USERS' EMOTIONAL AND MATERIAL SATISFACTION AT THE MICRO/MACRO LEVELS IN AN ACADEMIC LIBRARY

by

Fei Yu

B.A., Wuhan University, 1997

M.M., Wuhan University, 2000

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This dissertation was presented

by

Fei Yu

It was defended on

July 19, 2006

and approved by

Amy Knapp, PhD, Assistant University Librarian, University of Pittsburgh

Rush Miller, PhD, Professor, University of Pittsburgh

Gloriana St. Clair, PhD, Professor, Carnegie Mellon University

Dissertation Advisor: Chris Tomer, PhD, Associate Professor, University of Pittsburgh

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In late 1990s, Gap theories and the LibQual model began to be widely accepted by research libraries in the U.S. Since then, library service evaluation and user satisfaction issues have been discussed in various aspects of both the research and professional literatures of library and information science. Although the research presented herein is concerned with the evaluation of library services from users' perspectives -- like LibQual, for example -- it integrated other perspectives proposed in recent years by library researchers, including emotional and material satisfaction, service encounter and overall service satisfaction, and user satisfaction at the micro and macro levels. Specifically, the interrelationship of material and emotional satisfaction with the satisfactions at the micro and macro levels was investigated. In addition, this study sought to clarify factors or attributes of library services that contribute to user satisfaction at the micro and macro levels. Finally, the study examined how users' emotional and material satisfaction contribute to overall user satisfaction and user behavior, including user library use behavior in the short term (immediate next time information seeking) and the long term (library use loyalty).

In order to gather data on these user satisfaction issues, a Web survey of college students, a major academic library user group, was conducted at the University of Pittsburgh. Each participant completed a five section HTML survey questionnaire designed to collect information about their perception and attitude towards library resources and services.

Specifically, the findings provide library professionals greater understanding of how users perceive their library use and how user satisfaction is formed and influenced, in terms of its

formation, antecedent, and consequent impact. The research also provides librarians with what is hoped will be practical advice on what else they can or should do to improve library use. For instance, it is important to recognize users' emotional experience in their library use because it determines their immediate next time library use behavior and service use loyalty; it is easier to achieve service use loyalty for repeat users in some specific services than to achieve general library use loyalty for them or occasional users.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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1.0 INTRODUCTION

1.1 BACKGROUND

In order to survive in an increasingly competitive information environment, academic libraries must focus on improving the quality of the services they offer (Cullen, 2001; Simmonds & Andaleeb, 2001). Accordingly, library services have become more user-oriented. Library effectiveness measures have been derived from such user-oriented factors as user perception of library service, user behavior and user needs, and the extent of user satisfaction achieved in the library (Mohamed, O., 1976). The study of "information user" and "information user satisfaction" has a history of at least 40 years (Shi, 2001). In the late 1990s, Gap theories and the LibQual model began to be widely accepted by research libraries. Since then, library service evaluation and user satisfaction issues have been discussed in a variety of subject literatures. Many researchers have observed that user satisfaction is a central variable in most user-oriented research (Kotler & Andersen, 1996). They have also discovered that user satisfaction generally implies the existence of an appraisal of perceived performance. This appraisal is an active comparative process between various process components such as expectations and perceptions of services. Many researchers believe that, as Gap 5 theory promotes, "service quality is variously defined as a component of customer satisfaction and vice versa" (Cullen, 2001, p. 663). The prevalent LibQual model is based on Gap 5 theory – the discrepancy between customer expectations and customer perceptions of services received.

User satisfaction is a popular measure in current user surveys designed to evaluate library services. The relationship between user satisfaction and library performance has been implicit or explicit in a large number of library studies. Generally, there are two types of investigation into the relationship between satisfaction and performance. The first type equates library performance with user satisfaction; this relationship is widely accepted and adopted. The second one questions this assumed equation and tries to find a satisfaction formation process and its relation to library performance. For the second type, researchers have adopted knowledge and models from other disciplines such as marketing, psychology, and computer science. After doing so, they found a series of variables contributing to user satisfaction other than performance alone (Applegate, 1993).

Two researchers published results from their research into the satisfaction formation process in library settings. The first one is Rachel Applegate, who pointed out the existence of "false positive" phenomena in library services. According to Applegate (1993), “A ‘false positive’ occurs when a consumer is satisfied with an inferior product” (p. 525). The occurrence of a “false positive” means that, even when library performance fails to meet users' needs, they still could possibly feel emotionally satisfied. They would then give “Yes” as their answer when they are asked if they are satisfied with the library service. To examine the user satisfaction process, Applegate made a distinction between material and emotional satisfaction. In her estimation, she provides three models to describe the satisfaction formation process. The first model is the Material Satisfaction Model (MSM), in which system performance determines material satisfaction. In this model, emotional satisfaction is either equated with material satisfaction or ignored as unimportant. This model is consistent with the previous assumed equation, *performance = satisfaction*. It suggests that the performance variable is the antecedent

of customer satisfaction, with the result that user behavior is considered to be determined by material satisfaction. However, several studies have yielded weak or mixed results of the relationship between performance measurement variables and user satisfaction (Tagliacozzo, 1977; Fenichel, 1980; Hilchey & Hurych, 1985). Thus, the MSM is unable to explain the relationship between performance and satisfaction.

The second model is the Emotional Satisfaction Model-Simple Path (ESM-SP). Applegate proposed "emotional satisfaction" to be a distinct entity that can be independently measured and be caused largely or solely by material satisfaction. The research related to emotional satisfaction attempted to measure the user's actual feeling of "satisfaction," rather than simply trying to infer its presence. Both the MSM and the ESM-SP assume that if material satisfaction is achieved, emotional satisfaction is also achieved. The comparison between "emotional" and "material" is like giving emotional statement ("no matter if or not I can get what I need from this library, it is always helpful and my first choice for information seeking.") and giving material aspect statement ("As long as I can find the books I need in this library, I will stay with it"). If emotional satisfaction is determined by system performance or material satisfaction, then this simple-path model is sufficient. However, several library studies involving emotional satisfaction found weak relationships between satisfaction and performance. In a study of end-user search service, Ankeny (1991) found that almost 20 percent of respondents achieved emotional satisfaction without material satisfaction. Dalrymple (1990) found that users who used the electronic catalog, even if they located fewer items than those using the conventional card catalogue, were more satisfied. Similarly, Butler and Kortman (1988) found that, even though 31 percent of the users, by their own reports, could not possibly achieve material satisfaction, only 17.3 percent pronounced themselves neutral or even mildly dissatisfied. Moreover, a number of

research results found that most or even all of the observed variance in user satisfaction cannot be explained by performance. It is this unexplained variance that causes the occurrence of the "false positive."

The third model Applegate provided is the Emotional Satisfaction Model-Multiple Path (ESM-MP) that determines satisfaction by not one, but three, major variables: disconfirmation, product settings, and product performance. Among these, disconfirmation has been found to be the strongest predictor (Sullivan et al., 1990; Dalrymple, 1990). Disconfirmation refers to the difference between a person's expectation of product performance and the actually perceived performance. Compared to the former two models, the ESM-MP is the best way to explain user satisfaction. Based on this model, Applegate conducted an OPAC retrieval experiment for her doctoral dissertation. She found that disconfirmation plays an important role in explaining the formation of satisfaction. Her results also show that, “because this disconfirmation matters, expectation as well as performance matter” (p. 180). Furthermore, a “false positive” occurs when users’ perceived library performance is higher than their expectation. Her findings explain why users who do not get what they need (or say, their material satisfaction is not achieved) can still feel emotionally satisfied.

The other recent researcher specializing in user satisfaction formation process is Xi Shi. Following Applegate, Shi (2003) applied the disconfirmation paradigm to her own studies. She conducted an investigation that separately measured user satisfaction with both information product and information system/service. The significance of her research is twofold: one is that it separates user needs from user expectations in measurement, solving a long-existing problem of a mixture of these two subjective judgments in some user surveys (Bancroft et al., 1998); the other significance is that it successfully measured user satisfaction for information product and

information service, which are two distinct entities, but measured as one in previous studies. Earlier, the evaluation of library service and the evaluation of information product were usually combined and hard to distinguish between because of their intertwining character: library services serve users with information products, and information products are provided through library services. Shi's research took a lead in measuring them separately.

Shi and Applegate, as well as other researchers (Martensen & Gronholdt, 2003), agree on at least one point that library science is very important in terms of material satisfaction or measuring how users' information needs have been met. Actually, quite a few previous user studies measured user satisfaction from this material aspect; however, the term "satisfaction" has not been clearly defined, nor have varieties of it been considered separately (Applegate, 1993). For example, the questions employed in some previous user surveys involve asking users about their emotional feelings such as "Are you pleased with the results?" This kind of emotional satisfaction question may not answer the evaluator's material satisfaction interest in whether the library has delivered a product that matches the stated need. Nevertheless, user emotional satisfaction information can be valuable because it may be at least a partial indicator of material satisfaction. In the late 90s, more and more researchers brought up user emotional satisfaction issues because, based on the marketing research, they found that emotional satisfaction may affect behavior positively or negatively. For instance, emotionally satisfied patrons may use the library more in the future. Although how emotional satisfaction affects user behavior is still under debate, researchers need to specify which user satisfaction we are measuring: Is it material satisfaction or is it emotional satisfaction?

Generally, researchers in the library field agree that the relationship between library performance and user satisfaction is a complex one. Many commentators have borrowed

definitions for emotional satisfaction and material satisfaction from psychology and marketing fields (Applegate, 1993; Hernon & Altman, 1998). More complicated perspectives were proposed to view user satisfaction with library services. First, *service encounter satisfaction* and *overall service satisfaction* were proposed (Bitner & Hubbert, 1998). User satisfaction may involve short-term as well as long-term variables. Hence, personal perceptions and reaction to service may be built up over a number of transactions of varying quality. Second, customer satisfaction is manifest at the *micro level* and *macro level* (Cullen, 2001). Cullen proposed the concepts of customer satisfaction at the micro and macro levels to describe the complex interchange of customer expectations and perceptions across the services delivered by an organization. There can be little doubt that these new perspectives might help researchers to understand better user satisfaction (both material and emotional). However, the necessary investigation has not yet been conducted.

Due to the endeavor of these library researchers to analyze satisfaction formation, several questions emerge to challenge the reported abundance of user satisfaction in library surveys:

- Which type of satisfaction (emotional, material, or both) was the user's reaction recorded as?
- Was this user's satisfaction achieved at one service encounter, multiple encounters, or their general long-term library use experience?
- "Should all these users really be satisfied?" (Applegate, 1993, p. 527)

Because libraries are trying to survive in an increasingly competitive information environment, the answers to these questions are crucial to comprehend better users' perception and behavior. This refined understanding will help to improve the quality of library services and library survival. Of course, it is the goal for libraries that users can achieve both material and

emotional satisfaction. However, the "false positive" phenomenon (users with emotional but no material satisfaction) is a real problem. It may lead to negative behavior, such as a lack of complaints or a lack of demand for material satisfaction once emotional satisfaction has been achieved. Therefore, for libraries, it is important to study user satisfaction at least in three aspects: which type user satisfaction has been achieved; how each of the different type satisfaction influences user behavior; which type user satisfaction has more influence over user behavior. The results would be influential in library practice.

Going back to the issue of the relationship between emotional and material satisfaction, under Applegate's model, an initial relationship was constructed through a disconfirmation model. However, the model needs to be tested, especially under such conditions as user interaction in one service encounter, multiple transactions over one specific library service, and integrated service use experience. Furthermore, the ways that each of these two satisfaction contributes to overall user satisfaction and user behavior need to be clarified.

The primary goal of this investigation is to study the relationship between user material and emotional satisfaction at the micro and macro levels. Moreover, under both levels, if and how user material and emotional satisfaction influence user behavior in terms of their immediate next time library use and long-term library use loyalty.

1.2 STATEMENT OF THE PROBLEM

The recognition of the relationship between material satisfaction and emotional satisfaction has been under transition. As Applegate (1993) noted, researchers have moved from the original assumed the Material Satisfaction Model (MSM) to the Emotional Satisfaction Model-Multiple

Path (ESM-MP) model. From the viewpoint of library service, more complicated perspectives were proposed to measure user satisfaction. First, Bitner and Hubbert pointed out two new perspectives: one is *service encounter satisfaction* – customer satisfaction or dissatisfaction with a specific service encounter; the other one is *overall service satisfaction* – customer satisfaction or dissatisfaction with an organization based on multiple encounters or experiences" (Hernon & Altman, 1998, p. 182). Then, Cullen (2002) proposed the concepts of customer satisfaction at the micro and macro levels to describe the complex interchange of customer expectations and perceptions across the services delivered by an organization. Concerning only one individual service, customer satisfaction at the micro level contributes to the dimensions of service quality such as tangibles and reliability. Concerning all services with which the customer has interacted, customer satisfaction at the macro level is a global view of the quality of service, and integrates all five dimensions of service quality.

These proposed perspectives warrant further study on user satisfaction formation such as whether user satisfaction occurs in one specific transaction or multiple transactions; whether it is at the micro level or at the macro level, etc. Furthermore, the interrelationship of material and emotional satisfaction with the satisfactions at the micro and macro levels is still not clear. Cullen (2001) pointed out that it is unknown that when (or in what circumstances) these concepts measure the same customer response and when (or in what circumstances) they measure separate responses to service quality. Looking at these new satisfaction concepts, Cullen drew a tentative relationship model (Figure 1) to suggest the impact of user satisfactions on user loyalty.

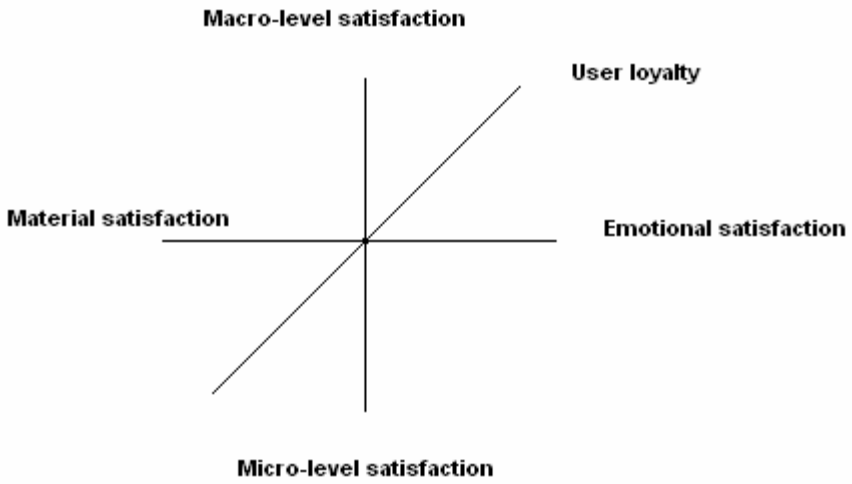

Figure 1: Impact of satisfaction on customer loyalty (Cullen, 2001, p. 666)

Starting with this tentative relationship and the previous studies, this investigation will focus on the clarification of the relationship between users' emotional satisfaction and material satisfaction at the micro and macro levels.

1.3 STATEMENT OF THE PURPOSE

The purpose of this study is to determine the relationship between users' emotional satisfaction and material satisfaction at the micro and macro levels. In addition, from the identification of this relationship, the study will clarify factors or attributes of library services that contribute to user satisfaction at the micro and macro levels. The researcher will also examine how users' emotional satisfaction and material satisfaction contribute to their overall satisfaction and user behavior. That is how emotional and material satisfaction influence user library use behavior in the short term (their next time information seeking) and the long term (library use loyalty).

1.4 SIGNIFICANCE OF THE STUDY

This study will be the first one in the LIS field to explore the relationship between users' emotional and material satisfaction at the micro and macro levels. Starting with the previous studies (Applegate, 1993, 1995; Shi, 2000; Cullen, 2001), this research will gain an improved understanding of user satisfaction in terms of formation, antecedent, and consequent impact. Furthermore, it responds to the call of more research in the field of library and information science to determine the factors or the attributes of services that contribute to user satisfaction (Applegate, 1993). The results from this study will be compared with previous ones to see any confirmation or disagreement. The findings are also expected to provide practical advice to librarians about whether there is anything else they can or should do to improve their current situation.

1.5 OBJECTIVES

This study has eight major objectives:

1. To identify the correlation between users' emotional satisfaction and material satisfaction at the micro and macro levels;
2. To measure and analyze the relationship, at the micro level and short term, of users' emotional satisfaction, overall satisfaction, and immediate next time library use behavior;
3. To measure and analyze the relationship, at the micro level and long term, of users' emotional satisfaction, overall satisfaction, and service use loyalty;
4. To measure and analyze the relationship, at the micro level and short term, of users' material satisfaction, overall satisfaction, and immediate next time library use behavior;

5. To measure and analyze the relationship, at the micro level and long term, of users' material satisfaction, overall satisfaction, and service use loyalty;
6. To measure and analyze the relationship, at the macro level, of users' emotional satisfaction, overall satisfaction, and library use loyalty;
7. To measure and analyze the relationship, at the macro level, of users' material satisfaction, overall satisfaction, and library use loyalty;
8. To compare the results with those from the previous studies.

1.6 RESEARCH QUESTIONS AND HYPOTHESES

Because of the overabundance of the "false positive" phenomena (users with emotional, but no material satisfaction), it is reasonable to assume emotional satisfaction may not relate to material satisfaction in some specific library service transaction. However, in the long term, if users cannot be satisfied repeatedly, which is also to say, they cannot always get what they need from library services, it would not be possible to maintain their emotional satisfaction at the same level as it reached in the short term. Therefore, the research questions and hypotheses are:

Research Question 1

What is the relationship between users' emotional satisfaction and material satisfaction at the micro and macro levels?

Hypothesis 1

At the micro level, in one specific transaction or service encounter (short term), there is not a statistically significantly strong relationship between users' emotional satisfaction and their material satisfaction.

Hypothesis 2

At the micro level, in multiple transactions or service encounters (long term), there is a statistically significantly strong relationship between users' emotional satisfaction and their material satisfaction.

Hypothesis 3

At the macro level, there is a statistically significantly strong relationship between users' emotional satisfaction and their material satisfaction.

For one specific library service, it is reasonable for a user to pick up this service again if he/she feels good from his/her previous experience no matter whether or not this good experience is built on previous fulfillment of emotional satisfaction, material satisfaction, or both. Therefore, the research questions and hypotheses are:

Research Question 2

At the micro level, if and how do users' emotional satisfaction and material satisfaction influence their overall satisfaction and their immediate next time library use behavior?

Hypothesis 4

At the micro level, in one specific transaction or service encounter (short term), users' emotional satisfaction contributes to their overall satisfaction and determines their immediate next time library use behavior.

Hypothesis 5

At the micro level, in one specific transaction or service encounter (short term), users' material satisfaction contributes to their overall satisfaction and determines their immediate next time library use behavior.

Users' emotional satisfaction involves their actual feelings and leads to certain behavior

(Applegate, 1993). For one specific library service or even for all services, if a library wants to establish user loyalty (long-term relationship), the library should either secure users' emotional satisfaction, material satisfaction, or both if possible. Therefore, the research questions and hypotheses are:

Research Question 3

At the micro level, if and how do users' emotional satisfaction and material satisfaction influence their overall satisfaction and service use loyalty?

Hypothesis 6

At the micro level, in multiple transactions or service encounters (long term), users' emotional satisfaction contributes to their overall satisfaction and determines service use loyalty.

Hypothesis 7

At the micro level, in multiple transactions or service encounters (long term), users' material satisfaction contributes to their overall satisfaction and determines service use loyalty.

Research Question 4

At the macro level, if and how do users' emotional satisfaction and material satisfaction influence their overall satisfaction and library use loyalty?

Hypothesis 8

At the macro level, users' emotional satisfaction contributes to their overall satisfaction and determines library use loyalty.

Hypothesis 9

At the macro level, users' material satisfaction contributes to their overall satisfaction and determines library use loyalty.

The hypotheses above are depicted by the following model,

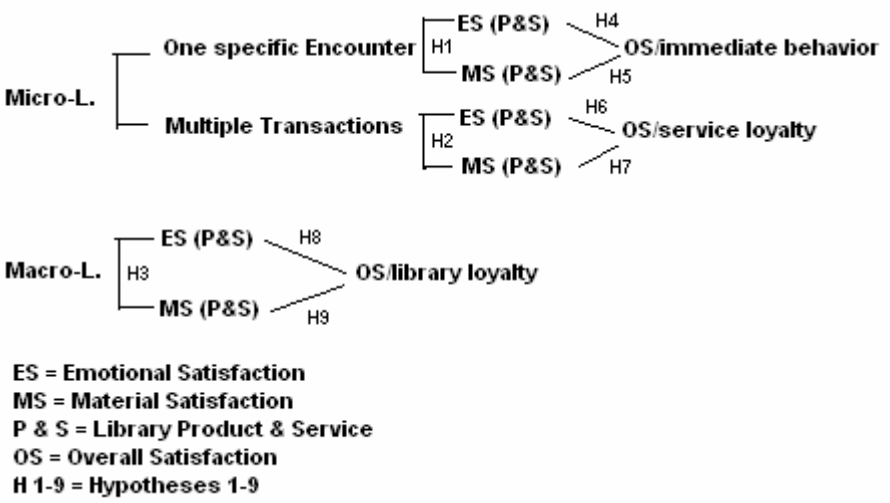

Figure 2: Users' emotional and material satisfaction model at the micro and macro levels

Overall, the test results are expected to show how important emotional satisfaction or material satisfaction is in contributing to overall satisfaction and predicting library user behavior. The separation of the micro level from the macro level of library services is for the measurement of users' specific and overall responses.

1.7 LIMITATION OF THE STUDY

Several limitations regarding the research methodology are imposed on the current study. The first limitation is the lack of extensive previous research in library field about users' emotional and material satisfaction. Because relevant research literature is limited, it is challenging to design an instrument to test the relationship between users' emotional and material satisfaction at micro and macro levels.

Another limitation is the generalizability of the data beyond the population included in the study. The first concern is that the respondents will not fill out the survey questionnaire. The

promotion from the instructors cannot guarantee the response rate. According to some previous studies, how much these self-selected respondents represent the target population is usually unknown (Berge & Collins, 1996; Cronin, et al., 1994). A second concern is that the participants are limited to the students involved in the Department of Communication at the University of Pittsburgh. It is not a random sample of the research population of all students at the University of Pittsburgh. However, under the restraint of time, cost, and the availability and accessibility of research subjects, the Department of Communication was chosen because it responded to the researcher's request for participants and promised its help. In addition, its faculties have a shared interest in students' information literacy. The students taking classes in this department come from various backgrounds in terms of academic level, major, gender, etc., which may, to some degree, represent the general undergraduate population.

The last limitation is about the self-administration Web survey. For instance, respondents tend to drop out before they actually complete surveys because of the lack of human contact (Dolenko, 1998). If this does happen, the response rate will be jeopardized.

1.8 DEFINITION OF TERMS

In order to contribute to a better understanding of the current project, it is necessary to define a number of terms as they will be used in the context of this study. While some of these terms may be familiar to some in the filed of librarianship, others have specific meanings in the context of this study.

User Satisfaction – an appraisal of perceived performance, which is a comparative process between various components, such as expectations and perceptions of services (Arishee,

2000, p. 7).

Emotional Satisfaction – users' internal, personal, and affective response to the product or service they received or the fulfillment of their information needs. Emotional satisfaction generally describes how users feel about the services or performance. A user may use emotional satisfaction as a criterion to evaluate information systems. Emotional satisfaction may be at least a partial indicator of material satisfaction. Based on the premise in marketing that people behave differently when they are satisfied, emotional satisfaction may affect user behavior positively or negatively (Applegate, 1993).

Material Satisfaction – material satisfaction depends on a match between what the user requests and what the user receives (Applegate, 1993, p. 526). Users' material satisfaction is determined by system performance. In library science, user material satisfaction is important because it measures how users' information needs have been met.

User Overall Satisfaction – users' satisfaction or dissatisfaction is based on their multiple encounters or general experience (Hernon & Altman, 1998, p. 182).

Service Encounter Satisfaction – users' satisfaction or dissatisfaction with a specific service encounter, such as user satisfaction with one specific OPAC information search or one specific reference service (Hernon & Altman, 1998, p.182).

Information Product – user obtained material/information from a library is studied as a consumable product in this research. According to the previous studies (Shi, 2002; Ankeny, 1991), the information product and the quality of the information in terms of users' perceived performance of the product play an important role in forming users' satisfaction. In this study, information product performance as part of user consumed library performance is defined by the

attributes of accuracy, appropriateness, details, precision, and relevance. It is also called "library product" or "obtained material/information" in the research questionnaire.

Library Service – all accessible services that libraries provide for users to obtain information they request such as OPAC, reference service, interlibrary loan, etc. As an important part of library performance, library service is characterized in this study by the attributes of timeline, user-friendliness, ease of searching, helpful attitude of information professionals, and knowledge and skills of information professionals (Shi, 2000).

User Satisfaction at the Micro Level – concerning only one individual service, user satisfaction contributes to the dimensions of service quality (i.e., tangibles, reliability, responsiveness, assurance, and empathy) (Cullen, 2001, p. 665).

User Satisfaction at the Macro Level – concerning all the services with which the user has interacted, user satisfaction is a global or macro view of quality of services and integrates all five dimensions of service quality. It contributes to user overall satisfaction with the organization (Cullen, 2001, p. 665).

User Behavior – the process that users engage in to select, secure, use, and dispose library products and services to satisfy their needs (Hawkins et al., 2001).

User Loyalty – user library loyalty mainly refers to three aspects in this study: users would like to use more library services in the future; it is important for users to use library resources and services in the future; users would like to recommend the library to other users (Martensen, 2003).

Gap Theory – Parasuranman et al. (1998) defined five gaps from their research data. Gap 1: The discrepancy between customers' expectations and management's perceptions of these expectations; Gap 2: The discrepancy between management's perceptions of customers'

expectations and service quality specifications; Gap 3: The discrepancy between service quality specifications and actual service delivery; Gap 4: The discrepancy between actual service delivery and what is communicated about it to customers: Gap 5: The discrepancy between customer's expected service and their perceived service. In spite of the several layers of complexity in this gap theory, it is the last gap that has been the main focus in library research.

LibQUAL – Before LibQUAL, SERVQUAL was a most widely used instrument to test the Gap Model. It was developed in 1988 and refined in 1994 by the marketing team of Parasuraman, Zeithaml, and Berry. In 1996, Hernon and Altman (1996) used the SERVQUAL model to develop a robust instrument for measuring service quality and satisfaction in academic libraries. In the SERVQUAL model, quality is defined as "perceived quality" rather than "objective quality," that is, it is dependent on the customers' perceptions of what they can expect from a service and what they believe they have received, rather than the objective standard determined by a professional group. The SERVQUAL scale consists of twenty-two items spread over five quality dimensions: tangibles, reliability, responsiveness, assurance, and empathy. In 1998, the SERVQUAL instrument was regrounded and evaluated within the research library community by Texas A&M University research team. Then it emerged as the LibQUAL+ protocol, a survey that measures user perceptions and expectations of library service quality in three dimensions: Affect of Service, Information Control, and Library as Place. In 2005, more than 150,000 users from 255 institutions completed the LibQUAL+™ survey. Participating institutions included college and university libraries, health sciences libraries, community college libraries, and law libraries. In addition, the users include participants in the U.S., Canada, the U.K., Ireland, Australia, and Sweden (www.libqual.org).

2.0 A REVIEW OF THE LITERATURE

To locate studies on user satisfaction issues, the researcher reviewed literatures of the related fields of library science, information science, psychology, management, and marketing for the years 1970 through 2004. Not surprisingly, the majority of literature on this topic has been generated in library science. Generally, these reviewed studies approached user satisfaction from two respects: user material satisfaction and user emotional satisfaction. The former studies focus on user need and material obtainment, while the latter focus on user emotional reaction towards library material and services. Recognizing these were two different kinds of user satisfaction, a few studies went further to explore the relationship between them. Thus, a series of user satisfaction variables have been derived from this effort such as user expectation and disconfirmation. The following literature review starts with a discussion of these two kinds of user satisfaction in terms of concept and measurement in previous studies, and then goes on with the examination of the relationship between material satisfaction and emotional satisfaction; the final part summarizes other issues related to user satisfaction examined in the literature.

2.1 WHAT IS USER SATISFACTION?

In the library field, researchers usually approach user satisfaction in two ways. The first way is a traditional way in which researchers emphasize the investigation of user material needs and

fulfillment - what users requested and received from libraries. Because the physical objects (e.g., books and journals) are the main focus of these studies, library literature usually interprets the fulfillment of user needs by assessing whether users have obtained the materials they were seeking.

Looking at user satisfaction as an emotional reaction, some researchers have approached user satisfaction in a second way that emphasizes the user, the material requestor. A few studies used this affective measurement (Tessier, Crouch, and Atherton, 1977; Plutchak, 1989; Dalrymple, 1991). They explored users' true feelings about their interaction with library systems and showed that an affective definition of satisfaction was valued. However, in empirical research, researchers usually tend to measure satisfaction from users' objective needs (e.g., books and journals) rather than their emotional status. Because emotional factors are usually "complex and multidimensional" (Applegate, 1995, p. 16), library researchers may mention them in the discussion of user satisfaction issues and survey questionnaire design, but give up in the practice of real measuring. It explains why the foundational discussion of user satisfaction may begin affectively but proceed to adopt a definition that refers to performance (an evaluation), not satisfaction (personal reaction).

These two different approaches to user satisfaction have led to two types of investigations into the relationship between user satisfaction and library performance. The first type follows an assumed equation model: *library performance = user satisfaction*. This relationship model is widely accepted and adopted. The second type questions this assumed equation and tries to formulate the satisfaction formation process and its relation to library performance. For this type, researchers have adopted knowledge and models from other disciplines such as marketing, psychology, and computer science. As a result, a series of variables have been identified that

contribute to user satisfaction other than performance alone (Applegate, 1993).

Based on previous investigations, Applegate (1993) made a distinction between material satisfaction and emotional satisfaction, both of which involve user interaction with library performance. Material satisfaction refers to a match between what the user requested and what he/she received (Applegate, 1993). Emotional satisfaction refers to user internal, personal, and affective response to the product or service they received, or to the fulfillment of their information needs (Applegate, 1993).

2.1.1 The study of material satisfaction

Many library studies have used user satisfaction as a performance measurement, which equates library performance with user satisfaction. Applegate (1993) described this equation as the "Material Satisfaction Model" (MSM). In this model, library performance determines material satisfaction; emotional satisfaction is either ignored, equated with material satisfaction, or regarded as unimportant; consequent user behavior is considered to be determined by material satisfaction. In a number of library studies that used this satisfaction measure to evaluate library performance, typically, they focused on "How users' needs have been met by library performance," or "How the library performance (specific or overall) contributes to user satisfaction."

In an early influential piece by Tagliacozzo (1977), he used three performance measures to evaluate patrons' satisfaction: patrons reported that a search was completely useless - very useful (7 pts.); patrons reported that the search provided a number of useful references (0-5, 6+); patrons reported that the search had missed some references found through other sources. It was

assumed in this research that "helpful" or "very helpful" searches produced higher satisfaction in the requestor than those reported "not helpful" or "moderately helpful."

Like Tagliacozzo, Beeler (1981) measured user satisfaction by online search results as being "useful" or "not useful." Both Momenee (1987) and Reese (1988) equated CD-ROM end-users' satisfaction with 1) having "success in locating references on their topics," 2) being "satisfied with the number of relevant citations retrieved," 3) locating "enough articles to write a four to five page paper." Ensor (1988) claims that user satisfaction with the performance of UMI/Data Courier's ABI/INFORM Ondisc CD-ROM database can be determined by ease of use. Ankeny (1991) operationalized "satisfaction" using the questions: "Overall, how would you rate these online services?" and "Did you obtain the information you wanted?" Zorn (1995) determined if user satisfaction was achieved according to increased/decreased usage of graphic user interface. Stewart (1996) regarded user willingness (satisfaction) as the determinant of "the success of scholarly electronic journals."

User satisfaction has not only been used to measure one specific library performance, but has also been used to evaluate integrated library system performance. Casey (1993) evaluated overall user satisfaction by asking: "which services deserve more, the same, or less funding;" "staff helpfulness or friendliness;" "selection of library materials;" "the users' attitudes toward new technology and potential future service." Stamatoplos (1998) evaluated academic library user satisfaction using four aspects of library performance: information accessibility, library staff competence and helpfulness, computer usefulness and ease of use, and skill level for using libraries. Martensen and Gronholdt (2003) developed a user satisfaction model that equates use satisfaction with six determinants: electronic resources, printed publications, other services, technical facilities, library environment, and the human side of user service.

In these studies, satisfaction measurement employed a user describing a service or integrated services as "useful," "helpful," "valuable," or "exactly what I need," etc. These are the typical instruments used to measure material satisfaction. The researchers who used these instruments look at library performance as one component of user satisfaction, or they say "library service is an antecedent of customer satisfaction." (Hernon & Altman, 1996, p. 40)

In some other studies, library researchers adopted mixed instruments in which questions were designed to measure both material and emotional satisfaction. Day, Lee, and Johnson (1985) used three groupings of questions to measure patrons' evaluation of library services. In one group, users were asked about their emotional satisfaction by a direct question: How are you satisfied with library services (such as "reference area… reserve room operations… copy machines)?" For the other two groups, material satisfaction, or say, library performance, was measured by questions asking patrons to "rate the facilities," and agree or disagree that personnel "tr[ied] to be helpful," "are courteous," etc. In this mixed instrument, the research focus was on performance measure even though the first grouping of questions concerned patrons' emotional satisfaction. Applegate (1995) pointed out a second similar mixed instrument that was used to measure "satisfaction," a feeling, but actually refers to performance. In this instrument, the key dependent variable is "success," which was defined as the combination of three survey items: patron is completely satisfied, patron has found what was needed, and patron has not selected any of the provided reasons for dissatisfaction. While the first survey item does refer to emotional satisfaction, the other two refer rather to performance issues. Dalrymple and Zweizig (1992) used a third mixed instrument to collect extensive data about user reaction to both a card catalog and an OPAC. Their typical questions were: The <> was easier to use than I expected; The <> is fun to use; The <> easy to use…(users were asked to rate the statement on a 5 point

scale). Although this instrument has some reference to emotions (frustration, confusion, ease, etc.), essentially, it is an evaluation of performance, rather than a reaction measure.

2.1.2 The study of emotional satisfaction

Applegate (1993) pointed out the “false positive” phenomena in the library field and went on to propose the concept of emotional satisfaction. A “false positive” occurs when a consumer is satisfied with an inferior product (Applegate, 1993, p. 525). The occurrence of a "false positive" means that even when library performance cannot meet users’ needs, they still could feel emotionally satisfied. The “false positive” phenomenon indicates the essential difference between users’ being materially satisfied and emotionally satisfied.

To examine the user satisfaction process, Applegate made a distinction between material and emotional satisfaction. Material satisfaction refers to a match between what the user requests and what the user receives in an information system (Applegate, 1993). Material satisfaction is determined by system performance. Emotional satisfaction refers to users’ internal, personal, and affective response to the product or service they received, or to the fulfillment of their information needs. Emotional satisfaction generally describes how users feel about the services or performance. A user may use emotional satisfaction as a criterion to evaluate information systems, and emotional satisfaction may be at least a partial indicator of material satisfaction (Applegate, 1993).

In the small body of library literature that conceptualizes user satisfaction as an emotion or a reaction, emotional satisfaction is often referred to with the word “emotion” not being used. This omission may blur the difference between emotional satisfaction studies and material satisfaction studies. However, an easy way to identify if emotional satisfaction is measured is to

check if the study attempts to measure users' actual feeling of "satisfaction," rather than simply trying to infer its presence (Applegate, 1993, p. 531). For example, in quite a few library studies concerned with material satisfaction, the researchers usually described a patron as "satisfied" if he/she gave "yes" as his/her answer to a question whether a search was "useful," or to other material measure questions such as whether information needs were met.

According to Applegate, the definition and measurement of emotional satisfaction have been tightly intertwined around two issues: "direct versus indirect, and multivariate versus univariate" (1993, p. 529). A direct measure of satisfaction employs one or more questions directly to ask patrons "Are you satisfied with the results from…," or to provide a scale for patrons to describe their reaction, like "1 (highly satisfied), 2, 3, 4, 5 (not at all satisfied)" (Butler & Kortman, 1987). An indirect measure asks questions that are assumed to reflect on satisfaction, but does not directly use the word "satisfaction," such as "What grade would you give the search experience?" Univariate measures ask single "global question." These appear most often in various library user surveys (e.g., "All in all, how satisfied are you?"). The satisfaction measured by the univariate measures corresponds to "overall satisfaction" in this study. Multivariate measures ask questions about a variety of components. For example, researchers ask patrons to indicate their satisfaction with the following aspects of library system: for one specific search, "helpfulness of search analyst, length of bibliography, time taken to deliver bibliography, value of the bibliography…" (Auster & Lawton, 1984); for the whole OPAC system, "screen display, result relevance, and terminology" (Siegel et al., 1984).

The above intertwined issues have been discussed in some library and information science literature. As one of the most explicit examples cited by Applegate (1993), D'Elia and Walsh (1986) investigated user emotional satisfaction in their study of public libraries. They

defined two types of satisfaction: "subjective user satisfaction," which corresponds to emotional satisfaction as used here, and "objective measures," which correspond to material satisfaction in this study. They prefer subjective satisfaction as an appropriate library evaluation measure to objective satisfaction because, they argue, objective measures are problematic. In their study, subjective satisfaction was measured both directly (by questions on "satisfaction") and indirectly (by questions soliciting an evaluation of the library in the form of a grade (A+ to F)). However, D'Elia and Walsh found only a weak correlation between these two measures.

Day, Lee, and Johnson (1985) used both multivariate and univariate measures for multiple and unitary services. The concept of "unitary service" in their research corresponds to the "micro-level library service" addressed in this study. The "multiple services" in their research correspond to the "macro-level library service" in this study. Day et al. found that the various forms of satisfaction all correlated with each other to a low but statistically significant extent, suggesting that they measured a singular satisfaction phenomenon. However, Lawton et al. (1979), who also combined multivariate and univariate measures found no statistically significant correlation between overall satisfaction and satisfaction with constituent parts.

Briefly, the multivariate versus univariate and the direct versus indirect measures coexist in library research and no single instrument has gained acceptance. This coexistence shows each measure has its own strength. Computer system research prefers multivariate and indirect measures, which elicit user reaction to enumerated system components for the assessment of system attributes. Marketing research favors the unidimensional, direct method because marketing studies often examine four or more variables, and for each variable (e.g., satisfaction), a relatively brief measure is used.

2.2 THE STUDY OF RELATIONSHIP

2.2.1 One-to-one relationship

After Applegate (1993) proposed emotional satisfaction as an entity that can be measured, researchers began to wonder about the relationship between emotional satisfaction and material satisfaction. “Is emotional satisfaction determined by system performance/material satisfaction?” (Applegate, 1993, p. 531)

Under the assumed equation, *library performance = user satisfaction*, Applegate (1993) proposed the Material Satisfaction Model (MSM) and the Emotional Satisfaction Model-Simple Path (ESM-SP) to describe the relationship between material satisfaction and emotional satisfaction.

Material Satisfaction Model (MSM): consistent with the previous equation, *Performance = Satisfaction*, the Material Satisfaction Model (MSM) suggests that the performance variable is the antecedent of customer satisfaction and system features determine system performance which then determines material satisfaction. Emotional satisfaction is either ignored, explicitly equated with material satisfaction, or argued to be unimportant. Consequent user behavior is considered to be determined only by material satisfaction.

Under this model, researchers identify and measure system features first, system performance second and material satisfaction third. There are four traditional variables in performance measurement: relevance, pertinence, precision, and recall. User satisfaction is usually measured by the comments: “good,” “useful,” “valuable,” and “high relevance/pertinent.”

Emotional Satisfaction Model – Simple Path (ESM-SP): in this model, emotional satisfaction is considered to be a distinct entity and can be independently measured. However, emotional satisfaction is still believed to be caused largely or solely by material satisfaction. It is either measured directly or considered part of system performance.

Despite a number of researchers having paid excessive attention to material satisfaction (or library performance aspect) as well as the assumed relationship models, a few felt this relationship still required empirical research to test its existence, to examine how the strength of the relationship varies between products and services, and to compare the strength of the relationship to the relationship among other variables (Arishee, 2000). Therefore, these few conducted a series of further studies and surprisingly observed that the relationship between library performance and user satisfaction varied widely:

(1) Non-significant: Fenichel (1980) found no relationship among recall, precision, unit cost, and the searchers' opinion of the "goodness" of a search. D'Elia and Walsh (1986) found either a non-significant or trivial relation between patrons' judgment of library service or collection quality and their satisfaction. Dalrymple and Zweizig (1992) measured card catalog or OPAC performance using a 0-6 scale of "found everything… found nothing needed." There was no significant relation to either benefits or frustration for card catalog use.

(2) Statistically significant but weak or trivial: in two studies, a relation between performance and satisfaction was found in library settings, but much weaker than the relation found in non-library studies. In Garland, Reilly, and Westbrook's (1989) study of a hypothetical online mediated service, they found a significant relation between role (friendly, unfriendly) and technical (fast, slow) performance and subjects' estimated satisfaction. Ankeny (1991) found rough correspondence between outcome and satisfaction from his survey of online end-users.

One of the reasons for these nonsignificant or weak significant results is that the aspects of performance being measured may not be the ones that most strongly influence satisfaction.

(3) Statistically significant, but mixed results. Some studies that used the most common measures like information system retrieval performance, recall, and precision, have produced mixed results. Auster and Lawton (1984) found that numeric recall (number of items retrieved) correlated with satisfaction, but the precision - satisfaction correlation was statistically insignificant. The study by Kinnucan (1992) also received the same result that satisfaction reactions were strongly associated with precision but insignificantly related to numerical recall. However, Siegel et al. (1984) found a significant relation between numeric recall and satisfaction. Hildenbrand's study (1985) showed a significant relation between both satisfaction and precision.

Because of these contradictory results, users' material satisfaction cannot precisely predict users' perception of library service. Therefore, the MSM is unable to explain the relationship between system performance and satisfaction.

Both the MSM and the ESM-SP assume that if material satisfaction is achieved, emotional satisfaction is also achieved, or is unimportant and nothing further need be done. However, a review of the relationship studies shows that this does not appear to be the case. Library research (Sandore, 1985; Williams & Hogan, 1985) has found weak relationships between emotional satisfaction and performance. More commonly, some studies (Butler & Kortman, 1988; Dalrymple, 1990; Ankeny, 1991) have found that all of the observed variances in user satisfaction cannot be explained by performance, which causes the occurrence of the "false positive." Thus, even the 'simple path' model cannot fully explain emotional satisfaction and depict the relationship between material and emotional satisfaction.

2.2.2 Multiple-path relationship

The inability of either the MSM or the ESM-SP to present the relationship between library performance and user satisfaction and to explain user emotional satisfaction led Applegate (1993) to create a third model, the Emotional Satisfaction Model-Multiple Path (ESM-MP). Compared to the former two models, the multiple-path model is considered the best to explain user satisfaction. The key feature of this model, the disconfirmation variable was tested in Applegate's dissertation research (1995).

The Emotional Satisfaction Model-Multiple Path (ESM-MP) determines satisfaction using not one, but three major variables: disconfirmation, product setting, and product performance (material satisfaction). The identified variables are consistent with those in other studies (Sullivan, Borgman, & Wippern, 1990; Dalrymple, 1990). Among the variables, disconfirmation has been found to be a stronger predictor of satisfaction than the others. Through disconfirmation, users' material satisfaction, which is reflected as one end in the disconfirmation model as users' perceived performance, and users' emotional factors such as user expectation on the other end, are both incorporated into this multiple-path relationship model.

In this multiple-path relationship model, one or more of these variables have been investigated separately or jointly in previous research. As stated earlier, product performance (material satisfaction) has been the focal point of library user studies. In addition, in this multiple-path model, emotional satisfaction measure brings out a category of remaining performance variable – user variables such as user expectations, user needs, and user demographic characteristics. Consequently, the review of these three sets of variables is as follows:

- User expectations
- The disconfirmation between user expectations and perceived performance
- User needs
- The variables in combination (performance, expectations, disconfirmation, needs)
- User demographic characteristics
- Product settings

2.2.2.1 User expectations

Expectation refers to pre-trial anticipation of product performance, in terms of activity, features or quality (Applegate, 1995). Although the relationship between expectations and satisfaction has been noticed in the library field, it is still under investigation whether and to what extent expectations affect satisfaction.

Some non-library studies have reported a direct relationship between expectations and satisfaction (Rushinek, 1986; Bearden & Teel, 1983). In the library field, Dalrymple (1992) used an attitude survey to investigate card *vs.* electronic catalogs usage, and the results suggested that expectations were a strong determinant of user satisfaction.

As an important variable helping to shape emotional satisfaction, expectation measurement has been widely discussed. However, there is more discrepancy than agreement in the subject literature concerning the measures. Researchers cannot agree on the role that expectations play in the measuring scale. Some researchers maintain that expectations serve as a reference point in a customer's assessment of service performance. In this case, the expectation measurement should be separate from perception measurement. For example, SERVQUAL and other studies have attempted to measure user expectations. This is a separate measuring process from perception. In comparing user expectations and perceptions, they hope to achieve an

accurate picture of service quality. However, Philop & Hazlett (1997) disagreed with this separation in that "the mental processes involved in shaping our perceptions automatically make an adjustment for the gap that exists between our expectations and our actually experience of a service" (p. 267). Therefore, it is questionable that the logic behind the measurement of service quality works as an arithmetic difference between expectations and perceptions. This perspective has been supported by several researchers (Andaleeb & Simmonds, 1998; Babakus & Boller, 1992; Cronin & Taylor, 1992, 1994; Teas, 1993).

A few other researchers explored other ways to incorporate expectations into service quality measurement. Webster and Hung (1994) proposed a "more appropriate scale for measuring service quality" (p. 56). This was used in some library user surveys, that is, -2 much less than I expected, to +2 much more than expected. Concerning user satisfaction measures, expectations, which just test "post-test" feelings instead of separating expectation measures from perception measures, could be incorporated into such a scale.

2.2.2.2 Disconfirmation

Disconfirmation is the difference between users' expectations and perceived product performance: confirmation would be an exact match; positive or negative disconfirmation is when the product performs better or worse than expected (Oliver & Bearden, 1988).

In quite a few library studies, disconfirmation has been found to be a stronger predictor of satisfaction than performance alone. For instance, Sullivan (1990) studied end-user satisfaction with intermediary online searching, and she found general user satisfaction equated with disconfirmation.

Applegate's (1995) doctoral dissertation is an influential piece on the application of this disconfirmation model to a library setting. To test this model, she designed a library OPAC

search. Her results not only confirmed the applicability of this model to the use of an OPAC, but also noted that "disconfirmation measured was shown to predict more variation in satisfaction than did performance" (p. 123).

Shi's (2003) dissertation research is also significant, having applied two disconfirmation models to a user satisfaction study. One is the expectation disconfirmation model, and the other one is need disconfirmation model. Her study confirmed that disconfirmation theory can explain library user satisfaction formation. The results showed that "both need disconfirmation and expectation disconfirmation were determinants of product satisfaction. However, only need disconfirmation, not expectation disconfirmation, was the determinant of information service satisfaction" (p. 103).

Currently, the measurement of expectations is still in a rudimentary state with single question measure most common. Another indirect way to measure expectations is to measure disconfirmation. This post-test-only design operates under the explicit assumption that pretest expectations are the same as expectations "remembered" in the post-test. Disconfirmation is determined not by what a consumer "really" thought "back then" but by what the consumer perceives after the post-test. However, it is under debate as mentioned previously whether expectations should be measured separately because the pre-test expectation is not necessary the same as in the post-test.

2.2.2.3 User needs

It is important for a library to measure how users' information needs have been met. In spite of little evidence, researchers assumed that if user needs could be identified, it would result in user satisfaction. For example, from the literature review in information system and marketing fields, Shi (2000) noticed the importance of user needs in determining user satisfaction formation. In

order to test this noticed importance, she constructed a need-performance disconfirmation model and found, "The more the information product performance (or information service) is perceived to fulfill the user's information needs, the greater the information product (or information service) satisfaction" (p. 81-82); "…only need disconfirmation, not expectation disconfirmation was the determinant of information service satisfaction" (p. 105). Her findings also show that the influence of need disconfirmation is greater than expectation disconfirmation, and in practical information searching activities, users' information needs must be met.

Essentially, Shi's user need disconfirmation model is consistent with Applegate's (1993) address of material satisfaction which emphasized that "library science is most important in terms of material satisfaction: measuring how users' information needs have been met" (p. 527). Therefore, the importance of users' material satisfactions is what most library researchers seem to agree on.

2.2.2.4 Variable integration (performance, expectation, disconfirmation, and user needs)

Shi (2000) incorporated most of studied variables into one satisfaction model to examine information user satisfaction formation: performance (both service and product), expectations, disconfirmation, and user needs. Her study successfully measured user satisfaction separately over information product and information service, which are two distinct entities (Murfin & Gugechuk, 1984), but used to be measured intertwiningly. She found that, "satisfaction with information product may be a better predictor of overall user satisfaction than satisfaction with information service (system/access) to retrieve the products" (p. 113). Further, she concluded that, compared to information service, information product was the key component in satisfying information users (p. 113). Coincidently, this conclusion is consistent with Martensen and

Gronholdt's (2003) that information product (library collection) was more important in predicting user satisfaction than library services.

2.2.2.5 User demographic characteristics

Several library researchers examined whether demographic variables affect satisfaction. Their findings have been mixed. Sandore (1985) found no difference between demographic groups in terms of satisfaction. However, D'Elia & Walsh (1983) did find significant, though low, demographic differences in the "grades" assigned to libraries and direct satisfaction with public libraries. Allen (1989) found that males had a less positive opinion of a CD-ROM system.

Arishee's (2000) research found statistically significant relationships exist between users' satisfaction with library services and users' culture values, geographic area, background variables of length of stay in the U.S., native language and English language proficiency, and academic levels. However, the other demographic variables examined such as gender, age, and undergraduate major field, showed no statistically significant relationship with user satisfaction.

2.2.2.6 Product setting variables

Product setting variables are the final category of hypothesized determinants of satisfaction. Specific factors identified are price, interface, and elapsed time. Although most library services are free, monetary cost to a user is an obvious factor contributing to user satisfaction. However, the effect of cost on satisfaction has been found to be statistically significant but trivial (Levene & Pedersen, 1996). What comes between a user and the product may be a person or a system interface. There may be presumed to affect satisfaction, but results have not confirmed this assumption (Sullivan et al., 1990; Lawton, 1979). Generally, product setting appears to have a possible but not demonstrated influence on satisfaction.

In summary, as the review of the literature has indicated, library performance/material satisfaction fails to predict users' emotional satisfaction. Material satisfaction and emotional satisfaction are not in a one-to-one assumed relationship. A few previous studies found that three sets of variables – product performance (material satisfaction), user characteristics (expectations, disconfirmation), and product settings (cost, intermediary, or interface), could determine satisfaction formation. Among them, disconfirmation has been proven to be the strongest predictor. Through the disconfirmation, material satisfaction and emotional satisfaction are able to be constructed in a multiple-path relationship model in which various variables work together such as user expectations, user needs, and product settings.

2.3 OTHER IMPORTANT USER SATISFACTION ISSUES

2.3.1 User satisfaction and user behavior

Based on the observation of library users' emotional satisfaction, Applegate raised the question: "Does emotional satisfaction affect behavior?"(Applegate 1993, p. 531) If it does, knowing a user's satisfaction will be valuable because it can predict the user's further behavior. However, findings have been mixed. On the positive side, Beeler (1981) found a correlation between anticipated behavior ("Would you recommend this service to others?" and "Would you use the service again?") and material satisfaction (results evaluated as "useful"). The user survey of five innovative Danish libraries also showed a very strong correlation between user loyalty (long-term user behavior) and user satisfaction, and that, "user loyalty is created as an interactive result of user satisfaction" (Martense & Gronholdt, 2003, p. 146).

On the negative side, D'Elia & Walsh (1986) showed no correlation between user behavior and satisfaction among patrons of public libraries. Fang (2001) also found no correlation between user satisfaction and their library use in a Chinese vocational school. In other fields such as psychology, marketing, and computer science, the findings are positive, but the cause-effect relationship between emotional satisfaction and behavior is still debatable (Applegate, 1993, p. 531).

User behavior can be divided into two aspects by timeline. One is the immediate next time behavior, and the other one is user loyalty in the long run (Cullen, 2001). The above mixed findings demand further studies on the relationship between user satisfaction and user behavior, specifically whether and how user satisfaction influences user behavior in both the short and the long term.

2.3.2 User satisfaction measurement

Any measurement of user satisfaction employs some utilization of a user survey. However, the theoretical framework and conceptual approach to evaluation within which the survey will be applied is rarely addressed (Cullen, 2001). The IFLA guide – *Measuring Quality: International Guidelines for Performance Measurement in Academic Libraries* (Poll & Boekhoerst, 1995) suggested that satisfaction surveys focus on:

1. General user satisfaction which evaluates the service of the library as a whole
2. User satisfaction with individual services or components of those services

This guideline is consistent with the previously discussed micro/macro level satisfaction model proposed by Cullen (2001). Also, it was observed in the design of SERVQUAL instrument. The refined SERVQUAL is capable of gathering information at both micro and

macro levels about library users' overall perceptions of specific services (Hernon & Altman, 1998). Likewise, five innovative Danish libraries (Martense & Gronholdt, 2003) abided by this guideline to investigate the relationship between library performance, user satisfaction, and user loyalty. This research is significant in that it not only identifies the relationship between users' satisfaction and user behavior at five performance dimensions, but also identifies which performance dimension contributes most to user satisfaction and user loyalty. However, one drawback is prevalent in all these mentioned studies that researchers took the assumed equation between library performance and user satisfaction for granted. Thus, users' emotional satisfaction is either ignored or equated to material satisfaction.

Therefore, further research is required not only to clarify how user satisfaction is measured at each level (micro *vs.* macro), but to identify which satisfaction (material *vs.* emotional) measures which library service or performance.

2.4 SUMMARY

Several variables and models of user satisfaction formation process have been achieved by researchers (Applegate, 1993, 1995; Shi, 2001; Cullen, 2001) who tried to join the strengths and compensate for the weakness of the library literature. However, the definition and modeling of satisfaction is still the weakest and most inconsistent part. Some crucial questions have been left unanswered. Overall, the following aspects need further attention:

- The relationship between users' emotional and material satisfaction at both micro and macro levels of library services;

- The relationship between user satisfaction (both emotional and material satisfaction) and user behavior (e.g., short-term *vs.* long-term);
- The distinction between user satisfaction with library products and user satisfaction with library services.

3.0 RESEARCH DESIGN AND METHODOLOGY

Survey method is a significant way of gathering information. By carefully following certain scientific procedures, one can make inferences about a large group of elements by studying a relatively small number selected from the larger group (Powell, 1997). As a well-established and standard tool in social sciences, surveys have been widely employed in the past to collect the data about how users have perceived library performance. Based on the review of the related literature, a survey will be the most appropriate method for this study. This survey, however, is different from previous ones, because the survey questionnaire is mounted on the Web. Research subjects will be requested to go to the Web to fill it out.

Although still evolving, the Internet, popular for its wealth of information resources and powerful means of communication, provides survey researchers with many new opportunities (Zhang, 2000). The instantaneous electronic capturing of data makes the Web even more attractive as a research tool in terms of data collection (Knapp, 1999). The Web has become either the only means or has been combined with other approaches to collect data in several library and information studies (Spink, Bateman, & Jansen, 1998). For example, Bertot et al. (1996) conducted a national survey on public libraries by both sending out questionnaires via postal mail and offering its Web version as an optional completion mode for those libraries with Web access. In addition, the Web has been used in collecting medical records (Subramanian,

McAfee, & Getzinger, 1997), studying drug dealers (Coomber, 1997), and conducting laboratory experiments in behavioral and social sciences and psychology (Piper, 1998; Davis, 1999).

In a number of academic and industry fields, there have been heated discussions about Internet survey *vs.* non-electronic survey during the last few years. These fields include library and information science, colleges and universities, secondary-school education, personnel and other applied settings, and of course, general survey and survey research industry (Zhang, 2000; Krantz, Ballard, & Scher, 1997; Paveer & Ellard, 1998; Davis,1999; Handwerk, Carson, & Blackwell, 2000; Riva, Teruzzi, & Anolli, 2003; Mertler, 2002; Stanton, 1998; Tompson et al., 2003; Schmidt, 1997; Couper, 2000; Gay, 2004). By comparing these two types of surveys, researchers agree on the strength of Web-based surveys as follows:

- The survey instrument is available 24-7 at a location convenient to the respondents;
- Less time is required for the delivery of the instrument to participants, the administrator's receipt of responses, data entry, and analysis and feedback;
- The Web-based instrument allows inclusion of text, images, and sound; direct and accurate electronic transmission (coding and analysis) of quantitative and qualitative data;
- The Web-based instrument accesses larger and geographically broader sample with fewer human resource services (e.g., photocopying, mailing, and typing) and fewer material resources (e.g., paper, ink, and postage).

The Web-based survey method has the potential for bringing efficiencies of comparable importance to the design and administration of self-administered questionnaires. Because of the incomparable efficiencies of nearly complete elimination of paper, postage, and data entry costs,

the Web-based survey has been accepted and appreciated by more and more respondents. In her 1999 dissertation at the University of Illinois at Urbana-Champaign, Ying Zhang developed a Web-based survey instrument to collect and analyze the scholarly-use of Internet-based electronic resources. Zhang (2000) found that 80% (125 of 156) of the usable replies were received via the Web, and only 20% were received via postal mail or fax, which she offered as additional survey completion methods. Therefore, she concluded that Web-based questionnaires have great potential value for LIS research.

For this study, a survey questionnaire was designed to determine the validity of the research questions and collect data on how university students perceive their library use experience. After considering the convenience of data collection, survey cost, and sponsorship as well as the fact that computers and Internet access have become basic work and study requirements in American universities and colleges, the researcher mounted the designed questionnaire on the Web. The specific survey methodology employed is Dillman's (2000) *Mail and Internet Surveys*. The elaboration of how his suggestion was followed is in the instrument design section (3.3.1 the Design of the Survey Instrument).

3.1 THE SITE OF THE STUDY

For the convenience of data collection and the consideration of research cost, the University of Pittsburgh was chosen as the study site.

The University of Pittsburgh is one of the oldest institutions of higher education in the United States. Since its foundation in 1787, it has evolved into an internationally recognized center of learning and research. By the end of the year 2005, the University has hosted a total of

5,176 faculty members and research associates, 6,814 staff, 23,858 undergraduates and 9,535 graduates, which include 1,623 international students from 109 countries (University Fact Book, 2006).

The university libraries and collections provide an abundant amount of information and services to the students, faculty, staff, and researchers. In the fiscal year 2005, the university libraries have surpassed 4.7 million volumes in collection. In addition, they contain more than 6 million pieces of microforms and over 43,000 current serials. The Hillman Library is the central library and also the largest facility with seating for 1,530 users. It offers an open stack arrangement and an extensive range of library services. PittCat, the university online catalogue, provides access to materials held in all university libraries and currently contains information for more than 4 million titles. Furthermore, the University Library System (ULS) provides access to a comprehensive journal and magazine federated search tool, Zoom!, and a number of online resources such as: Web of Science, Science Direct, PsycINFO, ERIC and Congressional Quarterly for the social sciences. Also included are, Historical Abstracts, Philosopher's Index, RILM Abstracts of Music Literature, and additional collections of article and newspaper databases from EBSCO, SilverPlatter, OVID, and Lexis-Nexis. These and hundreds of other online resources are available via the Pitt Digital Library at www.library.pitt.edu (University Fact Book, 2006).

Since this research is to study academic library users' satisfaction and behavior, the University of Pittsburgh is the ideal place for the identification of research population. Moreover, the researcher is studying at the University of Pittsburgh, which will facilitate the access to the research subjects in terms of geographic distance, time cost, financial cost, and possibility to obtain help.

3.2 POPULATION OF STUDY AND SAMPLING PROCEDURE

A research population is "the aggregation of units to which one wishes to generalize the results of a research study" (Powell & Connaway, 2004, p. 93). Selection of the population is crucial to the success of the sampling stage and must be done carefully with regard to the selection criteria, desired size, and costs in terms of time and money. Furthermore, the members of the population must be readily accessible to the researchers; otherwise, it will be very difficult to collect the necessary data (Powell & Connaway, 2004).

The research population of this study is all students at the University of Pittsburgh. The participants come from 20 Public Speaking classes for undergraduates in the Department of Communication at the University of Pittsburgh, and the same department's graduate student groups. The selection of this research population and participants follows specific criteria:

First, the purpose of this research is to study library users' emotional and material satisfaction as well as their behavior. Students, both undergraduates and graduates, comprise the biggest library user population.

Second, students, especially undergraduates, live in the campus, and their academic lives are closely tied to libraries both physically and electronically. Undergraduates have their own library use characteristics, which are different from graduate students. However, in previous studies, undergraduates were not specifically targeted.

Third, accessibility to the population is the key to data collection. The Department of Communication agreed to help by providing free research subjects. Their help not only reduced the risk of a low response rate, but also made the access to the subjects and data collection much easier.

Fourth, the purpose of sampling is to select a set of elements from a population so that the characteristics of these elements can accurately portray the parameters of the total population from which the elements are selected (Babbie, 1998). The participants in this study include all undergraduates attending the speaking classes and the graduates who are studying in the Department of Communication. The Public Speaking class is a popular class for undergraduates who come from various backgrounds in terms of demographic characteristics, academic levels, and library use patterns as well as study habits. By integrating the graduate groups, this sample should be able to reflect the characteristics of the student population at the University of Pittsburgh. Although it is not a random sample selected technically, it is a good way to collect the data that closely portray the total population.

Fifth, every Pitt student has a Pitt e-mail account and the accessibility to computers and the Internet, which provide great convenience for a Web-based survey.

3.3 INSTRUMENTS

3.3.1 Design of the survey instrument

A questionnaire mounted on the Web was used as the instrument for this study. It was written in standard HTML to be compatible with most Web browsers. For the actual design and layout of this survey instrument, the basic techniques from Dillman's (2000) *Mail and Internet Survey – Total Design Method*, was employed.

Based on his first version of *Total Design Methods* (Dillman, 1978), Dillman (2000) added Internet surveys in his second edition and provided comprehensive guidelines for designing both mail and Web surveys. He suggested that respondents might feel threatened by

demographic questions, and therefore, those should come at the end of the questionnaire. For the design of the Web survey, Dillman provided specific instructions on taking each necessary computer action in response to the questionnaire (Dillman, 2000, p. 389). He also provided design principles on Web skip direction, scroll bar use, screen colors, and bold print, etc.

According to other recommendations from the researchers of survey methodology, the design of the survey questionnaire and the phrasing of the questions are key factors in producing a worthwhile product. The questions should be logically arranged, well phrased (i.e., free of jargon), unambiguous, and consistent in appearance (Line, 1982; Alreck, 1985; Fowler, 1993). The survey instrument for the current study was designed by incorporating these suggestions.

This questionnaire has five sections: 1) questions about respondents' a most recent library use experience (e.g., questions about their satisfaction with the obtained information and encountered library service); 2) questions about respondents' multiple library use experience on one specific library service (e.g., questions about their satisfaction with this specific service, their satisfaction with the obtained information from this service); 3) questions about respondents' general library use experience (e.g., their overall satisfaction with library services and obtained information, their perception of the importance of the library); 4) questions about respondents' library use habits (e.g., frequency, self-appraisal library use skills, information seeking preference); 5) demographic questions (e.g., age, gender, academic level, institutional affiliation). In response to Dillman's recommendation that a questionnaire begin with less threatening, more general questions, (in this case, content questions), and progress to threatening ones (e.g., demographic questions), the researcher placed demographic questions in the last section so as not to put the respondent off initially.

In the HTML construction of the questionnaire, questions are composed of an assortment of either "radio" buttons that allow only one answer and require clicking an alternative button to erase a previous answer, or "check" buttons that allow multiple answers and require a single click on an answer box to erase a previous choice. Most designed questions are close-ended, with respondents selecting from a finite list of responses. There are also options for respondents to provide additional responses as appropriate, and enough text space was reserved for respondents' sharing additional information depending on the nature of the question.

Adopting Dillman's suggestion on font size and bold print, the researcher used them both for designing this questionnaire. Each question statement was bold-printed to make the flow of questions and choices clear. The font size of the key words in some question statements was increased to make respondents easily aware of the difference between each scenario. For example, the font sizes of "most recent," "single," and "one specific library service" were increased and bold printed to make the difference noticeable. Furthermore, as Dillman (2000) advised, a skip function was provided in Question 5 of Section I if respondents choose No. This function would allow respondents to skip all questions in Section II and directly go to the next applicable question in Section III. This questionnaire was also constructed to enable respondents to use the scroll bar at the side of the screen to go anywhere in the questionnaire at any time. At the end of the questionnaire, a "submit" button was set up to remind respondents to complete the survey by sending it out.

The first question on the survey questionnaire requests the respondent's name. This is a required field, meaning the response could not be submitted unless this section is completed. The respondents' names were requested for two purposes: one is to ensure that the questionnaire is completed by only those participants included in the research population and not by someone

who finds the survey on the Web; the other is to identify the winners of $25 bookstore gift certificates, which were offered as research enticement.

For most questions, respondents are restricted and able to select only one of the listed answers. In a few questions, they could select several items. This technique demonstrates another advantage of the Web survey as compared with a paper survey. In traditional paper surveys, respondents may disregard or misinterpret directions. As a result, they may provide more than one answer for a question rather than just one as required. In an HTML survey, HTML code does not permit more than one button to be selected if a "radio" button format is used ("radio" buttons permit only one selection to the question; "check" buttons allow the user to choose any number of answers for the question).

At the beginning of the Web survey page, a Web browser reminder was added between the survey title and an introductory script to ensure that the respondents have no problem to download this survey page and fill out the questionnaire no matter what type of computers they were using. To comply with the regulations of the IRB of the University of Pittsburgh, an introductory script, one of the application files for the IRB approval, was placed at the top of the survey page. This script briefly explains the research purpose and population, participants' age requirement and rights, and foreseeable risks and direct benefits associated with this project. To fulfill the research goals better, one special note was added immediately after the introductory script and prior to the survey questions. This note contains the definitions of the items that will appear in the questions. The definitions are listed, though their meanings may be explicit, just in case respondents need them to understand the questions better.

"End of the Questionnaire" and "Thanks for your cooperation" notes were placed at the end of the questionnaire. After the respondents click the "submit" button, a Web page will automatically be generated with a "Thank you for your opinion" note.

3.3.2 Questions in the survey instrument

Because the questions on the survey instrument provide the only mechanism for soliciting the desired data, their careful construction is essential to assure a successful study. For example, the question order is one of the key components of survey design (Dillman, 2000). Based on Applegate's (1993) Emotional Satisfaction Model-Multiple Path (ESM-MP), most of the test questions were developed from Xi Shi's 2000 study of information user satisfaction process. For the comparability of results, several questions were included regarding the dimensions of information product and service quality. Some revisions were made to reflect this study's focus of users' material and emotional satisfaction issues.

The survey questionnaire comprises five sections. The questions in the first section are to measure users' emotional and material satisfaction over one library use encounter. The data collected from this section are to test Hypotheses 1, 4, and 5.

The questions in the second section are to measure users' emotional and material satisfaction at the micro-level that concerns an individual library service. The data collected from this section are to test Hypotheses 2, 6, and 7.

The questions in the third section are to measure users' emotional and material satisfaction at the macro level that concerns all the services with which users have interacted. The data collected from this section are to test Hypotheses 8 and 9.

The questions in the fourth section are to collect the data about respondents' library use habits; the final section is to collect respondents' demographic data relevant to this study.

In both Section I and II, the first question requires respondents to recall a specific library use experience. This question is designed for two purposes: first, it helps respondents to recall their library transactions; second, it helps the researcher to identify which library service is being measured. The list of library services was adopted from the undergraduate library survey at the University of Washington (Hiller, 2002). Some revision was made according to the research purposes and the services provided by the University of Pittsburgh Libraries. For example, the original item "library Web site" was divided into three items in this questionnaire: PittCat (OPAC), Databases, and E-journals. However, some library services such as photocopy or study area were not included in the list because they are irrelevant to the hypothesis test of this study.

Measures of users' emotional and material satisfaction

In library and information science, computer science, and business field, several researchers found that user satisfaction with information services and user satisfaction with obtained information were two distinct entities (Xi Shi, 2000; Murfin & Gugelchuk, 1984). According to the findings of these studies, users judge library services in the same way as they do library material (or information). Therefore, in each section from I to III, users' emotional and material satisfaction were measured over these two entities: library service and obtained material/information.

Users' emotional satisfaction with obtained material/information was measured by the following attributes that were adopted from Shi's (2002) user satisfaction study.

Accuracy: refers to the extent to which the information is correct and true. Accuracy concerns users' evaluation of information reliability.

Appropriateness: refers to the appropriate format, language, and comprehension level of the information being communicated to the users, whether the information provided to users is suitable for their reading level, language, and comprehension level. Appropriateness concerns the empathy of library services.

Details: refers to the corresponding contents of the information requested and received by users, and the amount and depth of the knowledge that such information can provide to users.

Precision: refers to the degree of exactness of the information.

Relevance: refers to the degree of pertinence or congruence of information relative to the problem to be solved, or relative to the interests of users.

By the same token, users' emotional satisfaction with library services was measured by the library service attributes that were defined in Shi's (2000) user satisfaction study.

Timeline: refers to the timeline of the information delivery – the time required from the point when the information is requested to the point when the information is received by the user.

User-friendliness: refers to the mechanical perspectives of the information systems including the interface, display format, and navigating design of the system, etc.

Ease of searching: refers to the technical perspectives of information storage and retrieval systems.

Librarians' helpful attitude: refers to the degree of willingness to assist users in finding needed information.

Librarians' knowledge and skills: refers to the capability and expertise in searching and finding the needed information for users.

In American academic libraries, LibQual+ has become prevalent as an approach to test how users define satisfaction. It moves from library internally focused definitions of success to

user-oriented evaluation (Phipps, 2001). LibQual+ scale consists of twenty-two items spreading over five quality dimensions: tangibles, reliability, responsiveness, assurance, and empathy. However, LibQual+ model does not differentiate users' perceptions of library material/information from their perceptions of library services. Shi (2000) solved this problem in her product *vs*. service measurement model. Moreover, the five quality dimensions in LibQual+ scale can be covered by her model.

The term "tangibles" refers to library facilities offered to afford users comfort and/or convenience (Swan, 1998). It could be covered by the attributes of "user-friendliness" and "ease of searching" in Shi's model.

The term "reliability" refers to appropriate library collection in depth and breadth, not just in quantity; accessible library resources; organized resources for optimal self-help; various formats of library resources (Swan, 1998). It could be covered by the attributes of "accuracy," "appropriateness," and "detail" in Shi's model.

The term "responsiveness" refers to sufficient library personnel available to help customers (Swan, 1998). It could be covered by the attribute of "librarians' helpful attitude" in Shi's model.

The term "assurance" means that library personnel are approachable, knowledgeable, and skillful (Swan, 1998; Zeitham et al., 1991). It could be covered by the attributes of "librarians' helpful attitude" and "librarians' knowledge and skills" in Shi's model.

The term "empathy" means that libraries provide users with individualized attention such as customized information and services to different user needs. It could be covered under the measurement of "relevance" and "user-friendliness" in Shi's model.

According to Applegate's ESM-MP model, emotional satisfaction is determined by the disconfirmation between user material satisfaction (perceived performance) and user expectation (Applegate, 1993). In this study, user emotional satisfaction will be measured by recorded users' feeling to each attribute comparing to their previous expectation. A five-point scale is given for the rating of users' emotional satisfaction with each attribute. However, in case there is some situation where users may feel unsure about what applies to their experience, a "not applicable" option is provided as an extra option. For example, if the user uses the library collection without any interaction with a librarian or staff, the attributes of "librarians' knowledge/skills" and "librarians' helpful attitude" are hard to apply to this situation. The user can choose the "not applicable" option as his/her answer.

Regarding material satisfaction, most measurements employed in the previous studies involved a user describing a search as "useful" (Lipsett & Schultz, 1984; Tagliacozzo, 1973, 1977), "valuable" (Hilchey & Hurych, 1985; Lawton et al., 1978), or "I found information on my topic and successfully answered my question" (Allen, 1989). In this study, to measure material satisfaction, respondents were asked to rate three statements in each material and service part with a five-point scale from "strongly disagree" to "strongly agree":

Questions assessing material satisfaction for the library material/information part of the survey were as follows:

This material met/has fulfilled my information needs.

The material I found solved my problems.

I was glad that I found what I needed.

Questions assessing material satisfaction for the library service part of the survey were as follows:

The library facilities and services met my information needs.

The service helped me find what I was looking for.

I can find what I was looking for because of the services.

Measure of overall satisfaction

The measure of overall satisfaction is addressed in and by the following question:

Overall, how would you describe your overall satisfaction with this service transaction/this library service/the library services provided by the University Library System?

Not satisfied at all Totally satisfied

1 2 3 4 5

Measure of user immediate next time library behavior

The measure of user immediate next time library behavior is addressed and by the following question:

Will you choose to use this library service again if you have a similar request?

Yes No

Measure of user service loyalty and library use loyalty

The measure of user loyalty follows Martensen's (2003) three questions:

Would you use this library service again in the future? Or

Do you plan to use more Pitt library service in the future?

Yes No

How important do you think this specific service is to you? Or

How important are library services to you?

Not important at all Extremely important

1 2 3 4 5 not applicable

Would you recommend this service to others if you get a chance? Or

Do you recommend Pitt library services to other students?

Yes No

Measurement scale

As stated earlier, for the comparability of the results, the rate of material and emotional satisfaction, the rate of overall satisfaction, and the rate of user loyalty all take a five-point scale with:

1 = completely dissatisfied / strongly disagree/not important at all/not satisfied at all

5 = completely satisfied / strongly agree/extremely important/totally satisfied

Font size and bold print

Dillman (2000) suggested that people should wisely use computers' marvelous capabilities of increasing font size, bold print, and italics in a single sentence. He pointed out that, "such capabilities can ease the task of comprehending and responding to a questionnaire" (Dillman, 2000, p. 95). In this questionnaire, bold print was used in each question statement to make the flow of questions and choices clear. The increased font size was used for the key words in each section's first statement. It was also used in some question statements to make the respondents easily aware of the difference of each scenario. For example, the font sizes of "most recent," "single," and "one specific library service" were increased and bold-printed so that respondents can easily understand the different experience they were expected to recall.

Library use pattern and user demographic characteristics

The last two sections of the questionnaire are to collect respondents' library use habits and their demographic data. Following Dillman's (2002) suggestion, the researcher placed these "threatening" questions at the end of the questionnaire to avoid respondents' possible negative feelings. Demographic characteristics are the largest (and most studied) group of variables that

users bring to the information-seeking process (Applegate, 1993). The questions in this study ask respondents to indicate gender, departmental affiliation, academic background (i.e., study level and course taking), general library use preference and habits, and self-evaluation of library use skills. These demographic questions were developed from the undergraduate library survey at the University of Washington (Hiller, 2002).

3.4 DATA COLLECTION

In order to improve the return rate, the researcher followed the guidelines of questionnaire data collection provided by Leedy and Ormrod (2005) in their book, *Practical Research: Planning and Design*. Choosing a good timing, motivating respondents by providing monetary enticement, and being gentle and persistent were all included. The detailed data collection procedures are as follows.

Shortly after the Institutional Review Board (IRB) of the University of Pittsburgh approved this research proposal on March 24th, 2006, the researcher immediately contacted Professor Ronald Zboray, Director of graduate studies, in the Department of Communication at the University of Pittsburgh. He had promised to help with research subjects. On March 27th, Professor Zboray instructed the researcher to post four research promotion fliers with tear-off survey URLs on his department information boards. In addition, on March 28th, in order to introduce and promote this research, Professor Zboray sent out two e-mails: one was to 11 Public Speaking class instructors, and the other one was to the graduate student group. He also requested these instructors to add a link on their electronic class blackboards to this Web survey. For each e-mail he sent out, he forwarded one copy to the researcher. One week after initial e-

mails, upon the request of the researcher, Professor Zboray sent an e-mail again specifically to remind the undergraduate students to participate in this Web survey. The data collection officially started on March 27th and ended on April 12th, 2006. However, the researcher still allowed one more week for some late participants. It took about three weeks for the researcher to complete the data collection.

In addition to the participants from the Department of Communication, the researchers received some responses from the Department of English Literature and the Department of Psychology at the University of Pittsburgh. Two instructors working in the University Writing Center, Ms. Janine Carlock and Ms. Deborah Lynn Galle, and one faculty teaching in the Department of Psychology, Dr. Nelly Stadler, showed great interest in this research as soon as they knew about the survey, and they promoted it in their classes or even used it as a way to give their students extra credits. Therefore, the total self-selected research sample of this study increased from 300 students (just from the Department of Communication) to 350 students (including the students from two classes of English writing and one class of introduction to psychology).

The research questionnaire is mounted as an HTML file on the School of Information Sciences' server in the public directory set up by the researcher: www.sis.pitt.edu/~fyu/cgi_bin.cgi/survey.cgi. As respondents completed the questionnaire and clicked the "submit" button at the bottom of the questionnaire, a perl CGI program appended the response data to a text file named as survey.dat. In this file, all responses for a specific question were recorded accordingly. Upon the completion of the project, this text file was copied to a Microsoft Excel file. By a Microsoft Excel sheet, the data was manipulated to determine the extent and nature of the responses for each question.

3.5 DATA ANALYSIS

Both the Statistical Package for the Social Sciences (SPSS) and the SAS software were used to analyze the collected data. Descriptive statistics were employed to summarize all major variables selected from the data set. The researcher applied the following SAS data analysis methods to the hypothesis tests: Pearson correlation coefficients, logistic regression models, linear regression models, bootstraps, and the z-test.

The Pearson correlation coefficients were used to test (1) the statistical significance of the relationship between users' emotional satisfaction and material satisfaction at both micro and macro levels; (2) the statistical significance of the relationship between users' emotional/material satisfaction and their overall satisfaction at both micro and macro levels.

Logistic regression analysis and linear regression analysis were used to test if users' emotional/material satisfaction determines user behavior (i.e., users' immediate next time library use behavior, service use loyalty, and library use loyalty). In this study, the variable of user behavior was designed to be measured by the following three questions: (1) Would you use this library service again in the future? (2) How important do you think this specific service is to you? (3) Would you recommend this service to others if you get a chance? Nevertheless, in the questionnaire Section I, users' immediate next time library use behavior was measured just by the above question (1), because this was for an evaluation of a specific service transaction or encounter. Thus, Hypotheses 4 and 5 were tested just by logistic regression on the Yes/No answer for the question (1). In Section II and III, service use loyalty and library use loyalty were measured by all the above three questions. Therefore, Hypotheses 6, 7, 8, and 9 were tested by both logistic regression models on Yes/No answers (e.g., the above question (1) and (3)) and linear regression models on the library importance scale scores (e.g.., the above question (2)).

Bootstraps and the z-test were conducted to compare the statistical difference between the correlation coefficients derived from Hypotheses 4, 5, 6, 7, 8, and 9.

4.0 ANALYSIS OF THE DATA

4.1 RESPONSE RATE

After the data collection was completed, the researcher received a total of 105 responses from the undergraduate and graduate students at the University of Pittsburgh. The approximate response rate was 30%. However, among these 105 collected responses, eight responses were not valid and were excluded from the data analysis, because two respondents were from the language school affiliated with the University of Pittsburgh, not real Pitt students. Also, two respondents did not follow the survey instruction to answer the questions. For example, in the survey questionnaire Section I, these two respondents chose No as their answers for Question 5, but they did not follow the following instruction to skip all questions in Section II; instead, they went on and answered all the questions, which they only need to do if they had chosen Yes as their answers for Question 5. In addition, three respondents gave either careless or contradictory answers. For instance, one respondent neglected the title of Section II that reminded participants to recall another specific library service. In this section, respondents were to choose a library service different from the service they chose for Section I. However this respondent still chose the same service for both Sections I and II. Last, one respondent's submitted data was partially lost when the Web server of the School of Information Sciences where this study questionnaire was mounted had technical problems from 10:00 p.m. April 11th to 11:00 a.m. April 12th, and all the Web pages could not be found.

Therefore, the valid response rate of this study is 28%, which sounds low, but compared closely or favorably to some previous library surveys (Berger & Hines, 1994; Knapp, 1999; Shi, 2000). Although there is no standard for acceptable response rates, in social sciences, a response rate of 20% is usually considered satisfactory and can portray a studied population.

Furthermore, a brief demographic profile of these valid 97 responses shows that the respondents of this study can well reflect the characteristics of the student population of the University of Pittsburgh. Among the 97 respondents, 51 of them were female and 46 were male. Both the percentages of female students (52.58%) and male students (47.42%) in this study are very close to the percentages of female and male students in the University of Pittsburgh, which are 53.48% (F) and 46.52% (M) (University of Pittsburgh Fact Book, 2006). The participants of this research also reflected the same characteristic of the university student group that the number of undergraduates is more than graduates: 40 of them were undergraduates and 37 were graduate students in this study. In addition, these respondents came from 49 programs at the University of Pittsburgh, which spread over a majority of university schools and departments. Regarding the participants' ages, most respondents were in the age range 18-21 (48.5%) and 25-36 (30.9%), which is also consistent with the age characteristics of university students (University of Pittsburgh Fact Book, 2006). Last, more than half of the respondents (63.9%) chose North America as their geographic origin; however, there were 22.7% respondents from Asia, 11.3% from Europe, and 1% from Africa, as well as 1% from Latin America. This finding is unvarying with the characteristics of university students in that American students comprise the majority of university student population while international students have a small percentage; the top geographic areas from which most international students originate are Asia

(i.e.., China, Republic of Korea, and Japan) and Europe (i.e., Macedonia, Turkey, Romania) (University of Pittsburgh Fact Book, 2006).

4.2 DESCRIPTIVE ANALYSIS OF RESULTS

This part presents the results of the current study. Descriptive statistics for the variables in each section are reviewed as follows:

4.2.1 Section I

The first question asked the respondents to choose a library service that they used most recently at the University of Pittsburgh. PittCat was the most often chosen library service among all the listed library services with a percentage of 36.1 % of all respondents; E-journals was the second most often chosen library service with a percentage of 16.5% of all respondents. Library collection (13.4%), library computer access (12.4%), and Databases (10.3%) were moderately chosen. Just a few respondents chose Course reserves (5.2%), Interlibrary loan/Article delivery (2.1%), and Librarian assistance in library (4.1%). No one chose either Library instruction or Librarian remote assistance on the list.

The second question is about the respondents' emotional satisfaction and material satisfaction with the chosen library service. Each service was measured by the following attributes and statements: Accuracy; Precision; Relevance; Details; Appropriateness; Ease of searching; User-friendliness; Timeline; Librarians' knowledge/skills; Librarians' helpful attitude; Statement 1: if the material met the respondent's information needs; Statement 2: if the material solved his/her problem; Statement 3: if he/she was glad what he/she found; Statement 4: if

library facilities and services met his/her information needs; Statement 5: if the service helped him/her find what he/she was looking for; Statement 6: if he/she could find what he/she was looking for because of this service.

For each chosen library service, the respondents' emotional and material satisfaction with obtained materials was measured by the calculated mean of each attribute and statement. For example, for Course reserves, the mean for Accuracy is 4.0, which shows high user satisfaction on this attribute of the service.

Table 1: Respondents' emotional and material satisfaction with obtained material in Section I

Type	Accuracy	Precision	Relevance	Detail	Appropriateness	S.1	S.2	S.3
1	4.00	3.80	4.20	3.80	3.80	4.00	4.00	4.20
2	4.40	4.30	4.10	4.33	4.22	4.20	3.80	4.20
3	3.94	3.50	4.00	4.06	4.38	4.06	3.81	4.25
4	2.50	2.50	2.50	5.00	4.00	3.00	3.00	3.00
5	4.25	4.50	4.00	4.00	3.75	4.25	4.50	4.25
7	4.08	4.23	4.31	4.31	4.77	4.31	3.92	4.46
8	3.92	4.00	3.83	4.17	3.83	4.17	3.67	4.17
9	4.20	4.06	4.09	4.00	3.91	4.06	3.80	3.97

Type 1: Course reserves; 2: Databases; 3: E-journals; 4: Interlibrary loan/ Article delivery; 5: Librarian assistance in library; 7: Library collection; 8: Library computer access; 9: Pittcat

The respondents' emotional and material satisfaction with the library service was measured by the calculated mean of each attribute and statement:

Table 2: Respondents' emotional and material satisfaction with library service in Section I

Type	Ease	Friendly	Timeline	Skill	Attitude	S.4	S.5	S.6	OS
1	3.80	3.80	3.80	3.80	4.20	4.00	4.00	4.20	4.20
2	3.60	3.80	3.50	3.70	3.80	4.20	4.30	3.80	3.90
3	3.75	3.81	4.19	3.63	3.94	4.38	4.13	3.69	4.00
4	4.50	4.50	3.50	3.50	3.00	4.00	4.00	2.50	5.00
5	3.25	3.50	3.50	4.75	3.50	4.25	4.00	4.00	4.75
7	4.46	4.23	3.85	4.08	4.23	4.38	4.38	4.31	4.23
8	3.75	3.75	3.83	3.92	4.25	4.33	4.17	3.75	3.83
9	3.71	3.77	4.00	3.84	4.13	3.77	4.11	3.60	3.74

Type 1: Course reserves; 2: Databases; 3: E-journals; 4: Interlibrary loan/ Article delivery; 5: Librarian assistance in library; 7: Library collection; 8: Library computer access; 9: Pittcat; OS: Overall satisfaction

Table 1 shows that among all the listed library services, regarding the obtained material/information, Interlibrary loan/Article delivery had the lowest user satisfaction on

Accuracy (2.50); Precision (2.50); Relevance (2.50); Statement 1 (3.0); Statement 2 (3.0); Statement 3 (3.0). However, this service had the highest satisfaction on Detail (5.00).

Regarding the library service, Table 2 shows that Interlibrary loan/Article delivery had low user satisfaction on Attitude (3.00) and Statement 6 (2.5); Librarian assistance in library had low user satisfaction on Ease of searching (3.25). Generally, most respondents were satisfied with their most recent library transaction on each measure, because most measured means are above 3.5. Moreover, compared with user satisfaction with library service, user satisfaction with obtained materials is higher on most measured attributes and statements.

The third question asked the respondents to describe their overall satisfaction with the service they chose. A majority of the respondents had very high overall satisfaction: 48.5% of them chose 4 from a satisfaction scale 1 to 5, and 27.8% chose 5, totally satisfied. Although no one chose 1, not satisfied at all, 16.5% of the respondents chose 3, and 7.2% of the respondents chose 2, somewhat dissatisfied. Among all the chosen library services, Interlibrary loan/Article delivery (5.0) and Librarian assistance in library (4.75) have the highest overall satisfaction. It is surprising that although Interlibrary loan/Article delivery had the lowest user satisfaction on most measured attributes (e.g., Accuracy, Precision, Relevance, Timeline, Attitude, and Skill) and statements (e.g., S.1, S.2, S.3), this service achieved the highest overall user satisfaction. Two possible reasons may explain this oddness: one is that this library service was chosen by only two respondents in Section I, which may leads to a biased result; the other one is that this service had high user satisfaction on other attributes, especially Detail (5.0), which may contribute to the high overall user satisfaction on this service.

For Question 4 that asked the respondents if they would use this service again if they have a similar request, not surprisingly, most of them chose Yes. Only 5 respondents chose No.

The last question on Section I asked the respondents if they have used Pitt library services more than once. The majority of them showed Yes and proceeded to the questions on Section II. However, nine respondents chose No and showed that they were Pitt library first time users. Therefore, the total responses to Section II were 88, which are 9 responses less than either Section I or III.

4.2.2 Section II

Section II asked the respondents to choose another specific library service that they have used multiple times. Different from Section I, Library collection became the most often chosen library service among all the listed library services with a percentage of 26.1% of all respondents. Pittcat was the second most often chosen library service with a percentage of 23.9% of all respondents. Databases, E-journals, and Librarian assistance in library were moderately chosen with the same percentage of respondents, 9.1%. Library computer access (8.0%), Interlibrary loan/Article delivery (5.7%), Course reserves (4.5%), and Librarian remote assistance (2.3%) were chosen by less than 10 respondents. Two respondents chose Others but did not specify what services they chose.

The second question is about the respondents' emotional satisfaction and material satisfaction with the chosen library service. Each service was measured by the following attributes and statements: Accuracy; Precision; Relevance; Details; Appropriateness; Ease of searching; User-friendliness; Timeline; Librarians' knowledge/skills; Librarians' helpful attitude; Statement 1: if the material met the respondent's information needs; Statement 2: if the material solved his/her problem; Statement 3: if he/she was glad what he/she found; Statement 4: if library facilities and services met his/her information needs; Statement 5: if the service helped

him/her find what he/she was looking for; Statement 6: if he/she could find what he/she was looking for because of this service.

For each chosen library service, the respondents' emotional and material satisfaction with the obtained material was measured by the calculated mean of each attribute and statement. For example, for Course reserves, the mean for Accuracy is 4.75, which shows higher user satisfaction on this attribute of this service than in Section I.

Table 3: Respondents' emotional and material satisfaction with obtained material in Section II

Type	Accuracy	Precision	Relevance	Detail	Appropriateness	S.1	S.2	S.3
1	4.75	4.75	4.67	4.67	4.75	4.33	4.75	4.75
2	4.38	4.38	4.25	4.50	4.50	4.25	4.13	4.13
3	3.88	4.25	4.14	4.25	4.13	4.25	4.63	3.88
4	4.20	4.00	4.60	4.40	4.40	4.40	4.00	4.40
5	4.38	4.38	4.25	4.25	4.38	4.57	4.50	4.13
6	4.50	4.50	4.50	4.50	4.50	3.50	4.00	3.50
7	4.22	4.35	4.22	4.35	4.24	4.05	4.27	4.27
8	4.57	4.57	5.00	4.83	4.71	4.33	4.71	4.57
9	4.19	4.05	4.00	4.05	4.00	4.10	4.00	3.95
10	4.00	4.50	4.00	4.50	4.00	3.50	4.00	3.00

Type 1: Course reserves; 2: Databases; 3: E-journals; 4: Interlibrary loan/ Article delivery; 5: Librarian assistance in library; 6: Librarian remote assistance; 7: Library collection; 8: Library computer access; 9: Pittcat; 10: Others

The respondents' emotional and material satisfaction with the library service was measured by the calculated mean of each measure:

Table 4: Respondents' emotional and material satisfaction with library service in Section II

Type	Ease	Friendly	Timeline	Skill	Attitude	S.4	S.5	S.6	OS	Importance
1	4.50	4.33	4.00	4.50	4.75	4.75	4.67	4.75	4.75	4.50
2	3.88	3.75	3.80	4.00	4.60	4.25	4.13	4.38	4.25	4.50
3	4.25	3.75	3.57	3.40	4.33	4.38	4.25	4.13	3.88	4.75
4	4.40	4.20	4.00	4.40	4.60	3.40	4.20	3.60	3.80	4.40
5	4.13	4.29	4.00	4.67	4.29	4.25	4.25	3.88	4.38	4.25
6	4.00	4.00	4.00	4.00	4.00	3.50	4.00	4.00	4.00	3.00
7	3.86	3.80	4.32	4.71	4.68	4.14	4.05	4.09	4.13	4.57
8	4.71	4.33	5.00	4.83	4.86	4.83	5.00	4.83	4.71	4.43
9	3.90	3.95	3.93	4.45	4.59	4.10	4.10	4.05	3.90	4.19
10	3.00	4.50	4.00	4.00	4.00	3.50	3.50	4.50	4.50	3.00

Type 1: Course reserves; 2: Databases; 3: E-journals; 4: Interlibrary loan/ Article delivery; 5: Librarian assistance in library; 6: Librarian remote assistance; 7: Library collection; 8: Library computer access; 9: Pittcat; 10: Others; OS: Overall satisfaction

In general, the respondents' emotional and material satisfaction in Section II is obviously higher than in Section I. Therefore, most respondents were satisfied with the service they chose and have used multiple times. Regarding the measured attributes and statements, E-journals did not have good user satisfaction on Librarians' knowledge/skill (3.4); Interlibrary loan did not get good user satisfaction on Statement 4 (3.4). For the respondents who chose Others (library services) but did not specify which services, they gave low satisfaction scores to Ease of searching (3.0) and Statement 3 (3.0). However, all the chosen services have high scores on Librarians' helpful attitude; specifically, Course reserves had very high user satisfaction on all the measured attributes and statements; Library computer access achieved perfect user satisfaction on the attributes, Librarians' helpful attitude (5.0) and the statement 5 (5.0).

The third question asked the respondents to describe their overall satisfaction with the service they chose. Compared to the overall satisfaction in Section I, the respondents showed higher overall satisfaction with the services they have used multiple times: 48.9% of them chose 4 from a satisfaction scale 1 to 5, and 35.2% chose 5. The dissatisfied respondents were also less than those in Section I: 11.4% of the respondents chose 3, and 4.5 % of the respondents chose 2, somewhat dissatisfied. Regarding the specific library service, Course reserves had the highest overall user satisfaction (4.75), followed by Library computer access (4.71), Librarian assistance in library (4.38), Databases (4.25), Library collection (4.13), and Librarian remote assistance (4.00). Interlibrary loan/Article delivery had the lowest overall satisfaction, which is totally different from the finding in Section I. Because there were more respondents choosing Interlibrary loan/Article delivery service in Section II than in Section I, the data of this service in Section II should be more representative than Section I.

For Question 4 which asked the respondents if they would use this service again in the future, 92% of the respondents chose Yes, and only 8% respondents chose No. Question 5 measured how important the specific service was to the respondent. The responses showed that the majority of the respondents thought it was important to them: 50% of them chose 5, extremely important, and 37.5% chose 4, very important. Table 4 also shows that Others (library services) (3.00) and Librarian remote assistance (3.00) were considered the least important by the respondents, while E-journals (4.75) had the highest importance. For Question 6, 94.3% of the respondents chose Yes, that they would recommend this service to others if they get a chance.

4.2.3 Section III

Section III is about the measurement of the respondents' emotional and material satisfaction regarding all the resources and services of the University Library System that they have used.

Still, the respondents' emotional and material satisfaction was measured by the following attributes and statements: Accuracy; Precision; Relevance; Details; Appropriateness; Ease of searching; User-friendliness; Timeline; Librarians' knowledge/skills; Librarians' helpful attitude; Statement 1: if the material met the respondent's information needs; Statement 2: if the material solved his/her problem; Statement 3: if he/she was glad what he/she found; Statement 4: if library facilities and services met his/her information needs; Statement 5: if the service helped him/her find what he/she was looking for; Statement 6: if he/she could find what he/she was looking for because of this service. For example, regarding all the resources and services of the University Library System, the calculated mean of Accuracy is 4.03.

Table 5: Respondents' emotional and material satisfaction regarding all the resources and services

Accuracy	Precision	Relevance	Detail	Appropriateness	S.1	S.2	S.3		
4.03	4.03	4.13	4.14	4.20	4.16	4.01	4.13		
Ease	Friendly	Timeline	Skill	Attitude	S.4	S.5	S.6	OS	Importance
3.93	3.88	4.00	4.24	4.30	4.22	3.95	4.02	4.05	4.28

Table 5 shows that, regarding all the resources and services of the University Library System, the respondents were emotionally and materially satisfied on each measure. Specifically, Librarians' attitude and Librarians' knowledge/skills were most satisfied with the highest scores, 4.30 and 4.24; Ease of searching and User-friendliness were less satisfied with the lowest scores, 3.93 and 3.88; all measured attributes and statements achieved 3.5 above scores, which shows that the respondents were generally satisfied.

In terms of the overall satisfaction measured by Question 2, most respondents (66%) were satisfied with library services, and 19.6% of all respondents were totally satisfied. The average of overall user satisfaction was 4.05. Only 2.1% of the respondents were not satisfied, and no one was not satisfied at all.

When the respondents were asked if they plan to use more Pitt library services in the future, most of them chose Yes except two chose No. Those respondents who chose Yes also checked all the services they preferred to use more in the future: Pittcat was checked with the highest frequency, followed by Library collection, E-journals, Library computer access, Databases, Librarian assistance in library, Course reserves, and Interlibrary loan/Article delivery. Library remote assistance, Library instruction, and Others (library services) were checked with the frequency less than 10. "Others" include library laptops and couches for napping.

Regarding the importance, most respondents felt library services to be either important (26.8%) or extremely important (54.6%). The mean of importance was 4.28, which again, shows

that the library resources and services are important to the respondents. Moreover, 95.9% of the respondents recommend Pitt library services to other students.

In summary, the results of the above three sections are roughly consistent with previous findings (Bancroft et al., 1996; Andaleeb & Simmonds, 1998; Maughan, 1999) in that PittCat, E-journals, and Library collection are the top three library services that users consider important or plan to use more. Specifically, similar to the Washington State University Library Survey (Bancroft et al., 1996), this study found none of the students seemed particularly interested in library instruction because in all three sections, no respondents chose this service. Overall, respondents were satisfied with both library products and services. However, some library service attributes generally received low user satisfaction such as Accuracy, Librarians' helpful attitude, Librarians' knowledge/skills, and ease of searching.

4.2.4 Section IV

The first question in Section IV asked how many courses that respondents have written papers or presented work based on information sources they have found. The most common response was 1-2 courses (47.4%), followed by 3-4 courses (33.0%). A few respondents reported that either they had 5 or more courses (10.3%), or they did not have any courses at all (9.3%) in the spring semester, 2006.

Table 6: Number of courses taken in spring semester, 2006

	Frequency	Percent	Valid Percent	Cumulative Percent
1-2 courses	46	47.4	47.4	47.4
3-4 courses	32	33	33	80.4
5 or more courses	10	10.3	10.3	90.7
None	9	9.3	9.3	100
Total	97	100	100	

The second question asked respondents to select all libraries that they used on a regular basis. Most respondents chose one or two libraries; however, two respondents chose six or seven libraries. Furthermore, a few respondents indicated other libraries not provided as options, such as Barco Law Library, Falk Library, and WPIC (Library of the Western Psychiatric Institute and Clinic). As the following descriptive statistics illustrate, the Hillman Library, the central library of the University of Pittsburgh, was the most frequently used library by most respondents.

Table 7: Pitt libraries used on a regular basis

	Frequency	Percent	Valid Percent	Cumulative Percent
Archives Service Center	1	0.6	0.6	0.6
Barco Law Library	1	0.6	0.6	1.1
Bevier Engineering Library	16	8.9	8.9	10.1
Business Library	7	3.9	3.9	14
Chemistry Library	6	3.4	3.4	17.3
Falk Library	9	5	5	22.3
Frick Fine Arts Library	5	2.8	2.8	25.1
GSPIA / Economics Library	9	5	5	30.2
Hillman Library	85	47.5	47.5	77.7
Information Science Library	11	6.1	6.1	83.8
Langley Library	8	4.5	4.5	88.3
Mathematics Library	5	2.8	2.8	91.1
Music Library	10	5.6	5.6	96.6
Physics Library	3	1.7	1.7	98.3
WPIC	3	1.7	1.7	100
Total	179	100	100	

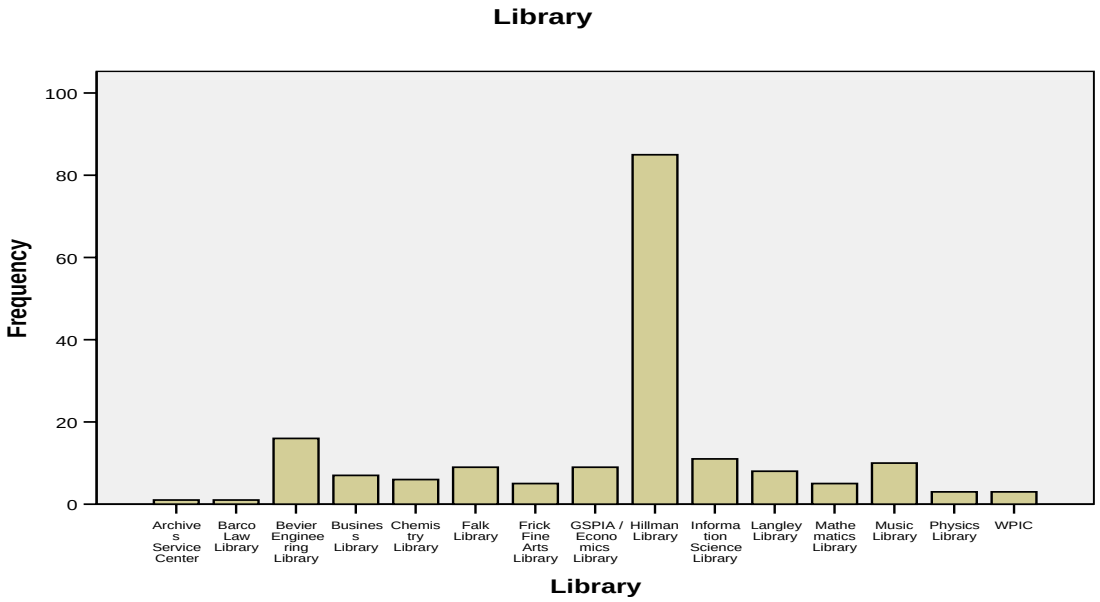

Figure 3: Pitt library use distribution

The third question asks respondents to mark frequency for each type of library use. For Library Use - Visit in Person, 46.4% of the respondents did it weekly, 18.6% of them did it monthly, and 15.5% did it daily; for Library Use – Library computer, 40.2% of the respondents did it weekly, 19.6% of them did it monthly, and 22.7% respondents did it less often than quarterly; for Library Use – CSSD computer[1], 32% of the respondents did it weekly, but 35.1% of them did it less often than quarterly; for Library Use – Home or work computer, most respondents (74.2%) did it daily, and 16.5% of the respondents did it weekly; for Library Use – Phone, 30.9% of the respondents did it weekly, but 32.0% of them did it less often than quarterly; for Library Use – E-mail/Web, the majority of respondents (51.5%) did it daily and 30.9% of respondents did it weekly. In brief, for many respondents, their common library use

[1] CSSD computers are run by the Computing Services and Systems Development at the University of Pittsburgh. They include all computers in student computer labs, kiosks, etc.

pattern is to access to the library resources and services from the Web using their home or work computer, or a library computer. However, the phone is the least preferred way for them to communicate with the library.

Table 8: Library use frequency - Visit in person

	Frequency	Percent	Valid Percent	Cumulative Percent
Daily	15	15.5	15.5	15.5
Less often/NA	9	9.3	9.3	24.7
Monthly	18	18.6	18.6	43.3
Quarterly	10	10.3	10.3	53.6
Weekly	45	46.4	46.4	100
Total	97	100	100	

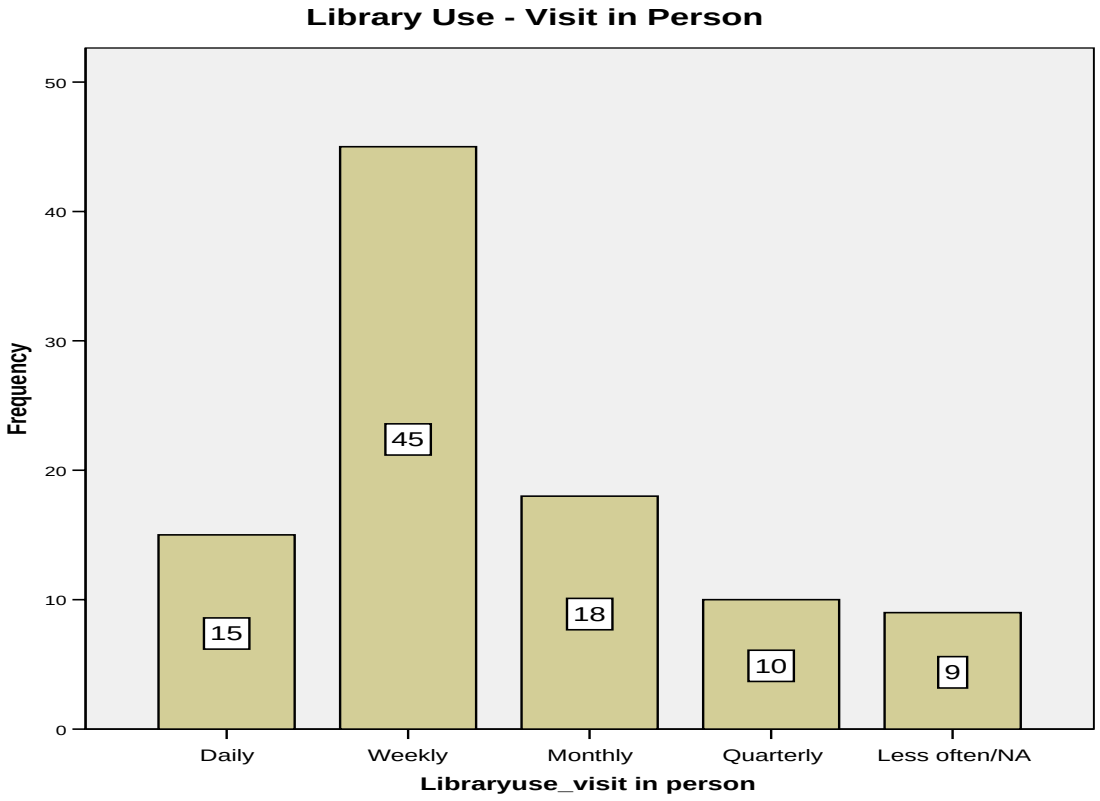

Figure 4: Library use frequency - Visit in person

Table 9: Library use frequency - Library computer

	Frequency	Percent	Valid Percent	Cumulative Percent
Daily	11	11.3	11.3	11.3
Less often/NA	22	22.7	22.7	34
Monthly	19	19.6	19.6	53.6
Quarterly	6	6.2	6.2	59.8
Weekly	39	40.2	40.2	100
Total	97	100	100	

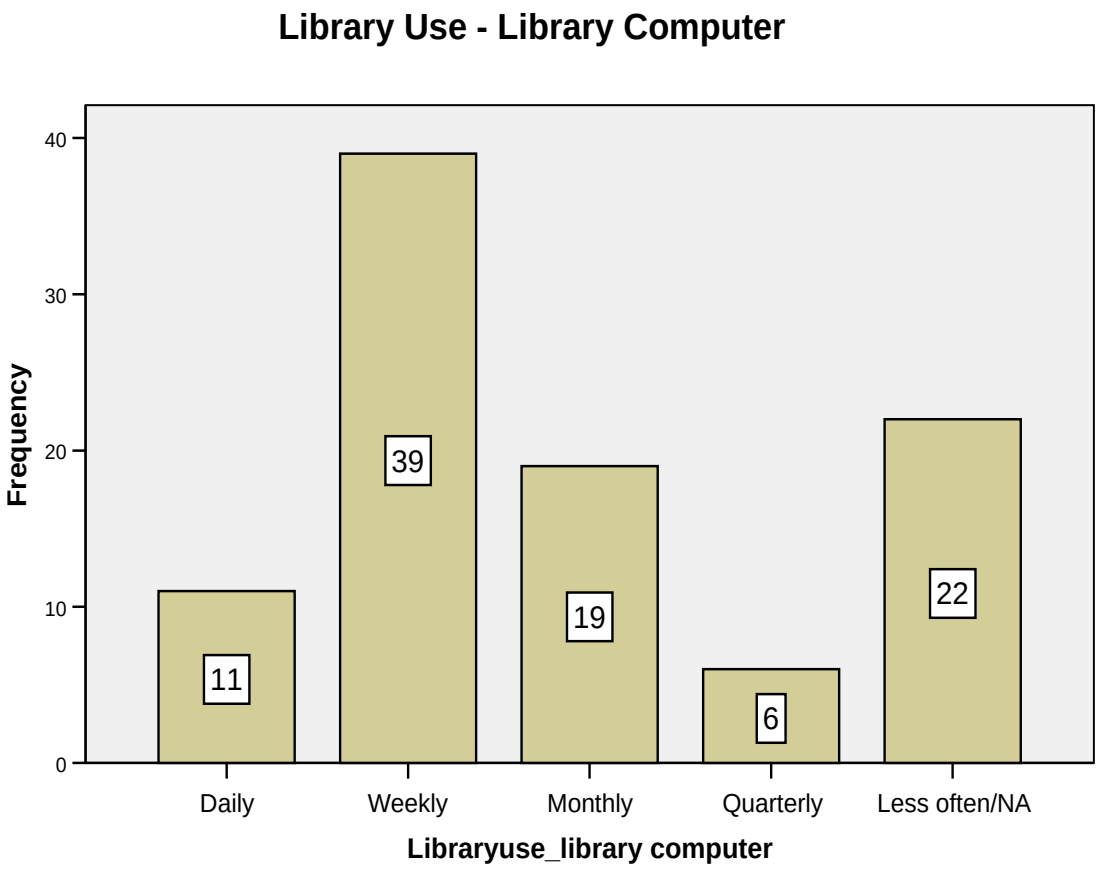

Figure 5: Library use frequency - Library computer

Table 10: Library use frequency - CSSD computer

	Frequency	Percent	Valid Percent	Cumulative Percent
Daily	17	17.5	17.5	17.5
Less often/NA	34	35.1	35.1	52.6
Monthly	13	13.4	13.4	66
Quarterly	2	2.1	2.1	68
Weekly	31	32	32	100
Total	97	100	100	

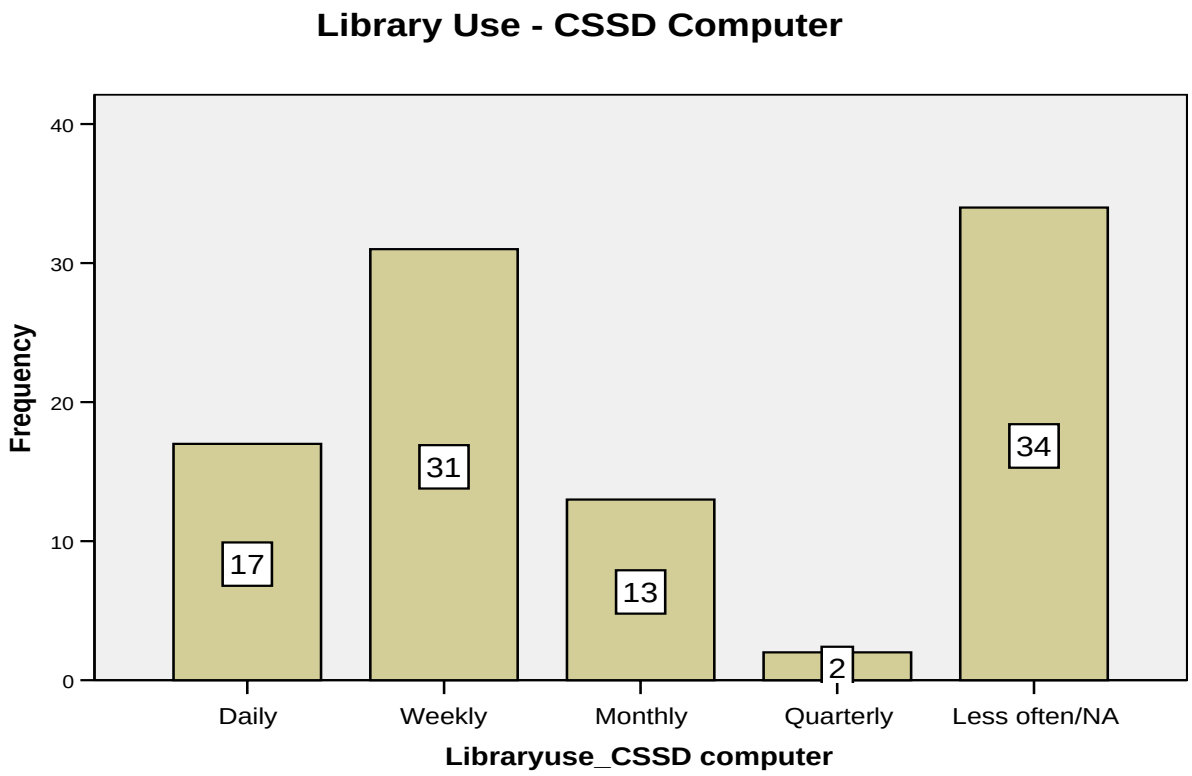

Figure 6: Library use frequency - CSSD computer

Table 11: Library use frequency - Home or work computer

	Frequency	Percent	Valid Percent	Cumulative Percent
Daily	72	74.2	74.2	74.2
Less often/NA	3	3.1	3.1	77.3
Monthly	5	5.2	5.2	82.5
Quarterly	1	1	1	83.5
Weekly	16	16.5	16.5	100
Total	97	100	100	

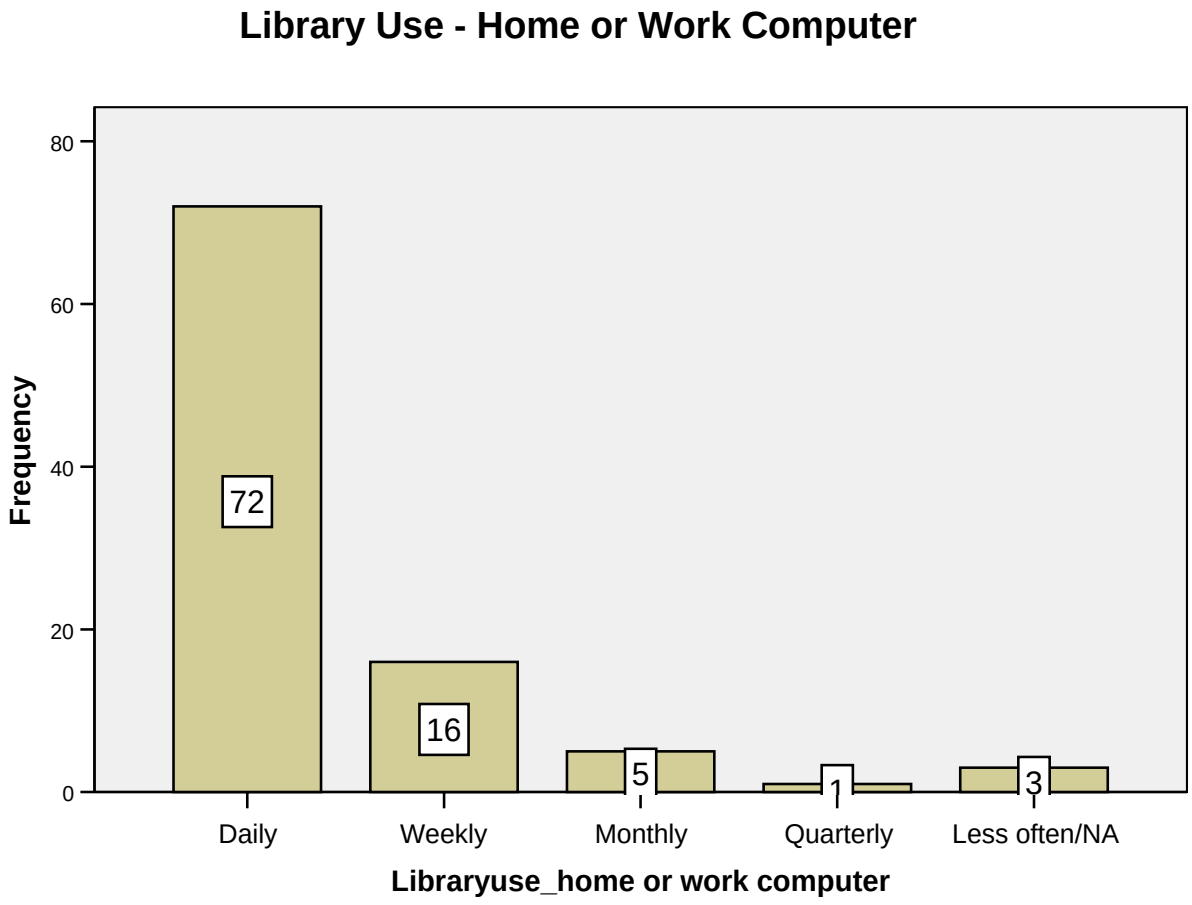

Figure 7: Library use frequency - Home or work computer

Table 12: Library use frequency - Phone

	Frequency	Percent	Valid Percent	Cumulative Percent
Daily	20	20.6	20.6	20.6
Less often/NA	31	32	32	52.6
Monthly	14	14.4	14.4	67
Quarterly	2	2.1	2.1	69.1
Weekly	30	30.9	30.9	100
Total	97	100	100	

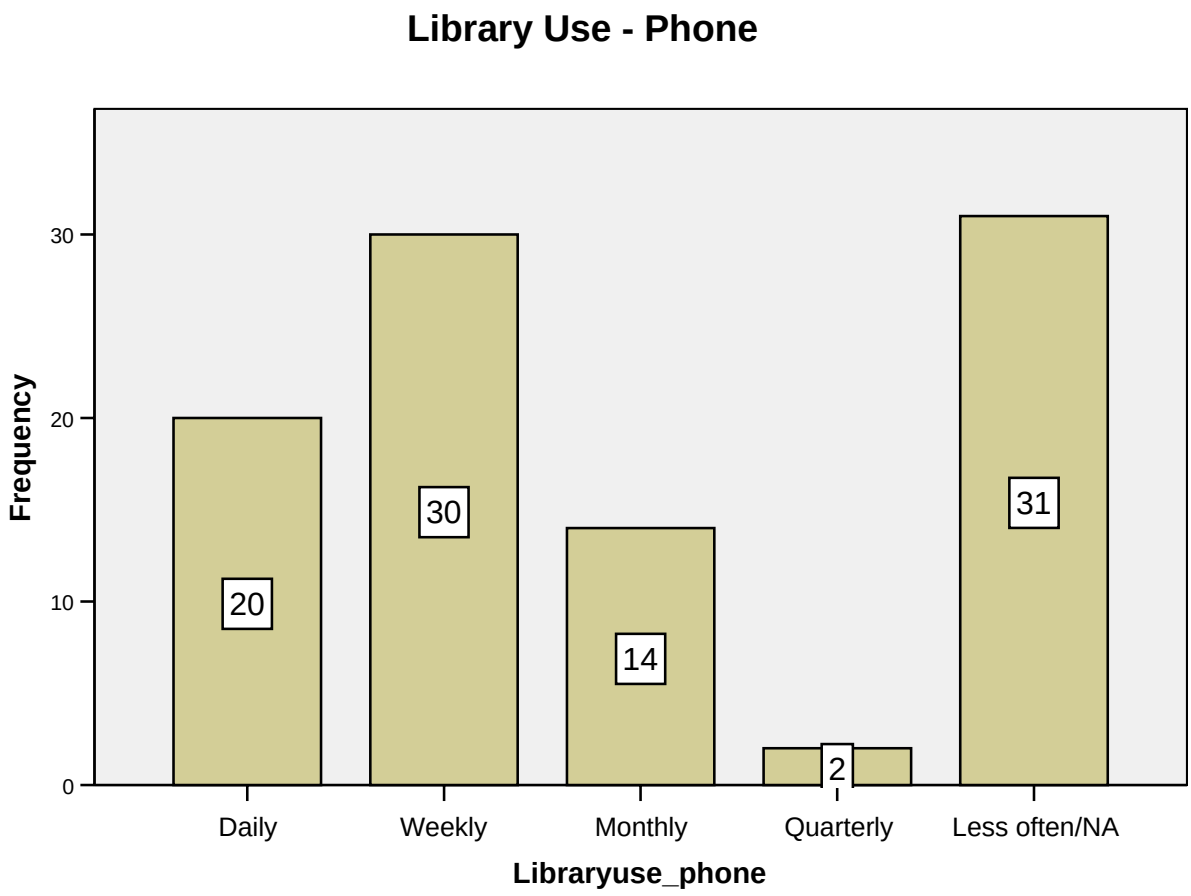

Figure 8: Library use frequency – Phone

Table 13: Library use frequency – E-mail/Web

	Frequency	Percent	Valid Percent	Cumulative Percent
Daily	50	51.5	51.5	51.5
Less often/NA	9	9.3	9.3	60.8
Monthly	7	7.2	7.2	68
Quarterly	1	1	1	69.1
Weekly	30	30.9	30.9	100

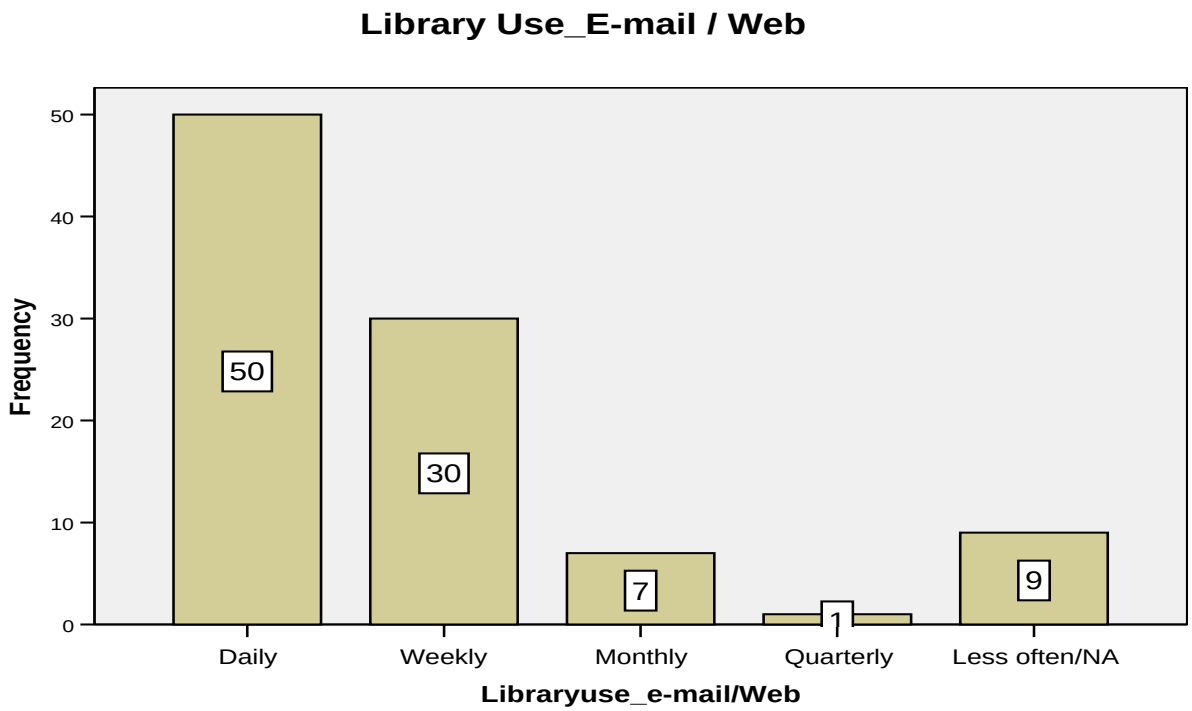

Figure 9: Library use frequency – E-mail/Web

The fourth question asked the participants how they would describe their skill at using library services. The responses show that a majority of the respondents were satisfied with their skill: 49.5% of them (or 48 respondents) were very satisfied by choosing 4 from a scale 1 to 5, and 34% of them (or 33 respondents) were fairly satisfied by choosing 3. Comparing the

respondents who were totally satisfied with their skill and the respondents who were not satisfied at all, the percentage of the former is much higher than the latter, which is 9.3% vs. 1%. There were just 6.2% of the respondents fairly dissatisfied with their library use skill.

Table 14: Respondents' self-evaluated library use skill

	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	1	1	1
2	6	6.2	6.2	7.2
3	33	34	34	41.2
4	48	49.5	49.5	90.7
5	9	9.3	9.3	100
Total	97	100	100	

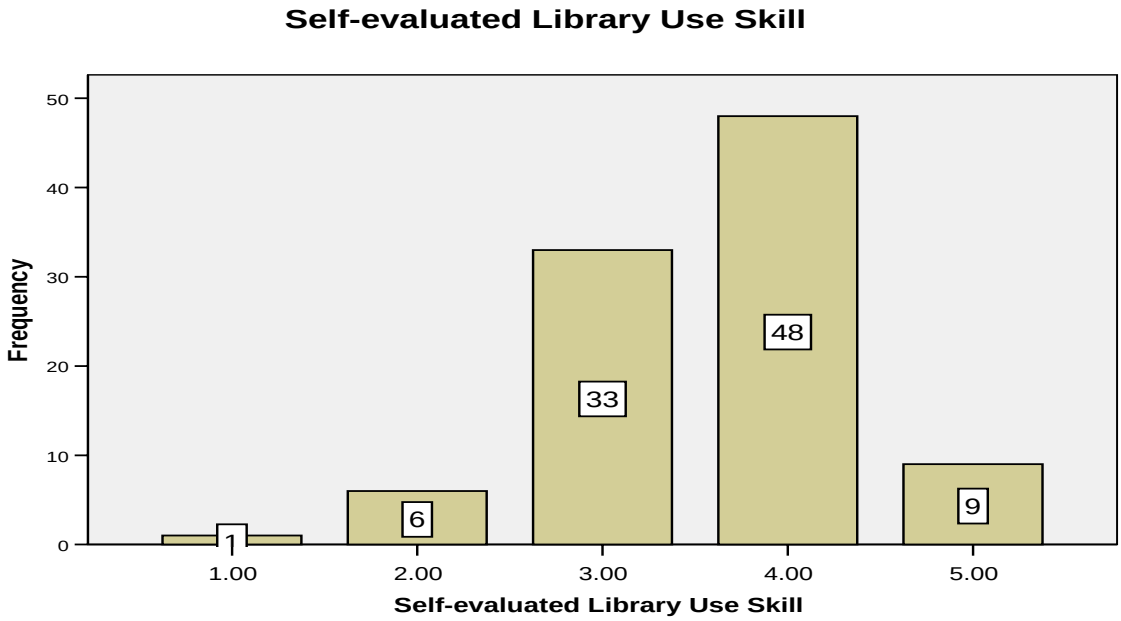

Figure 10: Respondents' self-evaluated library use skill

In terms of the first information seeking behavior that the participants will take when they have a particular academic information need, 42 respondents (or 43.3%) chose "go to

popular search engine such as Google"; 33 respondents (or 34.0%) chose "go to the library website, but from remote access"; 13 respondents (or 13.4%) chose "go to physical libraries"; 7 respondents (or 7.2%) chose "go to classmate or friends"; only 2 respondents (or 2.1%) chose "go to instructors or professor." Consistent with the finding of Amy Friedlander (2003), this result shows that information needs met on the Internet is common among students, and the Web has emerged as an important mode of academic communication.

Table 15: Respondents' first information seeking behavior

	Frequency	Percent	Valid Percent	Cumulative Percent
go to classmates or friends	7	7.2	7.2	7.2
go to instructors or professors	2	2.1	2.1	9.3
go to physical libraries	13	13.4	13.4	22.7
go to popular search engine such as Google	42	43.3	43.3	66
go to the library website, but from remote access	33	34	34	100
Total	97	100	100	

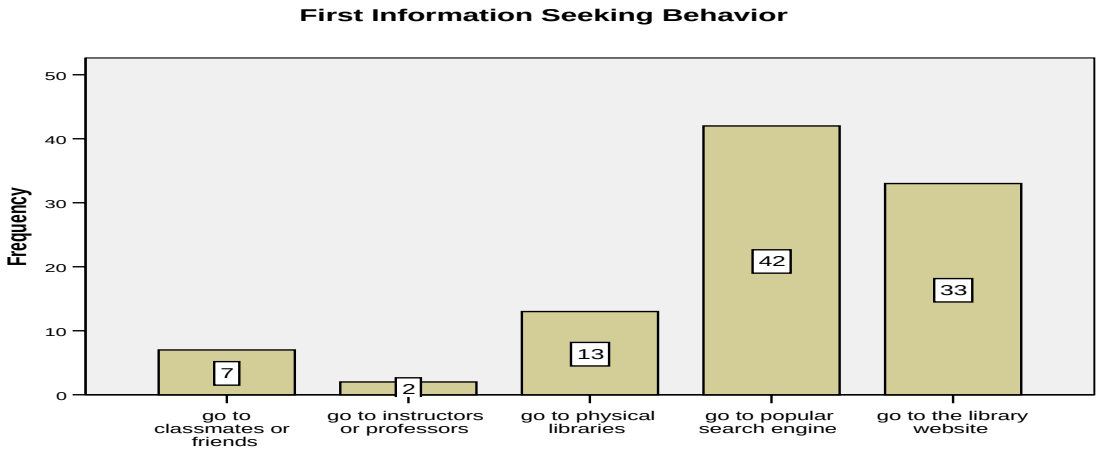

Figure 11: Respondents' first information seeking behavior

Question 6 asks what respondents usually do if they feel dissatisfied with the information or the service received from the library. Since respondents could choose all the answers that apply and were also given an opportunity to provide their own opinion, their answers show a variety of dissatisfaction behavior: "look for alternatives to fulfill information needs" has a dominating percentage, 63.6% of all the indicated dissatisfaction behavior; "keep the dissatisfaction to self, but avoid using the service in the future" has a second highest percentage, 21.2%; "complain overtly and immediately to others" and "file a complaint to the library by e-mail or letter" were also chosen by respondents, but their percentages are not significant with only 5.9% for each. Other specified opinions provided by the respondents include "call librarians for help," "grin and bear it," "I still use the service," and "never been dissatisfied."

Table 16: Respondents' dissatisfaction behavior

	Frequency	Percent	Valid Percent	Cumulative Percent
complain overtly and immediately to others	7	5.9	5.9	5.9
file a complaint to the library by e-mail or letter	7	5.9	5.9	11.9
keep the dissatisfaction to self, but avoid using the service in the future	25	21.2	21.2	33.1
look for alternatives to fulfill information needs	75	63.6	63.6	96.6
Others	4	3.4	3.4	100
Total	118	100	100	

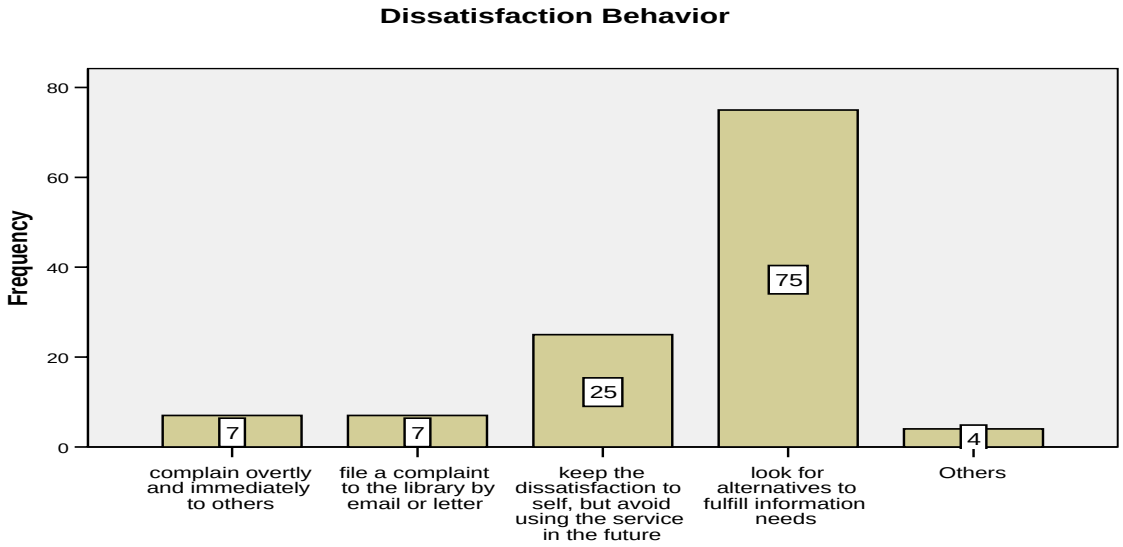

Figure 12: Respondents' dissatisfaction behavior

4.2.5 Section V

(1) Gender: of the 97 usable responses, 51 responses were from females and 46 from males. The percentage of female respondents, 52.58%, is slightly higher than the percentage of male respondents, 47.42%.

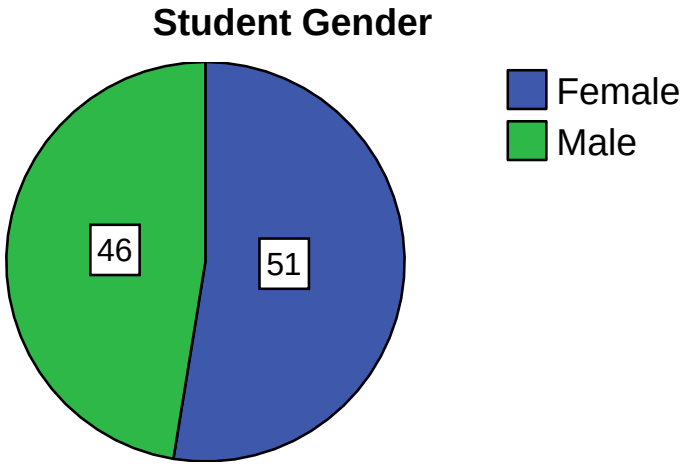

Figure 13: Gender status

(2) Academic level: among 97 respondents, there were 40 undergraduate and 37 graduate students. Freshman and doctoral students had the highest percentage, which were 27.8% and 25.8%. Sophomore and Master students had the second highest percentage, both of which were 12.4%. The senior, junior, and the fifth year students' percentages were 11.3%, 6.2% and 4.1%.

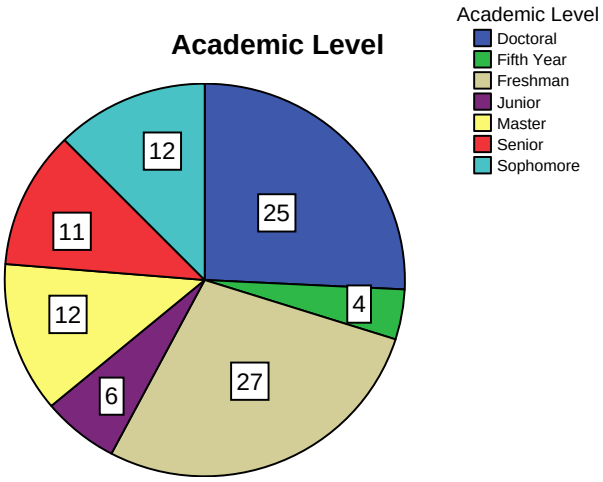

Figure 14: Academic level status

(3) Major: all 97 respondents came from 49 programs at the University of Pittsburgh. The communication program had the highest percentage of the declared major, which is 8.2%. There were 10 respondents who haven't declared their majors.

(4) Age: There were 47 students falling into the age category, 18-21, 30 students in 26-35, 18 students in 22-25, 1 student in 36-45, and only 1 student in over 46 years old.

(5) Geographic area of origin: of 97 respondents, 62 were from North America, 22 from Asia, 11 from Europe, 1 from Africa, and 1 from Latin America.

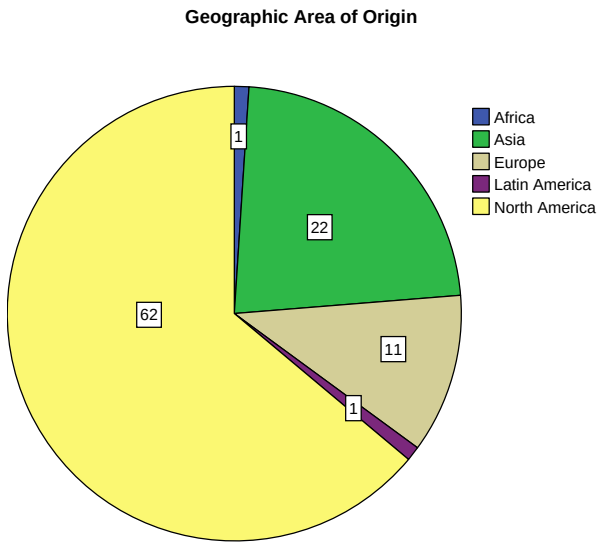

Figure 15: Geographic area of origin status

4.3 RESEARCH HYPOTHESES

The following 9 hypotheses were tested by the SAS software: Hypotheses 1, 2, and 3 were tested by Pearson correlation coefficients; Hypotheses 4 and 5 were tested by the Pearson correlation coefficients, logistic regression models, bootstraps, and the z-test; Hypotheses 6, 7, 8, and 9 were tested by the Pearson correlation coefficients, logistic regression models, linear regression models, bootstraps, and the z-test.

Hypothesis 1

At the micro level, in one specific transaction or service encounter (short term), there is not a statistically significantly strong relationship between users' emotional satisfaction and their material satisfaction.

Pearson correlation coefficients were used to test this hypothesis. As the following statistical output (Table 17) shows, the correlation coefficient, γ, between emotional satisfaction

with obtained material (ES_P) and material satisfaction with obtained material (MS_P) is 0.45; γ between emotional satisfaction with library service (ES_S) and material satisfaction with library service (MS_S) is 0.36; γ between total emotional satisfaction (ES_P + ES_S) and total material satisfaction (MS_P + MS_S) is 0.52. These three correlation coefficients are considered statistically low, because each of them is lower or close to 0.5. Thus, the hypothesis is accepted that in one specific transaction or service encounter, the relationship between users' emotional satisfaction and material satisfaction is not statistically strong.

Table 17: Pearson correlation test for Hypothesis 1

Pearson Correlation Coefficients, N = 97

	MS_P	MS_S
ES_P	0.45	N/A
ES_S	N/A	0.36

Pearson Correlation Coefficients, N = 97

	ES	MS
ES	1.00	0.52
MS	0.52	1.00

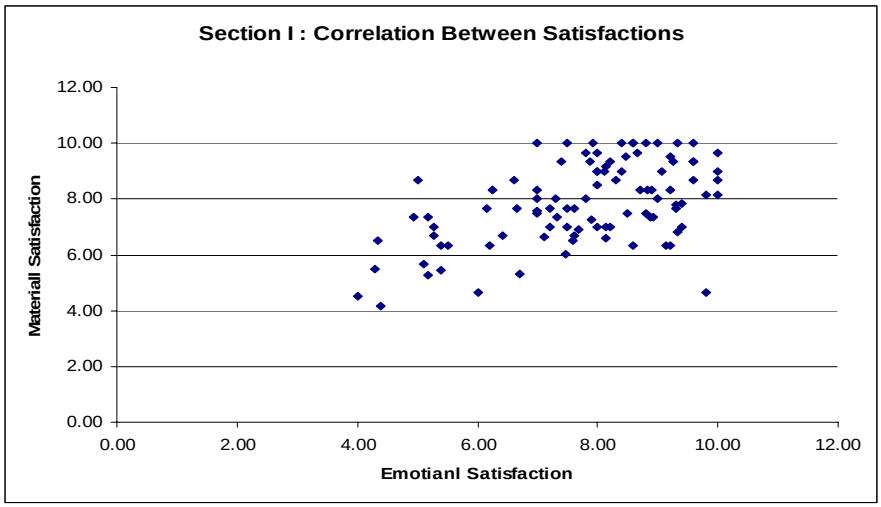

Figure 16: Correlation between emotional and material satisfaction in Section I

Hypothesis 2

At the micro level, in multiple transactions or service encounters (long term), there is a statistically significantly strong relationship between users' emotional satisfaction and their material satisfaction.

The Pearson correlation coefficients were also used to test this hypothesis. As Table 18 shows, the correlation coefficient, γ, between emotional satisfaction with obtained material (ES_P) and material satisfaction with obtained material (MS_P) is 0.74; γ between emotional satisfaction with library service (ES_S) and material satisfaction with library service (MS_S) is 0.76; γ between total emotional satisfaction (ES_P + ES_S) and total material satisfaction (MS_P + MS_S) is 0.85. These three correlation coefficients are considered statistically high, because each of them is much higher than 0.5 and close to 1, the maximum correlation coefficient. Thus, this hypothesis is accepted that in multiple transactions or service encounters,

the relationship between users' emotional satisfaction and material satisfaction is significantly strong.

Table 18: Pearson correlation test for Hypothesis 2

Pearson Correlation Coefficients, N = 88

	MS_P	MS_S
ES_P	0.74	N/A
ES_S	N/A	0.76

Pearson Correlation Coefficients, N = 88

	ES	MS
ES	1.00	0.85
MS	0.85	1.00

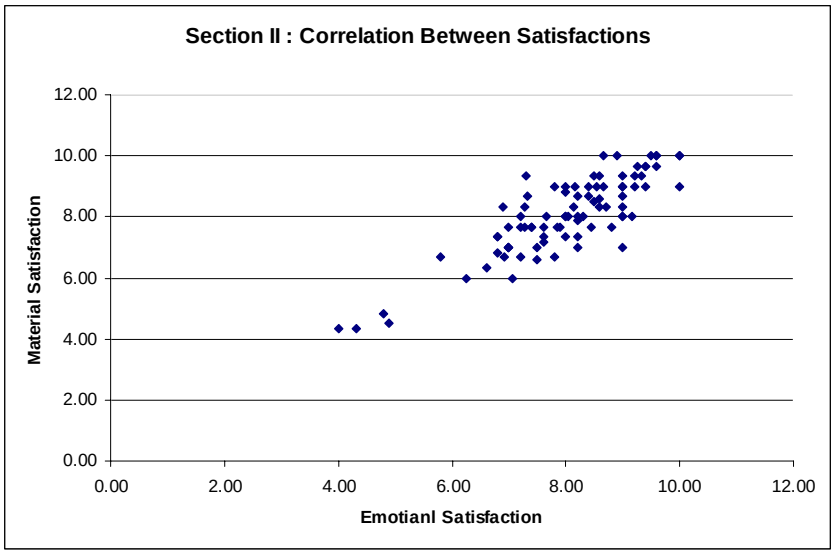

Figure 17: Correlation between emotional and material satisfaction in Section II

Hypothesis 3

At the macro level, there is a statistically significantly strong relationship between users' emotional satisfaction and their material satisfaction.

Same as Hypotheses 1 and 2, this hypothesis was tested by the Pearson correlation coefficients. As the following Table 19 shows, the correlation coefficient, γ, between emotional satisfaction with obtained material (ES_P) and material satisfaction with obtained material (MS_P) is 0.72; γ between emotional satisfaction with library service (ES_S) and material satisfaction with library service (MS_S) is 0.74; γ between total emotional satisfaction (ES_P + ES_S) and total material satisfaction (MS_P + MS_S) is 0.86. These three correlation coefficients are considered statistically high, because each of them is much higher than 0.5 and close to 1, the maximum correlation coefficient. Thus, this hypothesis is accepted that at the macro level, the relationship between users' emotional satisfaction and material satisfaction is significantly strong.

Table 19: Pearson correlation test for Hypothesis 3

Pearson Correlation Coefficients, N = 97

	MS_P	MS_S
ES_P	0.72	N/A
ES_S	N/A	0.74

Pearson Correlation Coefficients, N = 97

	ES	MS
ES	1.00	0.86
MS	0.86	1.00

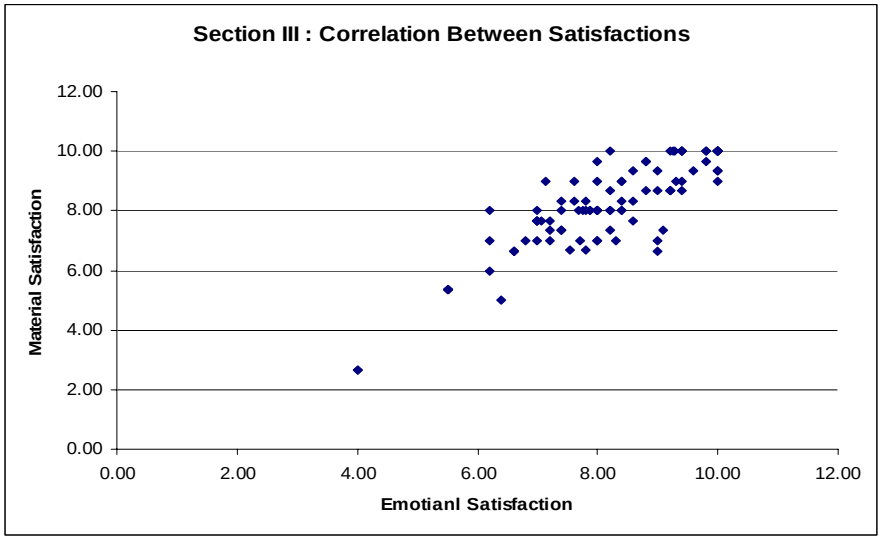

Figure 18: Correlation between emotional and material satisfaction in Section III

To compare the values of the correlation coefficients derived from Hypotheses 1, 2, and 3, the z-test and bootstraps were conducted with a significant level, 0.05 (95% confidence interval). Table 20 shows that the correlation coefficients derived from Hypothesis 1 are statistically different from the correlation coefficients derived from Hypothesis 2, because the p-values are much lower than 0.05; however, the correlation coefficients derived from Hypotheses 2 and 3 are not statistically different from each other, because the p-values are much higher than 0.05; In addition, the correlation coefficients derived from Hypothesis 1 are statistically different from the correlation coefficients from Hypothesis 3, because the p-values are much lower than 0.05. Therefore, emotional satisfaction and material satisfaction have a significantly strong relationship either at the micro level, in multiple transactions or service encounters or at the macro level. The evidence supports the hypothesis 1 that in one specific library transaction or service encounter, users' emotional satisfaction is not much related with their material

satisfaction. This conclusion explains the "false positive" phenomena proposed by Applegate (1993).

Table 20: Correlation comparison between hypotheses

Correlation Comparison between Hypotheses: I & II

var1_1	var1_2	corr1	n1	var2_1	var2_2	corr2	n2	z0	pval
ES_P	MS_P	0.45	97	ES_P	MS_P	0.74	88	-3.35335	0.00080
ES_P	MS_P	0.45	97	ES_S	MS_S	0.76	88	-3.69492	0.00022
ES_S	MS_S	0.36	97	ES_P	MS_P	0.74	88	-4.08400	0.00004
ES_S	MS_S	0.36	97	ES_S	MS_S	0.76	88	-4.42557	0.00001
ES	MS	0.52	97	ES	MS	0.85	88	-4.50026	0.00001

Correlation Comparison between Hypotheses: II & III

var1_1	var1_2	corr1	n1	var2_1	var2_2	corr2	n2	z0	pval
ES_P	MS_P	0.74	88	ES_P	MS_P	0.72	97	0.51482	0.60668
ES_P	MS_P	0.74	88	ES_S	MS_S	0.74	97	0.23107	0.81726
ES_S	MS_S	0.76	88	ES_P	MS_P	0.72	97	0.85725	0.39131
ES_S	MS_S	0.76	88	ES_S	MS_S	0.74	97	0.57350	0.56630
ES	MS	0.85	88	ES	MS	0.86	97	-0.14222	0.88691

Correlation Comparison between Hypotheses: I & III

var1_1	var1_2	corr1	n1	var2_1	var2_2	corr2	n2	z0	pval
ES_P	MS_P	0.45	97	ES_P	MS_P	0.72	97	-2.92172	0.00348
ES_P	MS_P	0.45	97	ES_S	MS_S	0.74	97	-3.21292	0.00131
ES_S	MS_S	0.36	97	ES_P	MS_P	0.72	97	-3.67344	0.00024
ES_S	MS_S	0.36	97	ES_S	MS_S	0.74	97	-3.96464	0.00007
ES	MS	0.52	97	ES	MS	0.86	97	-1.87249	0.0001

Hypothesis 4

At the micro level, in one specific transaction or service encounter (short term), users emotional satisfaction contributes to their overall satisfaction and determines their immediate next time library use behavior.

Hypothesis 5

At the micro level, in one specific transaction or service encounter (short term), users' material satisfaction contributes to their overall satisfaction and determines their immediate next time library use behavior.

Hypotheses 4 and 5 were tested by the Pearson correlation coefficients and logistic regression models. As the following Table 21 shows, the correlation coefficient, γ, between emotional satisfaction with obtained material (ES_P) and overall satisfaction (OS) is 0.52; γ between emotional satisfaction with library service (ES_S) and overall satisfaction (OS) is 0.40; γ between total emotional satisfaction (ES_P + ES_S) and overall satisfaction (OS) is 0.57. These three correlation coefficients shows that the correlation between emotional satisfaction and overall satisfaction exists but is not considered statistically strong, because each γ is close to 0.5, a medium correlation coefficient value. To test if users' emotional satisfaction determines their immediate next time library use behavior, a logistic model was applied, and Table 23 shows that, under 95% confidence interval, the odd ratio estimate[2] between emotional satisfaction and user behavior is 1.892. Since the 95% confidence interval (1.197–2.991) excludes 1, if the user's emotional satisfaction increases by one unit, the odds of his/her immediate next time library use

[2] The estimate ratio of odds is called odds ratio. For example, if odds ration estimate is 1.175, it means the odds will increase by 17.5 percent with each additional unit (Neter, J., et al. , 1996).

behavior (i.e., he/she will choose this service again) will increase by 89.2%. Therefore, both the correlation coefficients and the odds ratio estimate support Hypothesis 4 that at the micro level, in one specific transaction or service encounter (short term), users emotional satisfaction contributes to their overall satisfaction and determines their immediate next time library use behavior.

Hypothesis 5 was tested by the same procedures run for Hypothesis 4. The following Table 21 shows that the correlation coefficient, γ, between material satisfaction with obtained material (MS_P) and overall satisfaction (OS) is 0.55; γ between material satisfaction with library service (MS_S) and overall satisfaction (OS) is 0.62; γ between total material satisfaction (MS_P + MS_S) and overall satisfaction (OS) is 0.69. These three correlation coefficients show that a good correlation exists between material satisfaction and overall satisfaction. To test if users' material satisfaction determines their immediate next time library use behavior, a logistic model was applied, and Table 23 shows that, under 95% confidence interval, the odds ratio estimate between material satisfaction and user behavior is 1.913. Since the 95% confidence interval (1.148–3.486) excludes 1, if the user's material satisfaction increases by one unit, the odds of his/her immediate next time library use behavior (i.e., he/she will choose this service again) will increase by 91.3%. Therefore, both the correlation coefficients and the odds ratio estimate support Hypothesis 5 that at the micro level, in one specific transaction or service encounter, users' material satisfaction contributes to their overall satisfaction and determines their immediate next time library use behavior.

The correlation coefficient, 0.57, between total emotional satisfaction (ES_P + ES_S) and overall satisfaction (OS) in Hypothesis 4 is smaller than the correlation coefficient, 0.69,

between total material satisfaction (MS_P + MS_S) and overall satisfaction (OS) in Hypothesis 5. Nevertheless, bootstraps and the z-test need to be conducted to compare if there is a statistical difference between these two coefficients. Therefore, Table 22 shows that, under 95% confidence interval, the p-value is 0.205, which is much bigger than 0.05. This p-value demonstrates that there is no statistical difference between these two correlation coefficients; in other words, emotional satisfaction contributes to overall satisfaction at the same level (or by the same strength) as material satisfaction.

Table 21: Pearson correlation test for Hypotheses 4 and 5

Pearson Correlation Coefficients, N = 97

	ES	MS
OS	0.57	0.69

Pearson Correlation Coefficients, N = 97

	ES_P	MS_P	ES_S	MS_S
OS	0.52	0.55	0.40	0.62

Table 22: Correlation comparison between Hypotheses 4 and 5

Correlation Comparison between H4 and H5

var1_1	var1_2	corr1	n1	var2_1	var2_2	corr2	n2	z0	pval
ES	OS	0.57	97	MS	OS	0.69	97	-0.8239	0.20500

Table 23: Logistic model test for Hypotheses 4 and 5

The LOGISTIC Procedure
Model Information

Data Set	WORK.SECTIONI_COMB
Response Variable	YES_NO
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	97
Number of Observations Used	97

Response Profile

Ordered Value	YES_NO	Total Frequency
1	1	88
2	0	9

Probability modeled is YES_NO=1.

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
ES	1.892	1.197	2.991

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
MS	1.913	1.148	3.186

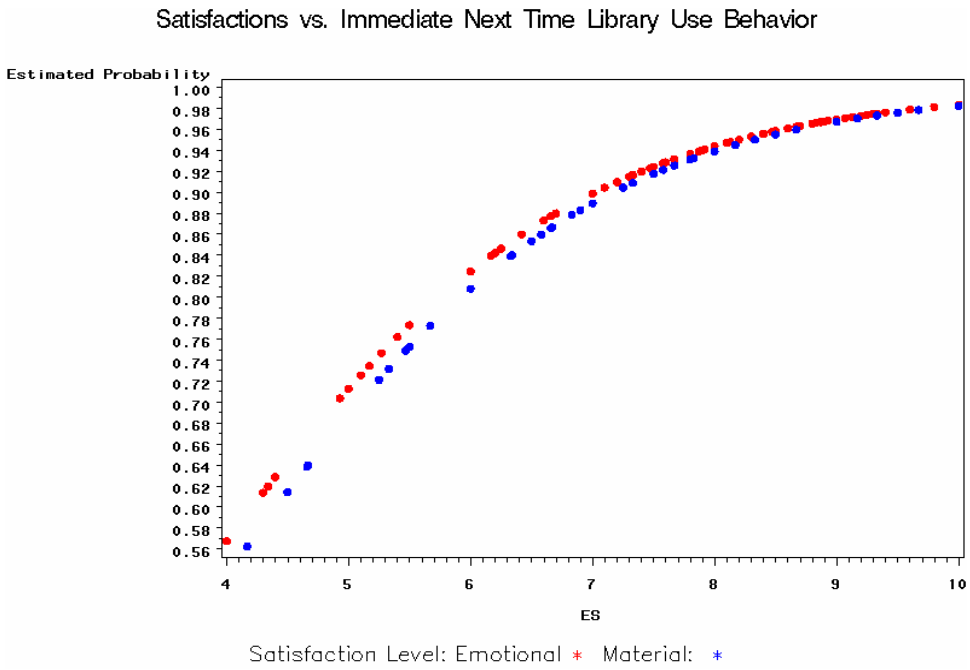

Figure 19: Emotional and material satisfaction vs. Immediate next time library use behavior

Hypothesis 6

At the micro level, in multiple transactions or service encounters (long term), users' emotional satisfaction contributes to their overall satisfaction and determines service use loyalty.

Hypothesis 7

At the micro level, in multiple transactions or service encounters (long term), users' material satisfaction contributes to their overall satisfaction and determines service use loyalty.

Hypotheses 6 and 7 were tested by the Pearson correlation coefficients, logistic regression models, and linear regression models. As the following Table 24 shows, the correlation coefficient, γ, between emotional satisfaction with obtained material (ES_P) and overall satisfaction (OS) is 0.72; γ between emotional satisfaction with library service (ES_S)

and overall satisfaction (OS) is 0.69; γ between total emotional satisfaction (ES_P + ES_S) and overall satisfaction (OS) is 0.77. These three correlation coefficients show that a good correlation exists between emotional satisfaction and overall satisfaction. To test if users' emotional satisfaction determines their service use loyalty, a logistic model and a linear regression model were applied. The following logistic model analysis output (Table 26) shows that, under 95% confidence interval, the odds ratio estimate between emotional satisfaction and user behavior (i.e., the user would use this service again in the future or recommend this service to others) is 3.757. Since the 95% confidence interval (1.735–8.134) excludes 1, if the user's emotional satisfaction increases by one unit, the odds of his/her service use loyalty (i.e., he/she would use this service again in the future or recommend this service to others) will increase by 275.7%. The linear regression model output (Table 27) shows that, under 95% confidence interval, the regression p-value is 0.0086, which is smaller than 0.05. This indicates that users' emotional satisfaction does have a positive influence on their self-evaluated library service importance. Therefore, Hypothesis 6 was accepted by the correlation coefficients, the odds ratio estimate, and the regression p-value.

Hypothesis 7 was tested by the same procedures run for Hypothesis 6. The following Pearson correlation output (Table 24) shows that the correlation coefficient, γ, between material satisfaction with obtained material (MS_P) and overall satisfaction (OS) is 0.68; γ between material satisfaction with library service (MS_S) and overall satisfaction (OS) is 0.71; γ between total material satisfaction (MS_P + MS_S) and overall satisfaction (OS) is 0.79. These three correlation coefficients show that a good correlation exists between material satisfaction and overall satisfaction. To test if users' material satisfaction determines their service use loyalty, a

logistic model and a linear regression model were applied. The logistic model analysis output (Table 26) shows that, under 95% confidence interval, the odds ratio estimate between material satisfaction and user behavior (i.e., the user would use this service again in the future or recommend this service to others) is 3.692. Since the 95% confidence interval (1.723–7.910) excludes 1, if the user's material satisfaction increases by one unit, the odds of his/her service use loyalty (i.e., he/she would use this service again in the future or recommend this service to others) will increase by 269.2%. The linear regression model analysis output (Table 27) shows that the regression p-value is 0.0147, smaller than the significant level 0.05. This indicates that users' material satisfaction has a positive relationship with their self-evaluated library service importance. Therefore, Hypothesis 7 was accepted by the correlation coefficients, the odds ratio estimate, and the regression analysis.

Although the correlation coefficient, 0.77, between total emotional satisfaction (ES_P + ES_S) and overall satisfaction (OS) in Hypothesis 6 is slightly smaller than the correlation coefficient, 0.79, between total material satisfaction (MS_P + MS_S) and overall satisfaction (OS) in Hypothesis 7, bootstraps and the z-test were conducted to compare if there was a statistical difference between these two coefficients. Therefore, Table 25 shows that, under 95% confidence interval, the p-value is 0.7474, much bigger than the significant level 0.05. This p-value demonstrates that there is no statistical difference between these two correlation coefficients; in other words, emotional satisfaction contributes to overall satisfaction in Hypothesis 6 at the same level (or by the same strength) as material satisfaction does in Hypothesis 7.

Table 24: Pearson correlation test for Hypotheses 6 and 7

Pearson Correlation Coefficients, N = 88

	ES	MS
OS	0.77	0.79

Pearson Correlation Coefficients, N = 88

	ES_P	MS_P	ES_S	MS_S
OS	0.72	0.68	0.69	0.71

Table 25: Correlation comparison between Hypotheses 6 and 7

Correlation Comparison between H6 and H7

var1_1	var1_2	corr1	n1	var2_1	var2_2	corr2	n2	z0	pval
ES	OS	0.77	88	MS	OS	0.79	88	-0.32204	0.7474

Table 26: Logistic model test for Hypotheses 6 and 7

The LOGISTIC Procedure

Model Information

Data Set	WORK.SectionII
Response Variable	YES_NO
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	88
Number of Observations Used	88

Response Profile

Ordered Value	YES_NO	Total Frequency
1	1	81
2	0	7

Probability modeled is YES_NO=1.

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
MS	3.692	1.723	7.910

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
ES	3.757	1.735	8.134

Table 27: Linear regression analysis for Hypotheses 6 and 7

ES / MS and Importance
The REG Procedure

Dependent Variable: IMPORTANCE

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1.34598	0.31174	4.32	<.0001
Intercept	1	1.15939	0.40999	2.83	0.0058
MS	1	0.14165	0.08887	1.59	0.0147
ES	1	0.25706	0.09552	2.69	0.0086

Figure 20: Emotional and material satisfaction vs. Service use loyalty

Hypothesis 8

At the macro level, users' emotional satisfaction contributes to their overall satisfaction and determines library use loyalty.

Hypothesis 9

At the macro level, users' material satisfaction contributes to their overall satisfaction and determines library use loyalty.

Same as Hypotheses 6 and 7, Hypotheses 8 and 9 were tested by the Pearson correlation coefficients, logistic regression models, and linear regression models. As the following correlation analysis output, Table 28, shows that, the correlation coefficient, γ, between emotional satisfaction with obtained material (ES_P) and overall satisfaction (OS) is 0.75; γ between emotional satisfaction with library service (ES_S) and overall satisfaction (OS) is 0.73; γ between total emotional satisfaction (ES_P + ES_S) and overall satisfaction (OS) is 0.79. These three correlation coefficients are considered statistically high. To test if users' emotional satisfaction determines their library use loyalty, a logistic model and a linear regression model were applied, and Table 30 shows that, under 95% confidence interval, the odds ratio estimate between emotional satisfaction and user behavior (i.e., users plan to use Pitt library services more in the future and recommend services to other students) is 1.469. Since the 95% confidence interval (0.755–2.861) includes 1, the odds ratio, 1.469, does not adequately show the change in odds. By analyzing the Maximum Likelihood the Estimates (MLE) of regression coefficient of this logistic model, we found that the MLE of B_1 (the regression coefficient) is 0.3849 and the p-value is 0.2575. Because this p-value is larger than 0.05, it provides insufficient evidence for rejecting the null hypothesis that $B_1 = 0$; in other words, emotional satisfaction has little positive influence on user loyalty. The linear regression model analysis, Table 31, shows that the regression p-value between emotional satisfaction and users' self-evaluated library importance is 0.0362. If the confidence interval is 95%, this p-value is smaller than 0.05, which shows that

emotional satisfaction has a positive influence on users' self-evaluated library importance. However, since library use loyalty is measured by three aspects (i.e., first, if users plan to user more Pitt library service in the future; second, if they recommend library services to others; third, how important library services are to them), the odds ratio estimate rejected the determination of emotional satisfaction on the first two aspects. Although the third aspect was confirmed, still, emotional satisfaction failed to determine library use loyalty. Therefore, the correlation coefficients support the former part of Hypothesis 8 that, at the macro level, users' emotional satisfaction contributes to their overall satisfaction; however, the latter part of the hypothesis was rejected by the logistic regression analysis. Thus, users' emotional satisfaction cannot determine library use loyalty.

The test procedures run for Hypothesis 9 were similar to those of Hypothesis 8. The following output, Table 28, shows that the correlation coefficient, γ, between material satisfaction with obtained material (MS_P) and overall satisfaction (OS) is 0.64; γ between material satisfaction with library service (MS_S) and overall satisfaction (OS) is 0.74; γ between total material satisfaction (MS_P + MS_S) and overall satisfaction (OS) is 0.75. These three correlation coefficients are considered statistically high. To test if users' material satisfaction determines their library use loyalty, a logistic model and a linear regression model were applied. The following logistic model analysis output, Table 30, shows that, under 95% confidence interval, the odds ratio estimate between material satisfaction and user behavior (i.e., users plan to use Pitt library services more in the future and recommend Pitt library services to others) is 1.788. Since the 95% confidence interval (1.067–2.997) excludes 1, if the user's material satisfaction increases by one unit, the odds of his/her library use loyalty (i.e., he/she will choose

to use more library services in the future or recommend library services to others) will increase by 78.8%. The linear regression model analysis output, Table 31, shows that, the regression p-value is 0.0033, much smaller than the significant level 0.05. This indicates that users' material satisfaction has a positive relationship with their self-evaluated library service importance. Therefore, Hypothesis 9 was accepted by the correlation coefficients, the odds ratio estimate, and the linear regression analysis.

Although the correlation coefficient, 0.79, between total emotional satisfaction (ES_P + ES_S) and overall satisfaction (OS) in Hypothesis 8 is slightly bigger than the correlation coefficient, 0.75, between total material satisfaction (MS_P + MS_S) and overall satisfaction (OS) in Hypothesis 9, bootstraps and the z-test were conducted to compare if there was a statistical difference between these two coefficients. Therefore, Table 29 shows that, under 95% confidence interval, the p-value is 0.4787, which is much bigger than 0.05. This p-value demonstrates there is no statistical difference between these two correlation coefficients; in other words, emotional satisfaction contributes to overall satisfaction in Hypothesis 8 at the same level (or by the same strength) as material satisfaction does in Hypothesis 9.

Table 28: Pearson correlation test in Hypotheses 8 and 9

Pearson Correlation Coefficients, N = 97

	ES	MS
OS	0.79	0.75

Pearson Correlation Coefficients, N = 97

	ES_P	MS_P	ES_S	MS_S
OS	0.75	0.64	0.73	0.74

Table 29: Correlation comparison between Hypotheses 8 and 9

Correlation Comparison between H8 and H9

var1_1	var1_2	corr1	n1	var2_1	var2_2	corr2	n2	z0	pval
ES	OS	0.79	97	MS	OS	0.75	97	0.70836	0.4787

Table 30: Logistic model test for Hypotheses 8 and 9

Model Information

Data Set	WORK.SECTIONIII
Response Variable	YES_NO
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	97
Number of Observations Used	97

Response Profile

Ordered Value	YES_NO	Total Frequency
1	1	93
2	0	4

Probability modeled is YES_NO=1.

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
ES	1.469	0.755	2.861

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	0.1591	2.5774	0.0038	0.9508
ES	1	0.3849	0.3399	1.2821	0.2575

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
MS	1.788	1.067	2.997

Table 31: Linear regression analysis for Hypotheses 8 and 9

ES / MS and Importance

The REG Procedure

Dependent Variable: IMPORTANCE

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.21932	0.43764	0.50	0.6174
MS	1	0.27625	0.09160	3.02	0.0033
ES	1	0.21951	0.10328	2.13	0.0362

Figure 21: Emotional and material satisfaction vs. Library use loyalty

5.0 CONCLUSION, DISCUSSION, AND SUGGESTIONS

5.1 SUMMARY OF THE FINDINGS

The first hypothesis test showed a statistically insignificant relationship between users' emotional satisfaction and material satisfaction at the micro level, in one specific transaction or service encounter. This finding confirmed and explained the "false positives" of user satisfaction existing in library services (Applegate, 1993). The second and third hypothesis test indicated that, at the macro level or at the micro level, in multiple transactions or service encounters, there was a significantly strong relationship between users' emotional satisfaction and material satisfaction. These findings confirmed the proposition that, in the long term, if users cannot be satisfied repeatedly, or they cannot always get what they need from the library, it would be impossible for them to maintain their emotional satisfaction at the same level as in the short term.

The fourth, fifth, sixth, seventh, eighth, and ninth hypothesis test suggested that users' emotional satisfaction and material satisfaction contribute to their overall satisfaction at both micro and macro levels. The comparison of the correlation coefficients between these hypotheses shows that there is no difference between any pair of γ values, which means emotional satisfaction contributes to overall satisfaction at the same level (or by the same strength) as material satisfaction. Because all these correlation coefficient tests between emotional/material

satisfaction and overall satisfaction were conducted on both obtained materials and library services, the results show that users' satisfaction (both emotional and material) with obtained materials and users' satisfaction (both emotional and material) with library services equally contribute to users' overall satisfaction. This conclusion is consistent with Shi's (2000), in that both product satisfaction and service satisfaction contributed to users' overall satisfaction. However, this study did not find any evidence that could support her further assertion that "information product satisfaction weighed more heavily in explaining overall information user satisfaction… than information service satisfaction" (Shi, 2000, p. 113).

Regarding the relationship between users' emotional/material satisfaction and user behavior, compared with other hypotheses, the sixth and seventh hypotheses were found to have the biggest odds ratio estimates. This shows that, at the micro level, in multiple transactions or service encounters**,** if the library can improve users' emotional or material satisfaction by one unit, there would be a great chance for the users to choose this library service again, recommend it to others, or consider it very important. Although it was also indicated that, at the micro level, in one specific transaction or service encounter, users' emotional/material satisfaction can determine user behavior, the odds in these situations were not as big as they were in the multiple transactions and service encounters of one specific service. The most surprising finding is that, at the macro level, users' emotional satisfaction had no positive influence on their library use loyalty, though material satisfaction did have.

5.2 DISCUSSION OF THE FINDINGS

The significance of this research is to measure and present users' satisfaction in terms of types, antecedents, and consequences. First, by following the suggestion proposed by Applegate (1993) that "researchers must define and separate as clearly as possible the phenomenon about which they are eliciting satisfaction responses" (p. 535), this research differentiated users' emotional satisfaction from their material satisfaction. Moreover, each satisfaction was measured and recorded separately over obtained materials and library services. Second, to explore the antecedents of user satisfaction, Applegate's disconfirmation model was adopted and tested in the circumstances of one service encounter, multiple transactions over one specific library service, and integrated service use experience. The findings show that the relationship between users' emotional satisfaction and material satisfaction was strong in the circumstances of both the micro level in multiple transactions or service encounters and the macro level, but not in the circumstance of the micro level in one specific transaction or service encounter. In other words, the performance variable is the antecedent of only repeat users' satisfaction. Third, the consequence of user satisfaction, user behavior, was studied in this research. The findings show that both users' emotional and material satisfaction can determine user behavior (i.e., immediate next time library use behavior, service use loyalty, or library use loyalty), except that at the macro level, only users' material satisfaction influenced their library use loyalty. Furthermore, repeat users' service use loyalty was found to be the easiest user behavior that could be enhanced. For the repeat library users of one specific service, their emotional satisfaction contributes more in determining their service use loyalty than their material satisfaction. Nevertheless, for general library services, only users' material satisfaction can determine their

library use loyalty. These findings are able to tell the librarians that it is important to recognize and measure users' emotional experience in their library use because it determines their immediate next time library use behavior and service use loyalty. In addition, compared with occasional users, repeat library users and their favored library services should be given priority. Also, it is much easier for the library to achieve service use loyalty for repeat users in some specific services than to achieve general library use loyalty for them or occasional users.

Cullen (2001) pointed out that it was unknown when (or in what circumstances) these concepts (micro-level satisfaction, macro-level satisfaction, emotional satisfaction, and material satisfaction) measure the same customer response and when (or in what circumstances) they measure separate responses to service quality. Now, the research findings are able to tell all these "unknowns," that at the micro-level, in multiple transactions or service encounters, or at the macro-level, emotional satisfaction and material satisfaction measure the same customer response because a strong relationship was found to exist between them. However, in the circumstance of the micro level, in one specific transaction or service encounter, users' emotional satisfaction and material satisfaction tend to measure separate responses to service quality, because the relationship between them was found not to be strong. In terms of the tentative relationship model (Figure 1) Cullen drew to suggest the impact of user satisfactions on user loyalty, the findings confirm that in the circumstances of both micro and macro levels, material satisfaction has a positive influence on user loyalty; however, emotional satisfaction has a positive influence on user loyalty only in the circumstance of micro levels. In addition, compared to other circumstances, it is in the circumstance of the micro level, in multiple transactions or service encounters, that both users' emotional satisfaction and material

satisfaction have the strongest influence on user loyalty. Therefore, the relationship model derived from this research should be as follows:

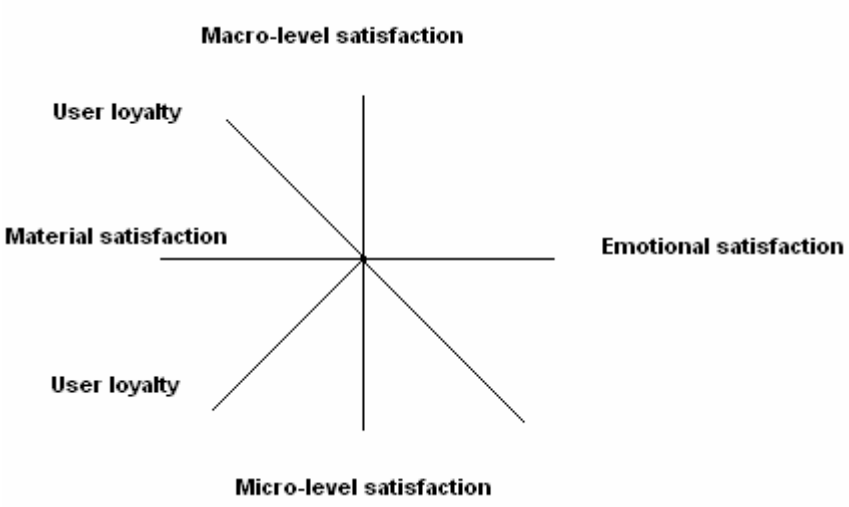

Figure 22: Impact of user emotional and material satisfaction on user loyalty

Although this research followed in Shi's (2000) footsteps by measuring user satisfaction separately over library service and obtained material/information, which are two different entities but measured as one in previous studies, the findings cannot agree with hers that "overall information user satisfaction was more heavily influenced by information product satisfaction than service satisfaction" (p. 108). This study found that both product satisfaction and service satisfaction equally contributed to users' overall satisfaction. A couple of factors may contribute to this discrepancy: first, the research populations are different. Shi's research subjects were faculty members of selected colleges and universities, while this study's subjects were undergraduates and graduate students from the University of Pittsburgh. The difference of academic levels, information needs, expectation, and information use pattern, etc., may lead to different answers to the satisfaction questions. Second, Shi did not differentiate emotional satisfaction from material satisfaction. The information product satisfaction or information service satisfaction she measured is not exactly under the same conceptual framework of this

study. However, this study's findings show that even users' emotional satisfaction (both with products and services) is no different from material satisfaction (both with products and services) in contributing to overall satisfaction. Thus, this discrepancy calls for further effort to find out the behind reasons.

As one of its purposes, this study responded to the call of more research in the field of library and information science to determine the factors or the attributes of services that contribute to user satisfaction (Applegate, 1993). The data collected by the questions in Sections I, II, and III present a big picture which tells how each measured attribute and statement of the services contribute to user satisfaction. For example, at the micro level, in multiple transactions or service encounters, Course reserves achieved the highest overall user satisfaction, which was contributed by high satisfaction scores on the attributes of Accuracy, Precision, Relevance, Detail, Appropriateness, Librarians' helpful attitude, etc.

The findings of this research provided reference scores for the librarians to check their services. For example, E-journals, Library collection, Course reserves, and Databases were the top four library services that the respondents thought were important. In addition, PittCat, Library collection, E-journals, and Library computer access were the top four library services that the respondents plan to use more in the future. It would be wise for the librarians to pay more attention to these user favored services; specifically to check which attributes of each service had low user satisfaction scores that leave room for future improvement. Moreover, this study found that, for some services, if the library can improve users' emotional or material satisfaction for one unit, the chance of enhancing service use loyalty will increase tremendously (e.g., 275.7% or 269.2%). Therefore, the library could easily achieve the user loyalty for some

important or user-preferred services such as E-journals and Library collection, just by improving one or more attributes of these services.

Other interesting findings from this study include the fact that the majority of respondents chose to go to popular searching engine such as Google when they had particular academic information needs. The Library website from remote access or the physical libraries were their second and third choices. For these respondents, if they felt dissatisfied with the library service, their first behavior was to look for alternatives to fulfill their information needs. This is a "positive outcome" in the sense that they were benefiting the most from the library system (Applegate, 1993, p. 526). However, their second most common behavior was to keep the dissatisfaction to themselves, but avoid using the service in the future, which is negative. Librarians need to be cautious about this, because librarians do not always know when users have not had their needs met, unless users are able and motivated to alert them.

In brief, this study is the first one in the LIS field to explore the relationship between users' emotional and material satisfaction at the micro and macro levels. Starting with the previous studies (Applegate, 1993, 1995; Shi, 2000; Cullen, 2001), this research has gained an improved understanding of user satisfaction in terms of formation, antecedent, and consequent impact. Furthermore, the findings imply that users do involve their emotions or feelings in their library use no matter they are aware of it or not. The most important finding of this research is the significance of users' emotional satisfaction in determining user behavior, especially service use loyalty. This finding is able to provide practical advice to librarians about what and how they can or should do to improve their current situation, such as to focus on serving repeat library users and their favored library services, to care more the attributes or factors of library services that contribute to users' emotional satisfaction when the library serve occasional users.

5.3 SUGGESTIONS FOR FUTURE RESEARCH

As stated in 1.7 LIMITATION OF THE STUDY, because the research sample was not selected randomly, the conclusions drawn from this study have limitations on generalizability. Future research is suggested to adopt the same instrument and repeat this study on a random sample, and then, the results will be generalizable to the whole research population. In addition, this research population is all university students, which did not include faculty and staff. When future research repeats this study, a larger research population is suggested, so that the conclusions could be compared broadly.

Sections IV and V of this survey questionnaire collected enormous data about respondents' library use habits and their demographic characteristics such as library use frequency, self-evaluated library use skill, first information seeking behavior, gender, academic level, etc. These data were not further analyzed in this research, because they were not related to the research questions and hypotheses. To make better use of them and also to compare the results with other studies (e.g., the OCLC new report: *College Students' Perceptions of Libraries and Information Resources* (2006))[3], further analysis is necessary. For example, the researcher observed that respondents' emotional and material satisfaction have a negative correlation with their self-evaluated library use skill; that is, the higher the user's self-evaluated library use skill score is, the lower this user's emotional and material satisfaction are. In other words, sophisticated library users seem to have lower user satisfaction than novice users. This observation should be tested by multiple t-tests. In addition, the respondents' demographic

[3] The OCLC study was published while this research was being conducted. Although the OCLC study focused on the same research population as this research, it was under different conceptual framework and research purposes.

characteristics are the largest (and most studied) variables that the user brings to the information-seeking process (Applegate, 1993, p. 532). It would be interesting to test the correlations between these variables and respondents' emotional satisfaction, material satisfaction, overall satisfaction, user behavior, library use habits, etc., and compare the results with previous studies (Tagliacozzo, 1977; D'Elia & Walsh, 1983; Allen, 1989). Overall, these data leave a lot of space for further studies.

Last, some discrepancies between this study's findings and previous ones, such as the contradictory conclusion about information production and information service satisfaction from Shi's (2000), should be investigated further. Also, further studies should distinguish print course reserves from electronic course reserves, which this research did not do. Furthermore, this research did not investigate the causality behind the findings. In order to fully understand the whole issues of users' emotional and material satisfaction, a lot of more work needs to be done.

APPENDIX A

NOTE

The style manual used in the preparation of this document was the *Publication manual of the American Psychological Association* (5th ed., 2001). Any deviation from this style manual is caused by the observance of the *Format Guidelines for Electronic Thesis and Dissertation Preparation at the University of Pittsburgh* (Office of the Provost, 2003), such as print, margins, numbering, captions, and arrangement of contents, etc.

The Institutional Review Board (IRB) of the University of Pittsburgh, which must review and approve all research activities involving human subjects and patients conducted by faculty, students, or staff of the University of Pittsburgh or staff of the UPMC (University of Pittsburgh Medical Center), reviewed this study. This committee approved this survey questionnaire and a copy of their approval form is available for review.

APPENDIX B

LIBRARY USER EMOTIONAL AND MATERIAL SATISFACTION SURVEY

You can use any web browser EXCEPT Apple Safari to take this Web survey.

This research is to study the attitude of library users. For that reason, I will be surveying undergraduate and graduate students at the University of Pittsburgh. All the participants should be 18 or older and they will be asked to complete a brief (approximately 15 minutes) online questionnaire. If you are willing to participate, my questionnaire will ask about your perception of your library experience, your library use habits, and your background (e.g., age, race, academic levels). There are no foreseeable risks associated with this project, nor are there any direct benefits to you. Some participants will have a chance to win a $25 gift certificate in the University bookstore. For example, if 100 students participate, 5, or every 20th participant, will win a $25 gift certificate. Although this is not an anonymous questionnaire, all your responses are confidential, and results will be kept under lock and key. Your name is requested for two purposes: one is to ensure that the questionnaire is completed by only those participants included in the research population and not by someone who finds the survey on the Web; the other is to identify the winners of the $25 gift certificates. Your participation is voluntary, and you may withdraw from this project at any time. This study is being conducted by Fei Yu, who can be reached via fey5@pitt.edu, if you have any questions.

Definitions of the items that will appear in the questions:

Accuracy: refers to the extent to which the information is correct and true.

Appropriateness: refers to the appropriate format, language, and comprehension level of the information being communicated to the users, whether the information provided to users is suitable for their reading level, language, and comprehension level.

Details: refers to the corresponding contents of the information requested and received by users, and the amount and depth of the knowledge that such information can provide to users.

Precision: refers to the degree of exactness of the information.

Relevance: refers to the degree of pertinence or congruence of information relative to the problem to be solved, or relative to the interests of users.

Timeline: refers to the timeline of the information delivery - the time required from the point when the information is requested to the point when the information is received by the user.

User-friendliness: refers to the mechanical perspectives of the information systems including the interface, display format, navigating design of the system, etc.

Ease of searching: refers to the technical perspectives of information storage and retrieval systems.

Librarians' helpful attitude: refers to the degree of willingness to assist users in finding needed information.

Librarians' knowledge and skills: refers to the capability and expertise in searching and finding the needed information for users.

Please print your name: _____

I. Please recall your most recent library use

1. Here is a list of library services. Please choose the one that you used most recently at the University of Pittsburgh.

- ☐ Library collection (including circulation and reshelving service)
- ☐ Course reserves
- ☐ Library instruction
- ☐ Librarian assistance in library
- ☐ Librarian remote assistance

☐ Interlibrary loan/Article delivery

☐ Library computer access (including Internet access through library computers)

☐ PittCat

☐ Databases

☐ E-journals

Others, please specify _____

2. How would you describe this single library encounter?

The following is a set of questions related to the library resources and services that helped you to get the needed information. Please read each question carefully, and circle the number that represents each answer.

Obtained material/information	Compared to what you expected, how did you **FEEL** about the information you received? Completely Dissatisfied … Completely Satisfied					
Accuracy	1	2	3	4	5	not applicable
Precision	1	2	3	4	5	not applicable
Relevance	1	2	3	4	5	not applicable
Details	1	2	3	4	5	not applicable
Appropriateness	1	2	3	4	5	not applicable
Obtained material/information	Regarding the fulfillment of your **MATERIAL** needs, please circle the number that most accurately reflects your feelings. Strongly Disagree … Strongly Agree					
This material met my information needs.	1	2	3	4	5	not applicable
The material I found solved my problems.	1	2	3	4	5	not applicable
I was glad that I found what I needed.	1	2	3	4	5	not applicable

Library service	Compared to what you expected, how do you **FEEL** about the service you received? Completely Dissatisfied — Completely Satisfied					
Ease of searching	1	2	3	4	5	not applicable
User-friendliness	1	2	3	4	5	not applicable
Timeline	1	2	3	4	5	not applicable
Librarians' knowledge/skills	1	2	3	4	5	not applicable
Librarians' helpful attitude	1	2	3	4	5	not applicable
Library service	Regarding the fulfillment of your **MATERIAL** needs, please circle the number that most accurately reflects your feelings. Strongly Disagree — Strongly Agree					
The library facilities and services met my information needs.	1	2	3	4	5	not applicable
The service helped me find what I was looking for.	1	2	3	4	5	not applicable
I could find what I was looking for because of this service.	1	2	3	4	5	not applicable

3. Overall, how would you describe your overall satisfaction with this service transaction?

Not satisfied at all — Totally satisfied

1 2 3 4 5

4. Will you choose to use this library service again if you have a similar request?

☐Yes ☐No

5. Have you used Pitt library services more than once?

☐Yes ☐No

If you choose Yes, please go on to Section II; Otherwise, please skip all questions in Section II, go directly to Section III and start from Question 3.

II. Please recall another specific library service at the University of Pittsburgh that you have used multiple times.

1. Which one of the following library services did you use?

☐ Library collection (including circulation and reshelving service)
☐ Course reserves
☐ Library instruction
☐ Librarian assistance in library
☐ Librarian remote assistance
☐ Interlibrary loan/Article delivery
☐ Library computer access (including Internet access through library computers)
☐ PittCat
☐ Databases
☐ E-journals
Others, please specify _____

2. How would you describe your experience with this specific library service?

The following is a set of questions related to the library resources and services that helped you get the needed information. Please read each question carefully, and circle the number that represents each answer.

Obtained material/information	Compared to what you expected, how do you **FEEL** about the information you have received throughout all your use of this service? Completely Dissatisfied				Completely Satisfied	
Accuracy	1	2	3	4	5	not applicable

Precision	1	2	3	4	5	not applicable
Relevance	1	2	3	4	5	not applicable
Details	1	2	3	4	5	not applicable
Appropriateness	1	2	3	4	5	not applicable
Obtained material/information	Regarding the fulfillment of your **MATERIAL** needs, please circle the number that most accurately reflects your feelings. Strongly Disagree ... Strongly Agree					
The material fulfilled my information needs.	1	2	3	4	5	not applicable
The material I found solved my problems.	1	2	3	4	5	not applicable
I am glad that I found what I needed.	1	2	3	4	5	not applicable

Library service	Compared to what you expected, how do you **FEEL** about this service you received throughout all your use? Completely Dissatisfied ... Completely Satisfied					
Ease of searching	1	2	3	4	5	not applicable
User-friendliness	1	2	3	4	5	not applicable
Timeline	1	2	3	4	5	not applicable
Librarians' knowledge/skills	1	2	3	4	5	not applicable
Librarians' helpful attitude	1	2	3	4	5	not applicable
Library service	Regarding the fulfillment of your **MATERIAL** needs, please circle the number that most accurately reflects your feelings.					

	Strongly Disagree				Strongly Agree	
The library facilities and services met my information needs.	1	2	3	4	5	not applicable
The service helped me find what I was looking for.	1	2	3	4	5	not applicable
I could find what I was looking for because of this service.	1	2	3	4	5	not applicable

3. Overall, how would you describe your overall satisfaction with this library service?

Not satisfied at all Totally satisfied

1 2 3 4 5

4. Would you use this library service again in the future?

☐Yes ☐No

5. How important do you think this specific service is to you?

Not important at all Extremely important

1 2 3 4 5

6. Would you recommend this service to others if you get a chance?

☐Yes ☐No

III. Regarding all the resources and services of the University library system that you have used,

1. How would you describe your general library use experience?

The following is a set of questions related to the library resources and services that have helped you get needed information. Please read each question carefully, and circle the number that represents each answer.

Obtained material/information	Compared to what you expected, how do you **FEEL** about the information you have received throughout all your library use?					
	Completely Dissatisfied				Completely Satisfied	
Accuracy	1	2	3	4	5	not applicable
Precision	1	2	3	4	5	not applicable
Relevance	1	2	3	4	5	not applicable
Details	1	2	3	4	5	not applicable
Appropriateness	1	2	3	4	5	not applicable
Obtained material/information	Regarding the fulfillment of your **MATERIAL** needs, please circle the number that most accurately reflects your feelings.					
	Strongly Disagree				Strongly Agree	
The material has fulfilled my information needs.	1	2	3	4	5	not applicable
The material I find has been solving my problems.	1	2	3	4	5	not applicable
I am glad that I have been able to find what I need.	1	2	3	4	5	not applicable

Library service	Compared to what you expected, how do you **FEEL** about library services you have received throughout all your library use?					
	Completely Dissatisfied				Completely Satisfied	
Ease of searching	1	2	3	4	5	not applicable

User-friendliness	1	2	3	4	5	not applicable
Timeline	1	2	3	4	5	not applicable
Librarians' knowledge/skills	1	2	3	4	5	not applicable
Librarians' helpful attitude	1	2	3	4	5	not applicable
Library service	Regarding the fulfillment of your **MATERIAL** needs, please circle the number that most accurately reflects your feelings. Strongly Disagree ... Strongly Agree					
The library facilities and services meet my information needs.	1	2	3	4	5	not applicable
Library services always help me find what I am looking for.	1	2	3	4	5	not applicable
I have been able to find what I need because of the library services.	1	2	3	4	5	not applicable

2. Overall, how would you like to describe your overall satisfaction with the library services provided by the University of Pittsburgh Library System?

Not satisfied at all ... Totally satisfied

1 2 3 4 5

3. Do you plan to use more Pitt library services in the future?

☐Yes ☐No

If you chose Yes, which of the following services would you prefer to use more in the future? Please check all apply.

☐ Library collection (including circulation and reshelving service)

☐ Course reserves

☐ Library instruction

☐ Librarian assistance in library

☐ Librarian remote assistance

☐ Interlibrary loan/Article delivery

☐ Library computer access (including Internet access through library computers)

☐ PittCat

☐ Databases

☐ E-journals

Others, please specify _____

4. How important are library services to you?

Not important at all Extremely important

1 2 3 4 5

5. Do you recommend Pitt library services to other students?

☐Yes ☐No

IV. Questions about your library use habits

1. During this semester, in how many courses will you have written papers or presented work based on information sources (e.g., books, journals, Web resources) you have found?

☐ None ☐ 1-2 courses ☐ 3-4 courses ☐ 5 or more courses

2. Which Pitt library do you use on a regular basis? Please check all apply.

☐ Archives service center
☐ Bevier Engineering library
☐ Business library
☐ Chemistry library
☐ Frick fine arts library
☐ GSPIA / Economics Library
☐ Hillman Library
☐ Information Science Library
☐ Langley Library
☐ Mathematics Library
☐ Music Library
☐ Physics Library

Others, please specify _____

3. How do you use the University of Pittsburgh Libraries? Mark frequency for each type of use.

	Almost daily	Weekly	Monthly	Quarterly	Less often/NA
Visit in person					
Use library computer					
Use a CSSD computer*					
Use home or work computer					
User phone to communicate with library					
Use e-mail/Web to communicate with library					

*CSSD computers are run by the Computing Services and Systems Development at the University of Pittsburgh. They include all computers in student computer labs, kiosks, etc.

4. How would you describe your skill at using library services?

Not satisfied at all Totally satisfied

1 2 3 4 5

5. What do you usually do **FIRST** if you discover you have a particular academic information need?

☐ go to physical libraries

☐ go to the library website, but from remote access

☐ go to popular search engine such as Google

☐ go to instructors or professors

☐ go to classmates or friends

Others, please specify _____

6. If you feel dissatisfied with the information or the service received from the library, what do you usually do? Please check all apply.

☐ complain overtly and immediately to others

☐ file a complaint to the library by e-mail or letter

☐ keep the dissatisfaction to self, but avoid using the service in the future

☐ look for alternatives to fulfill information needs

Others, please specify _____

V. Demographic questions

1. Are you: ☐Female ☐Male

2. Academic level:

If you are an undergraduate,

☐ Freshman ☐ Sophomore ☐ Junior ☐ Senior ☐ Fifth Year

Others, please specify_____

If you are a graduate,

☐ Master ☐ Doctoral

Others, please specify_____

3. Please specify your declared major

1st Major _____

or/and

2nd major _____

☐ Haven't declared major yet

4. Which of the following age range you are in

☐ 18-21 ☐ 22-25 ☐ 26-35 ☐ 36-45 ☐ over 46

5. Please identify your geographic area of origin

☐ Africa ☐ Asia ☐ Australia and New Zealand ☐ Europe

☐ Latin America ☐ Middle East ☐ North America ☐Oceania

☐ Pacific Ocean Island Areas

End of the questionnaire

Thanks for your participation!

Submit

APPENDIX C

University of Pittsburgh
Institutional Review Board

Exempt and Expedited Reviews

3500 Fifth Avenue
Suite 100
Pittsburgh, PA 15213
Phone: 412.383.1480
Fax: 412.383.1508

University of Pittsburgh FWA: 00006790
University of Pittsburgh Medical Center: FWA 00006735
Children's Hospital of Pittsburgh: FWA 00000600

TO: Ms. Fei Yu

FROM: Sue R. Beers, Ph.D., Vice Chair

DATE: March 24, 2006

PROTOCOL: User Material and Emotional Satisfaction at the Micro/Macro Levels in an Academic Library

IRB Number: 0603037

The above-referenced protocol has been reviewed by the University of Pittsburgh Institutional Review Board. Based on the information provided in the IRB protocol, this project meets all the necessary criteria for an exemption, and is hereby designated as "exempt" under section 45 CFR 46.101(b)(2).

Please note that the advertisement that was submitted for review has been approved as written.

The regulations of the University of Pittsburgh IRB require that exempt protocols be re-reviewed every three years. If you wish to continue the research after that time, a new application must be submitted.

- If any modifications are made to this project, please submit an 'exempt modification' form to the IRB.
- Please advise the IRB when your project has been completed so that it may be officially terminated in the IRB database.
- This research study may be audited by the University of Pittsburgh Research Conduct and Compliance Office.

Approval Date: March 24, 2006
Expiration Date: March 24, 2009

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