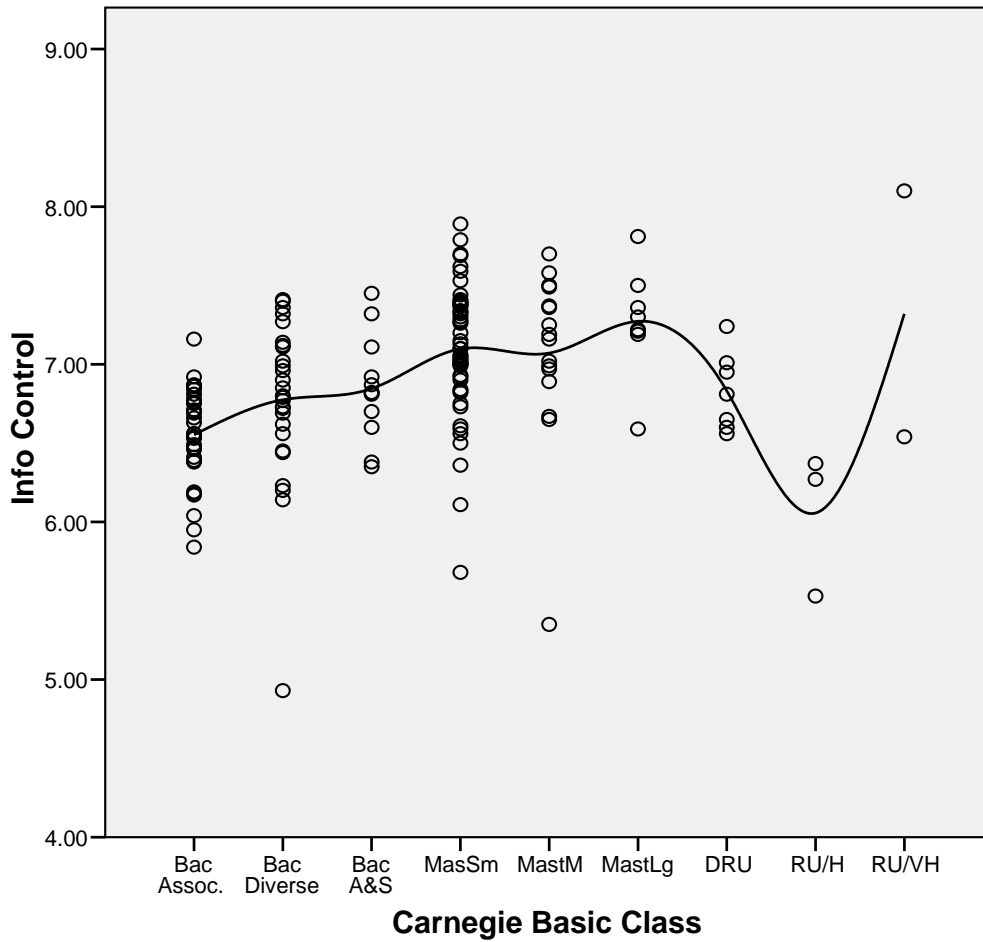


Figure 3. Information Control Dimension Scores and Carnegie Basic Classification

The scatterplot confirmed the positive correlation between the scores for the information control dimension and the Carnegie basic classification, but only for Carnegie basic classifications 1 through 6, which included institutions in the baccalaureate and master’s program classifications. There was clearly, however, a drop in information control dimension scores where the Carnegie basic classifications

differentiated among doctoral/ research institutions (7 and 8). Moreover, it was also clear in the scatterplot that the sample included relatively few doctoral/research institutions, hampering interpretation of findings regarding such institutions.

A bivariate linear regression was also computed for the information control dimension scores and Carnegie basic classifications. The analysis of variance (ANOVA) generated by the regression is presented in Table 12, which describes the sum of squares, degrees of freedom, and mean squares for the variation in information control dimension scores that was accounted for by the Carnegie basic classifications (Model 1).

Table 12

ANOVA for Carnegie Basic Classification and Information Control Scores

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.001	1	3.001	13.595	.000
	Residual	34.660	157	.221		
	Total	37.661	158			

Since the regression model (Carnegie basic classification) produced a small sum of squares (3.001) compared with the high residual sum of squares (34.660), Carnegie basic classification did not account for most of the variation in information control dimension scores. The critical test value for the F statistic for a probability of 0.01 is 6.8. Since the calculated F statistic (13.595) is greater than the critical test value (6.8), the regression is statistically significant at the 0.01 level. The significance value of the F

statistic was .000, indicating that the Carnegie basic classifications explained a statistically significant portion of the variation in information control dimension scores.

Table 13

Coefficients for Carnegie Basic Classification and Information Control Scores

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.641	.078		85.660	.000
	Basic Class	.073	.020	.282	3.687	.000

The unstandardized coefficients (B) are those of the estimated regression model. The estimated model was: information control dimension scores = 6.641 + .073 Carnegie basic classification. Since t values well below -2 or above +2 are a guide for identifying useful predictors, the t value for Carnegie basic classification, at 3.687, confirms that it may be identified as a useful predictor.

Research Question Four

The fourth research question asked, “To what extent, if any, were scores for the library as place dimension related to library expenditures per FTE student?”

A bivariate correlation coefficient was calculated for library as place dimension scores and library expenditures per FTE using the Spearman’s rho procedure. The Spearman’s rho correlation was -.053, with a significance level of .509, which indicated

that there was no correlation between library expenditures per FTE and library as place scores.

Taking a different approach to exploring the potential link between library as place scores and the investment that institutions make in their libraries, a Spearman's rho correlation was calculated for library as place dimension scores and total library expenditures. This computation resulted in a statistically significant ($p = .009$) negative correlation of $-.207$. A scatterplot was created to visually examine the relationship (Figure 4).

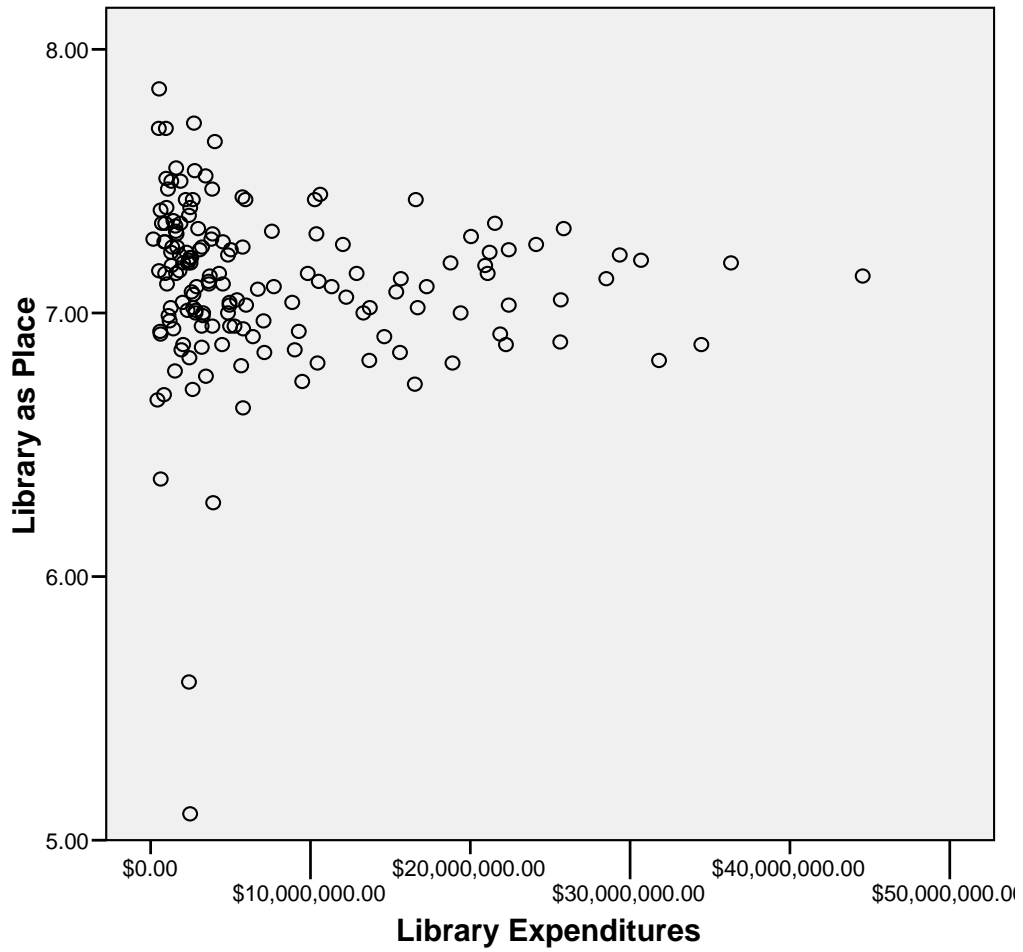


Figure 4. Library as Place Dimension Scores and Library Expenditures

An examination of the scatterplot indicated that the highest scores for the library as place dimension were clustered in the libraries with the lowest expenditures. It also appeared that the library as place dimension scores dropped slightly as library expenditures increased.

A bivariate linear regression was computed for the library as place dimension scores and library expenditures. The ANOVA generated by the regression is presented in Table 14, which describes the sum of squares, degrees of freedom, and mean squares for the variation in library as place dimension scores that was accounted for by library expenditures (Model 1).

Table 14

ANOVA for Library as Place Dimension Scores and Library Expenditures

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.058	1	.058	.574	.450
	Residual	15.817	157	.101		
	Total	15.875	158			

Since the regression model (library expenditures) produced a small sum of squares (.058) compared with the high residual sum of squares (15.817), library expenditures did not account for most of the variation in library as place dimension scores. The critical test value for the F statistic for a probability of 0.01 is 6.8. Since the calculated F statistic (.574) was less than the critical test value (6.8), the regression is not statistically significant at the 0.01 level. The significance value of the F statistic was .450, indicating that library expenditures failed to account for a statistically significant portion of the variation in library as place dimension scores.

Table 15

Coefficients for Library as Place Dimension Scores and Library Expenditures

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.126	.034		212.061	.000
	Library Expenditures	-2.2E-009	.000	-.060	-.758	.450

The unstandardized coefficients (B) presented in Table 15 are the coefficients of the estimated regression model. The estimated model was: library as place dimension scores = 7.126 - 2.2E-009 library expenditures. Since the significance value for the predictor was .450, it was not statistically significant and not a useful predictor for library as place dimension scores.

Research Question Five

Research question five asked, “To what extent, if any, were scores for service affect related to institutional size as expressed by FTE enrollment?” To determine whether, and to what extent, there was a relationship between institutional size and scores for the service affect dimension, a Spearman’s rho correlation coefficient was calculated for FTE enrollment and service affect dimension scores. The Spearman’s rho correlation resulted in a coefficient of -.377 and a significance level of .000, which revealed that, as

expected, there was a statistically significant, negative correlation between FTE and service affect scores (StatSoft, Inc., 2007, glossary, sec. B).

A scatterplot was constructed to examine the relationship graphically (Figure 5). As anticipated, the graphic confirmed that the highest scores for service affect were clustered at the lowest enrollment levels; scores dropped as enrollment figures climbed, particularly between about 5,000 and 10,000 FTE, and again between about 10,000 and 12,000 FTE.

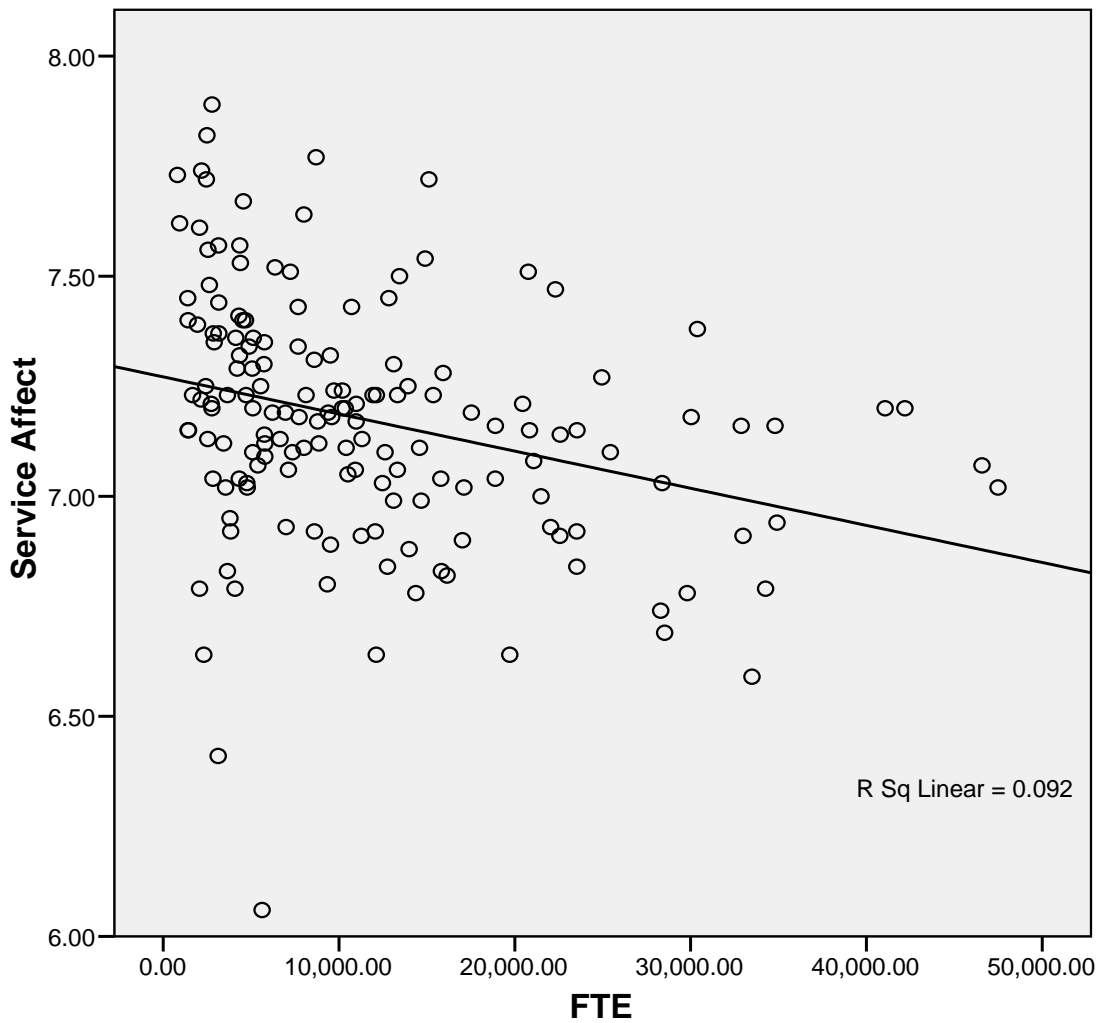


Figure 5. *Service Affect Dimension Scores and FTE Enrollment*

Finally, a bivariate linear regression was computed for the service affect dimension scores and FTE enrollment. The ANOVA generated by the regression is presented in Table 16, which describes the sum of squares, degrees of freedom, and mean squares for the variation in service affect dimension scores that was accounted for by FTE enrollment (Model 1).

Table 16

Regression ANOVA for Service Affect Dimension Scores and FTE Enrollment

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.21	1	1.121	15.930	.000
	Residual	11.044	157	.070		
	Total	12.164	158			

Since the regression model produced a small sum of squares (1.21) compared with the residual sum of squares (11.044), and the significance value was .000, this model (FTE enrollment) accounted for a small, statistically significant variation in service affect dimension scores. This confirmed that FTE enrollment explained a portion of the variation in the service affect dimension scores. The unstandardized coefficients presented in Table 17 are those of the estimated regression model.

Table 17

Regression Coefficients for Service Affect Dimension Scores and FTE Enrollment

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.271	.033		223.538	.000
	FTE Enrollment	-8.43E-006	.000	-.304	-3.991	.000

The estimated model was: service affect dimension scores = 7.271 - 8.43E-006 FTE enrollment. Since the significance value for the predictor was .000, FTE enrollment was a

statistically significant predictor for service affect dimension scores. The t value (-3.991), however, indicated that FTE enrollment alone would not be a useful predictor for service affect dimension scores as it would only predict a small portion of the total variance.

Research Question Six

Research question six asked, “To what extent, if any, is institutional investment in the library, as expressed by library expenditures, related to scores for each of the three dimensions, or to overall LibQUAL+™ scores?”

Considering the non-normal distribution of the independent variable (library expenditures) and the library as place dimension dependent variable, nonparametric bivariate correlations were calculated for each LibQUAL+™ score and library expenditures using Spearman’s rho. The results are summarized in Table 18 (See Appendix B for the bivariate scatterplots).

Table 18

Correlations between Library Expenditures and LibQUAL+™ Scores (n=159)

	Service Affect	Info Control	Library as Place	Overall
Library Expenditures	-.382	-.437	-.207	-.371
Sig.	.000	.000	.009	.000

The correlation coefficients between library expenditures and each of the four LibQUAL+™ scores were statistically significant ($p = .000$ to $.009$), negative correlations. The strongest correlation was between library expenditures and information control dimension scores, followed closely by the correlations for the service affect dimension and overall scores. The three stronger correlations each had significance levels of $.000$.

Summary

This chapter reported the detailed results of the statistical analyses that were calculated to address the research questions posed in this study. The descriptive statistics computed for the first two research questions indicated that the independent variables in the sample did not meet the assumption of normal distribution. In addition, among the dependent variables, the library as place dimension score did not meet the assumption of normality.

Since the distribution of some variables was not normal, the methodology included nonparametric tests such as Spearman's rho, which ranks data to create a normal distribution. Spearman's rho was used to calculate the bivariate correlations required by the research questions. Table 19 summarizes the statistically significant correlations that were calculated for this study.

Table 19

Summary of Statistically Significant Correlations

R.Q.	Dependent Variable	Independent Variable	Result	
3.	Information Control Dimension	Carnegie basic class	.392	.000
4.	Library as Place Dimension	Expenditures per FTE	-.053	.509
5.	Service Affect Dimension	FTE enrollment	-.377	.000
6.	LibQUAL+™ Scores			
	Service Affect	Expenditures	-.382	.000
	Information Control Dimension	Expenditures	-.437	.000
	Library as Place	Expenditures	-.207	.009
	Overall	Expenditures	-.371	.000

Note. R. Q. = Research Question.

The results of the data analyses in this exploratory study clearly indicated that there were statistically significant relationships between the selected institutional characteristics (FTE enrollment, Carnegie basic classification, library expenditures, and expenditures per FTE), and LibQUAL+™ scores. The two strongest correlations were with the scores for the information control dimension. Those correlations were with library expenditures and with Carnegie basic classification, respectively.

Chapter Five, the final chapter of this dissertation, will present the conclusions of this study, discuss the findings, make recommendations for future research, and address the implications for practice.

CHAPTER FIVE: CONCLUSIONS AND DISCUSSION OF FINDINGS

Chapter Four presented the detailed results of the data analyses and Chapter Five will present summaries of the problem identified in this research, the research questions developed to frame the study, the methodology and the results. The major sections of this chapter will present conclusions, a discussion of the findings, implications for practice, and recommendations for future research.

Statement of the Problem

During the past two decades, libraries have experienced rapid changes tied to the development of new information technologies. Technological developments have spurred librarians to reconsider and redefine collections, services, organizational structure, the skill sets required of library staff, and the attributes of library facilities. At the same time, the recent emphasis on formal assessment in higher education has prompted library decision makers to reconsider their assessment strategies and to develop more meaningful assessment methods and measures for libraries (Gratch-Lindauer, 2002).

The traditional measure of academic library quality has been collection size (Kyrillidou, 2002, p. 43); however, in recognition of the substantial changes in libraries precipitated by information technology developments, accreditation organizations have created different approaches to evaluating libraries. In light of the vast electronic collections in academic libraries, the Middle States Commission on Higher Education, for

example, now requires institutions to demonstrate the “availability and accessibility of adequate learning resources, such as library and information technology support services, . . . to support relevant academic activities (“Characteristics of excellence,” 2006, p. 43). With a requirement described in this manner, colleges and universities are left to determine what constitutes adequacy without any traditional, prescriptive measures such as volume counts or numbers of professional staff. Such broad statements have left librarians and institutional effectiveness staff to figure out a new approach to measuring and determining library quality (Gratch-Lindauer, 2002, p. 15).

The search for meaningful assessment approaches and instruments has librarians looking for tools that provide evaluative data and can serve as evidence for the thoughtful use of assessment results; the LibQUAL+™ survey, which measures customer perceptions of library service quality, is such a tool.

LibQUAL+™

The LibQUAL+™ survey is the first service quality assessment instrument available to libraries that has been tested for reliability and validity (Thompson, 2007). Based on a service quality instrument developed for the private sector, it was first administered across a group of 13 research libraries as an experimental project in 2000 (Kyrillidou, 2006, p. 4). Since then, increasing numbers of librarians have turned to the LibQUAL+™ survey for a quantitative assessment of service quality (see the complete

instrument in Appendix A). In 2006 there were 298 libraries that participated in the survey (Association of Research Libraries, 2006, p. 1).

The three dimensions of service quality that are measured by the LibQUAL+™ instrument are the service affect dimension, which is the perception of customers about library staff competency and helpfulness; the information control dimension, which is the adequacy of library collections and technology for meeting user needs and the organization of information resources for enabling self-reliance for library users; and the library as place dimension, which is the facility's functionality and adequacy for academic activities. There is also an overall score, which is a mean score that has been weighted by the number of usable responses for each question in the survey (Thompson, Cook, & Kyrillidou, 2006b).

LibQUAL+™ claims to have produced national benchmarks for library service quality. It has, therefore, provided academic librarians with quantitative measures that can be used to satisfy requirements for formal assessment. LibQUAL +™ results may be used to measure libraries against the norms of the survey data, or to measure libraries against their own scores in previous administrations of the survey.

One study suggests that validity coefficients for LibQUAL+™ replicated closely across different types of post-secondary libraries, leading the authors to conclude that “*LibQUAL+™ scores may be valid in reasonably diverse library settings*” [italics original] (Heath, Cook, Kyrillidou, & Thompson, 2002, p. 38). This study explored an

aspect of that conclusion by seeking to determine whether institutional characteristics would impact LibQUAL+™ scores.

Research Questions

This study sought to ascertain whether, and to what extent, scores from the LibQUAL+™ survey were related to the following institutional characteristics: institutional type, as defined by Carnegie basic classification, institutional size, as defined by 12-month FTE enrollment, and the level of institutional investment in libraries, as defined by library expenditures. The following six research questions were designed to establish a framework for the study that would address specific aspects of the central question: whether LibQUAL+™ scores were related to institutional characteristics.

1. What were the 2006 LibQUAL+™ scores for American college and university libraries?
2. What were the characteristics of the American college and university libraries that administered LibQUAL+™ in 2006?
3. To what extent, if any, were scores for the information control dimension related to institutional type as expressed by the Carnegie basic classification?
4. To what extent, if any, were scores for the library as place dimension related to library expenditures per FTE student?

5. To what extent, if any, were scores for the service affect dimension related to institutional size as expressed by FTE enrollment?

6. To what extent, if any, is institutional investment in the library, as expressed by library expenditures, related to scores for each of the three dimensions, or to overall LibQUAL+™ scores?

Methodology

This section summarizes the methodology employed in this study including selection of the sample, acquisition of the data, and methods of data analysis.

Sample

The sample of colleges and universities that was used in this investigation was a nonrandom, convenience sample. It was limited to an existing group of American college and university libraries that opted to participate in the LibQUAL+™ survey during 2006. A total of 298 libraries participated in the 2006 survey. Beginning with that group, 82 libraries were removed from the sample because they did not identify themselves as college or university libraries. An additional 55 libraries were removed from the sample because they were from countries other than the United States. Finally, two more libraries were removed from the sample because the complete data required for this study could

not be obtained. In both cases, the libraries participated in LibQUAL+™ as single institutions but did not report individual institutional statistics to the NCES Academic Library Survey; NCES data for the two libraries were subsumed in the reports of their parent institutions. The remaining 159 libraries formed the final sample that was used in this study.

Data Acquisition and Analysis

Data from the 2006 administration of LibQUAL+™ were culled from the individual score reports prepared by the Association of Research Libraries for each participating library. Annual library expenditures and 12-month FTE enrollment served as institutional characteristic variables in the study; data for these variables were retrieved from NCES publications. The values for the library expenditures per FTE variable were calculated based on the NCES data. Data regarding Carnegie basic classifications, which also served as an institutional characteristic variable in this study, were collected from publications of the Carnegie Foundation for the Advancement of Teaching.

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) to explore the relationships among the variables as they were posed in the research questions. Descriptive statistics were produced for each of the variables, bivariate correlations were calculated using Spearman's rho, and bivariate regression analyses were computed.

Summary of Findings

This section will present a summary of the findings of the data analyses that were computed to address each of the research questions. The next section will discuss these results, draw conclusions based upon the findings, note the implications of this study for practitioners, and suggest future research on the topic.

Research Questions One and Two

The first two questions required descriptive statistics for the data composing the values in each of the variables. All of the variables were expected to have a normal distribution of data. However, as detailed in Chapter Four, the data for three of the four LibQUAL+™ scores met the assumption of normal distribution and data for the fourth score, the library as place dimension score, did not meet the normality assumption. The data for all four institutional characteristic variables also failed to meet the assumption of normal distribution.

Research Question Three

Research question three asked, “To what extent, if any, were scores for the information control dimension related to institutional type as expressed by the Carnegie

basic classification?” Libraries in research universities are intended and expected to support significant graduate programs and research activity. In such libraries students and faculty expect to find large, well-organized collections. In contrast, libraries that support solely undergraduate work have collections that support the curriculum, but are not likely to have the resources required to support faculty research. Information control dimension scores, therefore, were anticipated to be related to institutional type.

A statistically significant Spearman’s rho correlation confirmed the anticipated result and indicated that the Carnegie basic classification had a positive relationship with information control dimension scores. A bivariate linear regression indicated that Carnegie basic classifications explained a small but statistically significant portion of the variation in information control dimension scores. A scatterplot confirmed the positive correlation between the scores for the information control dimension and the Carnegie basic classification, but only for Carnegie basic classifications in the baccalaureate and master’s program classifications. There was clearly a drop in information control dimension scores where the Carnegie basic classifications differentiated among doctoral/research institutions. It was also clear in the scatterplot that the sample included relatively few doctoral/research institutions, hampering interpretation of findings regarding such institutions.

Research Question Four

Research question four asked, “To what extent, if any, are scores for the Library as Place dimension related to library expenditures per FTE enrollment?”

Since building, maintaining, and updating library buildings, furnishings, technology infrastructure, and equipment requires an ongoing investment of resources, it was proposed that greater library expenditures per student (FTE enrollment) would result in better facilities, appropriate study spaces, and robust technology, leading to higher scores for the library as place dimension.

A Spearman’s rho correlation was calculated using library expenditures per FTE and no significant relationship was discovered. The correlation was re-calculated using the total library expenditures variable and this computation resulted in a statistically significant, negative correlation. A bivariate linear regression indicated that library expenditures failed to account for a statistically significant portion of the variation in library as place dimension scores.

Research Question Five

Research question five asked, “To what extent, if any, were scores for service affect related to institutional size as expressed by FTE enrollment?”

Research in student engagement supports the idea that small institutions foster more interpersonal contact between students and faculty, and student-faculty interaction at small colleges occurs more frequently and in different ways than at large institutions (Kezar, 2006, p. 100). The high level of faculty-student interaction typically found at small institutions was expected to be related to higher service affect scores. As anticipated, a Spearman's rho computation produced a statistically significant, negative correlation between FTE enrollment and service affect dimension scores. A bivariate linear regression confirmed that FTE enrollment would predict a small, statistically significant portion of the total variance for service affect dimension scores.

Research Question Six

Research question six asked, "To what extent, if any, is institutional investment in the library, as expressed by library expenditures, related to scores for each of the three dimensions, or to overall LibQUAL+™ scores?"

Budgetary support for the library is related to most aspects of library operations including human resources, technology infrastructure, and the development of library collections. Therefore, higher expenditures were expected to be related to higher scores in all of the LibQUAL+™ dimensions. An examination of the role of library expenditures revealed that all of the LibQUAL+™ scores had statistically significant correlations with library expenditures, and all of the correlations were negative. In fact, the correlations

between library expenditures and LibQUAL+™ scores represent the strongest relationships identified in this study for each LibQUAL+™ score.

Conclusions, Implications, and Recommendations

On the basis of this study alone, all of the institutional factors that influence LibQUAL+™ scores cannot be ascertained. From the results of this analysis, however, a number of conclusions may be drawn that have implications for consideration by practitioners. These conclusions also point to a number of potentially interesting questions for future research.

Conclusions

The results of the data analyses in this exploratory study clearly indicated that there were statistically significant relationships between the selected institutional characteristics (FTE enrollment, Carnegie basic classification, library expenditures, and expenditures per FTE), and LibQUAL+™ scores. The two strongest correlations were with the scores for the information control dimension. Those correlations were with library expenditures and with Carnegie basic classification, respectively.

All four of the LibQUAL+™ scores (service affect, information control, library as place, and overall) were impacted, at least to some extent, by the institutional

characteristics considered in this study. Since the study found significant statistical relationships between the institutional characteristics and each of the LibQUAL+™ scores, one may also conclude that knowing something about those characteristics for a college or university may afford a better understanding of the LibQUAL+™ results obtained in that institution's library. Because those statistically significant relationships were found in this study, one might also conclude that some portion of the scores can be attributed to institutional characteristics and the instrument may not measure only what it was intended to measure.

Another conclusion one can begin to construct from the results of this study is that library user expectations appear to play a critical role in user responses to the LibQUAL+™ survey. Consider that one significant, though counterintuitive, result of this study was a statistically significant, negative correlation between LibQUAL+™ scores and total library expenditures; for example, the more funding a library devoted to acquiring information resources and creating the intellectual access tools needed for using those resources, the lower its score for the information control dimension. While initially surprising, this finding is consistent with the findings of a previous study in which higher scores on the Association of Research Libraries' Membership Criteria Index (Kyrillidou & Heath, 2004) were correlated with lower information control dimension scores. A library's standing in the ARL Membership Index increases, in large part, as the size of its collections increase, so larger collections were related to lower information control dimension scores.

Kyrillidou and Heath (2004) interpreted that result as a reflection of the increased expectations and demands of library users at research institutions. The idea that that lower scores were the result of higher expectations might reasonably pertain to the present study's finding that higher expenditures lead to lower information control dimension scores. Since higher expenditures produce larger collections, and the largest collections are in large research institutions, the conclusion that larger collections were related to lower information control dimension scores may be interpreted as an indication that those who use large research libraries simply have higher expectations of those libraries than those who use other types of college or university libraries.

This conclusion may be an example of how the LibQUAL+™ survey scores reflect the survey's foundation in the Gaps Model of Service Quality. The LibQUAL+™ survey was derived from the SERVQUAL instrument, which is based on the Gaps Model of Service Quality. The Gaps Model assesses customer satisfaction and defines service quality by identifying the differences, or gaps, between customer expectations and customer perceptions of service (Parasuraman et al. 1985; Parasuraman et al. 1991).

Among the LibQUAL+™ dimension scores, those for the library as place dimension had the lowest correlations with the institutional characteristics examined in this study. Based solely on the results of this study, one might reasonably conclude that there is only a weak relationship between library expenditures and library as place dimension scores. An alternate interpretation of this finding, however, is that

improvements to library facilities are not adequately reflected in the variables selected for this study.

Library facilities are built, expanded, and renovated on a periodic basis rather than continually; the data for any single year, therefore, may simply be an inadequate base from which to determine relationships between expenditures and library as place scores. In addition, library construction, renovation, or expansion projects are frequently funded in a capital projects budget that is separate and distinct from the institutional operating budget. Similarly, technology acquisitions, upgrades, and replacements may be funded from a central, institution-wide fund rather than within the library operating budget. With those funding models, the full scope of investment in library facilities will never be reflected in the annual library expenditures figures used in this study.

Service affect scores had a moderate, but statistically significant negative correlation with FTE enrollment, as anticipated. Surprisingly, there was a slightly stronger negative correlation between service affect and total library expenditures. One explanation for this finding is that the expenditures may be a reflection of institutional size, but that cannot be substantiated by the data available in the present study.

Only one previous study (Kyrillidou & Heath, 2004) was identified in the literature review that specifically explored potential relationships between LibQUAL+™ scores and institutional characteristics. This previous study, however, used an earlier version of the LibQUAL+™ survey instrument that had four dimensions (rather than the

current three dimensions), and used a different set of institutional characteristics for the predictor variables than those selected for this study.

Implications for Practice

Since all four of the LibQUAL+™ scores were impacted to some extent by the institutional characteristics considered in this study, the first implication for librarians to consider is that LibQUAL+™ scores for their particular library may be affected by these institutional characteristics. This insight may be useful as librarians design and implement service quality improvements based on LibQUAL+™ results.

The LibQUAL+™ survey is a useful tool for assessing users' perceptions about libraries and the second implication of this study for librarians to consider is that the survey results should only be used as one component of an assessment strategy. Other approaches or instruments must also be employed to elicit information about the effectiveness of specific library collections, services, or programs; complementary assessment information can then be considered along with the results from the LibQUAL+™ survey for a fuller perspective about the library.

Finally, based on this study, library user expectations appear to play a critical role in user responses to the LibQUAL+™ survey. User expectations are often based in individual experiences with libraries; however, practitioners might consider the potential role of library marketing or public relations efforts to influence user expectations.

Recommendations for Future Research

While it seems clear that there are relationships between institutional characteristics and LibQUAL+™ scores, particularly between library expenditures and LibQUAL+™ scores, the dearth of previous studies on this subject and the limitations of the present study speak to the need for further investigation regarding these questions. If some portion of LibQUAL+™ scores can be reliably predicted by institutional characteristics, the validity of the instrument is a subject for future research.

The present study focused on the three LibQUAL+™ dimension scores and the overall, weighted score. Future research might focus on an examination of the results obtained from the comments box in LibQUAL+™. About 40% of all respondents choose to add something in the comment box. The comments may support, contradict, or explicate the numerical score results that were the focus of this study.

Further investigation of the relationship between information control dimension scores and institutional type may provide insights into that relationship that were not possible with the data used for the present study. A more reliable result is possible if a more representative sample of institutions can be assembled.

The sample used in this analysis was a nonrandom, sample of convenience that was drawn from a self-selected group: those libraries that opted to participate in LibQUAL+™ in 2006. In addition to their differentiation from the population through participation in the LibQUAL+™ survey, a review of the characteristics of the sample institutions revealed that the sample libraries were not entirely representative of the total

population of American colleges and universities. For example, approximately 8% of the sample was composed of doctoral degree-granting institutions, but among all institutions, approximately 17% confer doctoral degrees. Conversely, master's degree-granting institutions were somewhat overrepresented, composing about 48% of the institutions in the sample as compared with about 38% of colleges and universities in the population.

Related to the issue of a representative sample, future research might also consider whether there are reliable differences among the results for different types of institutions. If so, perhaps the instrument's scores should be adjusted to reflect that; perhaps the survey should be adapted for other types of college and university libraries?

Future research might also consider an examination of the LibQUAL+™ scores for each demographic sub-group within the pool of respondents. Is there a difference between faculty responses and student responses? Are those differences the same at different types of institutions? Are there differences among the academic disciplines? For example, faculty members, who have used libraries and conducted research successfully, are very likely to have a different view than students about whether collections meet their needs and whether information resources are easily located. Similarly, faculty in the humanities may use the library differently than faculty in mathematics; it would be interesting to see whether that influences the way in which individual faculty members respond to the LibQUAL+™ survey.

Summary

In this final chapter of the dissertation the research problem, research questions, methodology, and results were summarized. The focus of the chapter, however, was found in the sections that presented conclusions, discussed implications for practice, and made recommendations for future research.

This study found statistically significant relationships between the institutional characteristics selected for this study (Carnegie basic classification, FTE enrollment, and library expenditures) and each of the four LibQUAL+™ scores. Based on the results of the data analyses computed to address the research questions, several conclusions were reached. First, each of the four LibQUAL+™ scores is affected by institutional characteristics. A corollary is that knowing something about the institutional characteristics of a college or university may afford a better understanding of the LibQUAL+™ results obtained in that institution's library. Based on this study, one might also conclude that if some portion of the scores can be attributed to institutional characteristics, the instrument may not measure only what it was intended to measure. Finally, this study supports the conclusion that library user expectations play an important role in user responses to the LibQUAL+™ survey.

The implications for practitioners from this study include using the instrument as one part of an overall assessment strategy; understanding the effect one's institutional

characteristics may have on scores, and considering the potential for library public relations and marketing to impact user expectations.

The lack of previous studies on this subject, and the limitations of the present study, suggest the need for future research. Such future investigations might include a replication of this study with a more representative sample, an examination of the results obtained from the comments box in LibQUAL+™, an exploration of the scores for each demographic sub-group within the pool of respondents, or an analysis of whether there are reliable differences predicted by institution type in LibQUAL+™ scores.

APPENDIX A
LibQUAL+™ SURVEY INSTRUMENT

When it comes to...		My Minimum Service Level Is		My Desired Service Level Is		Perceived Service Performance Is																							
		Low	High	Low	High	Low	High	N/A																					
1)	Employees who instill confidence in users	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
2)	Making electronic resources accessible from my home or office	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
3)	Library space that inspires study and learning	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
4)	Giving users individual attention	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
5)	A libraryWeb site enabling me to locate information on my own	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
When it comes to...		My Minimum Service Level Is		My Desired Service Level Is		Perceived Service Performance Is																							
		Low	High	Low	High	Low	High	N/A																					
6)	Employees who are consistently courteous	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
7)	The printed library materials I need for my work	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
8)	Quiet space for individual activities	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
9)	Readiness to respond to users' questions	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
10)	The electronic information resources I need	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
When it comes to...		My Minimum Service Level Is		My Desired Service Level Is		Perceived Service Performance Is																							
		Low	High	Low	High	Low	High	N/A																					
11)	Employees who have the knowledge to answer user questions	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
12)	A comfortable and inviting location	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
13)	Employees who deal with users in a caring fashion	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
14)	Modern equipment that lets me easily access needed information	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
15)	Employees who understand the needs of their users	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
When it comes to...		My Minimum Service Level Is		My Desired Service Level Is		Perceived Service Performance Is																							
		Low	High	Low	High	Low	High	N/A																					
16)	Easy-to-use access tools that allow me to find things on my own	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
17)	A getaway for study, learning, or research	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
18)	Willingness to help users	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
19)	Making nformation easily accessible for independent use	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
20)	Print and/or electronic journal collections I require for my work	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
When it comes to...		My Minimum Service Level Is		My Desired Service Level Is		Perceived Service Performance Is																							
		Low	High	Low	High	Low	High	N/A																					
21)	Community space for group learning and group study	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
22)	Dependability in handling users' service problems	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="checkbox"/>
		Low	High	Low	High	Low	High	N/A																					

Please indicate the degree to which you agree with the following statements:

23) The library helps me stay abreast of developments in my field(s) of interest.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> 1 2 3 4 5 6 7 8 9 Strongly Disagree Strongly Agree
24) The library aids my advancement in my academic discipline.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> 1 2 3 4 5 6 7 8 9 Strongly Disagree Strongly Agree
25) The library enables me to be more efficient in my academic pursuits.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> 1 2 3 4 5 6 7 8 9 Strongly Disagree Strongly Agree
26) The library helps me distinguish between trustworthy and untrustworthy information.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> 1 2 3 4 5 6 7 8 9 Strongly Disagree Strongly Agree
27) The library provides me with the information skills I need in my work or study.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> 1 2 3 4 5 6 7 8 9 Strongly Disagree Strongly Agree
28) In general, I am satisfied with the way in which I am treated at the library.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> 1 2 3 4 5 6 7 8 9 Strongly Disagree Strongly Agree
29) In general, I am satisfied with library support for my learning, research, and/or teaching needs.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> 1 2 3 4 5 6 7 8 9 Strongly Disagree Strongly Agree
30) How would you rate the overall quality of the service provided by the library?	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> 1 2 3 4 5 6 7 8 9 Extremely Poor Extremely Good

Please indicate your library usage patterns:

31) How often do you use resources on library premises?	<input type="text"/>
32) How often do you access library resources through a library Web page?	<input type="text"/>
33) How often do you use Yahoo(TM), Google(TM), or non-library gateways for information?	<input type="text"/>

[Questions 34 through 38 are used by each library to address local concerns.]

39) Please enter any comments about library services in the box below:

(Association of Research Libraries, 2007).

APPENDIX B
SCATTERPLOTS: CORRELATIONS OF LIBQUAL+™ SCORES AND LIBRARY
EXPENDITURES

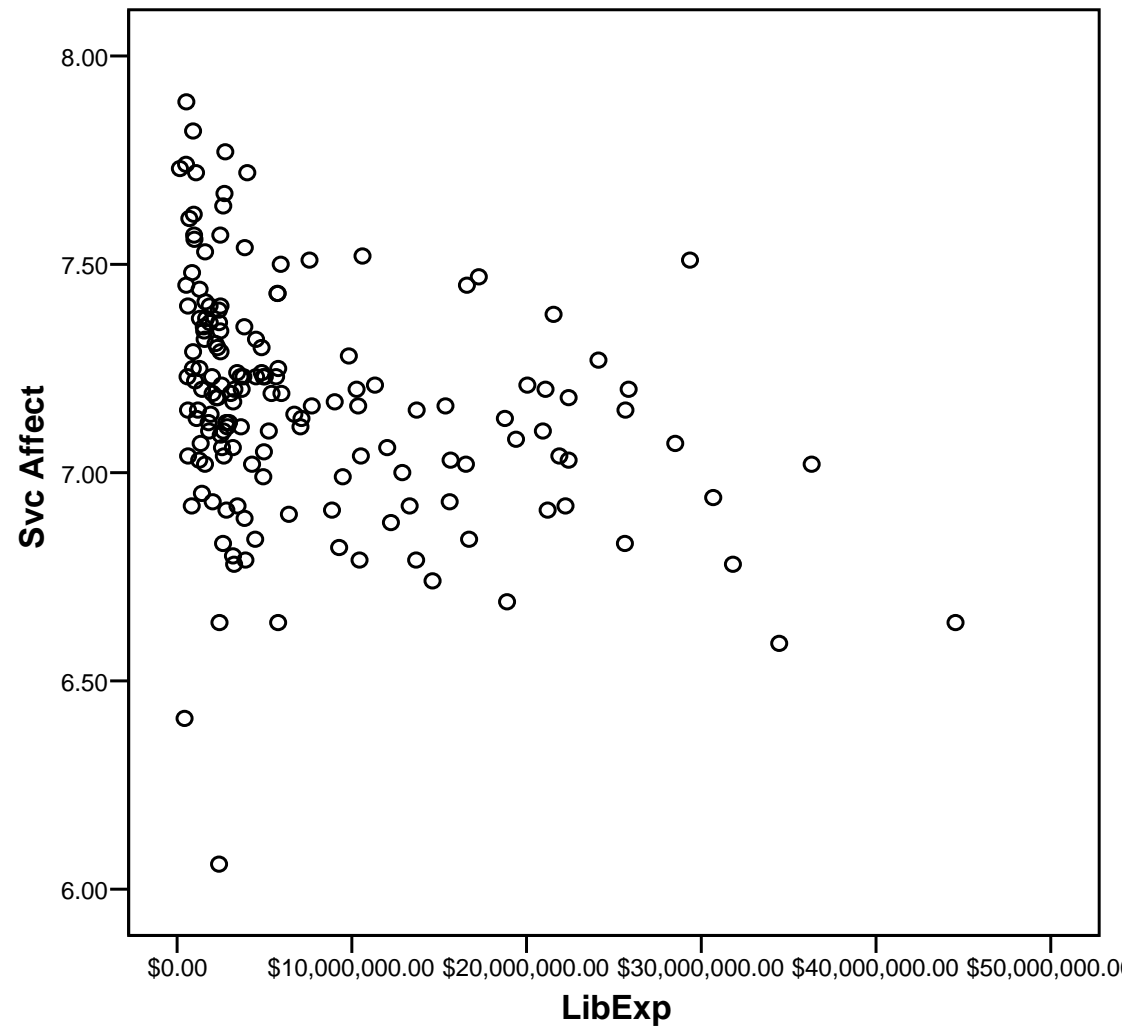


Figure B1. Service Affect Dimension and Total Library Expenditures

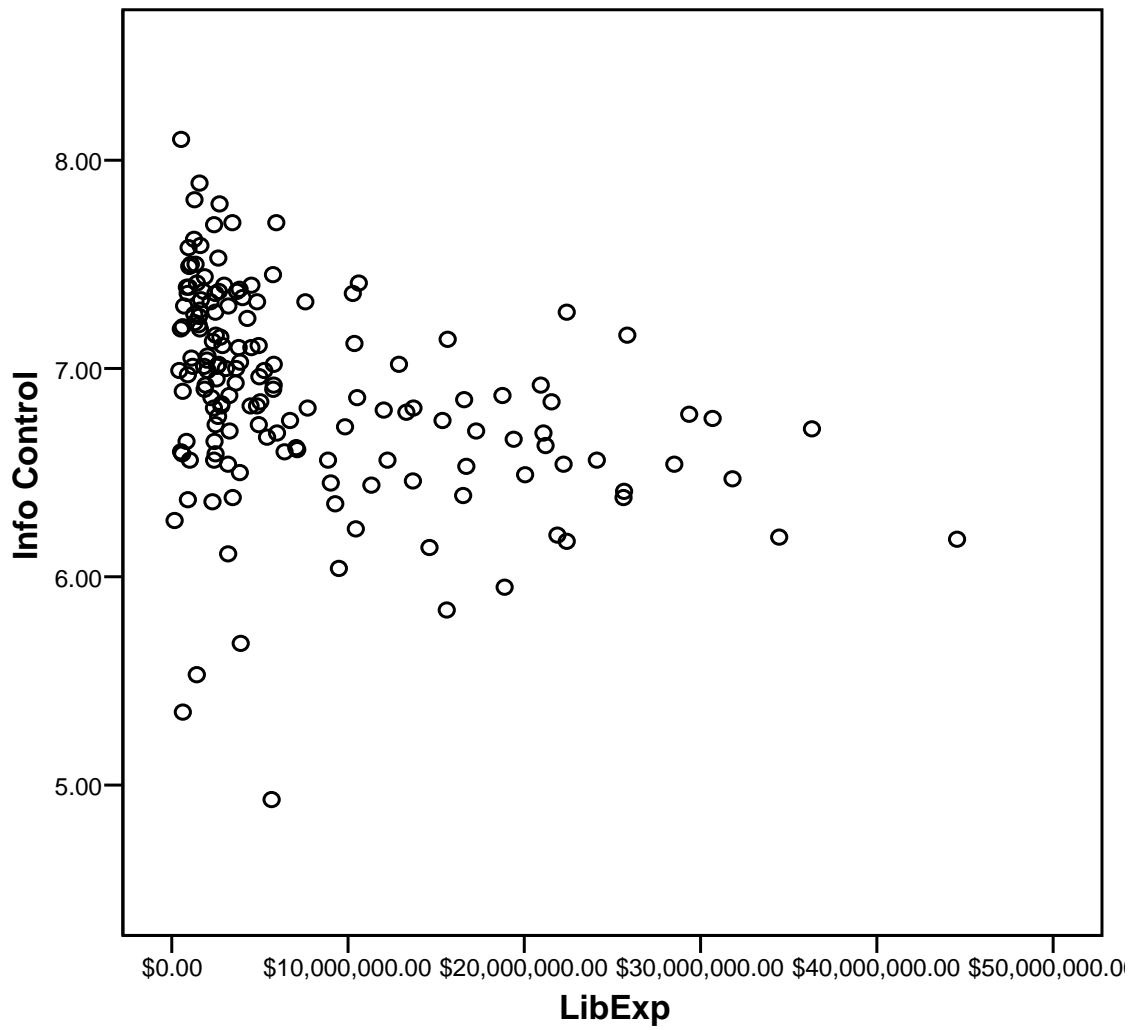


Figure B2. Information Control Dimension Scores and Total Library Expenditures

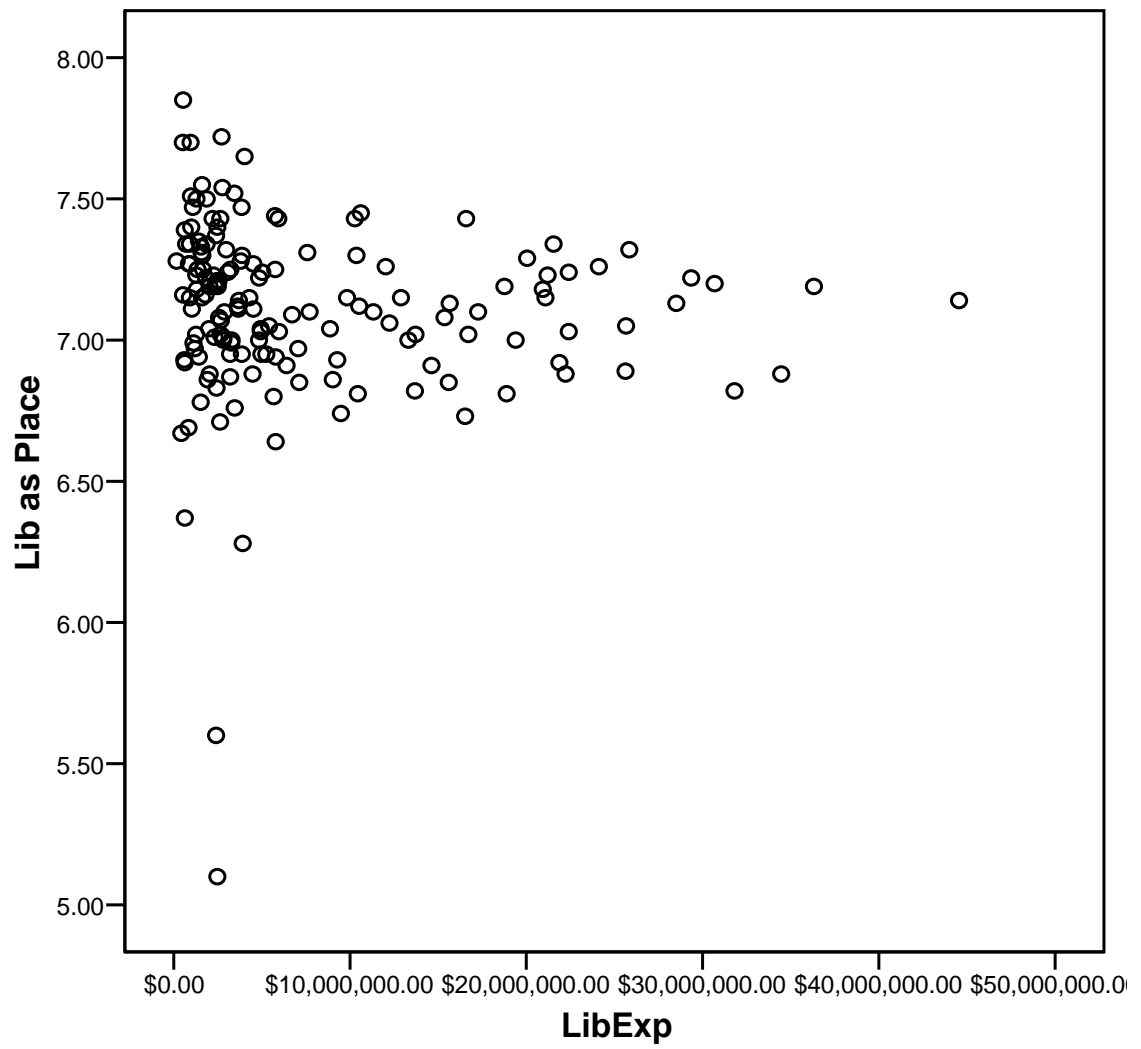


Figure B3. Library as Place Dimension Scores and Total Library Expenditures

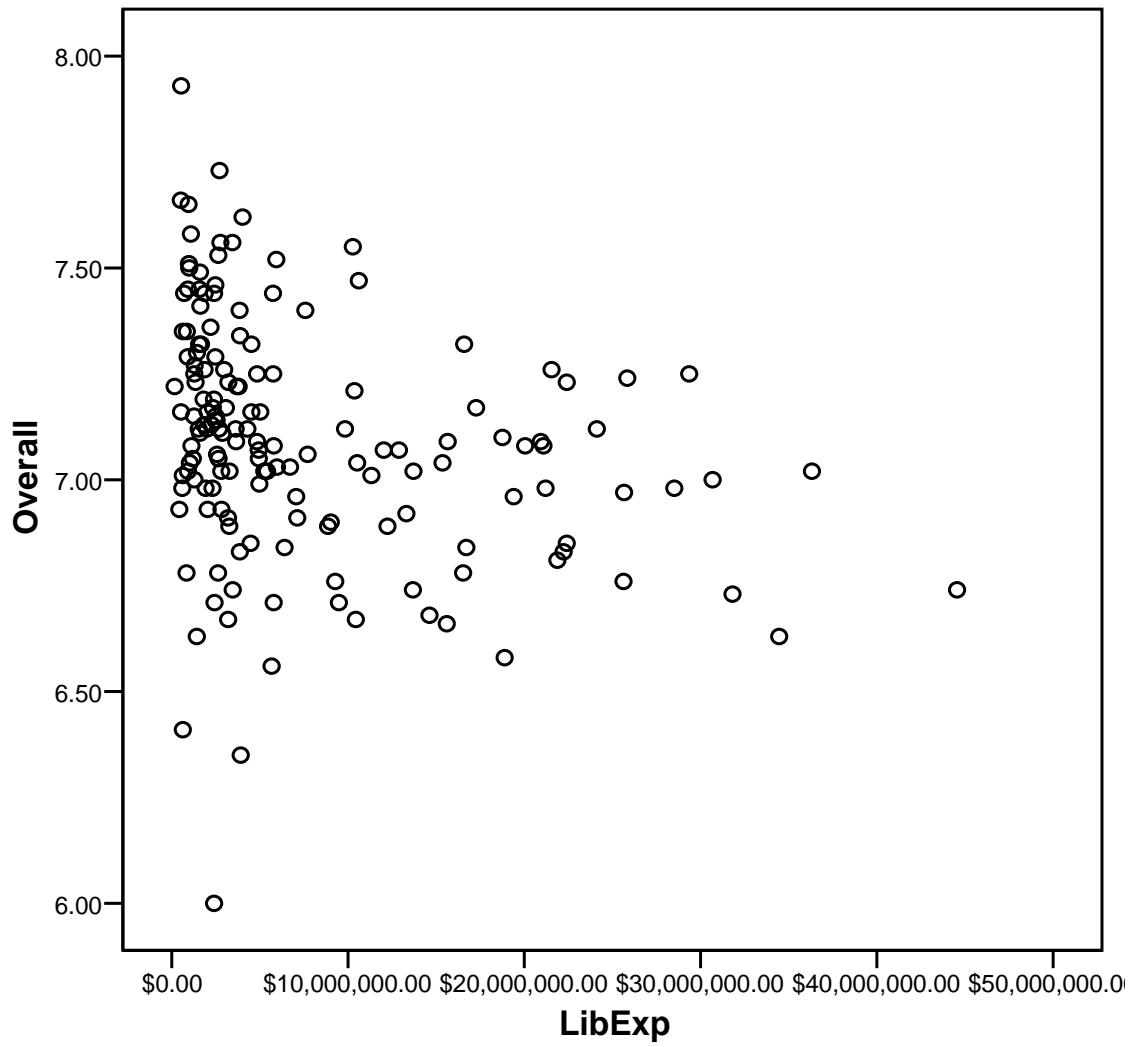


Figure B4. Overall Scores and Total Library Expenditures

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