Computer Anxiety in the 21st Century: When You Are Not In Kansas Any More

Rita Kohrman

Many students are woefully unprepared for the high level of technology found in academic libraries today. Students discover their research skills are inadequate for the computerized libraries of today, especially if they are adult learners who have been away from academic studies for a while. The intricacy of research requires searching beyond Internet sources. Students need to learn research skills, some truly learning them for the first time at the same time they must also learn a new online catalog, databases, interlibrary loan/document delivery procedures, electronic reserves, and other technical library applications.

The technological changes found in the library have moved from the backrooms of the acquisitions, cataloging, and circulation departments to the front desk of the reference area. The library's old wooden card catalog is now a computerized online catalog greeting students and patrons as they enter into the libraries of today. Students accustomed to the Dewey Classification System and paper indexes now must learn the Library of Congress Classification System, resources in different formats, and databases.

The use of the Internet has become a major resource for librarians and students searching for answers (Young and Von Seggern 2001). Since 1992, the Internet browser Mosaic has come and gone, replaced by Internet Explorer and Netscape (Berghel 1999). Older search engines such as Altavista and Yahoo find themselves competing with Google, Teoma, and newer competitors (OneStat.com 2002; Teoma 2002). Google is the preferred means to search the Internet (OneStat.com 2002), even though in 1999 it was found to cover only 7.8 percent of the web (Lawrence and Giles 1999).

General or subject-specific databases replaced many paper indexes and only a few indexes now survive in some subject areas in academic libraries. The major database for education majors, ERIC, can be found not only on microfiche, but also free through the Internet and through database vendors such as FirstSearch, SilverPlatter, and E-Subscribe. Database vendors such as ProQuest and SilverPlatter have moved from information accessed from individual computer disks to online services.

Rita Kohrman is Associate Librarian and Education Resources Librarian at Grand Valley State University, Allendale, Michigan; email: kohrmanr@gvsu.edu.

The liberating effect of the Internet in providing "free" access to all kinds of information results in a false sense of confidence for students (Frand 2000; Grimes and Boening 2001; Ren 2000; Saunders 1999; Schaffner 2001; Wei 2002). This confidence is countered by the fear and resentment of many students new to computers and to research. (Blandy and Libutti 1995).

Even though more students are aware of and use computer technology in their homes, in their work, and in their academic careers, there still are students who lag behind in their confidence and/or desire to use computers. Estimates range from 25 to 58 percent of higher education students feel or have felt some level of computer anxiety (Ayersman 1996; Brosnan 1998a; DeLoughry 1993; Heinssen, Glass, and Knight 1987; Rosen, Sears, and Weil, 1987). Goldsborough reports that as many as 85 percent of the public have expressed some level of computer anxiety (Goldsborough 2002). Brosnan reports that anywhere from 1/4 to 1/3 of school age children to older adults in the industrial world hold an irrational fear of computers (Brosnan 1998a).

The fear of computers is especially debilitating for students whether they are undergraduate, graduate, or doctorate level—or even library science—students (Cleveland, 2001; Dolman, 1996; Egan, 1992; Mellon, 1989; Morner, 1995). Many find they are unprepared for the high level of technology found in academic libraries.

Graduate students discover their research skills are inadequate for the computerized libraries of today when they come to universities or colleges for advanced studies after being away from academic studies for a while. Added to this pressure is the expectation held by many professors that graduate students already know or should know how to do research (Dreifuss 1981; Morner 1995). The intricacy of graduate-level research requires searching beyond the Internet for sources, and students find the need to learn research skills. Dreifuss (1981) reported that only 14 percent of graduate students felt they were familiar with research methods. When graduate students are faced with the research paper, they have to learn new avenues to obtain information. There are the online catalog, databases, interlibrary loan/document delivery procedures, electronic reserves, and other technical library applications.

Egan (1992), while referring to different and complex paper indexes not usually found in school or public libraries, aptly stated, "[library] tools give research a hostile face" (67). It can therefore be stated that library technology has given research a "hostile face" for many students. The library they knew is no longer the same. There is so much to learn. All these computer technologies have changed the way students use, view, and experience libraries. All these factors become sources of anxiety. It is as if students have been lifted by a tornado and transported to a new place. They are facing a new culture and new rules to learn just when they need stability and familiarity (Blandy and Libutti 1995; Crowe and McKee 1995; Ostrow 1998; Presno 1998; Worthington and Zhao 1999). They are not in Kansas any more.

Computer Anxiety

In their book, *Computerphobia: How to Slay the Dragon of Computer Fear*, Weinberg and Fuerust estimate as many as five percent of people are severely computerphobic. The severe computerphobic experiences physiological reactions such as nausea, sweaty palms, dizziness, and high blood pressure (Weinberg and Fuerust 1984).

Where are the remaining 95 percent of the computer anxious people? Rosen and Weil (1990) identify three levels of computer anxious people. The uncomfortable user is one who is computer functional but retains some level of anxiety when dealing outside his comfort area. The cognitive computerphobic person appears functional but inwardly uses negative self-talk when dealing with computers, thereby falling into a self-fulfilling prophecy profile. His private thoughts reveal his inward fears—computers are difficult, everyone else knows what to do, he might break the machine, etc. The anxious computerphobic, Weinberg and Fuerust's five percent, may display physiological systems of anxiety—e.g., sweaty palms, headaches, high blood pressure, heart palpitations, nausea, and chills—when interacting with computers (Rosen and Weil 1990). Crawford and Gorman (1984) and Saunders (1999) found the same physical reactions expressed by people when exposed to monitors for a long period of time.

Various phrases have been used in place of computer anxiety: computer stress; computerphobia; technostress; technophobia. Perceptions of computer

technology and how they affect our society and culture have changed greatly since the early 1980s when computer anxiety was initially defined and studied. The definition of computer anxiety has changed through the years, illustrating researchers' progression in understanding what computer anxiety is and what it entails.

A comparative study of computer instruments revealed that early computer anxiety scales often used the terms "computer anxiety" and "computer attitudes" interchangeably. These two traits should be treated separately (Kernan and Howard 1990). While there are many reliable anxiety scales, none deal with the level of computer technology needed for research in today's academic libraries.

Jay's definition of computer anxiety (cited in Brosnan 1998b) is the most commonly cited. Jay defined computer anxiety in 1981 as (a) a resistance to talking about computers or even thinking about computers; (b) fear of or anxiety about computers; (c) hostile or aggressive thoughts about computers. These three components touch on (a) behavior, (b) emotion, and (c) attitude (Brosnan 1998b, 12). A review of the literature shows the progressive recognition of the difference between attitudes toward and anxiety about computers (Kernan and Howard 1990), leading to the "multifaceted, complex phenomenon" (Worthington and Zhao 1999, 306) computer anxiety is considered today.

What is lacking is a definition that recognizes the fluidity of computer advancements and computer use. According to Torkzadeh and Angulo (cited in Jerabek, Meyer, and Kordinak 2001), the computer anxious person usually displays three characteristics: (a) psychological (fear of damaging computers); (b) sociological (social/cultural context); (c) operational (278). Other definitions combine the behavioral and psychological aspects (Cambre and Cook 1987; Chua, Chen, and Wong 1999; Hudiburg 1989; Liu and Johnson 1998; Presno 1998; Rosen and Weil 1990). Chua, Chen, and Wong state that computer anxiety is too complex to "be fully described from a single perspective" (611). A usable computer anxiety definition and instrument need to acknowledge the "changing nature of computer technology...[and] that computer anxiety is an adaptive response to the uncertainties of technological progress in society" (Worthington and Zhao 1999, 310–11).

Because of the broad nature of the computer anxiety definition, computer anxiety is defined in this paper based upon the definition of Simonson, Matt, and Maurer (cited in Leso and Peck 1992). They define computer anxiety as being a fear and/or apprehension when using or considering using a computer (Leso and Peck 1992). This definition takes into account the fear or apprehension individuals may display depending on various factors. Factors include who first might have first introduced the person to the computer technology, such as a mother (Quinn 2000) or a teacher (Brosnan 1998a; Rosen and Weil 1995); past failure or successes with hardware or software (Moore 2002; Turner, Kaske, and Baker 1990); and current task being attempted (e.g., a research paper) when simultaneously learning a new computer application (e.g., a new database).

Using Simonson, Matt, and Maurer's definition, the researcher recognizes three similar but different characteristics of a computer anxious person. The three characteristics are in behavior, emotion, and perception. The display of behavioral anxiety can be seen through students' resistance to learning new technology that would assist in a research project or paper (Fliotsos 1992). Avoidance is demonstrated even when a student might be somewhat familiar with technology but delays completing an assignment until the last moment. Some students become so preoccupied with the new technology that they show excessive caution when trying to manipulate the equipment or software.

Behavior may also be manifested through the expression of feelings or emotions. Students' fears are usually irrational or out of proportion to the actual computer use. Students expressed the fear of breaking the machine by pushing a wrong key (Russell 1996; Wang 2000). Fears of losing the data or embarrassment that they are the only ones not familiar with computers have been expressed to various researchers (Mellon 1986; Presno 1996). Hudiburg and Necessary (1996) reported that students expressed frustration over past computer hassles or negative expectations with computers. Students become resentful or frustrated when databases change or their research skills no longer are applicable (Blandy and Libutti 1995).

Some students, when attempting shortcuts, become frustrated when the computer does not perform a function or perform as quickly as they think it should

(Maurer and Simonson 1984; Turner, Kaske, and Baker 1990; Valentine 2001). Lester refers to this as the "McDonald's Effect" (cited in Jerabek et al., 279). Fast food is often not fast at all. After waiting to place your order, you have to wait to receive your desired outcome—the food. Retrieval can be slow not only at a fast-food restaurant, but also when doing research. The frustration feeds into impatience with technology—hence "rage against the machine"—technology rage (Moore 2002; Scott, Trimble, and Fallon 1995). Web rage, or frustration with searching the Internet, starts if results are not received within three minutes and reaches its peak within twelve minutes (Charny 2000).

Feelings of helplessness were expressed to Tenopir when she relayed her experience of teaching students how to use databases to research a topic. Students would ask for reassurance before and after a key was pressed (Nahl 1993; Tenopir 1994).

The behaviors and the expression of feelings are outward displays of a student's perception of self-efficacy with computers. Students who are feeling incompetent lack the confidence that the machine is a tool that can help and make the research process easier (Presno 1996; Russell 1996). They are troubled by negative self-talk and fear that others know more than they do. Many students perceive that databases are too complex or hard to learn. This becomes a major issue when having to learn a new database while attempting to do research at the same time (Blandy and Libutti 1995; Brosnan 1998a; Chou 2001; Quinn 2000; Russell 1996; Zhang and Espinoza 1998).

Computer technology has changed research methods and libraries forever. Those new to academic-level research and to the research technology can face their fears and embrace the possibilities offered by libraries. Evelyn L. Curry (2001) states that "emerging technologies offer more alternatives to the contemporary library users, and these alternatives are opportunities in disguise" (167).

Research Anxiety

When talking about research anxiety, it is necessary to know how the term is defined. Research may be understood in the broad sense as the complex, structured process a person uses when studying a question or problem, resulting in a clarification and/or resolution of the problem (Good 1973). Many academics, students, and librarians are talking at cross-purposes when using the term "research." Faculty are referring to a general research process of which library research is but one of the components. Students often define it as reporting, what Gordon refers to as "pseudoresearch" (Gordon 2002, 19). Librarians often refer to research as the process of finding sources of information that "frames the research, placing it in the context of a related body of knowledge" (Gordon 2002, 19). Stoan (cited in Rogers 1987) states that "research skills center on the quest for knowledge; library skills center on the search for information" (125). Research is a process that consists of a hypothesis or thesis, a review of materials pertinent to the topic, and a discussion/conclusion of the results of the study. The identification of previous materials on the subject is referred to as a literature review. The literature review is where the library becomes the part of the broader research process.

Higher education students, especially graduate students, need the literature review to reflect a high level of expertise and professionalism. Higher quality, peer-reviewed research oriented toward empirical studies is demanded for undergraduate capstone classes and graduate level studies. Students are asked to find past studies on their topic, many containing statistical language or jargon and detailed method analysis with which they may be unfamiliar (Onwuegbuzie 1997c; 1998, 2000; Parker-Gibson 2001). The resulting increase in materials means an increase in time to read, to analyze, and to synthesize the sources into the research product. The importance of the literature review lies in the fact that it can determine the success of the final product (Hart 1998). The anxiety of performing a literature review is compounded by the lack of familiarity many students have with the technology involved in the library research process.

There have been numerous studies of research anxiety since 1972. Those who have specifically studied the library skill portion of the research process did not provide a definition of library research anxiety. Rather, they included library research skills as part of a general library anxiety definition (Bostick 1992; Mellon 1986; Onwuegbuzie 1997a). Because of the very changing nature of seeking sources for a research assignment, this researcher feels a distinct definition of library research anxiety is warranted. For this study, library research anxiety is defined as the fear and/or

anxiety of performing the necessary search for information or sources while attempting a library research assignment.

Library research anxiety is manifested through behaviors and expression of feelings that reflect the researcher's perception of his ability to perform a literature review. Behaviors such as procrastination have been reported by librarians, professors, and students themselves to researchers (Onwuegbuzie and Jiao 2000; Valentine 2001). Physical discomforts of using the monitor have been noted as a reason people procrastinate starting or finishing research assignments (Crawford and Gorman 1995; Saunders 1999). The lack of support by faculty, who assume that students know how or have the time to perform a literature review, has been cited as one reason students procrastinate (Benson 1995; Jacobson 1991). There is also the self-imposed desire or need for perfection. Fear of failure, task aversion, high standards, and expectations of perfection cause many graduate students to delay attempting or performing the literature review or even enrolling in the research or thesis classes (Jiao and Onwuegbuzie 1998; Onwuegbuzie and Jiao 2000).

Distractions play a major role in procrastination. Family, work, and social obligations easily distract a student's interests and desire to do the research necessary to complete an assignment. Oberman (1991) reported on another distraction: the "cereal syndrome." Finding resources is similar to going down the cereal aisle. Too many choices or sources cause confusion and frustration, blocking the student's ability to make critical choices.

The researcher has observed another tendency of students attempting the literature review portion of their research assignments. Here the tendency is to want everything. The student acts similar to the dog with the bone in Aesop's fable. The fear of not finding or getting everything necessary drives some students to act like the greedy dog with a bone seeing his reflection in the river. He jumps into the river to get the other bone, only to lose the one he has. Upon seeing another citation (or web page), the student pursues the new lead only to find that too much information can be just as debilitating as not enough. With too much information, there is only more to process, more to read, more to analyze, more to synthesize (Oberman 1991). Turner, Kaske, and Baker (1990) reported the increase in baud rate technology increased the processing demand of students. Students with high anxiety displayed low comprehension with the retrieval of a corresponding increase in materials. The tasks of searching, reading, analyzing, and writing are complex skills and each is "altered by the other" (Lenski and Johns 1997, 16).

Students have reported feelings of inadequacy, confusion, frustration, and impatience to researchers when attempting library research. Students felt emotionally vulnerable (Brookfield 1995) over their lack of skill to perform the necessary literature review process (Crowe and McKee 1995; Grimes and Boening 2001; Onwuegbuzie 1997a; Parker-Gibson 2001). They felt confused because of the multiple skills and tasks they needed to learn and tasks they need to do when seeking and retrieving information. The need to multi-task under pressure has proven to decrease students' critical thinking and self-esteem and to lower the likelihood of success (Parker-Gibson 2001; Russell 1996; Schaller and Parker 1997; Turner et al. 1990). Brookfield (1995) states that students feel "public embarrassment and private humiliation" when they feel they fail to learn as quickly or as easily as desired (52). Frustration and anger increase when necessary sources may not be readily available (referred to by Onwuegbuzie as "resource anxiety" (1997c, 18), when what is retrieved is not wanted (Wiberley and Jones 2000), or when different technology is required to retrieve the desired source (i.e., microfiche or microfilm, which are notorious for their difficult usability and readability) (Valentine 2001; Wiberley and Jones 2000).

The hidden cost of research sometimes prohibits students from obtaining articles and books when they must pay for copying and interlibrary loan fees. Students also fear the needed articles will not arrive by a certain date. The issue of time was one constant mentioned over and over again in the research (Benson 1995; Croft 2001; Dolman 1996; Valentine 2001; Wiberley and Jones 2000; Young and Van Seggern 2001).

It is easier to settle for full-text articles that have been found, even if they are not the best (MacDonald and Dunkelberger 2000). Frustration and confusion feed into impatience because of the time needed to learn a computer program in order to retrieve and locate sources (Stamatopolos 2000; Wiberley and Jones 2000). Time is, as noted above, the most important and valuable constant students do not want to waste.

As with computer anxiety, library research anxiety is reflected in students' self-perception as they deal with uncertainty and feelings of inadequacy when seeking information sources. Computer technology has made obsolete the research skills many graduate students learned as an undergraduate, if they learned them at all (Gordon 2002). Undergraduate students arrive at the library with little or no knowledge of how to do research using computers, other than perhaps using search engines on the Internet. The feeling of incompetence is compounded by the students' perceptions that others know how, or at least have the basic skills, to do library research. Mellon (1986) reported on this tendency in her seminal study on library anxiety.

Students' feelings of incompetence are being reinforced by those they look to for guidance and reassurance. Many faculty expect the undergraduate and graduate students to know the concepts required for academic-level research (Dreifuss 1981; Gordon 2002; Mellon 1988; Murry , McKee, and Hammons 1977; Shen and Gresham 2000) and believe others are responsible for teaching students the library research process (Burton and Chadwick 2000). Faculty and other experienced researchers often fail to remember that they at one time were novice researchers. Their positions and experiences have allowed them to develop the cognitive skills and expertise to do research, including library research (Brookfield 1995; Laskowski 2002; Lenski and Johns 1997; Parker-Gibson 2001; Turner et. al. 1990).

The research of Short and Szabo (1974) found that only four percent of graduate students had an understanding of what graduate research entailed. Morner (1995) reported that 14 percent of graduate students felt they knew basic library resources and services. Gordon's 2001 study of 86 graduate students found that 64 percent believed they were prepared to do research, even though the survey questionnaire revealed that they did not have the necessary skills for graduate research. Forty-two percent used the Web for the majority of their research work (Gordon 2002). Quinn (2000) reported that most students were not even familiar with how to read a bibliographic record or a citation. This unfamiliarity with basic library research skills leaves the majority of graduate students doubting their abilities. The low perception of their research abilities is reflected in the high attrition rates of graduate students, especially African-American graduate education students (Onwuegbuzie 1998). Other vulnerable students are international students (Jiao and Onwuegbuzie 1995; 1999c) and rural students with little exposure to technology (Onwuegbuzie 1997a).

As with computer anxiety studies, library research anxiety studies report similar indicators of behavior, feelings, and perception. The extensive changes in research methods have therefore changed the way people view the library. Students are displaying a different form of library anxiety from what past research has shown.

Library Anxiety

Mellon (1986) defined library anxiety as fear and/or anxiety or phobia of using, or even contemplating using, the library. Her study involved undergraduate, community college, and graduate-level students who described their initial response to the library as feeling dread, scared, overpowered, lost, helpless, confused, and in a nightmare (162). Other studies on library anxiety revealed similar responses (Bostick 1992; Dolman 1996; Jiao and Onwuegbuzie 1995, 1997a, 1997b, 1998, 1999a, 1999b, 1999c; Mech and Brooks 1995; Mohundro 1999; Morner 1995; Napier 1978/79; Onwuegbuzie 1997a, 1997b, 1997c, 1998; Onwuegbuzie and Daley 1997; Onwuegbuzie and Jiao 1998a, 1998b; 2000; Schaller and Parker 1997; Szymanski, Swett, Watson, Lin and Chan 1998; Tenopir 1994; Westbrook and DeDecker 1993; Wilson 1998; Zahner 1993).

Mellon's study found 75 to 85 percent of the 6,000 students expressed fear of the library (Mellon 1986). She followed up her study with a 1988 report clearly stating that students fear or perceive others to be competent in library use with only themselves as the incompetent ones, that their incompetence was an embarrassment, and that asking for help would reveal their inadequacies (Mellon 1988).

Bostick (1992) found in her study of graduate, undergraduate, and community college students that those over the age of 50 were more likely to experience library anxiety. She speculated that previous "library experiences and/or their familiarity with modern library techniques" and returning to the academic environment might possibly be sources of their anxiety (83). It should be noted that Bostick's sample had only four students over the age of 50.

Bostick listed five dimensions of library anxiety in her dissertation describing the development and validation of her Library Anxiety Scale. The first dimension, barriers with the staff, describes how students perceived the librarians and library staff as intimidating, unapproachable, and too busy to provide assistance. The second dimension, affective barriers, deals with students' feelings of inadequacy when using the library and their level of library research skills. They feel that they alone do not know how to find materials in the library. Comfort with the library, the third dimension, deals with safety issues and being comfortable working in the library. Knowledge of the library, the fourth dimension, refers to level of familiarity with the layout of the building itself, library procedures, and where materials were located. The final dimension, mechanical barriers, deals with library technology such as copiers, computers, computer printers, and change machines. Bostick (1992) and Onwuegbuzie (1997c) found this to be the case more with graduate students than with students at other educational levels. A study of international students by Jiao and Onwuegbuzie (1999c) found that for these students the highest source of library anxiety was library technology, the mechanical barrier dimension of Bostick's Library Anxiety Scale.

Jiao and Onwuegbuzie, who have extensively researched library anxiety, have significant research to support the conclusion that library anxiety is a real phenomenon affecting academic success and perceived social acceptance (Jiao and Onwuegbuzie 1999b). They used Bostick's Library Anxiety Scale throughout their studies. Their three studies of the relationship between library anxiety and learning styles revealed numerous characteristics of library anxious graduate students. The Onwuegbuzie and Jiao (1998a) initial study of library anxiety and learning styles of graduate students revealed that anxious students preferred structure and lacked persistence. Students who liked to work on their own (self-motivated) were shown to have a high level of library anxiety because they were fearful to reveal to others that they needed help while in the library. Students tended to be peer-oriented, preferring a cooperative style of learning. Mobility preference was another characteristic of a library anxious student. Onwuegbuzie and Jiao theorized this might be because the need to move about is opposed to the need to sit in one place while conducting library research. They may lose their access to the computer or to the database to another student if they leave for one reason or another. The time of day when a student preferred to research also was a factor. Students displaying more library anxiety because of other factors (work or children) had to research in the afternoon. Onwuegbuzie and Jiao encouraged further research to investigate if "levels of library anxiety [reached] their peak in the afternoon" (244). Visual learners also tended to have higher levels of library anxiety. The researchers did not offer any possible reason but encouraged further study.

Their follow-up study on understanding the library anxious graduate student furthered the insights of the relationship between library anxiety and learning styles. Mobility was the number one factor most associated with these students with the library antecedents of barriers with the staff, affective barriers, knowledge of the library, and mechanical barriers. If a student preferred mobility, he realized that there was the chance of losing access to library resources. The lack of persistence predicated library anxiety because students were afraid of or perceived the staff as barriers, were intimidated about their poor knowledge of the library, and found library technology to be frustrating. Visual mode of learning was again a surprisingly high factor in library anxiety. The researchers encouraged further study to "unravel this relationship" (Onwuegbuzie and Jiao 1998b).

Their final 1999 study further analyzed how library anxiety and learning styles were related. Those students who displayed a high need for mobility and were not tactile learners showed a higher level of library anxiety. Most students believed that morning was their best time for work but because of various reasons were forced to come to the library in the afternoons or evenings. They preferred structure and found the open-ended nature of library research upsetting. They found working with library technology and locating materials difficult or troublesome. Noise was a factor for both those who preferred quiet and those who preferred to study in groups. The conflict between these two groups resulted in higher library anxiety because some students came to the library to study in quiet areas and some came to study with a group and needed to converse (Jiao and Onwuegbuzie 1999a).

As with computer and library research anxieties, students experienced a variety of feelings that added

to the stress of visiting an academic library. One major feeling was confusion. There was a new language to learn (e.g., magazines, periodicals, journals) (Collins, Mellon, and Young 1987; Keefer 1993; Kupersmith 1987). Locating books was confusing. Fiction books were not found in one section as in public or public school libraries, nor do most academic libraries use the Dewey Decimal Classification System. Because of the huge numbers of books, periodicals, and other sources of information (i.e., government documents, maps, music collection, etc.), more than one floor or library was often needed to hold the collections. Kupersmith (1987) wrote on the importance of signage or other directional aids upon first entering a library. He reported that students became disoriented because of the lack of or confusion about floor plans and other library graphics and signage.

Stress upon the mental and creative processes can hamper not only finding but also accessing information located in the library. Even with clear and easily observable signs, mental and cognitive stress can cause students to often overlook helpful directional signs, misread call numbers, or become overwhelmed by too many details. Keefer (1993) referred to this as the "hungry rat syndrome." A hungry rat often misses the correct and previously known turns because the drive and need for the food (information) at the end of the maze (library research process) causes it to become confused, anxious, or rattled. Students who come to the library in a state of stress or anxiety, or develop anxiety while attempting the library search process, find their cognitive abilities "degraded or limited." The student overlooks the obvious, displays rigid and inflexible thinking, and shows other anxious behavior (337).

Feelings of inadequacy haunt many students as with computer and research anxieties. They perceive themselves as the only ones who know nothing about libraries or the library research process. They become impatient with themselves or others. These feelings feed the perception that incompetence should be hidden. Many fear going to the library and asking for help will reveal their inadequacy. They put off starting their research and spending time in the library.

Onwuegbuzie and Jiao's (2000) recent study on graduate procrastination revealed many interesting figures and insights. Solomon and Rothblum (cited in Onwuegbuzie and Jiao 2000) stated that 27 to 46 percent of undergraduate students confessed to procrastination when writing a term paper, studying for examinations, or reading weekly assignments. Some procrastinate because of a fear of failure, but most because of task aversion. Onwuegbuzie and Jiao also cited a study performed by Onwuegbuzie regarding procrastination and statistical anxiety showing that graduate students admitted to procrastinating on writing papers (41.7%), studying for examinations (39.3%), and reading weekly assignments (60.0%). When comparing the graduate students to undergraduate students in Onwuegbuzie's study, it was reported that graduate students were 3.5 times more likely to procrastinate with weekly readings and nearly 2.5 times more likely to procrastinate studying for examinations. Onwuegbuzie's study also revealed that graduate students procrastinate during the literature review process (46).

Onwuegbuzie and Jiao's study confirmed Solomon and Rothblum's work. Onwuegbuzie and Jiao cited Solomon and Rothblum's finding that 87.0 percent of graduate students procrastinated because of the fear of failure and 45.6 % because of task aversion. There was a significant overall relationship between students' procrastination and their perception of barriers with the staff, comfort with the library, and mechanical barriers (Onwuegbuzie and Jiao 2000). Onwuegbuzie's 1997 study of graduate students when writing a research proposal confirmed task aversion and fear of failure as reasons for academic procrastination. Here library anxiety showed a significant relationship to barriers with the staff, affective barriers, comfort with the library, and knowledge of the library (Onwuegbuzie 1997c).

Onwuegbuzie and Jiao's procrastination study also revealed that procrastination and library anxiety were not related to time management or study skill deficits. Anxiety affected the students' cognitive-affective abilities. The researchers suggested that the bidirectional relationship of procrastination and library anxiety is a causal relationship because of the unique and "intricately intertwined" nature of each component (Onwuegbuzie and Jiao 2000, 51).

In 1998, Jiao and Onwuegbuzie reported on another study of graduate students and how perfectionism and library anxiety were related. Those graduate students holding a socially prescribed need for perfection had a higher level of library anxiety than the

self-oriented or other-oriented perfectionists. The self-oriented perfectionists set high standards for themselves and severe self-evaluations to attempt perfectionism. The other-oriented perfectionists hold others to extreme standards and set high standards for evaluations. The socially prescribed perfectionists feel that others of significance will judge them and fear negative social evaluations. They do not wish to reveal their ignorance to even the librarian who would be most qualified to assist them while at the library. This fear is also reinforced by the assumption of faculty that graduate students are familiar with the library and library research process.

With the faulty assumption that they should know everything about the library, including library technology and the research process, socially prescribed perfectionists set themselves up for failure or lower academic achievement. Jiao and Onwuegbuzie encourage further research to investigate the relationship among perfectionism, library anxiety, and completion rates of graduate degrees (Jiao and Onwuegbuzie 1998).

Summary

The staff-barrier dimension of library anxiety has changed with the latest in library technology. Students need rarely to interact with the library staff when they can access databases and electronic books outside the library premises. Questions can be asked through voice mail, email, or in some cases with a 24/7 format (Dougherty 2002; Patrick and Matthews 2002). Students can find books, check them out, and have them delivered to their homes or in some cases to the nearest library. Renewal of items can occur over the Internet by direct access into the student's record by the student. The need to come to the library and interact with the staff has diminished.

The affective dimension of library anxiety, or the students' confidence and/or ability to conduct research, no longer is confined to the library premises. They believe they can do their research without exposing themselves to the possibility of humiliation by asking for help. But research shows that students frequently cannot distinguish between quality scholarly sources and other sources. They spend hours in inappropriate databases or ineffective searching. They have heard they can access full-text articles and write their paper without ever coming into the library. With easy access, more students settle for the most convenient articles—not necessarily the best.

The comfort dimension of library anxiety has also changed because technology has altered the need to visit the library. Finding any material from the comfort of home or work computers outweighs the inconvenience of coming to the library to find the right source. Students can do the laundry while searching from home. Students can get up and get dessert or food and not fear losing the computer to another person. Many find the convenience of distance education more suitable to their needs, and library location is a low priority.

Technology has changed the pressing need to know the layout of the library. Document delivery, electronic course reserve, and electronic interlibrary loans can be initiated without coming to the library. Lower exposure to the actual library facility lowers the knowledge and familiarity of where things are located in the library. When students must come to the library, they find themselves confused by the vastness of the collections, by the location and use of library equipment and other facilities such as vending machines and restrooms. To locate needed items or facilities requires knowledge of the library.

These four dimensions of library anxiety (i.e., barriers with staff, affective barriers, comfort barriers, knowledge barriers) have been ameliorated and altered by library technology. The problem is that students believe they can work around the fifth dimension of mechanical barriers found in the library by getting what they want over the Internet or by finding suitable enough articles by unskillfully searching databases. It is easier not to expose oneself to the frustration of library research at the library and not to ask for help. It may not be convenient to drive the distance to the library. Students can call or email for help from the librarian without identifying themselves. Many students do not see the reason to even come to the library. Why struggle with the microfiche and microfilm machines? Why compete for computers and printers in a lab or library when a computer is at home or at work? Why take the time to come to the library?

With inadequate or shallow computer and library research skills, students are producing lower quality research assignments than before. Students' lack of persistence in finding the quality research sources

AND learning effective search skills are hampering the successful completion of quality graduate research. Brosnan (1998a) sees the lack of persistence as a symptom of low confidence or low self-efficacy when dealing with technology and is therefore a symptom of higher computer anxiety (71). It is easier not to persist (Brosnan 1998b; Quinn 2000) and just get by with what is found and easy to access. The mechanical barriers of library anxiety therefore remain the key component to understanding and improving students' library research skills. Those mechanical barriers now dominate the technology-driven academic library.

Methodology

The most commonly used instrument to measure library anxiety scale is no longer valid for the libraries in the 21st century. The Bostick Library Anxiety Scale, developed in 1992, lists five dimensions of library anxiety, but technology has changed how students use libraries since then. It no longer gauges the level of library anxiety most students now feel with the continuing changes technology brings to library and library research.

The exploratory study focused on the relationship among computer anxiety, library research anxiety, and library anxiety for students using academic libraries. Are these three factors related and how do they affect each other? If students have a high level of computer anxiety, would it not be reasonable to expect it to affect their library research skills? If students have a high level of anxiety regarding their library research skills, would it not affect their ability to use the library computer technologies in academic libraries? If students are anxious about coming to the library for help or to retrieve necessary items not available electronically, does this not affect their library research skills?

The initial pilot questionnaire and demographic questions were designed to understand students' areas of anxiety involving the library and the technology used in today's academic research.

The development of an instrument that compares the three anxieties of students in academic libraries will enable librarians to take into consideration and plan for the experiences, needs, and expectations of the students with whom they come into contact. Anxiety has been shown to limit the mental and cognitive abilities of students when faced with stressful situations or experiences. Librarians will develop more effective instructions when they are able to identify and understand the level of anxieties of their students. Knowing which area(s) creates more anxiety for students will allow for saving the item students, faculty, and librarians hold most precious—time.

Instrument

The survey was administered to 79 graduate education students from three sections of an education testing and measurement class at a midwestern public university. The sample population included 18 males and 61 females, of which 92 percent were teachers and 8 percent held other positions in the teaching field. The survey was designed by the researcher and consisted of 75 questions for a 4-point Likert survey based on the research of past computer, research, and library anxieties scales. The survey was divided into three sections of 25 questions each: Computer Anxiety, Internet/Database Anxiety (Research), and Library Anxiety. The psychologist and the faculty advi-

Table 1. Correlations of Computer Anxiety, Library Research Anxiety, and Library Anxiety

		Average on Computer Anxiety Component	Average on Library Anxiety Component	Average on Internet/Database Component (left out 75)
Average on Computer Anxiety Scale	Pearson Correlation	1.000	**.710****	**.798****
	Sig. (2-tailed)	.	.000	.000
	N	79	79	79
Average on Library Anxiety Scale	Pearson Correlation	**.710****	1.000	**.772****
	Sig. (2-tailed)	.000	.	.000
	N	79	79	79
Average on Internet/Database Scale	Pearson Correlation	**.798****	**.772****	1.000
	Sig. (2-tailed)	.000	.000	.
	N	79	79	79

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

Table 2. T-test Results to Determine If Any Gender Differences Within Each Scale

	Gender	Sample Number	Mean	Std. Deviation
Average on Library Anxiety Scale	Male	16	2.2525	.5548
	Female	56	2.3807	.3521

	Gender	Sample Number	Mean	Std. Deviation
Average on Computer Anxiety Scale	Male	18	2.4467	.4451
	Female	60	2.4407	.4224

	Gender	Sample Number	Mean	Std. Deviation
Average on Internet/Database (Research) Scale	Male	15	2.4750	.6258
	Female	60	2.5132	.4836

sor assisted in the wording of the questions. The demographic questionnaire was divided into three sections of 22 questions: General Demographics, Library Demographics, and Computer Demographics. The survey was an initial pilot study with a second survey, modified from the first, to be administered in January 2003. (The results of the second survey will be shared at the ACRL conference in Charlotte, NC, April 2003.)

Results

Data was analyzed using the SPSS version 10.0 statistical application. A significant correlation was found between all pairs of variables. Moderate linear relationships were indicated between each pair of variables. Table 1 indicates that the strongest correlation (.798) was between Internet/Database (Research) Anxiety and Computer Anxiety components (Table 1). The second strongest correlation (.772) was between Library Anxiety and Internet/Database (Research) Anxiety. Library Anxiety and Computer Anxiety had a correlation of .710. The researcher renamed the library research anxiety component to Internet/Database (Research) when running the analysis.

The overall moderate relationship confirms the mechanical barrier portion of Onwuegbuzie's study on library, statistical, and composition anxieties felt by graduate students in a research proposal writing class. He reported that library anxious students had a high level of anxiety in the affective barriers and knowledge of the library and a moderate level of anxiety in mechanical barriers (Onwuegbuzie 1997d).

An independent t-test was run to determine if there were any gender differences in the mean anxiety of each scale. Results indicated there were not significant differences between genders in regard to all three-anxiety scales. While this contradicts the studies by Jiao and Onwuegbuzie (1995, 1997a) and Jacobson (1991), it supports other studies (Chua et. al. 1999). The initial survey study had few male subjects (only 18 out of 79 subjects). Future research needs to be done that includes more male subjects to increase the study's reliability and for comparison purposes (Table 2).

The Internet/Database (Research) Anxiety and Computer Anxiety figures for all ages showed the strongest relationship for students (Figures 1, 2, 3). Figure 4 showed that students in the 21 to 30 years of age range had a higher level of library and computer anxieties than students in either the 31 to 40 age range or the over 41 age range (Figures 4 and 5). Figures 6–8 showed similar results for those students in the 21 to 30 age range who had more anxiety than the students in the other age ranges when comparing Library Anxiety to Internet/Database (Research) Anxiety (Figures 6, 7, 8).

The breakdown of demographic information of other variables relating to library and computer questions showed how and where graduate education stu-

Figure 1. Internet/Database (Research) Anxiety Relation to Computer Anxiety for 21–30 Years of Age

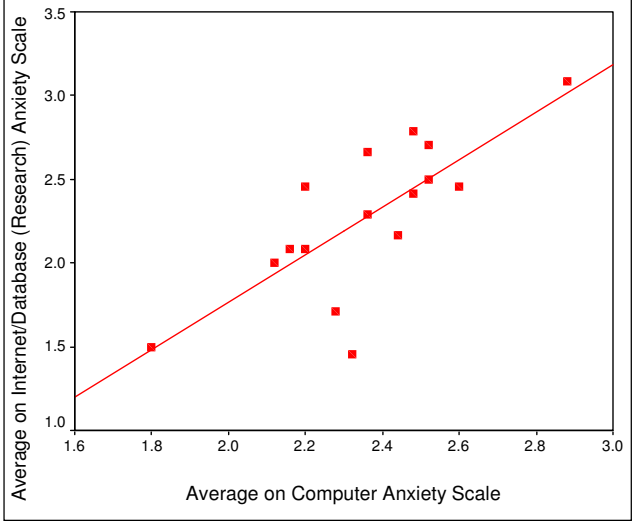


Figure 2. Internet/Database (Research) Anxiety Relation to Computer Anxiety for 31–40 Years of Age

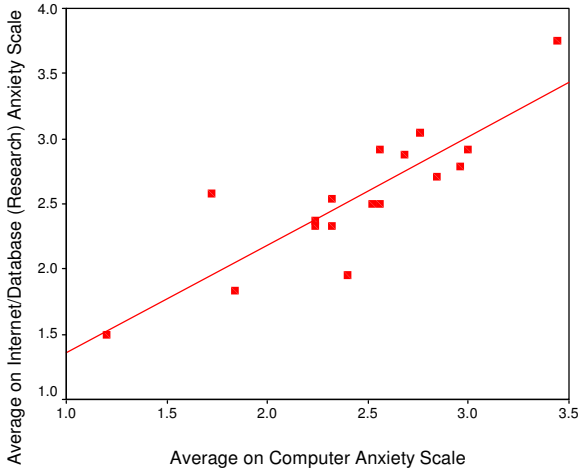
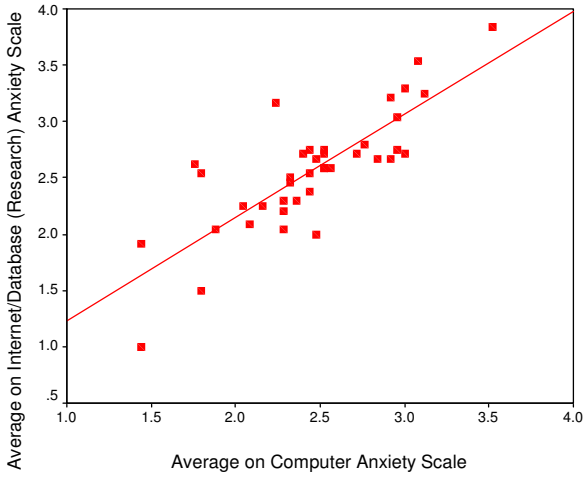


Figure 3. Internet/Database (Research) Anxiety Relation to Computer Anxiety for Over 41 Years of Age



dents are conducting their research. A statistical adjustment was performed to account for the missing or blank responses. Those students never coming to the library comprised 72 percent (Table 3). Of those who do go straight to the library, 51 percent come from home (Table 4). The nearest academic library that was not affiliated with the university where they were taking classes was 5 or fewer miles from the students' homes or work for 29 percent, with another 25 percent being 21 or more miles away (Table 5). Those students who lived or worked 21 or more miles away from the nearest library affiliated with the university where they were taking classes was 47 percent (Table 6).

The final three tables were of special interest to the researcher. Table 7 reported the last time the students were required to do a research paper. Eight people did not respond to the question, and one was coded as an error. The remaining 99 percent of the responses ranged from 49 to 13 percent (previous semester—49%; previous year—23%; 2–4 years ago—14%; over 5 years ago—13%) (Table 7). Those students who had previously received library instruction were 83 percent (Table 8). Research was done mainly

Figure 4. Library Anxiety Relation to Computer Anxiety for 21 to 30 Years of Age

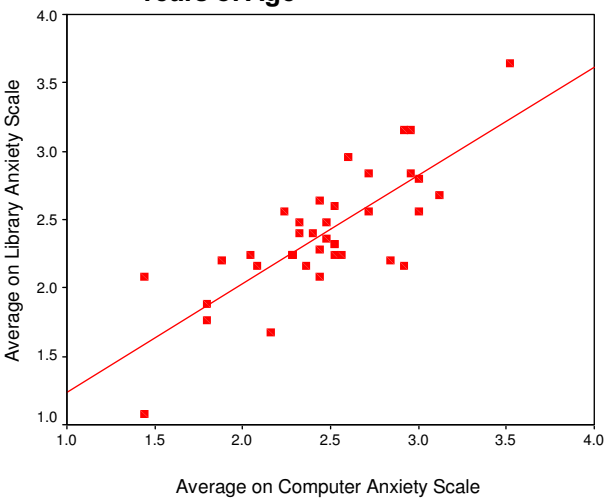


Figure 5. Library Anxiety Relation to Computer Anxiety for 31 to 40 Years of Age

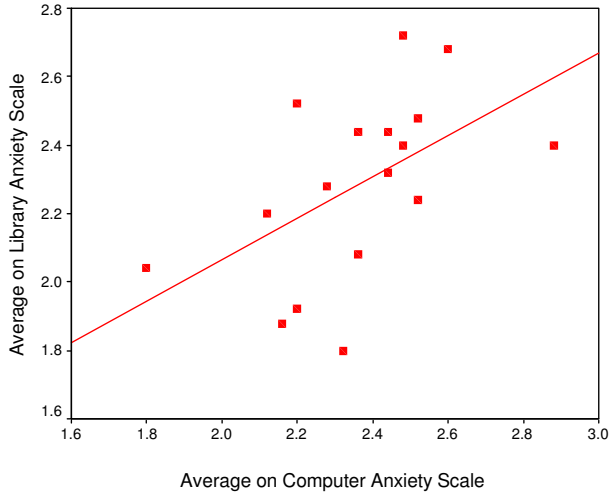


Figure 6. Library Anxiety Relation to Computer Anxiety for Over 41 Years of Age

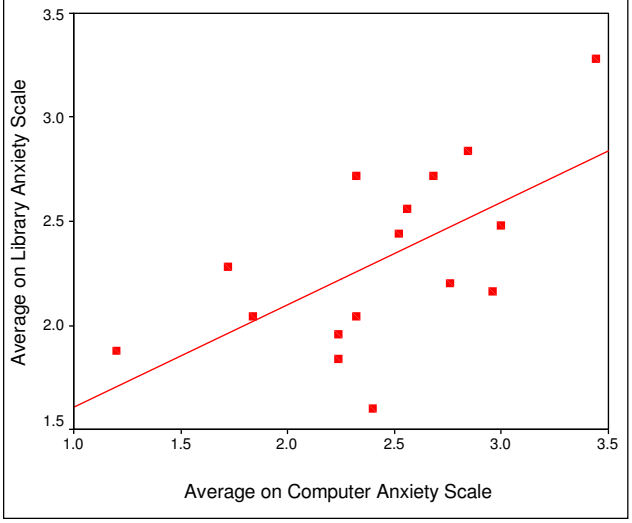


Figure 7. Library Anxiety Relation to Internet/ Database (Research) Anxiety for 21 to 30 Years of Age

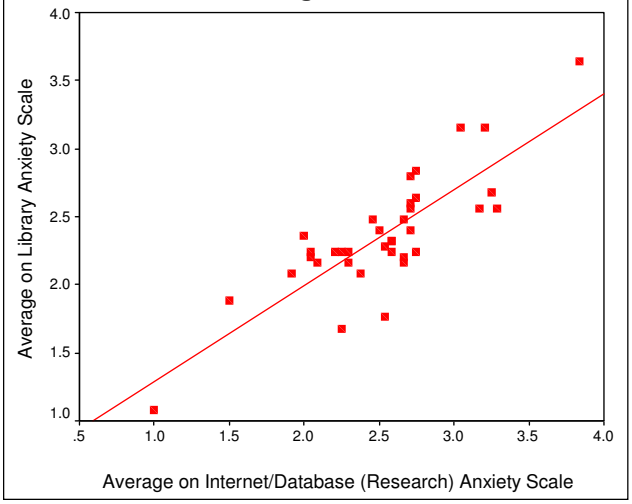


Figure 8. Library Anxiety Relation to Internet/ Database (Research) Anxiety for 31 to 40 Years of Age

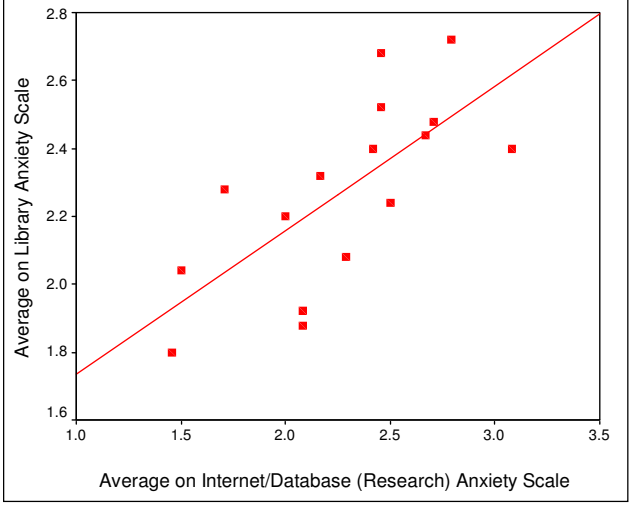


Figure 9. Library Anxiety Relation to Internet/Database (Research) Anxiety for Over 41 Years of Age

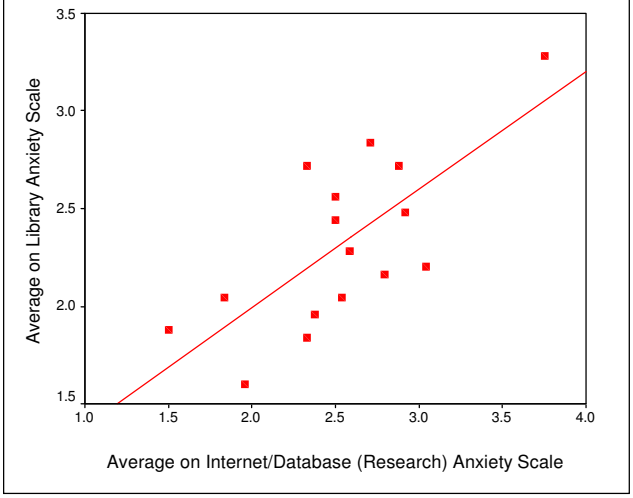


Table 3. Frequency Of On-Campus Library Visits

		Frequency	Valid Percent
Valid	Weekly	7	9.7
	Never	52	72.2
	Monthly	13	18.1
	Total	72	100.0
Missing	Blank	7	
Total		79	

Table 4. Frequency Of Those Visiting the Library Straight From Home Or Work

		Frequency	Valid Percent
Valid	Home	25	51.0
	Work	24	49.0
	Total	49	100.0
Missing	Blank	30	
Total		79	

Table 5. Distance To The Nearest Academic Library NOT Affiliated With The University Where Taking Classes

		Frequency	Valid Percent
Valid	0-5 miles	21	29.2
	6-10 miles	15	20.8
	11-15 miles	9	12.5
	16-20 miles	9	12.5
	21+ miles	18	25.0
	Total	72	100.0
Missing	Blank	7	
Total		79	

Table 6. Distance To The Nearest Library Affiliated WITH The University Where Taking Classes

		Frequency	Valid Percent
Valid	0-5 miles	11	15.3
	6-10 miles	13	18.1
	11-15 miles	7	9.7
	16-20 miles	7	9.7
	21+ miles	34	47.2
	Total	72	100.0
Missing	Blank	7	
Total		79	

with the Internet (55%), database searching (41%) and using the online library catalog for books and other materials (4%) (Table 9).

Discussion

The major weakness in this study was the small number of people sampled and number of males represented. The subjects were in three different locations for the same class taught by the same professor at the same time through distance education technology. The largest sampling was from the "remote" campus. These students have a very different library experience than those students closer to the library affiliated with the university. The nature of their library experience is very different from the other two samplings. The incentive to travel 3 hours to the nearest affiliated library is minimal. The off-campus students might be more at ease with computers and be more skilled in library research because of their unique and different situation from those attending classes closer to the main university library. The answers from the off-campus students could therefore alter the results of the study. Further analysis of the data might reveal interesting findings if each campus is analyzed separately.

There were at least 7 blank answers in all the demographic results of Tables 3, 5, 6, and 8. Table 4 had thirty left blank. Tables 7 and 9 had 8 blanks. Table 7 also had one error recorded that was the result of an incomplete erasure. The last seven questions on the demographic section were located on the back of the last page. It is possible that 7 subjects were not aware of their presence. The 30 blank responses in Table 4 are not as easily explained. There is the possibility that the confusion of the statement caused these subjects not to answer this question. Table 9 dealt with the terms Internet, database, and online library catalog. It is possible that subjects may have been confused about the differences among the three terms.

The initial result of a moderate level of correlation among for computer, library research, and library anxieties were disappointing for the researcher. The successes and failures of the initial pilot survey can-

Table 7. Last Time Writing A Research Paper Requiring The Use Of The Library Or Database

		Frequency	Valid Percent
Valid	Last semester	35	49.3
	Last year	16	22.5
	2-4 years ago	10	14.1
	Over 5 years ago	9	12.7
	E	1	1.4
	Total	71	100.0
Missing	Blank	8	
Total		79	

Table 8. Previous Library Instructions

		Frequency	Valid Percent
Valid	Yes	60	83.3
	No	12	16.7
	Total	72	100.0
Missing	Blank	7	
Total		79	

Table 9. Research Done Mainly Using the Internet, Database, Or the Online Library Catalog

		Frequency	Valid Percent
Valid	Internet	39	54.9
	Databases	29	40.8
	Online library catalog	3	4.2
	Total	71	100.0
Missing	Blank	8	
Total		79	

not be measured by the results of the survey for the researcher. This first-time experience of developing, writing, administering, and analyzing a survey was a very valuable learning activity. The researcher will continue working on the survey instrument to refine it and to develop a useful, reliable, and valid survey that will measure computer, library research, and library anxieties.

Conclusion

Graduate education students are required to maintain a high level of currency for teaching certification and job advancement. In 1998, 114,692 students earned a master's degree in education and 6,729 received a doctorate in education. Business and engineering students came in a distant second respectively (U.S. Dept. of Commerce 2001). It is vital to understand the computer and library anxieties of pre-service and in-service teachers because they are often the role models who introduce technology to their students (Brosnan 1998a; Rosen and Weil 1995; Yildirim 2000).

This becomes important if one uses the statistics mentioned in the literature review for each anxiety. That means five percent of the 114,692 teachers, or 5,735 teachers returning to graduate schools, could be severely computerphobic. If the average elementary teacher has an average of 25 students per class per year, then these teachers could be unconsciously influencing 143,300 students a year. If only 14 percent feel knowledgeable about library sources and services, that means that 86 percent of graduate students do not. Eighty-six percent of the 114,692 graduate education teachers, or 98,635 elementary teachers, could possibly be unconsciously negatively influencing 246,600 students a year regarding library research. If we use Mellon's figure of 75 percent of students having library anxiety, then 86,019 graduate education students have some level of library anxiety. Those 86,019 teachers are in contact with to 215,047 students a year and could unconsciously reflect a negative desire to come to the library. It is acknowledged that not all 114,692 graduate education students are elementary teachers. But if one even takes into account the increased number of students with whom teachers in the middle and secondary schools have contact daily, then the potential total numbers of students could be even higher.

It becomes imperative that administrators within the school systems, college and university education departments, librarians, and others who have contact with the pre-service and in-service teachers address computer and library anxieties. Today's teachers are the ones influencing the next generation of computer and library users.

What makes studying computer, library research, and library anxieties difficult is that it involves continually changing variables. The study of anxiety will always be a difficult endeavor because it involves the self-perception of people reacting to other variables that will always change—technology. The continual improvements and changes in library technology will "continue to challenge any stable view of information needs" (Westbrook and DeDecker 1993, 44.), and there will always be a "great deal of variance in what people find threatening in a library environment" (Zahner 1993, 7).

A researcher of library anxiety must be flexible enough to realize that there will never be one instrument that will be universally applicable for all time. Libraries and those they serve are not in Kansas anymore.

References

Ayersman, D.J. 1996. Effects of computer instruction, learning style, gender, and experience on computer anxiety. *Computers in the School,* 12 (4): 15–30.

Benson, L.D. 1995. Scholarly research and reference service in the automated environment. In P.M. Baxter, ed. *Social science reference services,* 57–69. New York: Haworth Press.

Berghel, H. 2000. World-Wide-Web. In A. Ralston, E.D. Reilly, and D. Hemmendinger, eds. *Encyclopedia of Computer Science* (4th ed.): 1867–74. London: Nature Publishing Group.

Blandy, S.G., and P.O. Libutti. 1995. As the cursor blinks: Electronic scholarship and undergraduates in the library. *Library Trends* 44: 279–305.

Bostick, S.L. 1992. The development and validation of the library anxiety scale (Doctoral dissertation: Wayne State University, 1992). *Dissertation Abstracts International* 53: 4116.

Brookfield, S. 1995. *Becoming a critically reflective teacher*. San Francisco: Jossey-Bass Publishers.

Brosnan, M.J. 1998a. The impact of psychological gender, gender-related perceptions, significant others, and the introducer of technology upon computer anxiety in students. *Journal of Educational Computing Research* 18: 63–78.

———. 1998b. *Technophobia: The psychological impact of information technology*. New York: Routhledge, 1998.

Burton, V.T., and S. A. Chadwick. 2000. Investigating the practices of student researchers: Patterns of use and criteria for use of Internet and library sources. *Computers and Composition* 17: 309–28.

Cambre M.A., and D.L. Cook. 1987. Measurement and remediation of computer anxiety. *Educational Technology*, 27(12): 15–20.

Charny, B. 2000. World Wide $#@%@$ing Web! *ZDNet News*. Retrieved June 21, 2002 from http://zdnet.com.com/2100-11-526590.html.

Chou, H-W. 2001. Effects of method and computer anxiety on learning performance and self-efficacy. *Computers in human behavior* 17: 51–69.

Chua, S.L., D-T. Chen, and A.F.L. Wong. 1999. Computer anxiety and its correlates: A meta-analysis. *Computers in human behavior* 15: 609–23.

Cleveland, A. M. 2001. Reducing library anxiety in first-year students: Computer assisted instruction (Master thesis, University of North Carolina at Chapel Hill, N.C., 2001).

Collins, B.L., C.A. Mellon, and S. B. Young. 1987. Needs and feelings of beginning researchers. In C. Mellon, ed., *Bibliographic instruction: The second generation*. Littleton, Colo.: Libraries Unlimited, Inc., 73–84.

Crawford, W. and M. Gorman. (1995). *Future libraries: Dreams, madness, and reality.* Chicago, ALA.

Croft, J.B. (2001). Changing research patterns and implications for web page design: Ranganathan revisited. *College & Undergraduate Libraries* 8: 69–77.

Crowe, K.M., and A.J. McKee. 1995. The adult learner and the new technology. In R. AmRhein, ed., *Continuity and transformation: The promise of confluence,* 460–61. Chicago: Association of College and Research Libraries.

Curry, E.L. 2001. Introduction: Technological advances in reference: A paradigm shift? *Library Trends* 50: 165–67.

DeLoughry, T.J. 1993, April 28. Two researchers say "technophobia" may afflict millions of students." *The Chronicle of Higher Education*, A25.

Dolman, A.U. 1996. Predicting library anxiety, computer anxiety, and library performance (Master thesis, University of North Carolina at Chapel Hill, N.C., 1996).

Dougherty, R.M. 2002. Reference around the clock: Is it in your future? *American Libraries,* 33 (5): 44, 46.

Dreifuss, R.A. 1981. Library instruction and graduate students: More work for George. *RQ* 21(2): 121–23.

Egan, P.J. 1992. Bridging the gap between the student and the library. *College Teaching* 40: 67–70.

Fliotsos, A. 1992. Anxiety layering: The effects of library and computer anxiety on CD-ROM use. *Southeastern Librarian* 42 (2): 47–49.

Frand, J.L. 2000. The information-age mindset: Changes in students and implications for higher education. *Educause Review* 35 (5): 14–24.

Goldsborough, R. 2002, May. Overcoming fear of PCs. *Poptronics* 3 (5): 51–53.

Good, C.F., ed. 1973. *Dictionary of education*. New York: McGraw-Hill Book Company.

Gordon, C.A. 2002. A room with a view: Looking at school library instruction from a higher education perspective. *Knowledge Quest* 30 (4): 16–21.

Grimes, D.J., and C. H. Boening. 2001. Worries with the web: A look at student use of web resources. *College and Research Libraries* 62: 11–23.

Hart, C. 1998. *Doing a literature review: Releasing the social science research imagination*. Thousand Oaks, Calif.: SAGE Publications.

Heinssen, Jr., R.K., C.R. Glass, and L.A. Knight. (1987) Assessing computer anxiety: Development and validation of the computer anxiety rating scale. *Computers in Human Behavior* 3: 49–59.

Hudiburg, R.A. 1989. Psychology of computer use: XVII. The computer technology hassles scales: Revision, reliability, and some correlates. *Psychological Reports* 65: 1387–94.

Hudiburg, R.A., and J. R. Necessary. 1996. Coping with computer-stress. *Journal of Educational Computing Research* 15: 113–24.

Jacobson, F.F. 1991. Gender differences in attitudes toward using computers in libraries: An exploratory study. *Library Information Science Research* 13: 267–79.

Jerabek, J.A., L.S. Meyer, and S.T. Kordinak. 2001. "Library anxiety" and "computer anxiety:" Measures, validity, and research implications. *Library & Information Science Research* 23: 277–89.

Jiao, Q.G., and A.J. Onwuegbuzie. 1995. Library anxiety: Characteristics of 'at-risk' college students. Biloxi, Miss.: Paper presented at the Annual Conference of the Mid-South Educational Research Association, November 9, 1995. (ERIC Document Reproduction Service No. ED416896)

———. 1997a. Antecedents of library anxiety. *Library Quarterly* 67: 372–89.

———. 1997b. Factors associated with library anxiety. Chicago: Paper presented at the Annual American Educational Research Association Conference, March 24–28, 1997. (ERIC Document Reproduction Service No. ED416895).

———. 1998. Perfectionism and library anxiety among graduate students. *Journal of Academic Librarianship* 24: 365–71.

———. 1999a. Identifying library anxiety through students' learning-modality preferences: Librarians need to share information to make library a powerful vehicle. *Library Quarterly* 69: 202–11.

———. 1999b. Is library anxiety important? *Library Review* 48: 278–82.

———. 1999c. Library anxiety among international students. Point Clear, Ala.: Paper presented at the Annual Meeting of the Mid-South Education Research Association. November 17–19, 1999. (ERIC Document Reproduction Service No. ED437973).

———. 1999d. Self-perception and library anxiety: An empirical study. *Library Review* 48: 140–47.

Jiao, Q.G., A.J. Onwuegbuzie, and C.E. Daley. 1997. Prevalence and reasons for university library usage. Memphis, Tenn.: Poster presented the Annual Conference of the Mid-South Educational Research Association, November 13, 1997. (ERIC Document Reproduction Service No. ED417735).

Keefer, J. 1993. The hungry rats syndrome: Library anxiety, information literacy, and the academic reference process. *RQ* 32: 333–39.

Kernan, M.C., and G.S. Howard. 1990. Computer anxiety and computer attitudes: An investigation of construct and predictive validity issues. *Educational and Psychological Measurement* 50: 681–90.

King, D.N., and J.C. Ory. 1981. Effects of library instruction on student research: A case study. *College and Research Libraries* 42: 31–41.

Kupersmith, J. 1987. "Library anxiety" and library graphics. *Research Strategies* 5: 36–38.

Landrum, R.E., and D.M. Muench. 1994. Assessing students' library skills and knowledge: The library research strategies questionnaire. *Psychological Reports* 75: 1619–28.

Laskowski, M.S. 2002. The role of technology in research: Perspectives from students and instructors. *portal: Libraries and the Academy* 2: 305–19.

Lawrence, S., and C.L. Giles. 1999. Accessibility of information on the web. *Nature* 400 (6740): 107–9.

Lenski, S.D., and J.L. Johns. 1997. Patterns of reading to write. *Reading Research and Instruction* 37, 15–38.

Leso, T. and K. Peck. 1992. Computer anxiety and different types of computer courses. *Journal of Educational Computing Research* 8: 469–78.

Liu, L., and D.L. Johnson. 1998. A computer achievement model: computer attitude and computer achievement. *Computers in the Schools* 14 (3/4): 33–53.

Loyd, B.H., and C. Gressard. 1984. The effects of sex, age, and computer experience on computer attitudes. *AEDS Journal* 17: 67–76.

MacDonald, R., and R. Dunkelberger,. 2000. Full-text database dependency: An emerging trend among undergraduate library users? *Research Strategies* 16: 301–7.

Marcoulides, G.A. 1989. Measuring computer anxiety: The computer anxiety scale. *Educational and Psychological Measurement* 49: 733–39.

Maurer, M.M., and M.R. Simonson. 1984. Development and validation of a measure of computer anxiety. (ERIC Document Reproduction Service No. ED243428).

Mech, T.F., and C.I. Brooks. 1995. Library anxiety among college students: An exploratory study. In R. AmRhein, ed., *Continuity and transformation: The promise of confluence*. Chicago: Association of College and Research Libraries, 173–79.

Mellon, C.A. 1986. Library anxiety: A grounded theory and its development. *College and Research Libraries* 47: 160–65.

———. 1988. Attitudes: The forgotten dimension in library instruction. *Library Journal* 113 (4): 137–39.

———. 1989. Library anxiety and the non-traditional student. In T.B. Mensching, ed., *Reaching and teaching library user groups*. Ann Arbor, Mich.: Pierian Press. 77–81.

Mohundro, J.L. 1999. The effectiveness of bibliographic instruction on reducing library anxiety in GED students at a community college. (Doctoral dissertation: Texas A&M University, 1990). *Dissertation Abstracts International* 51, 1867.

Moore, M.M. 2002. Rage against the machine: Why do we love to complain about technology? Is it fear, anger or just plain stress? *Darwin* 2: 56–60.

Morner, C.J. 1995. Measuring the library research skills of education doctoral students. In R. AmRhein, ed., *Continuity and transformation: The promise of confluence*. Chicago: Association of College and Research, 173–79

Murry, J.W., E.C. McKee, and J.O. Hammons. 1997. Faculty and librarian collaborations: The road to information literacy for graduate students. *Journal on Excellence in College Teaching* 8: 107–21.

Nahl, D. 1993. Guidelines for creating user-centered instructions for novice end-users. In L. Shirato, ed., *The impact of technology on library instruction*. Ann Arbor, Mich.: Pierian Press, 173–79

———. 1997. Information counseling inventory of affective and cognitive reactions while learning the Internet. *Internet Reference Services Quarterly* 2 (2/3): 11–33.

Napier, J.D. 1978/79. An experimental study of the relationship between attitude toward and knowledge of educational research. *Journal of Experimental Education* 47: 131–34.

Oberman, C. 1991. Avoiding the cereal syndrome, or critical thinking in the electronic environment. *Library Trends* 39: 189–202.

OneStat.com: Google is the most popular search engine on the web according to OneStat.com. 2002, April 15. *Coventry*. Retrieved May 26, 2002, from ProQuest database.

Onwuegbuzie, A.J. 1997a. The role of technology in the library anxiety of Arkansas college students. *Arkansas Association of Instructional Media Quarterly* 30: 6–8.

———. 1997b. The teacher as researcher: The relationship between enrollment time and achievement in a research methodology course. *Research and Reflection* 3 (1): Retrieved September 30, 2000 from http://www.gonzaga.edu/rr/v3n1/tony.html. Also: *College Student Journal* (1997) 31: 496–506.

———. 1997c. Writing a research proposal: The role of library anxiety, statistics anxiety, and composition anxiety. *Library & Information Science Research* 19: 5–33.

———. 1998. The underachievement of African American teachers in research methodology courses: Implications for the supply of African American school administrators. *Journal of Negro Education* 67 (1): 67–78.

———. 2000. Statistics anxiety and the role of self-perceptions. *Journal of Educational Research* 93: 323–30.

Onwuegbuzie, A.J., and C.E. Daley. 1997. Learning style and achievement in a course on research methods. *Psychological Reports* 80: 496–98.

Onwuegbuzie, A.J., and Q.G. Jiao. 1998a. The relationship between library anxiety and learning styles among graduate students: Implications for library instructions. *Library and Information Science Research* 20: 235–49.

———. 1998b. Understanding library-anxious graduate students. *Library Review* 47: 217–24.

———. 2000. I'll go to the library later: The relationship between academic procrastination and library anxiety. *College and Research Libraries* 61: 45–54.

Ostrow, R.L. 1998. Library culture in the electronic age: A case study of organizational change. (Doctoral dissertation: State University of New Jersey–Rutgers).

Parker-Gibson, N. 2001. Library assignments: Challenges students face, and how to help. *College Teaching* 49: 65–70.

Patrick, S., and C. Matthews. 2002. Ask a librarian LIVE. *College & Research Libraries News* 63: 280–81.

Popovich, P.M., K.R. Hyde, T. Zakrajsek, and C. Blumer. 1987. The development of the Attitudes Toward Computer Usage Scale. *Educational and Psychological Measurement* 47: 261–69.

Presno, C. 1998. Taking the byte out of Internet anxiety: Instructional techniques that reduce computer/Internet anxiety in the classroom. *Journal of Educational Computing Research* 18 (2): 147–61.

Quinn, B. 2000. Overcoming technostress in reference services to adult learners. In K. Sarkodie-Mensah, ed., *Reference services for the adult learner: Challenging issues for the traditional and technological era*. New York: Haworth Press, 49–62.

Ren, W-H. 2000. Library instruction and college student self-efficacy in electronic information searching. *Journal of Academic Librarianship* 26: 323–28.

Rogers, S.J. 1987. Science of knowledge. In C.A. Mellon, ed., *Bibliographic Instruction: The second generation*. Littleton, Colo.: Libraries Unlimited, Inc., 125–33.

Rosen, L.D., D.C.Sears, and M.M. Weil. 1987. Computerphobia. *Behavior Research Methods, Instruments, and Computers* 19: 167–79.

Rosen, L.D., and M.M. Weil. 1990. Computers, classroom instruction, and the computerphobic university student. *Collegiate Microcomputer* 8: 275–83.

———. 1995. Computer availability, computer experience and technophobia among public school teachers. *Computers in Human Behavior* 11: 9–31.

Russell, A.L. 1996. Six stages for learning to use technology. Indianapolis, Ind.: Proceedings of Selected Research and Development Presentations at the 1996 National Convention of the Association for Educational Communications and Technology. (ERIC Document Reproduction Service No. ED397832).

Saunders, L.M. 1999. The human element in the virtual library. *Library Trends* 47: 771–87.

Schaffner, B.L. 2001. Electronic resources: A wolf in sheep's clothing? *College and Research Libraries* 62: 239–49.

Schaller, J., and R. Parker. 1997. Effect of graduate research instruction on perceived research anxiety, research utility, and confidence in research skills. *Rehabilitation Education* 11: 273–87.

Scott, J., J.A. Trimble, and L.F. Fallon. 1995. @*&!#@ This computer and the horse it rode in on: Patron frustration and failure at the OPAC. In R. AmRhein, ed., *Continuity and transformation: The promise of confluence.* Chicago: Association of College and Research, 247–56.

Shen, Z., and K. Gresham. 2000. When technology transforms research methodology: The role of librarians in reforming the curriculum. *Reference Services Review* 28: 360–68.

Short, B.G., and M. Szabo. 1974. Secondary school teachers' knowledge of and attitudes toward educational research. *Journal of Experimental Education* 43: 75–78.

Stamatoplos, A.C. 2000. An integrated approach to teaching research in a first-year seminar. *College Teaching* 48: 335.

Szymanski, E.M., E.A. Swett, E.A. Watson, S. Lin, and S. Chan. 1998. The effects of contextualized research instruction on research anxiety, perceived utility of research and confidence in research ability. *Rehabilitation Education* 12: 347–60.

Tenopir, C. 1994. The emotions of searching. *Library Journal* 119 (14): 134–35.

Teoma aspires to compete with Google. 2002, May 16. *Computimes Malaysia.* Retrieved May 26, 2002, from ProQuest.

Turner, P.M., M.K.Kaske, and G.S. Baker. 1990. The effects of baud rate, performance anxiety, and experience on online bibliographic searches. *Information Technology and Libraries* 9: 34–42.

U.S. Department of Commerce 2001. Masters and Doctorate Degrees Earned by Field, 1971–1998. *Statistical Abstracts of the United States* (121st ed.). Retrieved June 14, 2002 from http://www.census.gov/prod/2002pubs/01statab/educ.pdf.

Valentine, B. 2001. The legitimate effort in research papers: Student commitment versus faculty expectations. *Journal of Academic Librarianship* 27: 107–15.

Wang, Y. 2000. Training teachers using computers. *T.H.E. Journal* 27 (10): 66–74.

Wei, R.P.C. 2002, May 16. Search engine technologies. *Computimes Malaysia*. Retrieved May 26, 2002, from ProQuest.

Weinberg, S.B., and M. Fuerust. 1984. *Computerphobia: How to slay the dragon of computer fear*. Wayne, Penn.: Banbury Books.

Westbrook, L., and S. DeDecker. 1993. Supporting user needs and skills to minimize library anxiety: Considerations for academic libraries. *Reference Librarian* 40: 43–51.

Wiberley, S. and W.G. Jones. 2000. Time and technology: A decade long look at humanists' use of electronic information technology. *College and Research Libraries* 61: 421–31.

Wilson, V.A. 1998. *A study of reduction of anxiety in graduate students in an introductory educational research course.* (New Orleans, La.: Paper presented at the Annual Meeting of the Mid-South Educational Research Association, November 4–6, 1998. (ERIC Document Reproduction Service No. ED427075).

Worthington, V.L., and Y. Zhao. 1999. Existential computer anxiety and changes in computer technology: What past research on computer anxiety has missed. *Journal of Educational Computing Research* 20 (4): 299–315.

Yildirim, S. 2000. Effects of an educational computing course on pre-service and in-service teachers: A discussion and analysis of attitudes and use. *Research on Computing in Education* 32: 479–95.

Young, N.J. and M. Von Seggern. 2001. General information seeking in changing times: A focus group study. *Reference & User Services Quarterly* 42*:* 159–69.

Zahner, J.E. 1993. *Thoughts, feelings and actions: Integrating domains in library instructions.* (New Orleans, La.: Proceedings of Selected Research and Development Presentations at the Convention of the Association for Educational Communication and Technology, January 13–17, 1993. ERIC Document Reproduction Service No. ED362215).

Zhang, Y., and S. Espinoza. 1998. Relationships among computer self-efficacy, attitudes toward computers, and desirability of learning computing skills. *Journal of Research on Computing in Education* 30: 420–36.