Exploring the Relationship between Patron Type, Carnegie Classification, and Satisfaction with Library Services: An Analysis of LibQUAL+® Results

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This dissertation titled
Exploring the Relationship between Patron Type, Carnegie Classification, and
Satisfaction with Library Services: An Analysis of LibQUAL+® Results

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Abstract

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Exploring the Relationship between Patron Type, Carnegie Classification, and
Satisfaction with Library Services: An Analysis of LibQUAL+® Results

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The purpose of this study was to explore how faculty and students responded to the Information Control section of the LibQUAL+® survey at two libraries with different Carnegie Classifications. As one of the institutions being studied was considering a shift from a research institution to one more focused on teaching and learning, this study used two schools with different Carnegie Classifications, one with a RU_H and the other with a Master’s M classification, to determine if faculty and students had different minimum, perceived, and desired scores related to Information Control.

A three way between-within subjects ANOVA was used as a method of analysis, with two between-subjects variables and one within-subjects variable. The first between-subjects variable was patron type, and consisted of undergraduate students, graduate students, and faculty members. The second between-within subjects variable was Carnegie Classification and consisted of RU_H or Master’s M classification. The within-subjects variable has three levels that serve as three dependent variables. Each dependent variable is a composite or the mean score for the combined eight questions that make up the Information Control component of LibQUAL+®. The Information Control component deals with collections and the access provided to those collections. Because
each question in the survey has a corresponding 9 point Likert scale for minimum, perceived, and desired service quality, three separate means were created for each respondent.

The results of the analysis indicate that Carnegie Classification has no significant effect on how students and faculty respond to minimum, perceived, and desired levels of service with regard to Information Control. There were significant differences with regard to patron level responses.
I would like to acknowledge the assistance of the faculty and staff of the Gladys W. and David H. Patton College of Education, and in particular the members of my committee, who provided the guidance and wisdom necessary to guide me towards the completion of this dissertation.

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Finally, I would like to thank my family and friends, without whom this goal would never have been achieved.
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Chapter 1: Introduction

The study described in this document was conceived from a statement that a librarian made in a staff meeting about the strategic planning process that was taking place in the library. A campus administrator was speaking to the library staff about the possibility of a shift in institutional focus from research intensive to an emphasis on teaching and learning. The librarian asked how this type of shift might impact the library system and the services the library provides. Would a different type of campus mean a different type of student and faculty, and would this new population have different expectations of library service? In order to investigate this statement, this study was conceived to explore the relationship between the type of school and the programs provided there, and the expectations of the patron base of library service quality, specifically the expectations that relate to collections and access.

This dissertation explores the relationship between faculty and student scores for minimum, perceived, and desired levels of service quality for Information Control as documented on the 2009 results of the LibQUAL+® survey taken by students and faculty at two mid-western universities; one with a RU/H Carnegie Classification and the other with a Master’s M Carnegie Classification. This chapter will briefly describe the LibQUAL+® survey instrument, state the seven proposed research questions, and provide a brief explanation of what will be gained by investigating these questions.

Background of the Study

LibQUAL+® is a survey that has been provided to libraries by the Association of Research Libraries (ARL) since 2001, and according to the ARL website, “… over 1,000
libraries have participated in LibQUAL+®, collecting over 1,000,000 library user responses. LibQUAL+® has been implemented in libraries in over 17 countries and the project supports over 12 language translations” (Association of Research Libraries, 2011a, History of LibQUAL+® section, para. 1). LibQUAL+® was adapted for the library community from the survey instrument SERVQUAL, which was designed to evaluate service quality in a variety of private sector service oriented professions (Parasuraman, Zeithaml, & Berry, 1985; Parasuraman, Zeithaml, & Berry, 1988). The LibQUAL+® survey instrument contains 22 core questions dealing with three areas: Affect of Service, Information Control, and Library as Place. Affect of Service (AS) asks questions that pertain to the dependability, courteousness, helpfulness, and willingness of library staff in assisting the user. Information Control (IC) asks questions about how well the library is doing in providing access to the materials and equipment necessary to fulfill the needs of the user. Library as Place (LP) ask questions about how well the library is providing the physical space that the user wants. Additional items may be chosen by participating institutions but only the 8 questions that make up the Information Control portion of LibQUAL+® are explored in the analysis that follows. The instructions for the LibQUAL+® survey and a sample portion of the survey can be found in Appendix A and B respectively.

For each of the 22 core questions on the LibQUAL+® instrument, the patrons are asked to give a score for the minimum level of service quality they will accept, the perceived level of service quality they are receiving, and the desired level of service quality they wish to have. These scores create a continuum which can then be used, as
Parasuraman, Zeithaml, and Berry (1994) describe in their analysis of SERVQUAL (the predecessor to the LibQUAL+® survey), to create a ‘zone of tolerance’ which describes the area between the minimum level of service expected and the desired level of service scores. Additionally, Parasuraman, Zeithaml, and Berry (1994, p. 204) describe two gaps in the scores which fall along the spectrum of responses for their SERVQUAL analysis which are the measure of service adequacy and the measure of service superiority. The Association of Research Libraries (2009) defines the service adequacy gap as being “calculated by subtracting the minimum score from the perceived score” (p. 10) and the service superiority gap as being “calculated by subtracting the desired score from the perceived scores” (p. 10). These gaps allow libraries to determine where customers feel the services are lacking or where service quality is above the level that the patron expects.

**Statement of Problem**

As part of the analysis that is provided to libraries who conduct the LibQUAL+® survey, radar charts display results of each of the core questions so that service adequacy, service superiority, and the zone of tolerance can be viewed in one graphic. Additionally, the mean and standard deviation are given for the scores pertaining to minimum, perceived, and desired service quality, as well as the adequacy and superiority gaps. All of the information is broken down by user group. Examples of these radar charts are available in Appendices C-F.

Several studies which will be discussed more thoroughly in the literature review of this document (Jaggars, Jaggars, & Duffy, 2009; Kayongo & Jones, 2008; Self, 2008; Thompson, Kyrillidou, & Cook, 2008) have shown that there are differences in the way
students and faculty emphasize service quality. The radar charts provided herein reiterate these findings.

Decisions that relate to collection development, access issues, and user interfaces are all affected by the opinions and characteristics of the user base. In the case of academic libraries, the user base is defined as the faculty, staff, and students that make up the academic community. Knowledge of the faculty and student body demographics of a campus and the opinions of those groups directly relates to all aspects of library service (Housewright & Schonfeld, 2008). An example of this would be how a library assigns budget lines and specific librarians to work with academic programs on campus. A librarian will have discretion over the budget for a program with the understanding that the librarian will stay informed of the research needs of the faculty and students in that discipline. The monies allotted for purchases directed at a specific discipline will be determined by the fund allocation formula being used by the library. As Walters (2008) suggests, a successful fund allocation formula takes into account demand, cost, and supply. The demand component is the one most associated with the makeup of the departments being studied, and it is here that characteristics like undergraduate and graduate enrollment, as well as courses offered, can play a role in the amount of money a department or college is allotted in the library budget. However, as institutional goals and strategic initiatives shift, it is reasonable to wonder just how much of an affect this shift in focus will have on the library system of campus.

The library providing service for one of the institutions being examined in this particular study, a campus with an RU_H Carnegie Classification, has been informed that
a shift is possible at the university level, wherein the direction of the university will focus
more on teaching and learning and no longer focus on becoming a top-ranked research
university (Name withheld, 2011). Carnegie Classification is a classification system
implemented by the Carnegie Foundation for the Advancement of Teaching. Colleges
and Universities are able to see who their peer institutions are based on criteria that
include the number of degrees deferred, expenditures, and the size and enrollment status
of student population. The two classifications being explored in this study are Master’s M
and RU_H. Master’s M is a level of Carnegie Classification that indicates a school has
awarded 100-199 master’s degrees in 2008-2009, but less than 20 research doctorates.
RU_H is the level of Carnegie Classification that signifies a doctoral granting institution
with at least 20 doctoral degrees awarded in 2008-2009 and meets the requirements for
levels of research activity and per capita research activity. The reason these two schools
were chosen for this study is because they both took the LibQUAL+® survey in 2009 and
their Carnegie Classifications resemble what a shift in institutional direction from
research to teaching and learning might look like.

As Cox, McIntosh, Reason, and Terenzini (2011) point out, there are significant
differences with regard to perception and acceptance of institutional missions regarding
teaching and learning that occur between varying Carnegie classified institutions. The
question then becomes, do these perceptual differences carry over into library services as
well? When library services are designed and implemented based on the desires of the
patron-base, it seems appropriate to determine if faculty and students at a school more in
line with the new goals of the institution are different from faculty and students at a school with a different institutional or academic focus.

**Purpose of the Study**

This purpose of this study is to explore the relationships between the minimum, perceived, and desired scores for the Information Control section of the LibQUAL+® survey conducted at two separate universities in the Mid-west, the academic level of the respondents, and the level of Carnegie Classification for each institution. The intent is to examine the differences and similarities in how each demographic views the three levels of service quality so that a stronger understanding of the Library community can be obtained.

The Information Control portion of LibQUAL+® was chosen for this study because, as the radar charts in the Appendix of this document illustrate, the IC section is the one area of library services that faculty often perceive, and will be discussed further in the literature review, as falling below the minimum level of service they expect. The IC section however relates specifically to the work needs of each population at the separate institutions, and while the perceived scores are library specific to the different collections and services at each library being examined, the minimum and desired scores are specific to the students and faculty at each institution and are not collection specific. A comparison of the two campus populations is therefore relevant because the mission and goals of each institution are different, so the students and faculty are working in two contrasting academic environments. This study explores how the different populations answered, and is not meant to evaluate separate services and collections. The literature
review will show that the trends in higher education are often technology-focused, and
the IC component of LibQUAL+® revolves a great deal around services that are
technology based. The 8 questions that make up the IC component of LibQUAL+®
(Association of Research Libraries, 2009, p. 45) are as follows:

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

While there is one question about making print materials available for the patron’s work,
even this question deals with technology, as the only way these print materials can be
found is through the use of the electronic catalog. The rest of the questions all relate to
electronic resources, equipment, the website, and access, all of which directly relate to
technology and services the library provides digitally.

Understanding the perceptions of a campus of scholars with regard to library
services is beneficial, but as academic institutions shift directions with new campus-wide
initiatives, libraries must try to determine how these shifts will play a role in planning for
and implementing library services. It is hoped that this research will help libraries to
make organizational decisions when the campuses they are working on change their vision and focus.

The purpose of this study is to examine how academic populations respond to the LibQUAL+® survey, and not to determine the strengths and weaknesses of the two libraries which have supplied their results. While LibQUAL+® results, as the literature review will demonstrate, typically function as a benchmarking tool or a way to see how a population views service quality, this study investigates how students and faculty respond, and if there are differences in these responses as they relate to institution type.

**Research Questions**

The questions that will be examined by this study are as follows:

1. Are there significant differences between the minimum, perceived, and desired scores for library service quality?
2. Are there significant differences between the levels of Carnegie Classification with respect to the minimum, perceived, and desired scores for library service quality?
3. Are there significant differences between the levels of the respondent group with respect to the minimum, perceived, and desired scores for library service quality?
4. Is there a significant interaction between the Carnegie Classification of an institution and the level of respondent?
5. Is there a significant interaction between the Carnegie Classification of an institution and the minimum, perceived, and desired scores for library service quality?

6. Is there a significant interaction between the level of respondent group and the minimum, perceived, and desired scores for library service quality?

7. Is there a significant interaction between the level of respondent group and the Carnegie Classification of an institution and the minimum, perceived, and desired scores for library service quality?

**Research Null Hypothesis**

Based on the proposed research hypotheses listed above, the null research hypotheses are as follows:

1. There are no significant differences between the minimum, perceived, and desired scores for library service quality.

2. There are no significant differences between the levels of Carnegie Classification with respect to the minimum, perceived, and desired scores for library service quality.

3. There are no significant differences between the levels of the respondent group with respect to the minimum, perceived, and desired scores for library service quality.

4. There is no significant interaction between the Carnegie Classification of an institution and the level of respondent.
5. There is no significant interaction between the Carnegie Classification of an institution and the minimum, perceived, and desired scores for library service quality.

6. There is no significant interaction between the level of respondent group and the minimum, perceived, and desired scores for library service quality.

7. There is no significant interaction between the level of respondent group and the Carnegie Classification of an institution and the minimum, perceived, and desired scores for library service quality.

**Significance of Study**

Understanding the customer or patron base is a critical component of service development and strategic planning. As Housewright and Schonfeld (2008) state:

Perhaps most significantly is the simple lesson that understanding user needs is of great value in planning for change. Libraries, for example, would be well served to engage in local intelligence-gathering to better understand how their faculty, students, and administrators use and perceive the library and its services. Information gleaned in this process may suggest otherwise unconsidered changes which could greatly improve user satisfaction, identify initiatives which are liable to be particularly controversial, and more. Regular analysis of the needs of one’s constituency is an essential tool in effectively serving a diverse population (p. 30).

Decisions all have to be influenced by the characteristics of the community. Any study or research project that explores and attempts to understand who the library customer is and what their interests are will help individual libraries and library systems
as a whole to provide better service and delegate resources to support the initiatives that best support those who will be using the services. This study could be duplicated using more campuses and representing additional Carnegie Classifications, or could be conducted on a broader scale, exploring multiple library systems from outside the consortium using the same research model. Additionally, this research can be used as a component of a purchasing model for consortium buying of resources. Knowing how different campuses view library services will help in determining what level of financial support different types of institutions provide.

**Delimitations**

Rather than using as many academic libraries that were available in the LibQUAL+® data repository for this proposed analysis, it was decided that it would be more prudent to do the initial investigation with two schools that have different Carnegie Classifications but that function within the same library consortium system. The results of this initial investigation may warrant additional inquiry at which point other academic library data sets may be included in the analysis. There were four schools that administered the LibQUAL+® survey in 2009 and who are a part of the same consortium system. This was important because, while libraries will have different collections, a consortium collection available to all the institutions being studied makes a comparison much more generalized. While specific holdings of materials may vary greatly from institution to institution, the consortium catalog, as well as InterLibrary Loan capabilities, enables borrowing throughout the consortium, so collection size becomes less of a concern as a result of increased access.
The research described in this dissertation is meant as a first step in an extended analysis of LibQUAL+® data using a research method that is not traditionally used on this data set.

**Limitations**

Perhaps a drawback to a large-scale study using LibQUAL+® results is that it negates the differences that are perhaps inherent in each individual campus. As Lee Shulman, President of the Carnegie Foundation for the Advancement of Teaching, wrote in an opinion piece for *The Chronicle of Higher Education*, “No single classification can provide insights into the full complexity and richness of American higher education” (Shulman, 2005, p. B20). While national trends are important to keep track of, it is important to pay attention to the individual needs of smaller populations like those of a single academic institution.

Another limitation of this study is that different types of faculty are being labeled as one entity. While campuses have different levels of faculty, tenure track versus non-tenure track being an example, this study is not taking into account how these different types of faculty may have different needs when it comes to library services. Tenopir, King, Spencer, and Wu (2009) demonstrated differences in reading practices of faculty from varying academic areas, as well as differences in reading practices by age of faculty member.

A third limitation to this study is that the dataset provided by the Master’s M school was not a proper random sample. The school sent the survey to every student, faculty, and staff member at the institution, thereby making their dataset an example of a
non-random or non-probability sampling (Davidson, 2006, p. 197). The goal of random sampling is to ensure that every member of a specific population has the opportunity to participate in the research, and in this case, every member of the population, or campus, was sent a survey.

A fourth limitation, and one which will discussed further in the literature review and in the results section of this dissertation is the impact of the library consortium on the results being generalized. The universities in this study both belong to a large consortium and therefore have a large core collection, making a comparison of perceptions of library services more valid. This may not be the case when comparing schools that do not share the same core collections.
Chapter 2: Literature Review

Introduction to Literature

Understanding the community an academic library serves is crucial to developing services and collections that are relevant and useful to student and faculty users, patrons, or customers that make up that community. Students and faculty require different services from the library. Both groups require material in the form of physical and digital collections, but depending on the area of study and goals of a particular university, levels of services required will vary. Neal (2009) points out that as library services change and the digital landscape expands, library users

Assess the library in the context of the collections we can develop, the services we can deliver, the applications we can enable, and the technologies we can provide. We work as library in the classroom, in the laboratory, and at the bedside. The academic library needs to be present to anyone, anywhere, anytime, and anyhow. (p. 464)

Being present to an entire community of users requires knowing the makeup of the community as well as how the library is perceived to contribute to the work of the community. Libraries have a long history of adjusting and adapting to the change associated with technological innovation and the shifting attributes and values of higher education. Examples of innovation include the classification system developed by Callimachus around the third century B.C. that resulted in the Pinakes (Staikos, 2004, p. 186), the Memex described by Vannevar Bush to assist in the collection of vast amounts of scientific research after World War II (Bush, 1945), or more recently at the infusion of
social media into library services (Brown, 2010). College and university campuses have become more diverse with regard to the characteristics of the faculty and students, as well as the areas of study being offered, particularly since the G.I. Bill enabled many Americans to attend higher education institutions that previously would not have been able to (Gardner, 2005; Ibarra, 2005; Schneider, 2005). As the faculty and student characteristics continue to change, the assessment practices used by libraries to evaluate collections and services have changed as well. Assessment practices in academic libraries are as varied as the services being offered to the communities that the libraries serve. In order to provide the appropriate services, libraries need to study their individual and collective patron bases to determine the needs of their communities. The community of an academic library is for the most part the students and faculty of the campus the library serves.

One way a library can assess the needs of the community is to administer a survey. An instrument that has been administered many times over the last decade is the LibQUAL+® survey. The LibQUAL+® survey is an instrument that academic libraries can administer to their patrons that investigates the perception of service quality provided by the library. The LibQUAL+® was developed as part of the Association of Research Libraries’ New Measures initiatives. Since its inception in 2000, the survey has been responded to by over a million users and has been taken in over 1000 libraries in 17 countries and in 12 languages (Association of Research Libraries, 2011a).

The study being described in this dissertation examines whether there is a significant variance between the minimum, perceived, and desired levels of service
quality a library provides and the type of patron, specifically the patron types of student and faculty. Additionally, this study explores the way faculty and students respond to LibQUAL+® across institution type, demonstrated by the Carnegie Classification of the school. Before examining the methods and variables of this particular research proposal, it will be helpful to briefly explore the history of assessment conducted by academic libraries and the types of services that are being examined in the LibQUAL+® survey. Exploring how library services and assessment techniques have changed will give insight into the reasons why knowledge of specific user groups plays such an important part in developing library initiatives and in strategic planning. Following the assessment piece will be a section on current technology trends as they relate to library services, then a look at patron population differences, how LibQUAL+® has been studied and used, and finally a piece on Carnegie Classification research.

Assessment in Academic Libraries

Carnegie Corporation

Assessment of academic library service has been well documented since the early twentieth century. In his opening keynote speech at the 2010 Association of Research Libraries’ Library Assessment Conference, Fred Heath (2011) described the academic library assessment process as evolving over time, with several distinct periods, initially starting with the funding of university and college libraries by the Carnegie Corporation in 1928. As Heath (2011) points out, during this period of time, assessment was focused on collection development and consisted mainly of determining whether a library contained certain titles deemed essential by the Carnegie Corporation. This approach is
somewhat flawed as the creation of essential title lists does not account for the varying interests of each particular community being served. Just as the interests and pursuits of a particular city or town can change based on characteristics like geographic location and economic system, it is also possible that the interests of a campus will vary depending on the fields of study emphasized and the characteristics of the students and faculty. A small liberal arts college may have research needs that differ greatly from a large university that is known for its engineering or chemistry programs.

**Expanding Input Measures**

Heath (2011) continues by describing the next phase of library assessment as occurring when libraries began acknowledging that library collection figures were not an accurate indicator of library quality. As a result of libraries taking a broader view of their worth, assessment metrics then moved beyond the lists of holdings and began to include inputs like the size of the collection, the numbers of staff working in the libraries, and the salaries of those workers. This type of formula, while an improvement over inventory lists, still fails to accurately assess the quality of a library. The inclusion of these additional measurements still fails to distinguish between the inherent differences in each academic community. Smaller schools with smaller budgets are going to have fewer employees. Salaries of library staff do not necessarily reflect the quality of service as much as they reflect the cost of living in the region the library is located in. Adding additional metrics creates a better picture of library services but it still does not take into account the end users, which in the case of academic libraries are the students and faculty that create the academic community.
Planning and Internal Assessment

Heath (2011) states that during this time period assessment was also being looked at as a process-driven tool that emphasized educating library administration on the importance of assessment and planning to achieve institutional success. In January 1999, ARL held a retreat in an attempt to come up with “new measures that better describe research libraries and their services”, and which produced several white papers, topics of which included access, facilities, and impact on research (Association of Research Libraries, 2011b). Planning for the future is critical to the success of an organization, and the library is not an exception. The digital age has drastically changed not only what services libraries provide and how they are provided, but the community itself has changed as well.

During a recent presentation at an academic library conference, Jaron Lanier (2011) drew comparisons between the changes to the music industry over the last decade to those that are affecting libraries now. Rather than sitting passively and waiting to see what technological changes will do to the Library, Lanier emphasized a more proactive approach where the Library attempts to predict niches in the new information system that can be exploited by using the skills libraries already possess. Staley and Malenfant (2010) used a futurist approach when discussing the planning process for academic libraries when they created a survey that explores the impact certain changes could have on libraries services. The respondent to their survey instrument is given a series of hypothetical situations that deal with technological innovation and societal changes and is asked to determine to what extent these innovations and changes will affect libraries.
Some of the hypothetical situations are actually based in reality or are actual innovations being explored, while others are simply possibilities. The survey is an exercise to determine which directions the library feels are most important to address and which ideas are less relevant. The results of this survey will be discussed later in this chapter, but it is important to understand the ways that libraries are being proactive in their attention to trends in higher education.

Herman Mauer (2010), spoke on the need for prediction, but emphasized how the practice can also be a futile one. As his example, Mauer used the *World of Tomorrow* exhibit at the 1939 World’s Fair in New York to show how prediction can sometimes miss the mark. While flying cars technically exist today, they are prohibitively expensive and impractical, whereas nowhere in the exhibit were mobile phones mentioned.

All of this led to yet another phase in assessment practice that dealt with the perceptions that the library community has of service quality. In an oft-quoted article during this time period, Nitecki (1996) wrote that “A measure of library quality based solely on collections has become obsolete” (p. 181). Later, Heath (2002, p. 27) states, the shift in assessment meant that the focus was “not on inputs such as library collection counts, but rather on outcome measures, such as assessments of expectations and perceptions of library service quality and user satisfaction”. Assessment with an emphasis on user perceptions of service quality is demonstrated by the LibQUAL+® instrument, which has been administered to academic libraries worldwide, and will be discussed in more detail at the end of this literature review and in the methodology section.
Web-based and other technologies have made it possible to conduct large scale assessments, like LibQUAL+®, at libraries worldwide and repeated over time to provide valuable longitudinal studies and datasets. Heath (2011) states that

What our culture of assessment can do is to allow us to concentrate with precision the assignment of available resources to the goods and services our communities most value. If we listen, and if we act purposefully, we will remain indispensible to teaching and learning. (p. 20)

To be indispensible and relevant to a patron is to understand the needs of that patron, and then provide a service that exceeds the service provided by others who offer similar services. As Wei, Thompson, and Cook (2005, p. 93) point out, “Clearly, in the Internet era, collections counts are no longer a sufficient index of library quality”.

In addition to how patrons perceive library services, other research that involves internal assessment includes a large emphasis on instruction assessment. A quick search in the Library, Information Science & Technology Abstracts database (LISTA) brought up over 500 articles from scholarly, peer-reviewed journals in the last 10 years that deal with the assessment of library instruction. Articles that deal with library instruction assessment vary in focus, but all aim to assess how well libraries are performing in the area of information literacy.

Ivanitskaya, DuFord, Craig, and Casey (2008) for example, conducted an investigation of the use of pre-assessment and feedback to graduate students prior to library instruction and found that students who were given the pre-assessment scored higher on obtaining information and on the overall information literacy score.
In another study conducted by Edwards, Kumar, and Ochoa (2010), the authors explored the value of having embedded librarians in an online graduate education technology course. A series of modules relating to information literacy topics, in addition to synchronous online chat sessions, were added to the course. Pre and post-surveys were used to show an increase in perceived self-efficacy, and student discussions and a faculty interview at the conclusion of the course showed positive opinions of the experience.

Perhaps more tangentially relevant to this proposal are the studies relating to technology assessment. For example, several studies have explored e-book usage and collections (Folb, Wessel, & Czechowski, 2011; Letchumanan & Tarmizi, 2011; Lin, Tzeng, Chin, & Chang, 2010; Rowlands, Nicholas, Jamali, and Huntington, 2007; Sprague & Hunter 2008). Other areas of library assessment that involve technology are studies pertaining to laptops (Feldmen, Wess, & Moothart, 2008; Holden & Deng, 2005; Hsieh & Holden, 2008; Summey & Gutierrez, 2012), instant messaging or chat (Bravender, Lyon, & Molaro, 2011; Nahyun & Gregory, 2007; Passonneau & Coffey, 2011), discovery layers (Becher & Schmidt, 2011; Denton & Coysh, 2011; Williams & Foster, 2011) and online tutorials (Appelt, K. & Pendell, K., 2010; Friehs & Craig, 2008; Kellum, Mark, & Riley-Huff, 2011; Tronstad, Phillips, Garcia, & Harlow, 2009).

Typically, these types of studies are looking at how effective library services are in terms of learning outcomes, or usage statistics, or perception of services, all of which can be considered internal assessments. The next section on external assessment will focus on how the library is measuring up with regard to the wider institutional goals of the university.
**External Assessment**

As libraries continue to fight for budget dollars, assessment becomes an invaluable tool for library directors who have to demonstrate that the libraries they represent are making a positive change in the lives of users, as well as tying library services to overall institutional quality and mission. This, according to Oakleaf (2010), can be directed either internally or externally, depending on the type of question being explored by the library. An internal assessment explores whether or not the library programs meet the goals that the libraries set out to accomplish. Examples of this type of assessment may include information literacy instructional success, patron awareness of projects or initiatives, or evaluating floor redesign plans with regard to patron needs and desires. An external assessment examines the value of the library in terms of the larger academic community it serves. Questions in this type of assessment model revolve around how well the library attaches itself to the strategic vision of the university administration. Regardless of whether the goal of library assessment is internally or externally motivated, the end result is to create data that can then be used to guide and inform the decision-making capabilities of library administrators and those responsible for library services. In regard to budget dollars, assessment of how those monies are spent can ensure that limited resources are used to their fullest potential. More importantly to this study is how the preferences and attributes of the patron base can contribute to purchases.
Acquisitions

The acquiring of materials is one area of library administration that requires a large percentage of the budget, both in the materials purchased and in the staffing hours to acquire the materials. In addition to the purchase of physical or digital artifacts, acquisitions or collection development decisions can largely affect how library patrons access the information they are seeking. Electronic cataloging systems differ in characteristics from vendor to vendor and the functionality of e-book platforms varies as well. Materials acquisition is one of many aspects of academic libraries that have been transformed in the last two decades as the emergent popularity of the web and its effect on knowledge retrieval continues to change the way libraries operate and assist their communities. Holden (2010) describes this shift from a primarily physical item-based collection to a more access-driven digital collection that can oftentimes involve materials located off-campus or not purchased by the library. This new view of looking at acquisitions is something Holden (2010) refers to as the “sphere of access” (p. 43). Acquisitions and collection development are no longer primarily concerned with physical artifacts. Monographs and serials purchases are still a part of most libraries, but digital formatting, consortia catalog systems, distance learning programs, mobile web technology, and other technological innovations of the last two decades, push library collections management into access, as well as materials acquisition. Building collections is no longer just a matter of purchasing material and placing it on the shelf in the proper wing of the building. The process now involves determining whether to purchase paper versus a digital version of the material, and if purchasing digital versions, which platform
and vendor plan matches the needs of a specific community for which the material is being purchased. Determining which books and databases to order will typically be determined by a subject-specific librarian or staff member. Once the decision is made to purchase or subscribe, what would once have been a matter of delivery and material preparation, followed by shelving, now becomes a question of how best to provide the access to this material. It then seems reasonable to conclude that knowing the preferred mode of delivery of the community is essential to making proper access decisions.

Managing a budget and the prudent purchasing of library materials are not enough to ensure a high quality of service. Access in relation to library collections means that not only must the materials be available for viewing but these materials must also be able to be located. Because card catalogs have been replaced with the online public access catalog (OPAC) and most print indexes have moved to electronic versions, the library website which houses these catalogs and indexes is crucial to ensuring access to the collection. The characteristics incorporated into the design and functionality of a library website will ultimately determine not only the value of a collection internally with regard to user expectations, but also externally with regard to the research mission of an institution. Collections are built by librarians using their knowledge of subject matter, material format, vendor options, the research needs of the user base, and budgetary concerns. All of the work associated with producing a high-quality and relevant collection will be negated if the website the users must go through to access the material is not conducive to their needs. As Ipri, Yunkin, and Brown (2009) point out, usability
studies are a good tool for libraries to determine whether or not discovery of library resources is being hampered by poor website design.

**Access**

User need, much like innovation, is subjective in nature. Libraries have a long history of adapting to change. Changing materials types have always led to changes in storage possibilities, and the shift to web-based technologies has given way to changes in cataloging and access possibilities. Collections now vary drastically in terms of format, and access to these collections has also become more complicated. The complexity of a collection is heightened by the way in which the paths to that collection are organized and displayed. Library materials once cataloged and indexed in physical manifestations are now for the most part only accessible through digital means. While not every valuable piece of material has been digitized, knowledge of the existence of that material must be gained through the digital world. The digital map that makes up the backbone of a library collection is the library website.

Access to the library catalog, the databases the library purchases, the special collections the library houses, the research guides and tutorials that have been created, and even the hours of operation, are all housed within the library website. If the library website is not accessible, then the library collection is not accessible. Access in many ways is a subjective term as well. Some researchers may have preferred the cataloging system made up of rows and rows of cards with their familiar brief records and consistent design. Sridhar (2004) writes “It appears that use of card catalogues or OPACs depends very much on the practice, attitude and behaviour of users rather than on technology or
tools alone” (p. 182). The innovation of the OPAC may be seen as an improvement by most librarians and patrons, but as Rogers (2003) states, it is the perception of the improvement that matters with regard to the adoption of innovations, and this may also be the case when dealing with service quality. When describing the attributes or characteristics of innovations, Rogers (2003) makes the statement that “The individuals’ perceptions of the attributes of an innovation, not the attributes as classified objectively by experts or change agents, affect its rate of adoption” (p. 223). Libraries are beginning to relax their grip on library catalogs and website design in an attempt to follow the success of perceived competitors like Google and Amazon, and the emergence of discovery layers being added over a range of databases seems to reflect these attitudes. As Breeding (2007) states “the concept of an online public access catalog that’s tied solely to the physical inventory of the library and that doesn’t incorporate at least the basics of how people use the Web today is dying” (p. 34).

Features and options have begun to emerge on library websites that seem to mirror those of the commercial competitors. These new features can, but not always, be implemented through what are known as discovery layers. Yang and Wagner (2010) define discovery layers as an addition to the searching and discovery mechanisms normally associated with integrated library system catalog, or ILS OPAC. The discovery layer covers what some might see as an awkward or unintuitive search interface with functions and characteristics that make the library catalog more searchable. The Yang and Wagner (2010) study examined different discovery layer interfaces, both open source and proprietary, to determine which products contained specific discovery layer
functions. The list of functions or features they used for evaluation were (a) single point of entry for all library information, (b) state-of-the-art web interface, (c) enriched content, (d) faceted navigation, (e) simple keyword search box on every page, (f) relevancy, (g) did you mean…?[spell checking], (h) recommendations/related materials, (i) user contribution, (j) RSS feeds, (k) integration with social networking sites, and (l) persistent links (Yang & Wagner, 2010, p. 694) These features take time to implement and cost a great deal of money, however, so it is important that libraries continue to assess the perception of access quality related to the implementation of these features in order to determine if an innovation will be successfully adopted. Faculty and student perceptions of and comfort with technology will help in determining if products like discovery layers are a worthwhile purchase.

Budget constraints require that libraries make purchases that their user base can appreciate and use. As Starratt and Armstrong (2011) posit, one example of how to make the most out library budgets is to consolidate and purchase consortially. This is the situation in the state of Ohio where all public academic libraries, some private academic libraries, and a few public libraries belong to the OhioLINK system, which combines catalogs and allows for patrons from one institution to borrow materials seamlessly from whichever institution has the material available. According to an Ohio Board of Regents (2012, November 1) press release, OhioLINK has grown from 6 institutions participating in 1992, to over 88 member institutions in 2012, providing access to 46.5 million books, as well as over 100 databases, and more than 81,000 e-books, to over 600,000 students, faculty, and staff. The result of this large consortium collection is that the participating
institutions have the same core collection from which they can then build upon, depending on the unique programs of study at each institution. The OhioLINK system also gives negotiating power to the member libraries, enabling them to purchase journal titles as a group, thereby lowering the price. Knowing the research needs of the local population as well as the holdings of OhioLINK institutions allows libraries to stretch budgets and still provide access to the materials needed by the patrons. The LibQUAL+® instrument becomes a crucial component in this decision making process.

The different sections of LibQUAL+® offer unique insight into three areas of library service that may have varying degrees of importance to different types of patrons. The Information Control section of the LibQUAL+® survey deals specifically with the strength and availability of collections. Website usability, journal subscriptions, monograph purchases, and log-in procedures all affect the scores that patrons give to a library in the Information Control (IC) component of LibQUAL+®. The Information Control component is traditionally an area that faculty respondents have seen as an area that needs improvement.

Self (2008) and Kayongo and Jones (2008) studied faculty at ARL institutions and found overwhelming low opinions of journal collections. The reasons for this do not seem to have anything to do with the actual size of the collection, as three of the libraries that scored highest in the Self (2008) study were in the middle range for collection size. Kayongo and Jones (2008) state that while IC scores seem to be an issue across all patron types, Affect of Service scores seem to be positive for both groups of patron respondents, whereas Library as Place scores seem to be less important to faculty and much more
important to student respondents. Library as Place (LP) may affect students more significantly because they need a place on campus for research and socializing more so than the faculty who have offices and possibly lounges to do work and talk to colleagues.

The distinction between the desired service expectations of different patron types is important in order to provide balanced service quality across all levels of library initiatives. In the case of the LP scores, an understanding that the student body feels more strongly about hours of operation than faculty may be an important factor in determining if funds should be set aside for a learning commons or extra staff to allow the building to stay open later. An institution that serves primarily undergraduate students can look at LibQUAL+® scores to determine if their institution falls in line with the other studies, or if the undergraduate population is different than other institutions, perhaps based on academic discipline or location of the library.

Understanding the patron base of an academic library cannot be accomplished without placing that patron base and the library as well within the context of the larger community which is higher education. A library on a college or university campus does not function within a vacuum. Staley and Malenfant (2010) point out that, “academic libraries are part of a larger ecosystem, and librarians should be consistently scanning the environment to look for signs of the changes to come” (p. 3). By studying local communities and studying trends both local and national, libraries will be better able to provide relevant services to their patrons and also strategically plan for future initiatives.

The literature review for this study will now shift from the history and types of assessment in libraries to an exploration of the trends in higher education that affect
libraries, examples of which include technology use, critical thinking, scholarly communication, and access to information. The section on trend analysis will then move into a look at how faculty and student characteristics relate to the themes brought out by the trend analysis, specifically how age and patron type can be indicators of how one prefers to use the library and its services. The discussion on faculty and staff characteristics will include research that involved using the LibQUAL+® survey instrument. Rounding out the literature review will be a look at the LibQUAL+® instrument in terms of validity which will lead nicely into the methodology discussion of Chapter Three. The aim of the review that follows is to guide the reader to the conclusion that understanding how patron groups relate to the library and use the library services will better assist in the strategic planning and service initiatives the library undertakes.

**Trends in Higher Education**

Technology has always played a role in how information is stored and distributed. As technologies are created and innovations take hold, libraries have adjusted services so that patrons could have better access to the collections. Cataloging systems, the printing press, networked computer systems, and now the Web, have all had an enormous effect on how libraries organize and permit access to their collections (Darnton, 2008). Darnton (2008) describes four events related to information technology that have effected how information is distributed: 1) humans writing, 2) the codex being used instead of scrolls, 3) moveable type print, and 4) electronic communication. While Darnton believes that each innovation had an effect on how information was disseminated, he feels that information has always been affected by outside influence, making it unstable. The
Internet has enabled more people to publish their thoughts and has made that information more accessible to others. This change has taken the authority away from publishers and placed the decisions of credibility more squarely in the hands of the reader or consumer. Darnton points out that while this may seem amplified in the modern age of electronic communication, it is in no way a new phenomenon. The reporting of news has always been subject to bias and publishing has often been guilty of pursuing money over an author’s original work. Regardless, libraries have always been able to adjust and remain relevant. A recent occurrence involving the social networking websites Facebook and Twitter can be used as an example of just how powerful these technologies can be in distributing information, correct or otherwise.

Gross (2011) reported on the incorrect attribution of a quote to Martin Luther King Jr. that went viral across sites like Facebook and Twitter immediately after the death of Osama bin Laden. It appears that while part of the quotation was correct, the first line was actually added by the initial poster of the quote on their Facebook profile. McArdle (2011, para. 5) documents the quote attributed to Martin Luther King as

I will mourn the loss of thousands of precious lives but I will not rejoice in the death of one, not even an enemy. Returning hate for hate multiplies hate, adding deeper darkness to a night already devoid of stars. Darkness cannot drive out darkness; only light can do that. Hate cannot drive out hate, only love can do that.

The original posting had the last three lines in quotations, while the first sentence was a statement from the original poster. As the quote was passed on and was reposted the quotation marks were removed and the initial commentary became part of the quote, until
millions of people were posting the entire text as though it came from Martin Luther King. While it is true that information has always been unstable in this regard, the Internet allows for this instability to be amplified more than any other time in history. Davidson and Goldberg (2009, p. 19) put it this way when they write that “The Internet, surely, has redefined access (and its limits) for the twenty-first century. It has also dramatically reordered, if not undermined, traditional hierarchical orders of knowledge authority based on domain expertise sanctioned by institutional license”. As Wright (2007) states, “The Web, like the printing press, seems poised to auger long-term social and political transformations whose effects we are only beginning to anticipate” (p. 151).

While the Internet has significant ramifications to libraries with respect to library holdings and access, the Internet and the technologies that have emerged from it are affecting libraries, and higher education, in ways that go beyond collection development.

Johnson, Smith, Willis, Levine, and Haywood (2011), conducted an analysis of the literature and trends with regard to emerging technologies and their impact on higher education. The resulting product, *The 2011 Horizon Report*, breaks the literature down into four key trends and four critical challenges, as well as six emerging technologies that higher education will likely face in the next five years. An examination of the trends and challenges described by Johnson et al. (2011) show that library services can directly be attached to the needs and concerns of higher education as forecast in *The 2011 Horizon Report*.

Johnson et al. (2011) describe the four key trends in higher education as
1. The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators in sense-making, coaching, and credentialing.

2. People expect to be able to work, learn, and study whenever and wherever they want.

3. The world of work is increasingly collaborative, giving rise to reflection about the way student projects are structured.

4. The technologies we use are increasingly cloud-based, and our notions of IT support are decentralized. (p. 3)

It is important to understand how the trend projections above will impact library services and the patron base that the library serves. Contemplating the direction that the larger environment of higher education is taking informs the decision making capabilities of library administration.

**Technology Trend One**

Trend one notes that, “The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators in sense-making, coaching, and credentialing” (Johnson et al, 2011, p. 3), and this speaks directly to the concept of critical thinking and to access issues, both of which are very important goals of academic libraries. The authors seem to be discussing Internet access improving, via technology like mobile phones, and open access content becoming more readily available freely online, but the concept of critical thinking and more specifically of information literacy is very much still relevant. The Association of College and
Research Libraries (ACRL) defines an information literate person as someone who “must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (Presidential Committee on Information Literacy, 1989, para. 3). As the citation date emphasizes, the teaching of obtaining information and critically thinking about quality research sources is something academic libraries have been pursuing for decades. Faculty who are interested in the source quality of their students’ research will be able to partner with the library and make use of instruction sessions and online tutorials as tools to achieve higher levels of critical thinking. In terms of the ability of students and researchers to access more material than ever before through the Internet, this too is something libraries have been dealing with since there have been collections of materials and people who wanted access to the materials. This concept goes back to the “sphere of access” (Holden, 2010, p. 43) that was touched on in this chapter. One function of libraries is to act as a gateway to information retrieval, regardless of whether that information has been purchased by the library or is freely available to anyone with Internet access. By cataloging all the information and placing it within one system like a library catalog or website, the library is placing the free information alongside the information that is purchased by the library, thereby allowing the student or researcher to create a more well-rounded examination of the topic. Johnson et al. (2011) make reference to “information outside of formal campus resources” (p. 3), but as the line between formal and informal resources continues to blur, the necessity for valuable information literacy skills will become more focused.
Technology Trend Two

Johnson et al. (2011) describe trend two as “People expect to be able to work, learn, and study whenever and wherever they want” (p. 3). This trend, possibly more so than the other three, is one that directly relates to several components of library service, and in particular to the IC component of LibQUAL+®. The physical layout and hours of operation of libraries have adjusted to accommodate the patron need for more physical access to the collections and services. Spaces and floors have been transformed into learning commons (Accardi, Cordova, & Leeder, 2010; Beagle, 2010; Birdsall, 2010; Mirtz, 2010; Seeholzer & Salem, 2010), making space, computers, and materials accessible for extended hours and varying learning styles. Wireless connectivity has been increased so that patrons can access our services and collections from their personal computing devices (Barnett-Ellis & Charnigo, 2005; Feher & Sondag, 2008; Spires, 2008) or through laptops which are made available for loan (Chen & Mills, 2011; Feldmann, Wess, & Moothart, 2008; Sharpe, 2009). Through proxy servers and login procedures students and faculty are able to search and pull full-text articles from databases made available from the library website. Creating access points to library services, with minimal restrictions in regard to location or time, touches on issues of funding, staffing, physical infrastructure, and technology. Extending the hours that library services are available means additional staff to maintain desks, floor design considerations with regard to safety and access to other floors, and technology support for problems that occur after hours. Knowledge of patron desires with respect to these changes will greatly enhance the decision making capabilities of library administrators.
Technology Trend Three

Trend three (Johnson et al., 2011) states that “The world of work is increasingly collaborative, giving rise to reflection about the way student projects are structured” (p. 3). Group work is nothing new in learning theory, but technology is making it easier and more practical for students and researchers to collaborate more freely than ever before. The role of technology in education has led some to consider developing new learning theories that incorporate technology and the ways people use technology in information retrieval and knowledge formation. Siemens (2004) discusses a learning theory called connectivism, where

Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing. (Connectivism section, para 1)

Kop and Hill (2008) acknowledge that many of the tenets of connectivism have merit but feel that school systems, the teachers themselves, and many of the students are not yet ready for this type of theory to take hold. They point out that

A paradigm shift, indeed, may be occurring in educational theory, and a new epistemology may be emerging, but it does not seem that connectivism’s contributions to the new paradigm warrant it being treated as a separate learning theory in and of it’s own right. (Kop & Hill, 2008, p. 11)

Regardless of whether connectivism is a new theory or an extension of theories like behaviorism, cognitivism, or constructivism, both sides feel that a change is happening
and both see technology and new learning environments playing a role in the paradigm shift. Connectivism stresses the idea that learning takes place in a network and that learners rely on other people in the network to supply them with information for knowledge building and that knowledge may exist stored on the network as well (Siemens, 2004). Library services have been embracing this type of thinking for some time with their use of social media and embedding into course management software. Instant messaging, Skype, and text messaging are other ways in which the Library is attempting to stay on user-initiated networks. Librarians who reach out to faculty and make themselves available for library instruction sessions are also insuring that the library remains in view and connectable to any network that students and faculty create to enhance knowledge acquisition.

**Technology Trend Four**

The fourth and final trend described by Johnson et al. (2011) is “The technologies we use are increasingly cloud-based, and our notions of IT support are decentralized” (p. 3). Kang, Kang, Crago, Park, and Lee (2011, p. 3596) define cloud computing as delivering “applications as services over the Internet as well as infrastructure”. This idea of not only moving data but also services and applications to outside servers appears to be a relatively new area of interest to libraries. Rapp (2010, p. 16) briefly discusses an initiative by the Online Computer Library Center, or OCLC, to create an integrated library system that would move “license and subscription management, circulation development, and acquisition and workflow” to a cloud-based system. This would consolidate several different systems into one, possibly cutting down on costs. Olson
(2010) discusses the concept of cloud-based storage in relation to geospatial datasets and concludes that when these datasets are created locally they should be stored locally, but if they state or national level datasets they can be stored remotely in the cloud.

The critical challenges listed in Johnson et al. (2011) seem to echo many of the concerns in the library literature and are as follows:

1. Digital media literacy continues its rise in importance as a key skill in every discipline and profession.

2. Appropriate metrics of evaluation lag behind the emergence of new scholarly forms of authoring, publishing, and researching.

3. Economic pressures and new models of education are presenting unprecedented competition to traditional models of the university.

4. Keeping pace with the rapid proliferation of information, software tools, and devices is challenging for students and teachers alike. (p. 3)

Digital media literacy, scholarly publishing and metrics, budgetary concerns, and changing technologies are all concerns that effect decisions being made in academic libraries today.

Staley and Malenfant (2010) found very similar results in their environmental scan of trends in higher education. The instrument they developed asked academic librarians to rate 26 future scenarios on the probability they will occur, the effect the scenarios will have on academic libraries, and the speed with which the scenario will occur. The timeline that Stanley and Malenfant’s scenarios cover are the next 15 years for academic and research libraries. The results were displayed graphically, with the upper
right quadrant being the highly probable scenarios with an equally high impact value to academic libraries. The high probability/high impact scenarios that were demonstrated in the Staley and Malenfant (2010) study are summarized as follows: (a) textbooks and course materials will become more affordable and openly produced (p. 10); (b) openly peer-reviewed journals will be the preferred publication method of faculty (p. 10); (c) personalized curricula and more practical methods of student evaluation (p. 12); (d) technological advances will greatly assist in collaboration (p. 13); (e) there will be an increase cybercrime (p. 13); (f) the digital divide will grow larger creating a need for more remedial computer classes (p. 15); (g) handheld devices will be heavily used by students for collaboration (p. 18); (h) colleges and universities continue to value traditional publication strategies for tenure process even as the university press system weakens (p. 15); and (i) online education will become more popular, as well as accreditation programs and the ability to transfer from online program to another (p. 20).

**Digital Divide**

While the Johnson et al. (2011) report focused on higher education trends, the Staley and Malenfant (2010) report was focused on higher education trends as they will possibly affect academic libraries. Interestingly though, both reports, while intended for different audiences, resulted in very similar findings. An example of this would be the projected challenge in the Johnson et al. report dealing with digital media literacy and the probable scenario in the Staley and Malenfant report having to do with the widening of the digital divide. Johnson et al. seem to suggest that the ever changing nature of the technologies being used, the lack of concrete definitions of digital media literacy, and the
expectations of specific programs to incorporate digital media literacy into the curriculum, make it an area to watch. Staley and Malenfant (2010) suggest it is an area of upcoming change, but they describe a situation where more and more students entering higher education will be doing so from economically depressed situations. Those students coming from economically advantaged areas will be more tech-savvy, but as the economy shifts, more and more students will be coming from households where the technology was not available. The challenge for libraries will be to continue being innovative while at the same time designing services and providing instruction so that students from different technology backgrounds will be able to function.

Talukdar and Gauri (2011) used data from two phone surveys conducted in 2002 and 2008 to study the impact of several factors on Internet usage and access. Their results show that there is a statistically significant increase in the digital divide related to socio-economic and racial identifiers. The more money a person has the more likely they are to have Internet access at home, and White-Americans are more likely to have Internet access at home than are African-Americans. When investigating Internet usage times, Talukdar and Gauri found that the digital divide had grown during the time frame of the study with respect to urban versus rural living and in education attainment. People in urban environments spent more time online than in rural environments, and people with levels of education higher than high school had significantly higher levels of daily use of the Internet than those without a high school degree. While the digital divide is an economic issue, there are some interesting research findings that indicate that money and location are not the only factors that are causing a divide in computer literacy. Studies
exploring the technological capabilities of students of the academic library constituency are also valuable in this discussion, and will be discussed next.

Adebonojo, Ellis, Campbell, and Hawkins (2010) used state demographic data to determine that while economics and access were not issues with their freshmen class, skill level was a factor contributing to the digital divide. Prensky (2006, p. 28) described someone who has been around technology for their entire lives as a digital native, and those who came to technology later as digital immigrants. These same digital natives now make up the majority of students on a university campus, but what these reports seem to indicate is that these digital natives are not as technologically savvy as was first thought. Becker (2009) discusses the dangers of describing an entire group of patrons under one umbrella term like Millennials. Simply being born within a particular year range does not take in to account different cognitive styles, economic factors, or even vastly different life experiences. Becker continues by stating that even though many of the current generation are accustomed to the Web, these skills do not appear to be necessarily making the jump to other areas of computer or technological expertise. Becker (2009) writes that

The Web is a powerful tool. Yet we live in a plug-and-play, menu-driven, value-added universe in which the majority of technologies are designed, like most consumer products, for ease of use. Students are using services, such as Facebook, YouTube, eBay, gamesonline.com, and Google, designed to be extremely user-friendly, stable interfaces usable with the modicum of expertise (p. 351).
Becker goes on to say that while they enjoy using the computer, many are unable to do things like attach or upload files, track changes in a Word document, or create an Excel spreadsheet.

Libraries have been recognizing that many patrons are not accustomed to more intricate technology interfaces like the common OPAC. As previously discussed, libraries have been begun purchasing discovery layers, which essentially make the user interfaces more in line with what popular search engines like Google are providing. Patrons who are accustomed to searching for materials using subject heading fields and constructing search queries using Boolean terms can continue to use them, but the implementation of discovery layers enables the more novice researcher to scan multiple databases from a single search box. Undergraduates who are less often required to do extensive literature reviews may find the ease of a discovery layer search more familiar, which in turn may translate to more use of library-provided materials.

**Self-Efficacy**

The ease with which information can be gleaned from Internet searches has led some to suggest that researchers are starting to develop what might be called a false sense of self-efficacy with regard to searching capabilities. A small study (Fields, 2005) was conducted that interviewed undergraduates to investigate whether there were differences in information retrieval and knowledge building across gender lines. The results showed that the males and females reported different levels of comfort with trusting the quality of information retrieved from the Internet. While both groups were likely to go the Internet for information to answer the query of a friend, females were less likely than males to
answer the question given to them by a professor by using the Internet. The interviews with the male students showed that the convenience of searching the Internet was preferred over a library search. This could be an indication of the perceived difficulties students feel exist with library websites and the database interfaces the library purchases. Fields (2005) makes a point in the discussion of her findings that is pertinent to this current study in that her comment describes a student characteristic that has an enormous effect on how the library designs and implements services. Fields (2005) writes that:

In the context of this study students across the board exhibited a high level of self-efficacy in the domain of finding information for both topics; this is, a high level of confidence that they could fulfill their information needs…Most librarians, however, can attest that such high levels of confidence are not usually well deserved, and indeed all of Kuhlthau’s research cited here bears this out, especially her later investigations of student anxiety when they reach certain stages in the information search process. (p. 544)

Tien and Fu (2008) conducted a large study in Taiwan and among their findings were that while undergraduates were spending 19.13 hours a week on the computer, only 5 of those hours were spent on academic work. They also found that ethnicity and socioeconomic factors did not play a significant role in academic performance, but did have an effect on the ratio of time on the computer to academic work and computer skill. Of particular interest to libraries was the finding by Tien and Fu (2008) that

Students who utilized the library to search for books and articles displayed better learning performance than students who did not. In the study, however, nearly
one-fourth (23%) of college freshmen did not utilize such library resources. This is a warning sign to college educators in Taiwan. If students do not know how to access knowledge on their own, i.e. by utilizing library resources, it is difficult to expect them to become life-long learners in a knowledge-based society. (p. 433)

Lumping an entire generation in to one classification and then basing funding and strategic initiatives around that narrow definition is a dangerous avenue to take for libraries and librarians. Booth (2010) wrote about her experience with VOIP, describing a similar situation where an innovation involving Skype did not achieve as much success as expected due to a lack of understanding of the user group’s proclivity to using the particular service.

**Scholarly Communication**

Another area of overlap between the report by Johnson et al. (2011) and the Staley and Malenfant (2010) report is in the area of scholarly publishing. Johnson et al. (2011) discuss how the tenure process has not adjusted to the new ways in which faculty are able to publish their work and interact with colleagues in their fields. Staley and Malenfant (2010) describe the almost identical situation, and project that not only will academic departments continue to lag behind with regard to acknowledging the importance of online publishing, but that faculty will continue to publish more and more in online peer-reviewed formats. The 2009 Ithaka S & R Survey (Schonfeld & Housewright, 2010) found that while a third of those faculty responding to the survey felt the current system of tenure and promotion hindered their publishing options, even faculty that listed free accessibility as a priority still felt that “a journal being well-read
among one’s peers is the most important characteristic in its selection, and in every case free availability is among the least important” (p. 26). What all three of these studies seem to indicate is that while changes in technology have enabled scholarly communication to exist online and be freely accessible, the old way of communication through published scholarly journals is engrained in the system and slow to adjust.

**Online Learning**

A third area of agreement between the two reports dealing with higher education trends is the idea that online learning will lead to major shifts in how academic institutions provide their services. Both the Johnson et al. and the Staley and Malenfant reports describe economic factors and the change demographic and need of the student body are going to force institutions of higher education to change modes of instruction, the degrees and programs offered, and also compete with commercial entities offering the same types of classes and services.

**Collaboration**

Johnson et al. (2011) describe a trend towards collaborative student projects as a result of a more global economy. Stanley and Malenfant also discuss collaboration but do so in a more technologically focused way, by discussing the impact personal mobile devices will have on collaborative work and scholarship being done by students on university campuses. Libraries have already begun to adopt tools like Quick Response codes, or QR codes, and mobile web pages in an attempt to lure more patrons towards library services (Hampton, Peach, & Rawlins, 2011; Jackson, 2011; Walsh, 2010).
The Association of College & Research Libraries Research Planning and Review Committee (2011) conducted an environmental scan and their results mirror the trends mentioned in the reports and research mention in the first section of this literature review. The findings indicate that libraries need to focus on the changes taking place in higher education, technology, campus demographics, scholarly communication, and assessment practices. An interesting point raised in this article is that the number of tenured faculty on academic campuses is getting smaller.

The trends in higher education suggest that libraries need to not only pay attention to the technologies being used by faculty and staff on their campuses, but must also understand how faculty and student makeup on individual campuses can be just as important in determining service initiatives and planning for the future. Every campus is different, even if the campuses are designated as similar by ARL statistics or by Carnegie Classification. In regard to library service, academic disciplines vary on their opinions of what the library means to them. Some disciplines are more paper-focused, while others are more appreciative on online discourse. Technology use is often dependent on a number of factors including age of user, availability of resources in digital form, and whether instruction is being conducted in person or through online distance education.

The next sections of this literature review will focus on the similarities and differences between faculty and staff in how they relate to the above-mentioned issues and trends in higher education that relate specifically to libraries.
**Student and Faculty Population**

As shown from the analysis of trends in higher education, the common themes of these environmental scans revolve around technology, publishing, the economy, and the changes in the way students are learning and faculty are teaching. In order to understand the differences and similarities between students and faculty, it will be useful to first look at the research in the areas of technology, publishing, learning environments, and pedagogy broadly but then focus on the library literature to determine if there are consistent commonalities between faculty and students with regard to libraries in these particular areas.

**Generational Differences**

The Pew Research Center (2010) conducted a study of the Millennial Generation in which they identify a Millennial as someone between the ages of 18-29 at the time the survey was conducted in 2010. The other generations were also labeled and include: 1) Gen X which includes those between the ages of 30-45, 2) Boomer which includes those between the ages of 46-64, and 3) Silent which includes those 65 years old or older. The authors readily admit that age is not the only factor one should use when identifying an individual within a sub-group of society as a whole. As with the Pew Research Center study, this proposed study acknowledges that age alone cannot, in and of itself, be the sole factor used to characterize a patron as a student or a faculty member. Just as several of the articles discussed earlier (Tien & Fu, 2008; Booth, 2010; Becker, 2009), just because a student belongs to the Millennial generation does not guarantee technology skills that are greater than those of other generations. What might appear at first as savvy
use of technology might actually be well-designed technology that does not require a large amount of skill to use. The Pew Research Center study does show that different age groups self-identify themselves with different characteristics, and while Millennial (ages 18-29) and Gen X (ages 30-45) respondents say the use of technology makes them unique, the Gen X, Boomer (ages 46-64), and Silent (ages 65 and older) generations see themselves as being unique based on their work ethic. These results seem to indicate that while members of the older generations looked at in the study are capable of using technology, they don’t feel it defines them as much as the younger generation.

In another Pew Research Center study entitled Generations 2010, Zickuhr (2010) looked at the differences between the survey respondents in regard to the generation in which they belonged. Zickuhr expanded the generational labels in the previously discussed survey to include the following: 1) Millennial generation as those between the ages of 18-33, 2) Gen X generation as those between the ages of 34-45, 3) Younger Boomers generation as those between the ages of 46-55, 4) Older Boomers generation as those between the ages of 56-64, 5) Silent generation as those between the ages of 65-73, and 6) G.I. generation as those who are 74 years of age and higher. The findings in Zickuhr study seem to indicate that Millennials still “remain more likely to access the internet wirelessly with a laptop or mobile phone” (p. 2), and are more likely to use instant messaging, social networking sites, blogs, and virtual worlds. Also suggested in the findings is that Gen X and older generations are more likely to visit government websites and use financial information retrieved from online sources. However, while there are differences in the ways that the different generations use technology, the older
generations are moving in the direction of the Millennials when the results of previous surveys are used as a comparison. The author makes particular note of the growth rate of “older adults’ participation in communication and entertainment activities online, especially in using social network sites such as Facebook” (Zickuhr, 2010, p. 2).

The two studies discussed above indicate that there is a difference in the way technology is used by different age groups, and additionally the different age groups identify themselves with technology in different ways. This is an important factor for libraries to understand when they attempt to consider their patrons in the planning process. Knowing that older patrons are less likely to take advantage of wireless capabilities and are less likely to download and use a mobile phone application are valuable pieces of information for library administration when deciding which projects to fund.

A large review of generational studies conducted by Tenopir and Rowlands (2007), looked at generational characteristics, but rather than focusing specifically on technology, they instead focused on library-related information seeking behavior. In one study looking at reading behavior of students which was broken down by age, the results showed that readers over the age of 22 were more likely to read in the laboratory or an office compared to those under 22 who read in the library or at home. While this study was looking at students and not faculty, it is safe to assume that faculty would also be more likely to read in their offices or departments because they have that place to go, whereas students who are on campus must use what is available to them, which is often the library. Additionally, faculty and students were surveyed separately to determine how
many journals articles each read in the last month. Across all ages faculty had a mean articles read of 23.75, whereas students across all age groups had a mean of 15.59 articles read. This shows a difference in reading habits of journal articles between the two sub-groups of library patrons, faculty and students.

In the same research review, Tenopir and Rowlands (2007) examine faculty reading behavior, and break faculty down by age group. Their study showed that only 15.2% of their faculty sample was under 30 or over the age of 60, with the majority of faculty falling between the ages of 31 and 60. Re-emphasizing what the Pew Research Center study above pointed out, age and generational categories are not the only factors needed to understand individual practices and preferences, but used together with other factors can help to predict behavior.

**Distance Learning**

Thomsett-Scott and May (2009) surveyed faculty teaching distance learning courses. Basing the questions on comments obtained from an earlier LibQUAL+® survey, the results were somewhat similar and led the researchers to suggest that marketing the library services to faculty would be a benefit in this situation. Another grievance reported in these survey results was that multiple authentications should be eliminated and user interfaces should be simplified. A desire for simplification stopped, however, as very few professors linked to reference chat function provided by the library or to the tutorials that have been made to explain library services and provide help with obtaining resources. Kyei-Blankson, Keengwe, and Blankson (2009) found similar results when they reported that only 27.3% of students they surveyed responded that their
instructors used technology like chat in their courses. This brings up an interesting
difference between student and faculty perceptions of library services as, not only are
faculty using the library for their own research but they are also using the library as a tool
in their instruction. On the other side of that statement, students can give their perceptions
of the library services as those services relate to their research and class needs, but
additionally they may be using the library more as a space than their instructors. More
than any other demographic information about students or faculty members, the use of
the library by each of these patron types is, by definition, different based on their
academic standing on campus.

A citation analysis performed by Pancheshnikov (2007) explored the similarities
and differences in citing behavior of faculty publications versus student theses. The
results showed that while faculty and students were both using journal articles for over
75% of their citations, faculty citations were more varied in regard to journal title. The
citation analysis results were framed in the context of collection management, but it
demonstrates a difference between faculty and student uses of library materials. While
both groups are using the collection and using monographs, journal articles, and other
material types, there is a difference in the depth of source acquisition.

Faculty Perceptions

Tenopir and Rowlands (2007) reviewed data from a CIBER survey dealing with
Google usage for discovering articles and point out that of the faculty members
responding to the survey under the age of 26, 56.9% of them are either ‘dependent’ or
‘very dependent’ on Google. Those percentages appear to drop and remain consistently around 40% for the other age groups.

Exploring another CIBER dataset, Tenopir and Rowlands (2007) investigated how students and faculty combined view their dependence on the physical library and again break the results down by age. The data shows a drop in dependence from ages 26 and on, which seems to reiterate the previous data examined by the same authors. That data shows that regardless of the age of faculty and staff, there is still high percentage of those populations that are dependent on the library catalog for finding books. This can be viewed as a strong reason to continue investing in the catalog by implementing discovery layers or more user-friendly interfaces, especially when a majority of library users are dependent on Google and its user-friendly interface.

Ismail (2010) writes of a study conducted to gather information about distance learning faculty and students and their opinions on library services. This study showed differences in how faculty and students were identifying with the library. While students who hadn’t had formal library instruction were having difficulty searching through library resources, faculty responded that they were handling the library instruction component of their classes. Both levels of user reported using services like InterLibrary Loan and access to online journals, but only students reported taking advantage of online chat and reference services. This survey broke faculty up into full-time and part-time faculty, noticing some differences in how these two groups responded in regard to the abilities of their students. While part-time faculty felt their students were better able to
navigate library resources than the students of their full-time counterparts, part-time faculty also reported more problems with locating library materials.

Imler and Hall (2009) make an interesting point that “a large portion of academic faculty, however, completed their undergraduate and even, for some, their graduate degrees by poring over print indexes and locating articles in the only manner available, print” (p. 65). The research project involved faculty perceptions of student use of print versus electronic journal articles, the results being that the faculty underestimated the student’s use of print material and also were perhaps unfamiliar with current citation practices for electronically accessed materials. This type of generational divide is one of the most obvious differences between students and faculty.

A large-scale longitudinal study (Housewright & Schonfeld, 2008), conducted in 2000, 2003, and again in 2006, gives several different perspectives on how faculty view the importance of libraries and the services they provide. The survey of faculty focused on three roles of libraries; purchasing, preservation, and as a gateway for research. These roles were defined as follows:

The purchaser role was described in the survey by the statement “the library pays for the resources I need, from academic journals to books to electronic databases,” the archive role by “the library serves as a repository of resources – in other words, it archives, preserves, and keeps track of resources,” and the gateway role by “the library is a starting point or ‘gateway’ for locating information for my research. (Housewright & Schonfeld, 2008, p. 5)
The results indicate that the highest rated role is that of purchaser, followed by preservation, with gateway being the lowest rated role. In the introduction to their report, Housewright and Schonfeld (2008) state that,

For libraries in particular, a deep understanding of the information needs of a scholarly community and how existing services mesh with these needs is essential in order to effectively serve and remain relevant on the modern campus. To succeed in the internet age, libraries must be aware of which traditional roles are no longer needed and which potential roles would be valued, and strategically shift their service offerings to maximize their value to local users. (p. 4)

Housewright and Schonfeld (2008) also discuss the issue of library visibility. As libraries provide better access to resources electronically, faculty members develop the misperception that they are becoming more independent in the research process. Resources that may appear to be freely accessible from an internet search in a faculty office are really being provided through a library subscription.

In regard to a question dealing with the “Starting point for research identified by faculty, by discipline” (p. 10), Housewright and Schonfeld (2008) state that regardless of discipline, faculty members rated the library building as lowest, as compared to search engines, the OPAC, and electronic research databases. This same type of finding came up in the Head and Eisenberg (2010, p. 7) survey that showed undergraduates preferred research sources like course readings, search engines, and research databases, over librarians. “Researchers no longer use the library as a gateway to information, and no longer feel a significant dependence on the library in their research process” (p. 30).
While Housewright and Schonfeld do point out that there are differences between faculty who work in the humanities, social sciences, and sciences, and that discipline area alone is not the only factor that can be attributed to library perception. They discuss economics faculty as a patron type that has changed drastically since the first survey was conducted in 2000. While economics faculty originally preferred paper and less electronic, as more resources became available to that area of study electronically, opinions shifted on the importance of maintaining a physical paper collection versus electronic only. While the humanities still show a preference for a physical collection, if more materials become available electronically, it would be interesting to see if they would become less attached to physical collections as well. Housewright and Schonfeld (2008) state that

> It is important to recognize that generally, scholars do not prefer a certain format simply out of emotional attachment, but because that format allows them to work most effectively and efficiently. As new tools emerge and mature, however, the format which best supports scholarship may shift, and preferences and practices may shift to whichever format best facilitates scholarship. (p. 14)

In a large-scale continuation of the multidisciplinary survey of faculty perceptions mentioned above (Guthrie & Housewright, 2011), it appears there is shift in what faculty view as important roles the library fills. The library acting as a gateway for information gathering as well as an archiving agent, have both dropped in importance, whereas the library as a buyer of material has increased. Additionally, while access to journal articles is still important, archiving paper copies is no longer as important to faculty as it once
was. These opinions seem to vary in strength depending on the academic discipline answering the question, but it is a strong indication that perception of library worth is changing. What Guthrie and Housewright (2011, p. 86) refer to as “electronic hub”, similar to what Holden (2010, p. 43) refers to as the “sphere of access”, seems to be the direction libraries are heading. In addition to the core functions of the library in the past (gateway, archive, and buyer), the two additional functions of teaching support and research support were added to this edition from the previous incarnations of this survey. Faculty was split by discipline, and further by level of faculty status, on the importance of these two areas. Breaking faculty patron type down further may be of interest in further studies that are larger than one institution.

Roblyer, McDaniel, Webb, Herman, and Witty (2010) conducted a small study on the differences between faculty and students on their use of Facebook. In addition to looking at how the social networking site was being used by each group, the authors also explored how the respondents felt it should be used for educational purposes. Perhaps not surprisingly, neither group overwhelmingly embraced the use of Facebook for classwork, but students were more likely to acknowledge the possibility than were faculty. While the authors admit their response rate was low, this study brings up a common problem that libraries face in dealing with the changing technical landscape. As Booth and Guder (2009) point out, user input is critical in determining which services and technologies should be explored by library personnel. Although the expertise required to set up an account on a social networking site is minimal, the time required to add content and maintain the page may be time better spent in other areas if the patron population is not
interested. Patron acceptance of social networking sites goes back to the idea of innovation being a subjective term. An innovation will only exist as such if enough of the population considers it to be an improvement over what has come in the past.

**Student Perceptions**

A large national study conducted by Head and Eisenberg (2010) investigated the information and evaluation usage of students attending 25 universities and colleges. One interesting finding is that while librarians assume students are using Web 2.0 applications, few respondents to this survey reported using these technologies for school-related collaboration or managing research skills. The survey results suggest that students will more frequently go to their instructors for help evaluating research as opposed to the 11% that indicated they would go to a librarian for assistance. When asked about sources used for course-related research, scholarly research databases were ranked third, behind course readings at the top of the list and search engines at number two. This seems to indicate that while there are many characteristics that are different between faculty and student populations, there is still an emphasis on scholarly journal access.

Law (2009) gives a synopsis of the literature of environmental scanning and discusses some future characteristics of library services. An interesting point he makes is that libraries are a trusted brand. Libraries are “seen as neutral, impartial, disinterested, and helpful” (Law, 2009, p. 61). Law sees libraries as moving towards new possibilities in terms of services offered to the campuses they serve.

In 2009 the Primary Research Group, a private organization that conducts research to assist organizations in identifying areas of interest in their clientele,
conducted a series of surveys aimed at academic library usage. Survey results from the survey dealing with research practices and skills (Primary Research Group, 2009a) have two findings that are relevant to this proposal. One third of the respondents said that most professors do not mention the library as a resource. Another finding of interest is that approximately 75% of the respondents either agreed or strongly agreed with the statement “I feel I am well versed in what the library has to offer and can use the various databases and collections easily or learn to use them easily” (Primary Research Group, 2009a, p. 109).

As mentioned earlier, Fields (2005) looked at the effect gender played in the self-efficacy of undergraduates. The small study was done with only 10 students, 5 male and 5 female, and explored what sources the students would turn to help a friend versus the sources they would use for a professor, how confident they felt about finding these resources, and finally they were asked to define “locating information” and “constructing new knowledge” (Fields, 2005, p. 541). While this sample of students was very small, there were differences in how males and females perceived their abilities and where they would go for information. The females were less likely to go to the Internet for trustworthy sources than the males, but both sexes did use the Internet. The females also felt less confident in their searching skills for the academic paper for their professor than the males surveyed. In the discussion section of the article, Fields (2005) writes with regard to the Internet that

They may assume that knowledge, as well as information, can be found there. If students’ perceived self-efficacy derives in part, as Bandura says, from their prior
experience, then general comfort with the Internet may account for their faith that information, and knowledge, is out there – on the Web – in the library, or somewhere – if they only search long enough for it. (p. 544)

Another survey, this one looking examining use of academic library reference services, also shed some light on usage by students. Among the findings, the Primary Research Group (2009b) found that a very limited number of students contact a reference librarian by email, instant message, telephone, or through the website. Another finding is that while two-thirds of the respondents felt they knew the library resources available to them for the major area of study, less than 6% of them were able to identify the librarian for that area of study. The portion of the survey that centered on library workstations found some interesting results. Approximately 52% of the students surveyed said they probably wouldn’t use laptops if they were supplied them by the library, but that number went up with students from lower income brackets. Over 75% of the students had accessed the library website from off-campus, and 99% were satisfied with the options provided to them with regard to Internet access.

Primary Research Group (2009c) found that nearly half of those surveyed felt that the library should have extended hours. Additionally, 55% of students had used a computer in the library in the last month, 60% had studied in the library in that same month, and 38% of respondents had attended a group meeting in the library in the last month.
Carnegie Classification

Articles included in this discussion of Carnegie classification will pertain to the two areas being explored in this proposal that relate to faculty and student populations and to academic libraries.

Orr, Head, and Nance (2010) used Carnegie classification as a tool for library collection development and created lists of electronic resources that were commonly held by the institutions in their Carnegie class.

Connell (2008) used Carnegie classifications to determine how academic libraries of varying sizes and focus dealt with Web design. One finding from this study indicates that Web designers from master’s and doctorate level institutions are more likely to be self-taught than their counterparts in associate’s, baccalaureate, and special focus colleges. A reason given for this is the availability of coursework related to Web design; the implication being that more of this coursework is being taught at the associate’s institutions than in the others. Another difference noted is that compliance with the Americans with Disabilities Act (ADA) is required at the smaller associate’s institutions more than at the larger institutions. With regard to the technologies being used, the results show that the smaller the institution, the more likely they are to use a content management system (CMS) and conversely, the larger the institution the more likely they are to use database-driven systems.

Applegate (2008) used Carnegie classification in her study of reference transactions at doctoral, master’s, undergraduate, and ARL libraries. Her question dealt more with how ARL membership libraries might be skewing the figures relating to the
numbers of reference transactions going down. Her study is interesting because it did show a decrease overall in reference interactions at all levels of institutions, but when a ratio was created incorporating questions to number of librarians, transaction have increased at all institution types except ARL libraries. The separation of non-ARL doctoral institutions and ARL institutions make this less relevant to the current proposed research. Factors contributing to the numbers of transactions going down include the increased use of the Internet as a first source of information, the push for information literacy training, librarian liaison programs, and virtual or chat reference not being fully implemented.

Doolittle and Lusk (2007) used 7 different levels of undergraduate Carnegie classification institutions and gender to explore faculty inclusion of specific syllabus components. Their results showed that there was no clear pattern of inclusion to syllabi, and that there were significant differences in syllabus components across institution type.

In a study done by Meyer and Xu (2007), 41 variables were examined to analyze what factors influence faculty use of technology from 16,914 faculty survey responses. Technology use was classified by whether or not faculty used email and websites, or some combination of the two, in their classroom instruction. The 41 variables were divided into individual and institutional-level factors. The only institutional-level variable that made it into the final model was Carnegie Classification. In their discussion of the results, Meyer and Xu (2007) state that

Perhaps the indirect influence of Carnegie classification is through the institutional type’s relative emphasis on teaching. This may also be how the
institution acquires resources (especially in states where institutions are funded on a per-FTE-student basis), so the teaching role of faculty increases the resources available (p. 193).

Another study that looks at the impact that a mission of teaching and learning has on faculty is the study by Cox, McIntosh, Reason, and Terenzini (2011), which specifically explores how campuses encourage an emphasis on learning and education with respect to the faculty teaching on the campus. The authors look at characteristics of 5,612 faculty members across 45 institutions to determine which variables seem to impact acceptance of institutional policies relating to a focus on teaching and learning. The variables in this study were faculty characteristics, institution characteristics, whether or not there were policies in place supporting teaching and learning, as well as whether or not, and to what degree, faculty perceived these polices and as being shared and acted upon. Their findings indicate that the institutional policies relating to teaching and learning had no direct relationship with how the faculty practice teaching and learning.

As Cox, McIntosh, Reason, and Terenzini (2011) point out, “…the faculty-teaching culture is strongly related to an institution’s size, selectivity, control, and Carnegie classification, as these variables collectively explain 43.6% more variance than the policy variable alone” (p. 821). With regard to the difference between doctoral-granting institutions, Cox, McIntosh, Reason, and Terenzini (2011) concluded that, “Together, the results suggest that, while considerable variability in teaching practices remains even among schools that do not offer doctorates, there is also a
considerable difference between doctorate-granting institutions (collectively) and their non-doctoral counterparts” (p. 821).

**LibQUAL+®**

The dataset for the research being discussed in this proposal comes from the 2009 implementation of the LibQUAL+® instrument at a university in the Midwest. At this point, before moving into the methodology chapter of this proposal, it will be beneficial to look at the LibQUAL+® instrument in regards to the development of the instrument and reliability, before looking at specific examples of how the instrument has been used.

LibQUAL+® is a survey instrument designed to measure library service quality. The LibQUAL+® survey design was adapted from a survey called SERVQUAL which was developed using gap measurement theory. The LibQUAL+® instrument moves away from lists of holdings and addresses the success of library services as seen through the eyes of those receiving the services. The LibQUAL+® survey is composed of three separate sections, with a total of 22 core questions, and an additional section where the local institution can submit up to five questions of their choosing. Patron type, as well as age and discipline are also gathered as demographic information. The three main sections of LibQUAL+® are Affect of Service, Information Control, and Library as Place. The Affect of Service questions deal with the users perceptions of the staff in the library. The Information Control questions relate to the quality of the collection and the ability to access the materials within the collections. Library as Place relates to the compatibility of the physical space to research and study. Each section of LibQUAL+® asks questions across three levels of service; the minimum level of service the patron expects, the
desired level of service the patron hopes for, and the perceived level of service being offered at the library. This type of data enables the reviewer of the survey results to see not only how well the library is doing in the eyes of the patrons, but it also allows for the creation of gaps between where the patron thinks the library should be and where the library is, as well as where the patron thinks the library is and the lowest possible level of performance. LibQUAL+® refers to these as the Superiority Gap and the Adequacy Gap. Knowing how specific patron types respond to questions within each of the three above mentioned categories informs the planning and implementation of future library initiatives and the dispersal of funding dollars.

In one of the earliest articles about the development of the LibQUAL+® survey (Cook, Heath, & Thompson, 2001b) the modification of the existing SERVQUAL survey into the first incarnation of the LibQUAL+® survey is explained. The authors describe how Gap Theory is relevant to the library setting but that SERVQUAL, which was designed for establishing benchmarks in the public sector, was not a tool that could be used unmodified in the library setting. SERVQUAL, for example, asked questions about how the staff was dressed, something of importance to store or restaurant patrons, but not as important to library patrons (Association of Research Libraries, 2011c). A literature review was conducted so that additional items could be added to the SERVQUAL instrument that better suited the library environment. The resulting survey, LibQUAL+®, was then administered to 3,987 participants and the results were looked at to determine whether what the authors term the second-order perception of service quality interacts with more specific first-order perceptions. What the authors suggest in their findings is
that while library service quality can be broadly rated by the LibQUAL+® instrument, there are more specific levels that can used as benchmarks as well. Recognized as five sublevels below overall perception were 1) Library as a Place, 2) Empathy with User Needs, 3) Access, 4) Collections, and 5) Reliability.

Using what appears to be the same dataset, Thompson, Cook, and Heath (2001) examine reliability and how well the dimensions of the instrument accurately convey user perceptions of library service across subgroup responses to the items on the LibQUAL+® instrument. Their results indicate a high level of reliability for the items (Thompson, Cook, & Heath, 2001, p. 132). Additionally, across each of the items, undergraduates, graduates, and faculty had similar scores, which led the authors to conclude that these groups have similar opinions about library service quality.

Thompson, Cook, and Kyrillidou (2005) conducted a large-scale analysis to explore the validity of LibQUAL+® scores. There were over 88,000 participants, both faculty and students, who took either the American English or British English versions of the instrument. The results indicated that the scores measured satisfaction over outcomes, but that there are variations in how much each sub-scale of the instrument measure satisfaction. In other words, the LibQUAL+® instruments is more correlated with statements about service satisfaction than with statements about enabling research or staying current with trends in the field. With regard to validity, both the American and British versions had similar scores for undergraduate and graduate students, as well as faculty, suggesting that there is “equivalent validity across these cultures and across these three respondent groups” (Thompson, Cook, & Kyrillidou, 2005, p. 520).
Heath, Cook, Kyrillidou, and Thompson (2002) explored the psychometric validity of LibQUAL+® scores. It was determined that the scores for the separate subscales within LibQUAL+® and the total scores were highly correlated. This can be seen as a justification for using total scores in this current dissertation research.

In a large study conducted using LibQUAL+® data from 37 ARL libraries, Jaggars, Jaggars, and Duffy (2009) explored service priorities between the user groups of staff, undergraduate students, graduate students, and faculty, across the three dimensions of LibQUAL+® scores. Their findings show that there are significant differences between the way library staff view the importance of information control, affect of service, and library as a place. Their results also show that students and faculty vary on where they place each of the subsets of LibQUAL+® in terms of importance. For example, in regard to library as a place, undergraduates rated these items higher than faculty, and with affect or service, all user groups rated this lower than library staff.

Kayongo and Jones (2008) discuss an analysis of LibQUAL+® results broadly at first but then begin focusing on faculty perceptions, specifically on the Information Control component of LibQUAL+®. Their results indicated that regardless of patron type, in this case undergraduates, graduates, and faculty, the top three areas perceived as problematic were all found in the Information Control section of LibQUAL+®. While the top three service areas that needed to be improved upon were all Information Control questions, except for one question that all agreed on, each user group varied in their responses. This led the researchers to conclude that “…there were differences in needs and expectations about library services among faculty, graduate students, and
undergraduates and that each group must be considered when making service improvements” (Kayongo & Jones, 2008, p. 138). Of the three sections of the LibQUAL+® instrument, the Information Control section is most associated with access issues and decisions. The response rate for the study was large, with 2737 completed surveys possibly due to the incentives offered which included six video iPods. Once the authors analyzed the data for their institution, they then expanded the analysis to include other ARL libraries that had taken LibQUAL+® in 2006 as well. What they found was that faculty at these other institutions were also dissatisfied with components of the Information Control section, and specifically with the question “Print and/or electronic collections I require for my work”. This question, which is the eighth question in the Information Control section (IC8), is often a problem area for libraries who conduct a LibQUAL+® survey. It is not a complaint that is specific to faculty however, as Kayongo and Jones also noted that it was the number one area of dissatisfaction for graduate students, and the number two dissatisfaction with undergraduate students.

A month after the Kayongo and Jones (2008) article was published, another study was available that dealt specifically with the problem of IC8 and faculty perceptions. Self (2008) explored LibQUAL+® results for consecutive years for 37 ARL libraries and discovered that faculty, as well as graduate students, consistently gave IC8 negative scores. Follow-up interviews were conducted and the problems for faculty included confusion with access, electronic access that did not work well, and browsing capabilities need to be improved, as well as other issues about specific collection shortfalls (Self, 2008, p.11). Results varied by academic department, but in the survey of 37 ARL
libraries, the size of the collection did not seem to be a factor, as faculty discontent was, with the exception of a few institutions, below the minimum in regard to journal collections. Across the ARL libraries studied, graduate students rated the journal collections slightly higher, but their scores were still below the minimum service levels. This study focused on the Information Control section of LibQUAL+® but also briefly discussed that ARL faculty don’t hold the Library as Place section of LibQUAL+® at nearly the same expectation level, and for the most part, the perception of service quality was positioned positively between the minimum and desired levels. Self (2008) concludes by writing that “When it comes to libraries, journals are the most important item for faculty, and the source of their greatest dissatisfaction. How faculty feel about the library is closely aligned to the feelings toward the journal collections” (p. 11). This was found in the earlier study of Wei, Thompson, and Cook (2005) when they found that faculty gave higher ratings to accessible journals being available in their home or office than did undergraduates and graduates.

A component of the study completed by Thompson, Kyrillidou, and Cook (2008) explored desired scores across user groups. This study analyzed data from three consecutive years of LibQUAL+® scores for both American and British versions of the instrument. One difference they found between user groups was that both the American and British undergraduate students found the item about modern equipment they can use to access information as desirable, whereas faculty did not include this item in the top five most desirable. The authors suggest that undergraduates rely more heavily on their institutions to provide the computers necessary for them to do their work. One interesting
difference between American and British undergraduates was that the Library as Place component was important to the British students but not to their American counterparts. Faculty, it seems, rated the library as a gateway low in desirability, which seems to correspond with the Ithaka study mentioned in this literature review.

Heath, Cook, Kyrillidou, and Thompson (2002) explored the differences in the way different user groups responded to perception of library service quality and found that in general all user groups had little difference in perception scores. The version of LibQUAL+® being used in the aforementioned study included library staff in addition to faculty, undergraduates, and graduate students. The authors state that the results of their study “suggest that users may have similar perceptions of library service quality regardless of their vantage points, even though there are some differences in the service needs of these groups” (Heath, Cook, Kyrillidou, & Thompson, 2002, p. 39) but suggest that further study is merited.

Cook, Heath, and Thompson (2001a) investigated score reliability by comparing graphic rating scales that were unnumbered, where the respondent used a slider to represent their score, and a Likert scale. Their results showed that while there were some differences, primarily in the Library as Space sub-scale of LibQUAL+®, that the differences were minor, and that both types of user rating systems showed score variance which in turn led to higher score reliability.

Roszkowski, Baky, and Jones (2005) investigated whether the superiority score or the perceived score was a better predictor of user satisfaction with library services. The superiority score is one of the results that are reported to libraries who have taken the
LibQUAL+® instrument and is determined by subtracting the perceived score from the desired score. The results of their analysis indicate that the superiority gap does not correlate as well as the perceived scores with the criterion that made up the supplemental questions of LibQUAL+®. The authors suggest that it may be more beneficial to eliminate the minimum and desired ratings and stick with the perceived rating only, as lengthy questionnaires can be burdensome and people have a difficult time distinguishing between minimum and desired. The authors stipulate that respondents would naturally want the best service.

Wei, Thompson, and Cook (2005) explored two alternatives to studying LibQUAL+® results. The authors compared polytomous item response theory (IRT) to using means to analyze and report the survey results. Their study concluded that the results from both methods were similar and that means could be used for analysis and the use of a more elaborate model of analysis was not necessary.

**Summary of Literature Review**

The literature described above shows that not only are the trends in higher education tied to the services that academic libraries provide, but also that the students and faculty using academic library services have different priorities and concerns with regard to those library services. Additionally, LibQUAL+® is an instrument that can and has been used to determine differences in the academic population with regard to perceptions of library service quality. More specifically, the IC component of LibQUAL+®, relates directly to the technologies that are trending right now in higher education.
The next section of this dissertation will deal with the experimental design and identify the variables of the study,
Chapter 3: Methodology

This study explores the difference between faculty and student responses to the LibQUAL+® survey conducted at two mid-west universities. The study is a non-experimental design using a three way between-within subjects ANOVA as the method of analysis. The analysis was conducted on a pre-existing dataset composed of responses to the 2009 administration of the LibQUAL+® instrument created by the Association of Research Libraries. The study is important, as it will add to the literature that surrounds the analysis of LibQUAL+® results by using an alternative method of analysis to investigate opinions on service quality across the patron types of undergraduate students, graduate students, and faculty members. It is hoped that this investigation will add another layer of depth to the survey results and further aid Libraries in their efforts to meet the needs of its patrons.

Research Questions

The research questions are:

1. Are there significant differences between the minimum, perceived, and desired scores for library service quality?
2. Are there significant differences between the levels of Carnegie Classification with respect to the minimum, perceived, and desired scores for library service quality?
3. Are there significant differences between the levels of the respondent group with respect to the minimum, perceived, and desired scores for library service quality?
4. Is there a significant interaction between the Carnegie Classification of an institution and the level of respondent?

5. Is there a significant interaction between the Carnegie Classification of an institution and the minimum, perceived, and desired scores for library service quality?

6. Is there a significant interaction between the level of respondent group and the minimum, perceived, and desired scores for library service quality?

7. Is there a significant interaction between the level of respondent group and the Carnegie Classification of an institution and the minimum, perceived, and desired scores for library service quality?

Null Hypotheses Equations

The null hypotheses equations for the above questions are complex and may cause more confusion than clarification. The example below is for research question number 3.

\[ H_0: \mu_{\text{min under grad}} - \mu_{\text{min graduate}} - \mu_{\text{min faculty}} \]

\[ = \mu_{\text{perc under grad}} - \mu_{\text{perc graduate}} - \mu_{\text{perc faculty}} \]

\[ = \mu_{\text{des under grad}} - \mu_{\text{des graduate}} - \mu_{\text{des faculty}} \]

As the research questions become more complex, the corresponding equations become difficult to produce in a way that offers clarity. For this reason the equations were removed from this report of findings.
Variable Definitions

Patron Type

The first between-subjects or between-group variable in the experimental model will be the patron type or academic level of the respondent. Individuals are classified as one of three patron types: faculty, undergraduate student, or graduate student.

Carnegie Classification

The second between-subject or between-group variable is the Carnegie Classification of the two university communities being studied. In this particular study the institutions are designated as RU/H or Master’s M. As was stated in Chapter One, Master’s M is a level of Carnegie Classification that indicates a school has awarded 100-199 master’s degrees in 2008-2009, but less than 20 research doctorates, and RU/H is the level of Carnegie Classification that signifies a doctoral granting institution with at least 20 doctoral degrees awarded in 2008-2009 and meets the requirements for levels of research activity and per capita research activity.

Satisfaction Levels

The within-subjects or repeated measures variable in this experimental model is the patron expectations of satisfaction for Information Control with three levels. The three levels are composite variables composed of the mean service quality scores of the eight IC questions for minimum, perceived, and desired levels. Each participant in the study is asked the same questions dealing with expectations of service quality, so each participant has a score for minimum, perceived, and desired service quality. As it has been stated previously in this document, the service quality scores for this proposed
research are being taken from two data sets created from the implementation of the LibQUAL+® survey at two separate institutions in 2009.

**Information Control Questions**

The LibQUAL+® survey instrument is designed so that each question is followed by three 9-point Likert scales with a range of 1 to 9. The three Likert scales represent the minimum, perceived, and desired levels of service for each respondent. An excerpt of the actual LibQUAL+® instrument is available in Appendix B. The 22 core questions on the LibQUAL+® survey are broken into the themes of Affect of Service, Library as Place, and Information Control. Of interest to this research project are the 8 questions that make up the Information Control component of the LibQUAL+® survey. Those 8 questions (Association of Research Libraries, 2009, p. 45) are as follows:

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

**Identification of Population**

The population for this study is students and faculty at two universities in the Midwest. At the time of the LibQUAL+® survey implementation the Carnegie
Classifications for the schools were RU/H and Master’s M. The LibQUAL+® survey that is being used for this analysis was conducted in March of 2009, so population statistics are for the 2008-2009 school year. According to the statistics compiled by the libraries for submission to LibQUAL+®, there were 19,946 students (undergraduate and graduate) and 1,746 faculty members on campus during the 2008-2009 school year at the RU/H institution. Of the 167 respondents that identified as themselves as faculty, 3 were Adjunct Faculty, 56 were Assistant Professors, 58 were Associate Professors, 5 were Lecturers, 42 were Professors, and 3 listed as “Other Academic Status”. Of the 242 Undergraduate respondents, 49 identified as first year, 59 as second year, 53 as third year, 61 as fourth year, 18 as fifth year of above, and 2 as non-degree. The Graduate students identified as 74 Master’s level and 54 as Doctoral level.

At the Master’s M institution, there were 2967 students (undergraduate and graduate) and 380 faculty members on campus during the 2008-2009 school year. Of the 319 respondents, 32 were identified as faculty, with 0 Adjunct Faculty, 7 Assistant Professors, 10 Associate Professors, 3 Lecturers, 10 Professors, and 2 “Other Academic Status”. There were 258 Undergraduate respondents, self-identified as 52 first year students, 61 second year students, 82 third year students, 59 fourth year students, 3 fifth year or above, and 1 as non-degree. There were 9 Graduate student respondents, self-identified as 8 Master’s level and 1 Doctoral level.

These initial figures were then reduced during the data screening described at the end of this chapter.
**Sampling**

According to the primary liaison for LibQUAL+® at the RU/H library being examined in this study:

Samples were pulled by the [campus] Office of Institutional Research during the first week of spring quarter. This assured the affiliation of the prospective participants and provided the most current email addresses. We excluded the College of Osteopathic Medicine and the regional campuses; we included all students who have been identified as having physical disabilities and/or from minority groups. The sample size was 5,000 undergraduate students, 1,000 graduate students, and 881 faculty members. The sampling was not specific to academic areas. (Name withheld, personal communication, March 14, 2011)

According to information obtained from the Master’s M institution, the entire campus was invited to participate in the study.

**Power Analysis**

According to the liaison from the Office of Institutional Research for the RU/H university being studied (Name withheld, personal communication, September 26, 2011), an attempt was made to achieve an 20%-25% response rate so, as mentioned previously, a simple random sample of 5,000 undergraduate students, 1,000 graduate students, and all 881 faculty members were chosen to receive the survey instrument. Using the GPower 3 effect size calculator (Faul, Erdfelder, Lang, & Buchner, 2007), these numbers allowed for a power of .95 to be used to detect a small effect size at alpha = .05.
Analysis

The method of analysis used in this research study is a three way between-within subjects ANOVA. This type of analysis can be accomplished using LibQUAL+® survey results because each survey respondent has been measured for library satisfaction under three separate conditions. The measure is the mean for library service satisfaction, and the three conditions are minimum, perceived, and desired levels of service. The library service scores are each obtained from a 9 point Likert scale and are each measuring service quality, which creates three separate commensurate scores, making a repeated measures ANOVA possible.

Assumptions

A Mauchly’s sphericity test was conducted to determine if the differences in scores across the repeated measures variable of service quality have equal or unequal variances. If the variances are equal, as shown by a probability level higher than .05 in the Mauchly’s Test of Sphericity table in the SPSS output, then sphericity can be assumed and the F-statistics can be explored. If the variances are unequal, as shown by a less than .05 probability level, then sphericity is said to be violated. Field (2008) states that a violation of sphericity can be corrected by using the estimates of Greenhouse and Geisser, Huynh and Feldt, or the Lower Bound estimate, depending on the level of error variance. Field recommends using Huynh-Feldt if $e>.75$ and using Greenhouse-Geisser if $e<.75$. According to Tabachnick and Fidell (1996), the problem of homogeneity of covariance, or sphericity, can occur in a mixed design such as this, and profile analysis is suggested as a way to “circumvent some of these problems” (p. 46). Seltman (2010)
recommends a profile plot as well as the post-hoc tests of Tukey or Dunnett for the between-subjects variable, and the Bonferroni test for the within-subjects variable. As shown in the following chapter, Huynh-Feldt corrections were used.

**Data Screening**

The data set of responses supplied to the schools being explored in this research study by LibQUAL+® contain all the responses that were given by those who took the survey. However, the summary statistics that institutions are provided within the official report from LibQUAL+® contain analysis conducted on select responses that meet predetermined criteria. LibQUAL+® includes in their summary statistics only those user responses that 1) answered all the questions completely, 2) did not overuse the N/A option, and 3) that answered consistently and logically. If a user left answers blank on the survey, before being able to submit the answers, the user is given the opportunity fill-in the neglected fields. The user could choose to submit without completing the survey, but only surveys with a user group identified and answers to all of the core questions were included in the summary statistics provided to the institution. Additionally, if a user answered more than 11 times that questions were N/A, then his/her answers were not included in the summary statistics. Finally, if there were more than 9 instances where, for example, the minimum rating on an item was higher than the desired rating, then those users were eliminated from the summary statistics. The official cleaning or screening methods used for the official summary statistics report given to the schools being studied were also used in this current analysis. It will be interesting to look at how the data is presented to the school through the radar charts and through the superiority and adequacy
gaps, and compare that to whether there are statistically significant variations in the
scores of faculty and students. This would add another component to the understanding of
LibQUAL+® results and to the user groups themselves, and allow the Library to view the
findings using the additional relationships this additionally type of analysis will provide.
In order to use the same criteria for incorporating survey results into the analysis, an
SPSS filter was used to limit analysis to only cases in the dataset that LibQUAL+®
demed as ‘complete’ and ‘active’. Library staff and university staff groups were also
filtered from the analysis as these two user groups are not pertinent to this study.

Once the datasets for each institution were combined, and the non-valid surveys
and non-pertinent respondents were removed, there remained a total of 833 cases to
explore. Of those 833 cases, 535 were from the RU_H institution and 298 were from the
Master’s_M institution. Further breakdown shows that 499 (59.9%) were undergraduates,
137 (16.4%) were graduate students, and 197 (23.6%) were faculty.
Chapter 4: Results

Introduction

The results in this chapter refer to a non-experimental three way between-within subjects ANOVA. The two between-subjects variables are patron type or academic level of the respondent and the Carnegie Classification of the respondent’s institution. This study looked at two types of Carnegie Classifications; RU/H which stands for a Research University with high research activity, and Master’s M which stands for Masters Colleges and Universities with medium sized programs. The three levels of patron type, or academic level, being explored in this study are undergraduate students, graduate students, and faculty. The within-subjects variable in this study is composed of three dependent variables that are composite scores representing the mean for the minimum, perceived, and desired scores of each respondent for the Information Control section of the LibQUAL+® instrument. The purpose of this study was to determine to what extent there is an interaction between the type of school that students and faculty are associated with and their opinions on the technology-laden Information Control section of the LibQUAL+® survey. The results shown below are displayed corresponding to the original order of the research questions stated in previous chapters and the appropriate SPSS tables have been reproduced and referenced in the results. A more in-depth interpretation of the results and their impact on library decision making are discussed in Chapter 5.
Outliers

Box plots, stem and leaf displays, and histograms were created to explore outliers in the dataset. Review of the case numbers that were listed as outliers and extreme cases show that while some of the scores were below the normal scoring, they were valid scores and not entry errors or illogical scores. As was mentioned in Chapter Three, LibQUAL+® has specific criteria for including cases in the analysis they provide to the schools participating in the survey, and that the same criteria were used in this study of the LibQUAL+® results. Only survey responses that were categorized as complete and active were included in the results. The stem and leaf display indicates 5 (=<1.9) extreme values for the minimum information control scores, 29 (=<3.4) extreme scores for the perceived information control scores, and 24 (=<4.1) extreme scores for the desired information control scores. The boxplots, stem and leaf displays, and the histograms for the outlier results are available in Appendix G of this dissertation.

Reliability

The within-subjects or repeated measures variable is made up of three composite dependent variables; each composite variable was tested for reliability. Each of the eight information control questions has three scores attached to it; a minimum, perceived, and desired level of library service. The within-subjects or repeated measures variable has three components to it: how the respondent answered the information control questions for the three levels of minimum, perceived, and desired service quality. A composite mean score was then created from the responses to each of the eight questions at all three levels.
As the tables available in Appendix H of this dissertation show, Cronbach’s Alpha is acceptable in all three instances. The Cronbach’s Alpha for the minimum component of the Information Control scores is .932. The Cronbach’s Alpha for the perceived component of the Information Control scores is .832. The Cronbach’s Alpha for the desired component of the Information Control scores is .792. The only instance where Cronbach’s Alpha would be raised if an item were deleted is question 3 in the desired component of Information Control, and the increase would only be from .792 to .795. Because of these results no items were removed in the analysis.

**Pearson’s Correlation**

The following is the SPSS for Pearson Correlation. Notice how all but the correlation between Perceived Information Control and Academic Level show significance at 0.01 or 0.05.
Table 1.

*Pearson’s Correlation*

<table>
<thead>
<tr>
<th></th>
<th>Acad L</th>
<th>CC</th>
<th>Min IC</th>
<th>Per IC</th>
<th>Des IC</th>
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</thead>
<tbody>
<tr>
<td>Acad L</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>.120**</td>
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<tr>
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<td>.001</td>
<td>.001</td>
<td>.001</td>
</tr>
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<td>833</td>
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<td>833</td>
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<tr>
<td>CC</td>
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<td>.115**</td>
<td>.083*</td>
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</tr>
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<tr>
<td>Min IC</td>
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<td>.670**</td>
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<td>.314**</td>
<td>.670**</td>
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<td>.670**</td>
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<td>.670**</td>
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<tr>
<td>Des IC</td>
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<td></td>
<td>.417**</td>
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</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Descriptors

As Table 1 indicates, N for this experiment is 833. While there are 2156 survey results in the dataset created from the combined results from both schools, after LibQUAL+® weeds the responses based on the criteria mentioned previously in Chapter 3, there are 833 cases with completed and valid returned surveys. There were 535 respondents from the RU/H institution and 298 from the Master’s M institution. Of the 833 cases, 499 were self-identified as undergraduates, 137 were self-identified as graduate students, and 197 were self-identified as faculty members.
Table 2.

**Between-Subjects Factors**

<table>
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</thead>
<tbody>
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</tr>
<tr>
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<td>Academic Level 521</td>
<td>Undergraduate</td>
</tr>
<tr>
<td>Academic Level 522</td>
<td>Graduate</td>
</tr>
<tr>
<td>Academic Level 523</td>
<td>Faculty</td>
</tr>
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</table>

Table 3.

**Within-Subjects Factors**

<table>
<thead>
<tr>
<th>Information Control</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mean Minimum</td>
</tr>
<tr>
<td>2</td>
<td>Mean Perceived</td>
</tr>
<tr>
<td>3</td>
<td>Mean Desired</td>
</tr>
</tbody>
</table>
Table 4.

Descriptive Statistics

<table>
<thead>
<tr>
<th>CC</th>
<th>Acad L</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>RU_H</td>
<td>Under</td>
<td>6.5512</td>
<td>1.55352</td>
<td>241</td>
</tr>
<tr>
<td></td>
<td>Grad</td>
<td>6.8885</td>
<td>1.36140</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>7.4771</td>
<td>1.13203</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6.9192</td>
<td>1.44206</td>
<td>535</td>
</tr>
<tr>
<td>Min IC</td>
<td>Master’s M</td>
<td>Under</td>
<td>6.6043</td>
<td>1.40866</td>
</tr>
<tr>
<td></td>
<td>Grad</td>
<td>7.4861</td>
<td>1.92480</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>7.0510</td>
<td>1.43641</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6.6774</td>
<td>1.43677</td>
<td>298</td>
</tr>
<tr>
<td></td>
<td>Under</td>
<td>6.5787</td>
<td>1.47914</td>
<td>499</td>
</tr>
<tr>
<td></td>
<td>Grad</td>
<td>6.9278</td>
<td>1.40384</td>
<td>137</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>7.4101</td>
<td>1.19114</td>
<td>197</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6.8327</td>
<td>1.44397</td>
<td>833</td>
</tr>
<tr>
<td>RU_H</td>
<td>Under</td>
<td>6.7484</td>
<td>1.63815</td>
<td>241</td>
</tr>
<tr>
<td></td>
<td>Grad</td>
<td>7.0928</td>
<td>1.47946</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>6.8983</td>
<td>1.39389</td>
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<tr>
<td></td>
<td>Total</td>
<td>6.8773</td>
<td>1.53158</td>
<td>535</td>
</tr>
<tr>
<td>Per IC</td>
<td>Master’s M</td>
<td>Under</td>
<td>7.2350</td>
<td>1.32768</td>
</tr>
<tr>
<td></td>
<td>Grad</td>
<td>7.6806</td>
<td>1.29015</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>7.0645</td>
<td>1.43464</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7.2307</td>
<td>1.33682</td>
<td>298</td>
</tr>
<tr>
<td></td>
<td>Under</td>
<td>7.0000</td>
<td>1.50405</td>
<td>499</td>
</tr>
<tr>
<td></td>
<td>Grad</td>
<td>7.1314</td>
<td>1.47079</td>
<td>137</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>6.9245</td>
<td>1.39797</td>
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</tr>
<tr>
<td></td>
<td>Total</td>
<td>7.0038</td>
<td>1.47384</td>
<td>833</td>
</tr>
<tr>
<td>RU_H</td>
<td>Under</td>
<td>7.4175</td>
<td>1.59618</td>
<td>241</td>
</tr>
<tr>
<td></td>
<td>Grad</td>
<td>7.8320</td>
<td>1.34871</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>8.0843</td>
<td>1.19264</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7.7236</td>
<td>1.45008</td>
<td>535</td>
</tr>
<tr>
<td>Des IC</td>
<td>Master’s M</td>
<td>Under</td>
<td>7.9380</td>
<td>1.11903</td>
</tr>
<tr>
<td></td>
<td>Grad</td>
<td>8.2917</td>
<td>0.83853</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>8.0323</td>
<td>1.41125</td>
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</tr>
<tr>
<td></td>
<td>Total</td>
<td>7.9585</td>
<td>1.14367</td>
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</tr>
<tr>
<td></td>
<td>Under</td>
<td>7.6866</td>
<td>1.39350</td>
<td>499</td>
</tr>
<tr>
<td></td>
<td>Grad</td>
<td>7.8622</td>
<td>1.32403</td>
<td>137</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>8.0761</td>
<td>1.22582</td>
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</tr>
<tr>
<td></td>
<td>Total</td>
<td>7.8076</td>
<td>1.35248</td>
<td>833</td>
</tr>
</tbody>
</table>
Assumptions

As shown in Table 3 below, Mauchly’s Test of Sphericity demonstrates that the assumption of sphericity has been violated with $p = .000$. The three corrections for violations of sphericity all had similar values attached to them, so the recommendation of Field (2008) was followed and the Huynh-Feldt correction was used in evaluating the results of the ANOVA.

Table 5.

Mauchly’s Test of Sphericity

<table>
<thead>
<tr>
<th>Within Subjects Effect</th>
<th>Mauchly’s W</th>
<th>Approx. Chi-Square</th>
<th>df</th>
<th>Sig.</th>
<th>Epsilon Greenhouse-Geisser</th>
<th>Huynh-Feldt</th>
<th>Lower-bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Control</td>
<td>.833</td>
<td>150.507</td>
<td>2</td>
<td>.000</td>
<td>.857</td>
<td>.864</td>
<td>.500</td>
</tr>
</tbody>
</table>

Research Questions

The research questions are restated below followed by the answers provided by the statistical analysis. Reference to the particular reproduced SPSS table within this document is also given. For the purpose of clarity, the initial research question will be in italics, with the corresponding result in regular font.

1. Are there significant differences between the minimum, perceived, and desired scores for library service quality? Yes, there are significant differences between the minimum, perceived, and desired scores for library service quality. As Table 4
indicates, p = .000, with a partial eta squared of .060. This research question deals with the within-subjects main effect. The results indicate that the mean levels of minimum, perceived, and desired library service quality expectations change across the Information Control portion of the LibQUAL+® survey.

2. *Are there significant differences between the levels of Carnegie Classification with respect to the minimum, perceived, and desired scores for library service quality?* No, there are not significant differences between the levels of Carnegie with respect to the minimum, perceived, and desired scores for library service quality expectations. As indicated in Table 5, p = .081. Put another way, respondents from the RU_H school did not have different mean IC scores than respondents from the Master’s M school.

3. *Are there significant differences between the levels of the respondent group with respect to the minimum, perceived, and desired scores for library service quality?* Yes, there are significant differences between the levels of the respondent group with respect to the minimum, perceived, and desired scores for library service quality expectations. As Table 5 indicates, p = .002, with a partial eta squared of .015. As with question two, question three is also dealing with the between-subjects main effects. The results for question three show that undergraduates, graduates, and faculty members have different means scores for library service quality.

4. *Is there a significant interaction between the Carnegie Classification of an institution and the level of respondent?* No, there is not a significant interaction
between the Carnegie Classification of an institution and the level of respondent. As Table 5 indicates, \( p = .132 \). Question number four deals with the between-subjects interaction effect. Put another way, this question is exploring whether the differences in mean scores on library service quality expectations for Carnegie Classification change for the different user groups of undergraduates, graduates, and faculty members.

5. *Is there a significant interaction between the Carnegie Classification of an institution and the minimum, perceived, and desired scores for library service quality?* No, there is not a significant interaction between the Carnegie Classification of an institution and the minimum, perceived, and desired scores for library service. As Table 4 indicates, \( p = .212 \). This question, as well as questions six and seven, deal with the within-subjects by between-subjects interaction effects. Put another way, the result of a non-significant \( p = .212 \) shows that the differences in mean library service quality expectation scores for Carnegie Classification groups do not change at the three different levels of the minimum, perceived, and desired library service quality. The mean scores across library service quality expectations for respondents from the RU/H school did not increase or decrease more than the respondents from the Master’s M school.

6. *Is there a significant interaction between the level of respondent group and the minimum, perceived, and desired scores for library service quality?* Yes, there is a significant interaction between the level of respondent group and the minimum, perceived, and desired scores for library service quality. As indicated in Table 4, \( p \)
=.001, with a partial eta squared of .012. This question is similar to question five above, but looks at the between-subjects factor of respondent group instead of Carnegie Classification. The significant p value indicates that that the differences in mean library service quality expectation scores for undergraduates, graduate students, and faculty members groups changes at the three different levels of the minimum, perceived, and desired library service quality. The mean scores across library service quality expectations for undergraduates, graduate students, and faculty members vary.

7. Is there a significant interaction between the level of respondent group and the Carnegie Classification of an institution and the minimum, perceived, and desired scores for library service quality? No, there is not a significant interaction between the level of respondent group and the Carnegie Classification of an institution and the minimum, perceived, and desired scores for library service quality. As Table 4 indicates, p = .683. The last of the within-subjects by between-subjects interaction effects, this question explores whether there is a pattern with all three factors interact with each other, and the answer in this case is no.
### Tests of Within-Subjects Effects (Huynh-Feldt)

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC</td>
<td>110.711</td>
<td>1.728</td>
<td>64.068</td>
<td>52.834</td>
<td>.000</td>
<td>.060</td>
</tr>
<tr>
<td>IC * Carnegie Class</td>
<td>3.277</td>
<td>1.728</td>
<td>1.897</td>
<td>1.564</td>
<td>.212</td>
<td>.002</td>
</tr>
<tr>
<td>IC * UGroup</td>
<td>21.537</td>
<td>3.456</td>
<td>6.232</td>
<td>5.139</td>
<td>.001</td>
<td>.012</td>
</tr>
<tr>
<td>IC * CC * UGroup</td>
<td>2.249</td>
<td>3.456</td>
<td>.651</td>
<td>.537</td>
<td>.683</td>
<td>.001</td>
</tr>
<tr>
<td>Error(IC)</td>
<td>1732.934</td>
<td>1429.074</td>
<td>1.213</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 7.

Tests of Between-Subjects Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>35350.087</td>
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<td>35350.087</td>
<td>9341.034</td>
<td>.000</td>
<td>.919</td>
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<tr>
<td>Carnegie Class</td>
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<td>1</td>
<td>11.553</td>
<td>3.053</td>
<td>.081</td>
<td>.004</td>
</tr>
<tr>
<td>UGroup</td>
<td>47.575</td>
<td>2</td>
<td>23.787</td>
<td>6.286</td>
<td>.002</td>
<td>.015</td>
</tr>
<tr>
<td>Carnegie Class * UGroup</td>
<td>15.348</td>
<td>2</td>
<td>7.674</td>
<td>2.028</td>
<td>.132</td>
<td>.005</td>
</tr>
<tr>
<td>Error</td>
<td>3129.688</td>
<td>827</td>
<td>3.784</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 1. *Comparison of User Group Responses*

The chart above shows how the scores differed between the three user groups examined in this study. While Carnegie Classification showed no significant interaction, user group affiliation did show an interaction with the Information Control scores. As was discussed in the literature review, undergraduates typically respond with lower numbers, graduate students and faculty members score higher, and this chart demonstrates that. The chart above indicates that faculty members have a slightly higher minimum level of service quality than do graduate students, an almost equal desired level of service quality as the graduate students, but in the perceived category faculty members
drop to the same level as undergraduates. This will be discussed further in chapter five of this document.
Chapter 5: Discussion

Introduction

Perhaps the easiest way to explore the results of this study is to begin by discussing the origins of the analytic model and how the variables in this study differ from the historical usage of the analytical model. Following a discussion of the analytical model, the results from Chapter Four will then be restated and placed into the context of the impetus of this study. The discussion section will end with a look at how this current study could be expanded on by further research into the Carnegie Classifications of institutions taking the LibQUAL+® survey.

Explanation of Analytical Model

Originally called a split-plot design, this method was established for research in the agricultural field by Sir Ronald A. Fisher (Federer & King, 2007; Jones & Nachtsheim, 2009). The plots in the split-plot model were actually plots of land, and each plot was then divided up, or split, into sections that would receive different treatments, or variables. So for example, a farmer/researcher may have six separate plots of land and then plant different varieties of a certain crop on different plots. Each plot would then, for example, be split by the amount of direct sunlight the crops in the plot receive; shade provided on the top part of the plot, and full sun on the bottom plot. Finally, a variable like the time it takes for the plants to grow would be recorded to determine which plants flourished and with which amount of sunlight.

The image below represents an early experiment by R. A. Fisher (1970, p. 238). Each plot, or rectangle in the image, contains a particular variety of potato. Within each
plot there are three rows, which appear as lines of dots in the image. Each line of dots represents a row of seed from the particular potato variety present in each plot. Each line of dots is then labeled with an S, C, or B. These initials represent the three different types of fertilizer being tested; sulfate, chloride, or basal.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Fertilizer Type</th>
<th>Variety</th>
<th>Fertilizer Type</th>
<th>Variety</th>
<th>Fertilizer Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ajax</td>
<td>K of K</td>
<td>Nithsdale</td>
<td>Great Scott</td>
<td>Duke of York</td>
<td>Great Scott</td>
</tr>
<tr>
<td>Ajax</td>
<td>K of K</td>
<td>Nithsdale</td>
<td>K of K</td>
<td>Nithsdale</td>
<td>Great Scott</td>
</tr>
<tr>
<td>Duke of York</td>
<td>Arran Comrade</td>
<td>Up to Date</td>
<td>Kerr’s Pink</td>
<td>Up to Date</td>
<td>British Queen</td>
</tr>
<tr>
<td>British Queen</td>
<td>Tinwald</td>
<td>Epicure</td>
<td>Kerr’s Pink</td>
<td>Kerr’s Pink</td>
<td>Up to Date</td>
</tr>
<tr>
<td>Iron Duke</td>
<td>Ajax</td>
<td>Tinwald</td>
<td>Arran Comrade</td>
<td>British Queen</td>
<td>Tinwald</td>
</tr>
</tbody>
</table>

*Figure 2. R.A. Fisher’s Potato Experiment*
This would be considered a 3x12 model, where there are three types of fertilizer and 12 varieties of potato being explored. The yield of each row of potato was then documented to determine which type of fertilizer produced the greatest amount of potatoes.

In the current study being described in this dissertation, the user group status of the library patron took the place of the plots of land, so in this case there were three sections, or plots, of patrons; one for undergraduate students, one for graduate students, and one for faculty. These sections were then split or divided into the Carnegie Classes of RU-H and Master’s M. Carnegie Classification replaces the fertilizer in the above mentioned Fisher experiment. Where this truly departs from the standard split-plot model is in the dependent variables. The dependent variables in this study are composite variables and are applied to everyone in the study. The dependent variables are composite variables because they are derived from the mean of the eight Information Control (IC) scores that make up the Information Control portion of the LibQUAL+® survey. The IC portion of LibQUAL+® is made up of eight questions, but each of the eight questions is asked three times with regard to the minimum, perceived, and desired levels of service. This creates three dependent variables, each measured on the same, or commensurate, 9 point Likert-scale, and each question is asked of every respondent. It is because of these commensurate variables that the method of analysis departs from the standard split-plot and becomes a repeated measures method of analysis. Unlike the Fisher example involving potatoes above, this current research design would be considered a 2x3x3. Monlezun, Blouin, and Malone (1984, p. 21) describe the difference between the research designs as
…in split plot experiments, experimental units are literally divided into subunits, and it is these subunits that are observed under each level of the split plot factor. In repeated measures experiments no such subdivision occurs. Rather, the experimental unit (subject) is observed in its entirety under each level of the repeated measures factor.

To complicate matters slightly, the model being discussed in this current research project is, as was previously stated, a 2x3x3, so there are two subjects or experimental units, and the split plot factor is now a repeated measures factor, with three levels. Each of the levels is then observed in its entirety across all subjects, in this particular case, the students and faculty at two separate schools. The image below attempts to create a visual for the three-way, between-within subjects ANOVA with repeated measures.
Findings

The results of the analysis show that Carnegie Classification did not have an impact on how different user groups answered the IC component of the LibQUAL+® survey. Returning to the Fisher experiment mentioned earlier, this would mean that fertilizer choices had no effect on the yield of potato crop. In this current experiment, the Carnegie Classification of the institution of the respondent did not interact with the mean scores from the LibQUAL+® data. The IC component of LibQUAL+® deals with access to collections, both in physical format and electronically. Access to library collections,
electronic or otherwise, relies heavily on technology. Faculty and student perceptions of library services as they relate to technology provide an avenue for library planning and strategizing for the future. The results did show a significant difference in how each user group responded, but none of the interactions or effects can be attributed to the Carnegie Classification of the institution the respondent belongs to. This means that while Carnegie Classification had no impact on scores, the scores did fluctuate based on whether the respondent was an undergraduate student, a graduate student, or a faculty member. As was shown in the literature review in Chapter Two, this finding about patron type is consistent with many other studies.

Every main effect and interaction effect that involved the Carnegie Classification of an institution showed no significant effect. The between-subjects main effect of Carnegie Classification, or research question number 2, demonstrates that respondents from the RU_H institution do not have different mean scores on the IC component of LibQUAL+® than respondents from the Master’s M institution. The between-subjects interaction of Carnegie Classification and patron level, or research question 4, demonstrates that the pattern of responses to the IC component of LibQUAL+® does not change dependent on whether the patron is a undergraduate student, a graduate student, or a faculty member. The within-subjects by between-subjects interaction effect dealing with Carnegie Classification, or research question number 5, demonstrates that the mean score for each Information Control level does not change dependent on the Carnegie Classification of the respondent. Research question number 7 deals with the interaction
effects of all three variables and demonstrates once again that Carnegie Classification has no influence in IC scores.

These findings are interesting because they show no significant difference in how faculty and students responded at substantially different institutions. While it may be reasonable to assume that the choice to attend or work in a specific type of college or university would bring with it varying opinions on library service, this was not the case with these findings. The two institutions that were examined were different not only in Carnegie Classification, but also in environment, as one would be considered rural and the other an urban setting. More research would have to be conducted, but there may also be differences in the requirements and the possibility of tenure at the two institutions, and these differences may also translate to factors like salary, job security, or even health insurance.

One possibility that would explain these results is that while there may have been significant differences in Carnegie Classifications in previous decades, at least with regard to library services, these gaps have been narrowed or are now non-existent. Again, further research would have to be conducted to explore this, but perhaps as more classes move to the digital environment and are offered through distance education, students who once may have made decisions based on campus location or the ability to commute or work while attending classes, are now making decisions based on program availability or factors related to online access.

The collective access to a large scale consortium catalog in the state may also have a leveling affect on perceptions of library service. With such a large core collection
available to all participating libraries, as well as strong InterLibrary Loan and document delivery services, patrons may now have much higher levels of expectations regardless of institution type. As the consortium catalog has continued to grow over the past two decades, and schools with smaller budgets and fewer degree programs have received greater access to more materials, this greater access may translate to higher use and expectations from students and faculty who otherwise would not know what they were missing.

Generalization

For the purpose of this study, Carnegie Classification reflects the academic mission of the universities being studied. Of the four institutions that participated in the LibQUAL+® survey in 2009, the two schools chosen for this study aligned favorably with the proposed shift in institutional direction being discussed at the RU_H university. As was briefly discussed in Chapter One of this study, the RU_H university being studied here is discussing a possible shift from an emphasis on research to an institution with a focus more on teaching and learning. While this may or may not come to fruition, the idea of this study was derived from library staff wondering what impact this type of institutional shift would have on the operations and decisions of the library system (Name withheld, 2011). The results of this research, while limited to only two schools, would indicate that even though the two schools in question have different populations in terms of degree programs offered and levels of research being conducted, the faculty and student bodies have similar opinions with regard to the levels of library services they minimally expect, perceive, and desire.
A metaphor could be made to other facilities on campuses that share similar partnerships with students and faculty. Take for example the lab facilities used by scientists and engineers on a campus. It is reasonable to assume that a school which is world-renowned for their chemistry program would have better facilities and labs than a school which may offer some chemistry classes but does have a research intensive or well-funded chemistry program. Another example could be made for college athletics. It may be reasonable to assume that schools within the same conference would have similar facilities, but coaches and students would most likely expect different stadiums and athletic facilities from a small college where athletics is not as well funded as opposed to facilities of one of the larger conference schools. The findings of this study, however, show that unlike what one could reasonably expect from research-intensive or athletics-oriented campuses about their labs and facilities, faculty and students have the same level of service expectations regardless of campus focus as these expectations pertain to library services. The knowledge that faculty and students from different types of campuses bring with them the same expectations of service will be useful in the strategic planning process of the Libraries. Decisions about website design, remote access, discovery layer attributes, link resolvers, and log in procedures can all be explored with the knowledge, that regardless of Carnegie Classification, faculty and student populations will expect the same levels of service.

Some possible problems with this study are the collapsing of IC scores into mean scores may lose some of the distinctions that individual questions may provide. Additionally, the Masters’s M school did not conduct a truly randomized sample. Also, as
was mentioned previously, the lumping of several categories of student and faculty member into one broad definition may negate the differences inherent with the different levels. Another factor which may hinder generalizability with these findings is the presence of a strong library consortium in the state that contains both institutions being studied. Because of the strong core collection these two schools share, it is possible to consider the perceived Information Control scores as looking at roughly the same collection, but in a library system that does not have a strong consortium this would not necessarily be the case.

**Practice**

This study was initially conceived as a response to a proposed shift in the academic emphasis of one of the university communities being analyzed in this research. Strategic planning for the Libraries was underway and several guest speakers from campus community were invited to come in and discuss directions the campus could be taking in the future. Much of the planning discussion taking place internally on the library staff blog was in regard to how changes in technologies and in the higher education environment would require libraries to adjust to meet the new needs of users. While most of this was based on larger work by futurists (Staley, 2012) and library scientists (Staley, Seaman, & Theodore-Shusta, 2012) exploring the topics of libraries, technologies, and higher education, the idea of a campus shifting its emphasis away from being a research institution to one more focused on teaching and learning was specific to this one campus being studied. Emphasis on technology changes has been widely reported on and discussed in Chapter Two of this document. What has not been widely
discussed in the literature of library science is the impact a university shift of this magnitude would have on patron perception of the services provided by the library that serves a university that is changing its mission. What this study shows is that regardless of the level of Carnegie Classification of the two schools being investigated, faculty and students have similar expectations regarding library service, particularly as it relates to issues like access and user interfaces, which are the types of services represented in the IC component of the LibQUAL+® instrument. This knowledge is important, especially if it can be repeated using other datasets, because it means that libraries don’t have to fear these types of shifts in institutional mission focus. Faculty needs may change with regard to research areas, and student research and projects may change as the emphasis of programs change, but on the whole both of these populations still expect the same level of service in regard to Information Control, regardless of institution type.

On the local level knowledge gained from this research will help in strategically planning for a possible shift in institutional focus, but it could also be of interest to the larger system of libraries within the state. The consortium system both institutions belong to is another area where knowledge of these similarities in users can be beneficial. These possibilities will be addressed in the following section about future research options with this type of analysis and findings.

**Future Research**

The findings described above may have relevance beyond the two schools being examined. Both schools being studied in this research are members of a state-wide consortium. As the state-wide consortium explores several purchasing decisions and
budgeting options for all the member libraries, the findings of this current study could be useful in making the final purchasing decisions for a group of libraries that represent schools with varying Carnegie Classifications. In addition to clarifying purchasing decisions, the broader field of library and information science may be able to derive some benefit from this type of user study with regard to future library studies and generalizing of results.

**State-wide Consortium Purchasing**

As was previously stated, both schools being studied in this dissertation are members of a state-wide consortium of 88 college and university libraries. The consortium provides a way for multiple libraries to combine financial resources and band together to purchase things like journal subscriptions, database access, and digital video collections at reduced rates from publishers and vendors. The formulas for how much a journal provider will charge individual institutions and consortia is not as transparent as many libraries would wish for. Moore and Duggan (2011, p. 104) state that

> When a provider is not transparent about the model they are using to determine cost, a consortium will apply their own model to the total price, which can result in totals for individual institutions that stray drastically from the provider’s intended target price. These differences in applying prices to individual institutions have the potential to vary so drastically as to result in an institution paying more to participate in a consortial purchase than they may have paid by purchasing or subscribing individually.
Within the consortium to which both schools being explored in this research belong, the rates for these downloads from the consortia journal collection have varied in the past from institution to institution, and depend largely on size and research level of the institution contributing (K. Broughton, personal correspondence, September 26, 2012). Previous funding models rely more heavily on larger institutions to make up a considerable percentage of the purchase price for resources, but enable schools with smaller or different research missions to still gain access. The reasoning behind this model is that the larger, research-centered institutions are using more of the resources and have a higher need for these resources, and this level of use justifies a higher percentage of financial responsibility for the purchase. The result is that universities with high or very high research missions, like those with a Carnegie Classification of RU_H or RU_VH, will pay substantially more for the same collection of journal titles than a two-year or community college.

Using consortia funding figures obtained for this analysis (K. Broughton, personal correspondence, September 26, 2012), it appears that much of the funding model for the consortial journal collection relies on assuming differences in university types. The two universities in the current study both pay approximately the same price for each download from the consortial journal collection. However, in looking at the contributions from the community colleges, there are four community colleges with more downloads, and in one case twice as many downloads, who are paying one-fifth as much per download than the RU_H and Master’s M level institutions in this study.
As the local consortium continues to look at products like ebook contracts and a possible discovery layer purchase for the member institutions, research into how member institutions vary with regard to library service satisfaction would be beneficial in determining funding models. Future studies could include community colleges as one of the Carnegie Classifications explored for interactions. Both ebooks and discovery layers would fall under the LibQUAL+® IC component, as they relate to making materials available in an efficient manner. If it were shown that faculty and students at these other classifications have the same expectations and desires with regard to consortium library initiatives, and their FTE figures are proportional to the institutions with a stronger research mission, an argument could be made for the funding formula to be investigated and possibly realigned to more accurately represent the academic work in the state.

Guzzi (2010) describes several consortial funding models in her review of academic library consortia. Options for types of funding models include volume-based which requires some or all members to participate, usage-based pricing models, and tiered approaches that create levels based on criteria like FTE. Guzy (2010), while discussing pricing models specifically for two-year institutions, writes that “Electronic resource pricing for two-year colleges is commonly discounted from that of four-year institutions regardless of FTE; this is because of how databases are used and the significantly lower acquisitions budgets at two-year colleges” (p. 176). The idea of ‘how databases are used’ is valuable to this discussion, because if future research were to include two-year or community colleges in the analysis, it would be interesting to see if faculty and students at these schools have different minimum, perceived, and desired
service scores than their four-year counterparts, and if they are using the collections differently.

Raley and Smith (2006) explored the relationships between community colleges and library vendors and state that community colleges, by their course and degree offerings, vary from their four-year universities and K-12 counterparts with regard to research needs, due in large part to the coursework offered. The authors also point to more non-traditional students attending community colleges, with a large need for remote or distance access. As several of the reports listed in the literature review of Chapter Two point out, however, distance and remote coursework, as well as non-traditional students, are a growing trend in all of higher education and not limited to just community colleges.

**Mixing Carnegie Classifications**

A study exploring LibQUAL+® results across a consortium (Gatten, 2004) found an increase in the expectations of community college respondents from a 2002 and 2003 survey results. Rather than comparing LibQUAL+® results to peer-institutions that are perhaps out of the consortia, comparing within the consortium changes the analysis and “The goal then becomes to not seek significant differences between peer groups, but instead to simply examine the data and determine where improvement is desired regardless of comparative performance” (Gatten, 2004, p. 224). This quote reiterates the need for further and varying uses of the LibQUAL+® instrument. Rather than using it solely as a benchmarking tool, further research could look at service expectations with an emphasis on similarities and differences in the user population of an academic library consortium, regardless of Carnegie Classification.
If faculty and students at schools with varying Carnegie Classifications have similar attitudes towards the IC component of the LibQUAL+® survey, then the consortium could use smaller research studies to determine which discovery layer would be most appreciated by its members. For example, if an interface has been observed to be preferred by faculty at a Master’s M level university, then this current study would suggest that faculty at a RU_H school would have similar criteria for a successful interface. Knowing that faculty and students have essentially the same levels of service requirements could mean less hesitancy in making a large purchase of a discovery layer based on a few usability studies. The consortium could conduct a large-scale usability test with input from institutions with different Carnegie Classifications, thereby increasing the response rate without invalidating the results.

Another future study may seek to explore the literature of library and information studies research to determine how many studies use a combination of research libraries and smaller institutions that don’t meet the criteria for research institutions in the Carnegie Classification system. For studies that are not collection-oriented or for research that isn’t specific to a particular school community, perhaps datasets from universities that are not typically considered peer institutions could be combined for greater power and clarity. A meta-analysis on the numbers of studies using a multiple institution methodology may shed light on the generalizability of research in the information and library sciences. A cursory examination of the 2012 issues of The Journal of Academic Librarianship shows that often research is being conducted at one institution. There was in fact one study by Roy, Khare, Liu, Hawkes, and Swiatek-Kelley (2012), who studied
the Affect of Service component of LibQUAL+®, was conducted initially on results taken from one medium-sized, private academic library, but the follow-up study was done at a larger institution. The authors studied the interaction between the perception of service quality and patron level, as well as length of association with the university, as well as non-response rates. They did not combine datasets but found similar results for their hypotheses and determined that the results could be generalized across institution types.

As was mentioned in Chapter One of this study, it may also be beneficial to explore the perceptions of faculty in greater depth, perhaps by breaking the faculty patron designation into the categories of adjunct faculty, assistant faculty, associate faculty, lecturers, and professors. The datasets provide for this level of demographic breakdown, and as the results of this current study are in line with other LibQUAL+® studies with regard to patron levels, breaking the levels of faculty, or undergraduate student for that matter, may afford a richer understanding of the similarities or differences in the individual populations.

Along the same lines, another area of future research could be to explore tenure and publishing requirements at varying universities with different Carnegie Classifications. By looking at these requirements and the levels of library service expectations, funding models could also be adjusted to take into account not only the levels of research being conducted, but the need for scholarly research at the different levels of institution.
Conclusion

This study was conceived as an attempt to answer the question of how a shift in institutional emphasis from research to teaching and learning may affect the Library. The results indicate that regardless of institutional emphasis, as characterized by Carnegie Classification, faculty and students will have the same level of expectation. The implications for this research and future studies can have a much broader impact on the library community as a whole. While this research provides a small window by which to view the success of library initiatives and planning, it also provides possible data that could be used to assist future library purchases both at the local and consortia levels.
References


Booth, C., & Guder, C. (2009, March) If you build it, will they care? Presented at ACRL 14th National Conference, Pushing The Edge: Explore, Engage, Extend, Seattle, WA.


Appendix A: Instructions for the LibQUAL+® Survey

Ohio University Libraries, Athens Campus

Welcome!

We are committed to improving your library services. Better understanding your expectations will help us tailor those services to your needs.

We are conducting this survey to measure library service quality and identify best practices through the Association of Research Libraries’ LibQUAL+® program.

Please answer all items. Thank you for your participation!

Please rate the following statements (1 is lowest, 9 is highest) by indicating:

- Minimum -- the number that represents the minimum level of service that you would find acceptable
- Desired -- the number that represents the level of service that you personally want
- Perceived -- the number that represents the level of service that you believe our library currently provides

For each item, you must EITHER rate the item in all three columns OR identify the item as "N/A" (not applicable). Selecting "N/A" will override all other answers for that item.
Appendix B: Sample of LibQUAL+® Survey

<table>
<thead>
<tr>
<th>When it comes to...</th>
<th>My Minimum Service Level Is</th>
<th>My Desired Service Level Is</th>
<th>Perceived Service Performance Is</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Employees who instill confidence in users</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>N/A</td>
</tr>
<tr>
<td>2) Making electronic resources accessible from my home or office</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>N/A</td>
</tr>
<tr>
<td>3) Library space that inspires study and learning</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>N/A</td>
</tr>
<tr>
<td>4) Giving users individual attention</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>N/A</td>
</tr>
<tr>
<td>5) A library Web site enabling me to locate information on my own</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Appendix C: Overall Results

3.1 Core Questions Summary

This radar chart shows the aggregate results for the core survey questions. Each axis represents one question. A code to identify each question is displayed at the outer point of each axis. While questions for each dimension of library service quality are scattered randomly throughout the survey, on this chart they are grouped into sections: Affect of Service, Information Control, and Library as Place.

On each axis, respondents’ minimum, desired, and perceived levels of service quality are plotted, and the resulting “gaps” between the three levels (representing service adequacy or service superiority) are shaded in blue, yellow, green, and red.

The following two tables show mean scores and standard deviations for each question, where $n$ is the number of respondents for each particular question. (For a more detailed explanation of the headings, see the Introduction to this notebook.)
Appendix D: Undergraduate Results

4.2 Core Questions Summary for Undergraduate

This radar chart shows aggregate results for the core survey questions. Each axis represents one question. A code to identify each question is displayed at the outer point of each axis. While questions for each dimension of library service quality are scattered randomly throughout the survey, on this chart they are grouped into sections: Affect of Service, Library as Place, and Information Control.

On each axis, respondents' minimum, desired, and perceived levels of service quality are plotted, and the resulting "gaps" between the three levels (representing service adequacy or service superiority) are shaded in blue, yellow, green, and red.

The two following tables show mean scores and standard deviations for each question, where n is the number of respondents for each particular question. (For a more detailed explanation of the headings, see the Introduction to this notebook.)
Appendix E: Graduate Results

5.2 Core Questions Summary for Graduate

This radar chart shows aggregate results for the core survey questions. Each axis represents one question. A code to identify each question is displayed at the outer point of each axis. While questions for each dimension of library service quality are scattered randomly throughout the survey, on this chart they are grouped into sections: Affect of Service, Library as Place, and Information Control.

On each axis, respondents' minimum, desired, and perceived levels of service quality are plotted, and the resulting "gaps" between the three levels (representing service adequacy or service superiority) are shaded in blue, yellow, green, and red.

The two following tables show mean scores and standard deviations for each question, where n is the number of respondents for each particular question. (For a more detailed explanation of the headings, see the Introduction to this notebook.)
Appendix F: Faculty Results

6.2 Core Questions Summary for Faculty

This radar chart shows aggregate results for the core survey questions. Each axis represents one question. A code to identify each question is displayed at the outer point of each axis. While questions for each dimension of library service quality are scattered randomly throughout the survey, on this chart they are grouped into sections: Affect of Service, Library as Place, and Information Control.

On each axis, respondents’ minimum, desired, and perceived levels of service quality are plotted, and the resulting “gaps” between the three levels (representing service adequacy or service superiority) are shaded in blue, yellow, green, and red.

The two following tables show mean scores and standard deviations for each question, where n is the number of respondents for each particular question. (For a more detailed explanation of the headings, see the Introduction to this notebook.)
## Appendix G: Outliers

### Minimum IC Stem-and-Leaf Plot

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Stem &amp; Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.00 Extremes (&lt;=1.9)</td>
<td>3 . 013&amp;</td>
</tr>
<tr>
<td>9.00</td>
<td>3 . 55678</td>
</tr>
<tr>
<td>12.00</td>
<td>4 . 0122344</td>
</tr>
<tr>
<td>27.00</td>
<td>4 . 55666778888</td>
</tr>
<tr>
<td>83.00</td>
<td>5 . 000000000000000000000111111122222223333333&amp;</td>
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<tr>
<td>70.00</td>
<td>5 . 5555555666666667777777888888888888</td>
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<tr>
<td>93.00</td>
<td>6 . 0000000000000000000011111111111222222223333334444</td>
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<td>121.00</td>
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<td>98.00</td>
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<td>87.00</td>
<td>8 . 0000000000000000000011111111111122222222233333334</td>
</tr>
<tr>
<td>54.00</td>
<td>8 . 5555555555566666677777788888888888</td>
</tr>
<tr>
<td>68.00</td>
<td>9 . 000000000000000000000000000000000000000000</td>
</tr>
</tbody>
</table>

Mean = £6.83  
Std. Dev. = 1.444  
N = 835

Minimum IC Stem-and-Leaf Plot
Stem width: 1.00
Each leaf: 2 case(s)

& denotes fractional leaves.
Perceived IC Stem-and-Leaf Plot

Frequency Stem & Leaf

29.00 Extremes (=<3.4)

4.00  3.78

16.00 4.0112233

26.00 4.55667777788

35.00 5.00012222333333

57.00 5.55555666666777777778888888

68.00 6.00001111111122222222233333333

103.00 6.555555555556666666666677777777777788888888888

130.00 7.0000000000001111111111111112222222222222222222333333333333

115.00 7.555555555556666666666666677777777777778888888888888888

131.00 8.000000000000000000001111111111111222222222222222222333333333333

Mean = 7.00

Std. Dev. = 1.474

N = 633
Stem width: 1.00
Each leaf: 2 case(s)
Desired IC Stem-and-Leaf Plot

Frequency  Stem & Leaf

24.00 Extremes  (=<4.1)
  .00  4.
  8.00  4. 556&
 14.00  5. 0002223
 24.00  5. 555566778888
 44.00  6. 00000111122222233333
 52.00  6. 55555555566777777788888888
 75.00  7. 0000000000001111111111112222222333333333
 99.00  7. 555555555566666666666677777777777777888888888888888888888888
137.00  8. 00000000000000000011111111111112222222222222222222333333333333333
Stem width: 1.00  
Each leaf: 2 case(s)

& denotes fractional leaves.

![Box plot diagram with stem width and leaf data]
## Appendix H: Reliability Testing

### Reliability Statistics for Information Control Minimum

<table>
<thead>
<tr>
<th>Cronbach’s Alpha</th>
<th>Chronbach’s Alpha based on Standardized Items</th>
<th>N of items</th>
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</thead>
<tbody>
<tr>
<td>.932</td>
<td>.933</td>
<td>8</td>
</tr>
</tbody>
</table>

### Item-Total Statistics for Information Control Minimum

<table>
<thead>
<tr>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach’s Alpha if Item Deleted</th>
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<td>IC min question 1</td>
<td>.701</td>
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<td>IC min question 2</td>
<td>.760</td>
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<tr>
<td>IC min question 3</td>
<td>.650</td>
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<tr>
<td>IC min question 4</td>
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<td>IC min question 5</td>
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<tr>
<td>IC min question 6</td>
<td>.809</td>
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<tr>
<td>IC min question 7</td>
<td>.829</td>
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<tr>
<td>IC min question 8</td>
<td>.796</td>
</tr>
</tbody>
</table>

### Reliability Statistics for Information Control Perceived

<table>
<thead>
<tr>
<th>Cronbach’s Alpha</th>
<th>Chronbach’s Alpha based on Standardized Items</th>
<th>N of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.832</td>
<td>.836</td>
<td>8</td>
</tr>
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</table>
### Item-Total Statistics for Information Control Perceived

<table>
<thead>
<tr>
<th></th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach’s Alpha if Item Deleted</th>
</tr>
</thead>
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<tr>
<td>IC perc question 1</td>
<td>.439</td>
<td>.829</td>
</tr>
<tr>
<td>IC perc question 2</td>
<td>.522</td>
<td>.818</td>
</tr>
<tr>
<td>IC perc question 3</td>
<td>.471</td>
<td>.827</td>
</tr>
<tr>
<td>IC perc question 4</td>
<td>.608</td>
<td>.808</td>
</tr>
<tr>
<td>IC perc question 5</td>
<td>.530</td>
<td>.817</td>
</tr>
<tr>
<td>IC perc question 6</td>
<td>.648</td>
<td>.801</td>
</tr>
<tr>
<td>IC perc question 7</td>
<td>.673</td>
<td>.798</td>
</tr>
<tr>
<td>IC perc question 8</td>
<td>.621</td>
<td>.804</td>
</tr>
</tbody>
</table>

### Reliability Statistics for Information Control Desired

<table>
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<th>Cronbach’s Alpha</th>
<th>Chronbach’s Alpha based on Standardized Items</th>
<th>N of items</th>
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<tbody>
<tr>
<td>.792</td>
<td>.796</td>
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</table>

### Item-Total Statistics for Information Control Desired

<table>
<thead>
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<th></th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach’s Alpha if Item Deleted</th>
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<tbody>
<tr>
<td>IC des question 1</td>
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<td>IC des question 2</td>
<td>.403</td>
<td>.783</td>
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<tr>
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<td>.795</td>
</tr>
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Thesis and Dissertation Services