

FACULTY USE OF THE WORLD WIDE WEB: MODELING INFORMATION
SEEKING BEHAVIOR IN A DIGITAL ENVIRONMENT

Maurice G. Fortin, B.A., M.A., M.L.S.

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APPROVED:

Ronald W. Newsom, Major Professor and Program

Coordinator for Higher Education

Herman L. Totten, Minor Professor

D. Barry Lumsden, Committee Member

M. Jean Keller, Dean of the College of Education

C. Neal Tate, Dean of the Robert B. Toulouse
School of Graduate Studies

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There has been a long history of studying library users and their information seeking behaviors and activities. Researchers developed models to better understand these information seeking behaviors and activities of users. Most of these models were developed before the onset of the Internet.

This research project studied faculty members' use of and their information seeking behaviors and activities on the Internet at Angelo State University, a Master's I institution. Using both a quantitative and qualitative methodology, differences were found between tenured and tenure-track faculty members on the perceived value of the Internet to meet their research and classroom information needs. Similar differences were also found among faculty members in the broad discipline areas of the humanities, social sciences, and sciences. Tenure-track faculty members reported a higher average Internet use per week than tenured faculty members.

Based on in-depth, semi-structured interviews with seven tenured and seven tenure-track faculty members, an Internet Information Seeking Activities Model was developed to describe the information seeking activities on the Internet by faculty members at Angelo State University. The model consisted of four basic stages of activities: "Gathering," "Validating," "Linking" with a sub-stage of "Re-validating," and

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CHAPTER 1

INTRODUCTION

Introduction

It is an old maxim that the first place most faculty members look for information is within their own personal library. If the information cannot be located there, then they look in a colleague's library. If they still have not found the needed information, then maybe they will look in a library. The above may seem humorous, but similar stories were reported in the literature. (See Curtis, Weller, & Hurd, 1993, p. 383; and Herson, 1984, p. 406.)

Increasingly, the second and third scenarios recounted above are being replaced by faculty members' use of the Internet to query colleagues for needed information or to access remote Web sites and databases to obtain information for their research. (The term Internet will be used interchangeably with Web and WWW to represent the network of networks by which computer users communicate, exchange files, and access information from remote sites.) The Internet offers the new avenues of database searching, optical disk products, full-text electronic documents, and E-mail for faculty members to access information. In his book, Rossman (1992) described a developing "electronic university." A key component of this new "electronic university" was the electronic library.

And today a university library is less and less a place for books and printed materials alone; it also supplies the scholar with resource materials such as . . . CD-ROM and computer diskettes, and on-line data bases with interconnections that are increasingly international. Many universities have merged their libraries

and computer centers, and 'library resources' are increasingly in hyperspace. The use of microcomputers and sophisticated telecommunications systems by faculty and students means that 'service requirements in the electronic university will be driven and shaped by this increasing use of technology' (p. 62).

Jacobson (1994) reported on plans for a "virtual university" on the Internet. This virtual university concept was similar to Rossman's "electronic university." Through the Internet, scholars located around the globe could band together to offer courses of study to students at distant locations, thereby, overcoming the necessity of limiting enrollment only to those who could afford to travel and attend elite universities.

The Internet has become a new, technological tool for higher education institutions. Beck and Ormand (1997) discussed the efforts of many universities and colleges to use the Internet and other technologies to extend their course offerings and degree programs to students in distant learning programs. Through the use of these new technologies, many universities now have the capability to offer courses virtually anywhere in the world. Some scholars advocate using the Internet to store and access scholarly research papers on a variety of topics. "Scholars would deposit their papers in the system, called the Open Archives, and retrieve papers written by others - - all for free" (Kiernan, 1999, p. A43).

Many popular magazines, academic journals, newspapers, and computer related publications now carry columns and feature articles devoted to reporting on the latest developments concerning the Internet. This collection of networks linked to other networks known as the Internet is considered by many to be essential for research and information exchange. As Morris and Ogan (1996, p. 39) noted, "The Internet has become impossible to ignore. . . ."

Through the inter-linking of scholars and students from throughout the world, the Internet makes possible the electronic university envisioned by Rossman. As more researchers, faculty members, students, businesses, government agencies, and the general public gain access to the Internet, all face a common problem: what is available to search and how does one search for information on the Internet? Although written some eight years ago, Oblinger (1992) described this problem that has only gotten worse as the Internet continues to expand at such a rapid pace. "The largest problem faced by most newcomers to the network is understanding what such networks can provide" (p. 3).

By 2000, the growing phenomenon of the Internet and the World Wide Web now permeates higher education campuses. The Internet provides scholars and students with quick and easy access to colleagues and electronic information resources located around the globe. Scholars can now exchange preliminary drafts of research findings with colleagues or keep in touch by monitoring electronic bulletin boards, chat rooms, and listservs on subjects of interest. Both students and faculty members now use the Web to tap remote databases and full-text document resources that were previously only available through expensive on-site research visits. Researchers and students use the Web to watch real-time images from remote research stations and satellites or to participate in class discussions and group projects.

DeLoughry (1994) reported on the potential of listservs and discussion groups on the Internet to serve as the "first truly worldwide seminar room" (p. A25). Mashhadi and Han (1996) noted that "The information and communications revolutions that have resulted in the Internet have built a means of information exchange which has

‘annihilated’ distance and time, and accelerated the process of creating a global community of inquiry” (p. 4).

Students could now take issues and topics raised in a conventional classroom onto the Internet and seek input from other scholars and students from around the world. Many universities now offer on-line courses and facilitate distant learning projects through the Internet. This type of access is possible from libraries, offices, computer labs, residence hall rooms, homes, and offices. One researcher (Shade, 1995) noted that faculty members and students “depend on the Internet as a medium for generating scholarly discussion, peer review and feedback, expediting the pace of academic research, and cementing diverse scholarly communities inter-institutionally” (p. 211). Both students and faculty members no longer have to depend on an intermediary to search this electronic environment. As Large, Tedd, and Hartley (1999) noted “Information seeking in electronic data environments is no longer solely the purview of the information professional; alongside the burgeoning information available in such environments and the expansion in the variety of delivery platforms has been the tremendous extension of access to electronic information” (p. vii).

As the entire university community makes more use of the Internet to aid scholarly research and communication, classroom projects, and in developing teaching methodology and course/program offerings, it is essential that university administrators gain an understanding of how and for what purposes the faculty and students are using the Internet. Information technology resources and access will require an ever increasing share of the university’s budget. By understanding the role the Internet plays in the

university's research, teaching, and service roles, university administrators will have better arguments for reallocating existing budgets and for requesting increased funding. In turn, information providers and system designers and researchers also need to understand and build models to describe how users approach and use the Internet to satisfy their information needs. If information providers such as academic libraries wish to retain their central role in the university setting, they must gain knowledge about Internet usage and information seeking by their academic communities in order to provide quality services and relevant information access, training, and resources.

One means of understanding this usage is to develop models of how academic faculty and administrators search for information. During the course of his research into better designs for information retrieval systems, Ellis developed a behavioral model (Ellis, 1993, 1989a, & 1989b; Ellis & Haugan, 1997; & Ellis, Cox, & Hall, 1993) to better understand the information seeking behaviors of faculty members in the social and physical sciences. Ellis (1989a) stated his model's purpose was to describe the information seeking patterns of his subjects (social scientists) and break the patterns "down into their basic behavioural characteristics." When the information retrieval system incorporates these behavioral patterns, researchers will find the retrieval systems easier to use; and adapt the systems to each individual's preferred style of searching for information (p. 172). In another article, Ellis and his colleagues (Ellis et al., 1993) determined that the behavioral model could also describe the information seeking behavior of physical scientists. The researchers concluded there were "no overriding differences between the two groups" (p. 365).

Combining his research on social scientists and that of his work with his colleagues' research on physical scientists, Ellis' behavioral model consisted of eight stages (Ellis, 1989a, pp. 178-200; & Ellis et al., 1993, pp. 364-365). The first stage was "Starting" which Ellis described as the "initial search for information." This stage involved finding a key citation to a paper, article, or monograph. The faculty member then wanted to find additional information on the subject or additional articles by the same author(s).

The second stage was "Chaining." Ellis described chaining as following the footnote trail. As the faculty member followed the trail from citation to citation, the faculty member created a chain of footnotes that led to the needed information.

"Browsing" was the third stage. Once the faculty member found a source or "area" that had useful information, the faculty member then began to browse the area or source for additional information on the topic of interest.

The fourth stage was "Differentiating." Here the faculty member began to sift through the discovered resources and filtered out the undesirable resources. The faculty member made choices on each discovered piece of information based on the quality (how well it met the faculty member's information need) of the document or article.

Ellis called the fifth stage "Monitoring." Once the faculty member found a number of sources that met the information need, the faculty member then continued to monitor the field for new developments or additional information.

“Extracting” was the sixth and final stage in Ellis’ initial model. Once the faculty member discovered the desired source, the faculty member then began to work through the source “to locate material of interest.”

In their study of physical scientists while verifying the six-stage model, Ellis et al. (1993) added two additional stages to the model. These stages were “Verifying” and “Ending.” In “Verifying,” the faculty member attempted to check the discovered source for errors in data gathering, research design, statistical calculations, citations, and reputation of the author. The social scientists reported that this was only a minor concern to their information seeking behavior. “Ending” occurred at the finish of a project when the faculty member returned to the literature for one last review to find any additional sources of information on the topic of interest.

These stages did not occur in the sequence or order given in the model. Ellis (1989a) noted “The six features of the model [original model] together represent the major generic characteristics of the social scientists’ individual information seeking patterns, and any individual pattern can, therefore, be described in terms of the features of the model.” The actual order of the behaviors in which a faculty member seeks information could vary depending “on the unique circumstances of the information seeking activities of the person concerned at that particular point in time” (p. 178).

In his research with a Norwegian colleague, Ellis and Haugan (1997) used the same techniques as those used to develop the original Ellis behavioral model to conduct a study of a group of research scientists and engineers of a large oil and gas company. The authors wanted to describe their information seeking activities in their daily work

routines and for special projects. Ellis and Haugan's study resulted in a behavioral model similar to the one used to describe the information seeking behaviors of social and physical sciences faculty members. Again, it was an eight-stage model. The eight stages were "Surveying," "Chaining," "Monitoring," "Browsing," "Distinguishing," "Filtering," "Extracting," and "Ending."

Ellis and Haugan described "Surveying" as the initial stage "in the beginning of a project's life cycle to approach a new or unfamiliar subject field and is recognized as a method for planned information gathering among the researchers" (p. 395). This "Surveying" stage was the equivalent of the "Starting" stage in the original model.

The "Chaining," "Monitoring," "Browsing," "Distinguishing," "Extracting," and "Ending" stages in the new model had similar purposes as those in the original model. Ellis and Haugan did note that "The decision to stop following a chain of references is usually based on the time available, while the chaining of personal contacts depends on the knowledge the persons possess, their willingness to give information, and if they know the names of others who are more knowledgeable" (p. 396).

The "Filtering" stage in the new model was similar to the "Verifying" stage in the original model. Ellis and Haugan described their subjects use of "certain criteria or mechanisms when searching for information, to make the information as relevant and precise as possible" (p. 399). One of the major differences between the faculty members studied in the original research and the research scientists and engineers studied by Ellis and Haugan was the pressing element of time. The research scientists and engineers had more time pressures to complete their research and information searching than the faculty

members. Because of these time constraints, the research scientists and engineers could not spend as long a period of time searching for information as did the faculty members studied in the earlier research.

Ellis and Haugan noted that their research was part of a trend away from studying large groups via “questionnaires or structured interviews, to a micro-approach, studying small groups via observation or unstructured interviews” (pp. 384-385). This “micro-approach” allowed for more in-depth observations and analysis necessary for model building of complex behavioral activities involved in information seeking.

In his initial research and subsequent research with colleagues, Ellis did not include Internet searching as a major factor in the information seeking behaviors of his subjects. In the initial research articles, the World Wide Web was just beginning to become available for use by faculty members. At the time of his initial research, the most likely on-line sources faculty members would use were on-line public access library catalogs and commercial database search vendors, and possibly E-mail. Even with his research with Haugan, the research scientists and engineers working for the oil firm rarely reported Internet activity.

The Problem

What are the information seeking activities on and uses of the Internet by and the differences between tenured and tenure-track faculty members in the disciplines of the humanities, social sciences, and sciences at a Master’s I university?

Purposes

Most of the existing models of information seeking by faculty members were developed before the advent of the Internet and the inter-connectivity made possible by this linking of networks. Additional research is needed on the uses faculty members make of the Internet in their daily research, teaching, and service activities; how the Internet effects faculty members' information searching behaviors and activities; and the criteria used for selecting useful Web sites. By undertaking this research at a micro-level (studying a single group of faculty members at one institution), a better understanding was gained of any differences among faculty members in their usage and opinions of the usefulness of the Internet. In addition, an analysis of information seeking behaviors and activities by faculty members in a single institution made possible the creation of a model to describe these behaviors and activities.

This research project described what uses faculty members at a Master's I university made of the Internet in their daily research, teaching, and service activities and the opinions they hold as to the usefulness of the Internet. The project also determined if any variances existed in the information seeking behavior and activities between Master's I university faculty members' use of the Internet and the behavioral model created by Ellis. Additional purposes were to determine the criteria faculty members used to determine a useful Web site and the differences in usage between tenured and tenure-track faculty members in the discipline areas of the humanities, social sciences, and sciences.

Research Questions

- 1.) What research, teaching, and service information needs influence a Master's I university faculty member to choose to use the Internet to find information?
- 2.) What time- and convenience-related factors influence a Master's I university faculty member to use Internet information resources over more traditional information resource providers?
- 3.) How do Master's I university faculty members use Internet search engines to find information on the Internet?
- 4.) What criteria and factors do Master's I university faculty members use to govern the choice and usefulness of a Web site/homepage to meet an information need?
- 5.) What differences in opinions concerning the usefulness of the Internet for research and classroom activities exist between tenured and tenure-track faculty members as well as among faculty members in the three discipline areas of the humanities, social sciences, and sciences at a Master's I university?
- 6.) What differences in usage of the Internet exist between tenured and tenure-track faculty members as well as among faculty members in the three discipline areas of the humanities, social sciences, and sciences at a Master's I university?
- 7.) What do Internet using Master's I university faculty members perceive as barriers to easy access to information available on the Internet?
- 8.) How does the Internet searching behavior and activities of Master's I university faculty members vary from Ellis' behavioral model of information seeking activity of faculty members?

Significance of the Study

This research project will add to the existing understanding of the uses faculty members currently make of the Internet to aid in their research, teaching, and service roles in higher education institutions. Most of the previous research efforts and model development in information seeking by faculty members did not include Internet usage as a factor in these activities. Without including this new technology, the observations and research models will remain flawed, and they will not provide a total picture of the information seeking behavior and activities of faculty members.

Librarians and other information providers must have recent and continuous research on how their patrons access information and which sources and mediums (print, microform, and electronic) they use to fulfill their information needs. This research project furnished information providers with information on how faculty members at a Master's I university used the Internet in their roles of researcher, teacher, and service provider.

Higher education administrators must gain knowledge of how technology is transforming the classroom and the curriculum. Distant learning initiatives opened the competition for students from between not only cross-town or area rival institutions to institutions from around the world. This research also provided vital information to higher education administrators on the need for additional resources to insure that all levels of faculty members receive adequate access to the Internet and that their institutions are making the best use of this technology.

Definitions of Terms

Barriers to easy access: For the purposes of this research project, barriers to easy access to information over the Internet include the concepts of problems with browser interfaces, search engines, and Internet service providers; difficulties with search commands and protocols; robustness of hardware; and the reliability and validity of information on Web sites.

Choice and usefulness criteria for Web sites and homepages: For the purposes of this research project, choice and usefulness criteria include the concepts of a Web site containing desired information that fulfills an information need, having reliable and authoritative information, timely updating of information, and allowing for access with the least amount of search commands and protocols.

Information: “Include(s) objects in the world, what is transferred from people or objects to a person’s cognitive system, and as the components of internal knowledge in people’s minds.” (Marchionini, 1995, p. 5)

Information needs: Begins at the earliest “hint that information may be of interest” (Westbrook, 1999, p. 17) or needed to fill a gap in existing knowledge.

Information seeking: “The paths pursued by individuals in the attempt to resolve a need” (Chen & Herson, 1982, p. 6). Marchionini defined it as “a process in which humans purposefully engage in order to change their state of knowledge” (p. 5). For Westbrook (1999, p. 14) during the information seeking process, “Faculty members handle information from three sources: that for which they actively research, that which they choose to encounter, and that which they encounter involuntarily.” In turn “The

information seeking experience refers to every relevant action, thought, or affective response an individual is involved in or has while actively aware of a need for information without the assumption of the stages or forward progression implicit in a ‘process’” (Westbrook, 1995, p. 3).

Internet usage: The use (on at least a weekly basis) of the Internet to read and participate in listservs and discussion groups, accessing Web sites and remote databases for needed information, and/or for collaborative work (E-mail) with colleagues on research projects.

Search engine: A vendor supplied software program that allows one to search for individual key words or bound phrases. These key words and bound phrases can be combined by using the boolean operators “AND,” “OR,” and “NOT.” Large, Tedd, and Hartley (1999) described search engines as having “a component known as a Web spider or Web crawler. This is a piece of software which regularly trawls the Web, visiting sites, ‘reading’ them, following up links both within the site and to other sites. The crawler then ‘reports back’ the information from a site to the search engine” (p. 36). This information is used to compile large indexes of Web sites. Most search engines also supply defaults for searching categories. These categories might include information about entertainment, sports, current news, or other similar areas of interest. Examples of popular search engines include AltaVista®, Excitesm, HotBot, InfoSeek, Lycos®, and Web Crawler™. Since no search engine indexes all of the Web, one of the latest developments in search engines is meta-search engines. These specialized search engines “send queries simultaneously to multiple Web search engines and/or Web directories.

Many of the meta-search engines integrate search results . . .; some rank the results according to various criteria; some allow selection of search engines to be searched” (Liu, 1999).

Time- and convenience-related factors: For the purposes of this research project, time- and convenience-related factors include the concepts of speed of access; easily obtained documents, articles, and other materials in full-text, image formats; and timeliness of information retrieval and delivery.

Traditional information providers: Include academic, personal, public, school, and special libraries as well as fee-based information services including vendors such as DIALOG and STN.

Delimitations

Non-Internet users will not be studied.

Only tenured and tenure-track faculty members at a Master’s I university will be studied which limits the generalization of the study.

Assumptions

Although Ellis based his model on research conducted with faculty members at a British university, it is assumed that British faculty members have similar information seeking styles as American faculty members at a Master’s I university.

Tenure-track faculty should be newer to the profession than those faculty members already possessing tenure. Therefore, it is assumed that the tenure-track faculty members are more recent graduates and will have had more exposure to using the Internet to conduct research and in classroom activities than faculty members with tenure.

CHAPTER 2 LITERATURE REVIEW

Introduction

There has been a long history of studying user needs in all types of libraries. The most common explanation for studying user needs has been to improve services and to be more responsive to users' needs (Varlejs, 1987, p. 67). Over the last forty years, there has been a close link between information retrieval research and information seeking behavior research. Lancaster and Warner (1993) felt that information retrieval was "synonymous with 'literature searching;' it is a process of searching some collection of documents (using the term document in its widest sense) to identify those that deal with a particular subject. Any system that is designed to facilitate this literature searching activity may legitimately be called an information retrieval system" (p. 11).

Development of the Internet and Its Importance to Higher Education

Beginning in the early 1970s in a United States Department of Defense project called ARPAnet (Ellis & Vasconcelos, 1999), the Internet grew from a project to facilitate transfer of intelligence information to the present World Wide Web of the 21st Century. Lawrence and Giles (1999) estimated that in early 1999 there were approximately 800 million homepages on the Internet comprising around six terabytes of textual data. Access to the Internet was provided from approximately three million servers which made for over four billion IP addresses available for use on the Internet.

By July 2000, Perlman and Johnson (2000) estimated that the Internet had grown to contain “2.1 billion unique, publicly available [home]pages.” The rate of growth was approximately seven million homepages a day. For additional information on the history and development of the Internet and the Web, see Arnold and Arnold (1997), Cartwright (1996), Green (1996), “Revolution@alma” (1996), Roberts (1994), and Shade (1995).

With its availability to higher education beginning in the late 1980s and early 1990s, the Internet has now become essential to higher education’s teaching, research, and service roles. The president of Harvard University (Rudenstine, 1997) believed the Internet had a key role to play in the higher education process. He felt that the Internet could provide students and scholars with access to essential information beyond that of the traditional research library. Students and scholars would no longer be tied to the resources of the local library or information obtainable through interlibrary loan or expensive research trips. In turn, faculty members would use the Internet to create “unusually rich course materials,” as well as enable distant students to receive instruction from any teacher at any campus. As more faculty members adopted an active learning approach in the classroom, the Internet would enhance the “conversational” aspects of information exchange between students and between students and the instructor. Rudenstine concluded his opinion piece with “In short, the Internet has distinct powers to complement, reinforce, and enhance traditional approaches to university teaching and learning” (p. A48).

Increasingly, scholars, and researchers use the Internet in place of more traditional venues to offer their thoughts, research findings, and theories for review by their peers.

Electronic, refereed journals have become important sources of scholarly research. In her paper, Butler (1994) argued that electronic journals could be structured to provide the same academic scrutiny as more traditional printed journals. Rieber, Wilkinson, Bennett, and Al-Ghafry (1998) traced the development and use of the "ITForum." This on-line resource served as an Internet site where scholars could discuss "theories, research, new paradigms, and practices in the field of instructional technology" (p. 17). Unlike printed sources, this new on-line forum offered "direct access to authors" (p. 18). Readers could "pose questions and make comments for the author to respond to during the discussion week" (p. 18). Finholt and Brooks (1997) studied the effect of the availability of electronic journal collections ("JSTOR") on social sciences faculty members in higher education institutions in Michigan. One notable finding was that faculty members from the smaller institutions had a tendency to use the electronic collections more frequently than their colleagues at the resource rich University of Michigan.

With the increasing emphasis on using technology to access information, there was a great potential for faculty members to become more reliant on both librarians and information technology specialists. Graziadei and McCombs (1996) advocated that faculty members and librarians work together to build skills in searching strategies, understanding the search process, and presenting a united front in developing a university's information policies. In their research on information seeking by faculty at the University of Illinois at Chicago, Hurd, Weller, and Curtis (1992) concluded that "Those earlier studies, as well as the results of this research, suggest opportunities for

both the Computer Center and the Library to promote new technologies with potential to enhance the research process” (p. 139).

Henderson and MacEwan (1997) researched how electronic resources aided a faculty member’s research and teaching roles. “. . . [I]t is worth noting that, like the chicken and the egg, the electronic collection and the wired faculty enjoy a which-came-first relationship. It is unclear whether our electronic collections truly create wired faculty or whether faculty requirements drive our collection formats and philosophy” (p. 497). These two concepts (“electronic collections” and the “wired faculty”) were now linked together: the electronic collections demanded more resources while the wired faculty members demanded more access.

As an example of the potential of the Internet to aid research on university campuses, three researchers (Duncan, Generous, & Hunter, 1993) described how NASA researchers developed a prototype system to support the research and development activities of the many scientists and engineers working on NASA research projects. NASA’s Access Mechanism (NAM) supported the work of these scientists and engineers “through an iconic form-based interface, where, for example, the user may fill in a form with the keyboard and mouse to prepare a query” (p. 40). NASA scientists and engineers sent and received answers to these queries over the Internet. The NAM system allowed the scientists and engineers in many different locations to work on the same project, share information, and receive assistance with their information queries.

In the area of fostering increased scholarly communication, Kovacs, Robinson, and Dixon (1995) researched how library school faculty members used listservs and similar discussion lists. The responses to their survey led the authors to conclude ‘E-conferences may be enhancing the value of established information sources such as journals, physical conferences, interpersonal mail, and telephone contacts. Some respondents feel that e-conferences [sic] replace some of the established sources for them, especially telephone and paper mail’ (p. 250). Weedman (1994) studied humanities scholars’ use of an Internet listserv (“Humanist”) to communicate new ideas and assist in their research projects. Weedman found that many of the listserv subscribers actively used the listserv in seeking new research ideas, testing findings and conclusions, and for exploratory development of potential research ideas.

In her doctoral dissertation, Alexander (1995) studied the use of listservs as a means of providing post-conference follow-up activity for community college faculty whom attended a satellite conference. Although she reported that the listserv was successful as a follow-up activity for those who participated, the teleconference reporting the largest participation in a listserv had only a 4.5% rate of participation.

The academic use of the Internet is a worldwide phenomena. In researching Australian academics’ use of the Internet, Bruce (1998, 1995, & 1994) outlined some expected benefits to teachers who use the Internet in the classroom. These benefits included using E-mail to build contacts with colleagues to exchange ideas and help students with assignments; increased access to library information from remote sites; demonstrations of new technologies in the classroom; and an increase in administrative

and personal research efficiency. For information on similar developments in Canada, see Towards a new paradigm for scholarly communication (1995).

As the use of the Internet became essential to faculty at all levels of education, electronic information access literacy will join with the original three “Rs” of reading, writing, and arithmetic to form a new traditional basic education. Olsen (1992) advocated that electronic library literacy was essential for any individual to be successful in the coming century. “As the electronic library emerges, the traditional literacy skills of reading and writing will no longer be sufficient for effective use of this new form of literacy. Colleges and universities must produce students who are information literate in an electronic world” (p. 94). Beacham and Kester (1994) also advocated intensive training in the use of the Internet for faculty members and students. If students are to become information literate, higher education faculty and their colleagues in elementary and secondary schools must become masters of this emerging on-line environment. In turn, information providers and system developers must gain knowledge of their users information needs and information seeking behaviors.

Scott (2000) reported on an effort between faculty members and librarians at the University of Missouri-Kansas City to develop “high-order information literacy skills” in students. Some of the skills developed included evaluation of Web sites. The program was judged a success and has led to other collaborative efforts in the library’s instruction program.

It is essential that faculty members help prepare students for accessing the wealth of information available from the Internet. Harris (1995-1996) recommended that faculty

members build information seeking skills in their students. In turn faculty members should also help students refine their abilities in the evaluation and synthesizing of information and making judgements on the reliability and usefulness of Web sites. To build these internet searching skills, faculty members must have workshops and training sessions especially designed for their own learning needs. For examples of these specially designed workshops and training sessions, see Cunningham (1994) and Kenny (1995).

Williams (1995) described the existing Internet access to information and other resources available at a branch campus of the University of Maine System. The Internet and the existing E-mail system allowed this isolated branch campus to augment its “underfunded” library collections. Williams also discovered that “. . . having that ability and using it are two quite different things. Only ten percent of our faculty are comfortable with Internet travel, and I fear the number of students is at the same level” (p. 2). The librarians at Duke University found similar usage patterns. “Faculty on the other hand, were least oriented toward computerized access, and were most likely to utilize the more esoteric research publications (e.g., manuscript materials and conference proceedings)” (Berger & Hines, 1994, p. 308).

A recent survey of faculty members across the United States (Magner, 1999, September 3) found that many older faculty members reported they were “being more stressed by information technology even though they aren’t using it as much as younger faculty” (p. A18). In another recent research survey on Internet usage at one institution, Bao (1998) reported on a survey of Internet users at Seton Hall University. Although the number of faculty included in the survey respondents was quite low (3.8%), the

conclusions from the survey were true for all respondents. Bao felt the survey showed that a large number of Seton Hall faculty and students use the Internet on a daily basis which indicated that the Internet must be part of any library's services. Secondly, because of this increasing Internet usage, libraries will have to allocate larger shares of their budgets to meet this demand for on-line access to information. In turn, academic librarians will need to develop Internet skill classes for all types of users. Use of Internet search engines should be included in any instruction program. Finally, academic libraries should publicize their homepages to promote on-line tutorials and other pertinent Internet resources and information. All information providers need to gather this kind of information on their users.

In addition to Alexander's dissertation research on the potential of listservs to enhance conference participation, several other recent doctoral students examined various aspects of the impact of the Internet on higher education practices. Calvert (1999) studied science and mathematics faculty members' use of Internet resources in the classroom and the students' reaction to these new resources and on-line courses. She found that many students preferred to take more on-line courses out of their major fields of study. Since they felt there was a potential for more difficulties with an on-line course, they did not want to risk a low grade in their major.

Lennertz (1999) studied the use of the Internet by faculty members at church-related colleges and universities. She found that these faculty members were active users of the Internet. Their use of the Internet affected their communications patterns, teaching

activities, and research. The more active users felt their productivity increased because of their Internet usage.

Kumari (1999) examined the implications of using the Internet to teach Web-based courses. She explored the interactions between faculty and students in these courses. Coe (1999) and Morihara (1999) also examined the topic of distance education courses and the resultant effects on teaching practices.

Carr (1998) examined the success of an introductory astronomy course offered through the Idaho Virtual Classroom Electronically Distributed Learning Environment program. He concluded that such an on-line course offering provided flexibility in when and where a course could be offered. It also enhanced critical thinking and cognitive interaction skills. However, some students did not possess the technical knowledge to access and use the technology used in the course. Toms (1997) examined faculty members' concerns over the use of the Internet in instructional activities at the University of Florida. Kaminer (1997) determined that Internet usage by faculty members did not significantly increase their productivity in producing publications.

Anyone who is an occasional "surfer" on the Internet can become quickly overwhelmed and discouraged by the vast sea of information sources, Web sites, links, advertising, and junk that clutters cyber-space. Shapira, Shoval, Raveh, and Hanani (1996) recommended the development of user profiles to prevent the "lost in hyperspace" syndrome so many users of the Internet experience on a daily basis. Jennings and Higuchi (1992) studied a neural network browser for a USENET news service. These authors proposed developing a browser that would adapt itself to a user's preferences for certain

types of news stories. Once the system learned a user's preferences, the system could then automatically screen information in the USENET service and only deliver items that match the preferences preferred by the users. However, the system did allow the user to change system settings at each stage or use.

Unless researchers develop better models of Internet usage, effective search interfaces (engines) cannot be created to provide easy access to electronic information resources on the Internet. Most of the recent research on the effectiveness of search engines to retrieve information from the Internet involved traditional measures of relevancy and retrieval. (See Berkman, 2000, Conlon & Conlon, 1998; Ellis, Ford, & Furner, 1998; Gordon & Pathak, 1999; and Nicholson, 1997.) Unfortunately, there has been very little research done on the criteria employed by Internet users to evaluate web sites for usefulness and relevancy. (See Sowards, 1997 and Brandt, 1996.)

History of Information Retrieval and Seeking Research

The earliest research on information retrieval began in the 1950s with what became known as the Cranfield Studies (Ellis, 1996a, 1996b, & 1990a). Mortimer Taube devised the "Uniterm System" whereby documents could be represented by a term from the title or abstract of a document. This contrasted with the practice of using indexing and subject terms to describe the content of a document. Beginning in 1953, tests were conducted in both Great Britain and the United States on the merits of this new retrieval system. These early tests established the classical paradigm of retrieval standards involving relevancy/precision and recall.

Until the 1980s, retrieval systems and computer retrieval programs were rated on how successful they were in gaining relevancy/precision (the number of relevant documents out of total number of documents retrieved) and on recall (number of relevant documents retrieved from the total number of relevant documents in the system) (Ellis, 1996b, p. 7). One of the important outcomes of the Cranfield tests was the establishment of an empirically based rationale for testing computer retrieval systems. “In this respect, they [Cranfield tests] mark a historical change in consciousness from a philosophical and speculative approach to information retrieval system design to an empirical and experimental one” (Ellis, 1996b, p. 19).

From these first 30 years of research, an “implicit model” of information seeking behavior slowly developed. Ellis (1990a, p. 23) described it as “a user recognizes an information need. The user comes to an information retrieval system with a request based on that need. The retrieval system matches the request against representations of documents in the system. The task of the system is seen as that of presenting to the user the text or texts most likely to satisfy the user’s need.” The user then had the task of sifting through these recommended texts for items relevant to satisfying the information need. If the need remained unmet, then the user would start the process over and begin a new search request in the retrieval system.

Frants and Brush (1988) described two types of information needs: concrete information needs and problem-oriented needs (p. 88). Concrete information needs had the features of clearly defined boundaries; stated in exact words; usually there was only one pertinent document; and once that document was located, the need was satisfied.

Problem-oriented needs have the following features: the boundaries were not defined; the request did not always reflect the true meaning of the needs; any one system did not have all of the necessary documents to answer the need; and even when relevant documents were retrieved, the problem-oriented information needs may change boundaries and continue (p. 90).

As Reneker (1993) noted, there is a considerable body of literature concerning information needs and uses and the behavioral characteristics of information seekers. She estimated that in the decade between 1983 and 1993 more than one thousand research studies were conducted on these topics. The significant change occurred with the publication of the review article by Dervin and Nilan (1986). Their article identified the research shift from studying the system to focusing on the information user and their searching behavior. To learn more about individual information seeking behavior, Dervin and Nilan also called for supplementing quantitative research methods with qualitative approaches.

Prior research that focused only on the system viewed the user as a “passive” operator and thus system design did not include consideration of the user. “Past assumptions place the user in the passive position of having to adapt to the information-provision mechanism rather than the mechanism’s adapting to the user’s particular characteristics” (Hewins, 1990, p. 147). Coupled with this change in research focus to the user was the technological changes and developments that enabled the information seeker to be an end-user and no longer dependent on an intermediary for operating the information retrieval system (pp. 146-147).

Hjorland (1997) also noted this dichotomy of studying users' information seeking behavior or the information retrieval system. He felt that Information Science was studying these two areas in isolation from each other (p. 3). Unfortunately there has been little research to tie these two areas together. Ellis (1992) referred to the dichotomy in the literature as finding "references to the 'Cranfield paradigm' or to the 'cognitive paradigm'" (p. 45).

Ellis' effort to build a behavioral model of the information search process was an attempt to give system designers better information on how individuals searched for information. Another example of research that attempts to tie the two areas together was the research of Chen and Dhar (1991) to link research on cognitive processing to retrieval of on-line documents.

In an effort to link the study of systems and users' behaviors, some researchers now seek to understand how the user interacts with a retrieval system. Hert (1995) described the new paradigm as "a user of an information retrieval system is seen as engaged in a process of interpretation and adaptation, actively seeking to make sense out of system responses as presented by the system interface, and charting a course based on that sense" (p. 7). As Hert understood the new paradigm, it emphasized the user, dynamic interaction, and the understanding by the user. All of which was time- and context-specific (p. 8).

In addition to the two major paradigms of studying the system or the user's behavior, a third area of study was an off-shoot of studying the user's behavior and involved sense-making theory. This line of inquiry looked not at systems or behavioral

actions, but rather a study of communicating behavior. “The central activities of sense-making are information seeking, processing, creating, and using. Sense-making is a process; *sense* [sic] is the product of this process” (Savolainen, 1993, p. 16).

The predominant areas of research for social science information researchers involve studying individual users’ behaviors and what use they make of information (Ellis, 1986, p. 86). In conjunction with using traditional quantitative research methodologies, increasingly researchers are employing qualitative methods as well (Ellis, 1990b). In the following sections, reviews of the prevailing information seeking models are reviewed and summaries are given for the more general survey descriptions of information seeking activities by higher education faculty members and related groups.

Behavioral Models

The behavioral model for describing the information seeking process for higher education faculty members developed by Ellis (1993, 1989a, & 1989b; Ellis & Haugan, 1997; & Ellis, Cox, & Hall, 1993) was detailed in Chapter 1 of this paper. His eight-stage model was originally intended to help with designing new retrieval systems. Ellis and his colleagues extended this model and the associated research methodology to study different types of faculty members and professionals to determine the adaptability of the model.

Wolcott (1998) adapted Ellis’ behavioral model and associated research methodology to the study of seventh grade students’ searching behavior on the Internet. His findings indicated that Ellis’ model and the “classification scheme from [Wolcott’s] study frames the protocols and produces an analysis that shows no overriding differences

from categorizations of Ellis. The characteristics of the information-seeking patterns were fundamentally the same” (p. 152). These seventh grade students “verbalized similar categories of research activities” as those that Ellis found in working with faculty members (pp. 158-159).

Palmer (1991a & 1991b) studied scientists and researchers involved in agricultural research. She employed cluster analysis to group these scientists and researchers by common characteristics and behaviors in information seeking activities. In their use of documents and books, Palmer found little differences. In the use of electronic resources, however, she was able to identify five distinct user groups (1991a, pp. 117-122). Group 1 was called “non-seekers.” Statisticians mainly comprised this group. The statisticians used computers for their work but not for information gathering. She called the second group “lone, wide rangers.” Members of this group were oriented more towards print-based materials. They preferred to work alone and searched a wide variety of topics. Group 3 was the “unsettled, self-conscious seekers.” Biochemists and entomologists were in this group. They made more use of the library than any other group. They were heavy users of the on-line catalog.

Palmer called the fourth group the “confident collectors.” Entomologists were the most numerous members of this group. Although they did not have a regular information seeking routine, members of this group made regular use of on-line services. The fifth group was known as “hunters.” Biochemists comprised this group. They described the field of biochemistry as exploding with information. As a result, all members of this group developed “regular information-gathering routines, sometimes visiting the library

on a daily basis” (p. 121). Members of this group “recognized the value of online information, even if they disliked computers, and used the online search service heavily” (p. 122).

Palmer also assigned each scientist to one of six categories based on “how active they were in their efforts to find information, either when they needed it or on a regular basis; how relaxed or anxious they were in their attitude towards the under-supply or over-supply of information; how much they appeared to need to be in control; and how broadly they searched” (p. 123). The six categories of information users were “information overlord,” “information entrepreneur,” “information hunter,” “information pragmatist,” “information plodder,” and “information derelict.” The “information overlord” had the most organized system for gathering information on broad interests. This category of information user also used a wide variety of strategies to seek information. As the name implied, the “information derelict” was the worst seeker of information or rarely even sought information.

Using a process and research methodology similar to Ellis and Palmer, Westbrook (1999 & 1995) examined the information seeking behavior of faculty members in researching and teaching women’s studies. Since women’s studies programs were highly interdisciplinary in nature, faculty members involved in the discipline relied on a wide variety of information resources. Westbrook’s model of the information-seeking process for these faculty members involved five elements. Her five elements were:

1. Needing: from the first hint that information may be of interest
2. Starting: to work on the need
3. Working: on the need

4. Deciding: on the value of any results of working on the need
5. Closing: the effort to work on the need (1999, p. 17)

Westbrook indicated that these actions could take place in any order or lead to entirely new searches for information.

Although browsing from Ellis' model was not one of the elements in Westbrook's model, her informants did report they used the browsing behavior to find needed information in bookstores, libraries, and exhibits (1999, p. 110). For further information and analysis of the importance of browsing in the information seeking process, see Chang (1995).

Leckie (1996) wrote an entertaining article on a subject that frustrates all academic reference librarians: why faculty members make assignments and then assume their students know how to find the resources to complete the assignment? Another way to express this frustration was that faculty members simply tell their students to go to the library and the librarians will help you with the assignment. Leckie described the faculty research process as the "Expert Researcher" model (p. 202). After years of apprenticeship, better known as graduate school, most faculty members began a life-long process of research and scholarship. Because they were often pressed for time, most faculty members maintained extensive personal libraries and subscriptions to those periodical sources that concentrate on their respective fields of study. The typical faculty member devoted a great deal of time each week to keeping up with the literature. As a result, the faculty member had an extensive knowledge of the current scholarship within a particular field of study. Unless the faculty member began researching a topic in a new field, there was rarely a need for comprehensive bibliographic searches for new literature.

To develop a research idea or trace a new thought, the faculty member typically followed a “citation trail” through the footnotes within articles and/or monographs. Because of their subject expertise and extensive graduate course work, most faculty members prided themselves on being “independent library users.” Because academic librarians usually did not possess the same level of subject expertise, many faculty members viewed their assistance as unneeded or of little value. Unfortunately, many faculty members assumed all levels of students (graduate and undergraduate) possessed this same familiarity with the subject literature in the field and/or skill in finding information. The frustration level for both librarians, undergraduates, and even for beginning graduate students grew as they painfully spent hours searching and learning how to become information literate in yet another research assignment.

Leckie, Pettigrew, and Sylvain (1996) researched the information seeking activities of engineers, health care professionals, and attorneys. Their model involved analyzing “the [work] roles and related tasks undertaken by professionals in the course of daily practice [that] prompt particular information needs, which in turn give rise to an information seeking process” (p. 180). These work roles and tasks generated information needs. The characteristics of the information needs coupled with an individual’s personal awareness of information (both direct and indirect) and familiarity with information resources (print, electronic, and human) available in the field of interest influenced the search paths for information. As with most models, the outcome of the search process provided feedback and this feedback could re-trigger or refine the search process until the individual satisfied the information need. Within these three professions, Leckie and her

colleagues discovered five similar roles (ranked by frequency of occurrence): “service provider, administrator/manager, researcher, educator, and student” (p. 181). Each of these roles influenced the type of information seeking process and sources needed by the professional.

In the Ellis model, the faculty member began the information seeking process because of a citation found in an article, paper, or monograph. For the professionals studied by Leckie and her colleagues, the process began because of a work role performed or task that the professional engaged in to complete an assignment. The faculty member’s information seeking process was broader and less focused than the professional’s information seeking process. The professional was more likely to seek a single source or fact rather than a comprehensive literature search. Both of these models included an “evaluation” process or feedback loop where the final outcome or results are checked for additional sources, relevancy, and accuracy.

Although not a model of the information-seeking process, Erdeley (1995) described a model of what she referred to as “information encountering” which was the actual interaction between the user and information. Her study included a small number of faculty members (five out of 132 participants) at the University of Texas at Austin. Within her model, Erdeley found four main elements in “information encountering.” The respondents to her research “encountered information while performing both information- and non-information-related activities.” The location where her respondents were most likely to encounter information was one in which “specifically provide information services.” After encountering both needed and unneeded information, her

respondents put to use the needed information and the unused information “was recorded and retained for future use.” The fourth element involved information encountered that was related to a problem. These problems could be from the past, present, or future as well as “both active and passive problems” (pp. 142-143).

Liddy and Jorgensen (1993) studied the difference in usage between print indexes and their electronic equivalents. By modeling the information seekers’ behaviors, they hoped “to determine the optimum specifications for indexes in electronic texts” (p. 185). Their subjects included only students (including doctoral students) from Syracuse University’s School of Information Studies. They determined that a model (pp. 187-188) of this index usage needed to include five stages. These stages included “recognition of a searching need,” “entering the search,” “verifying the search,” “evaluating the search,” and finally “finding a satisfactory answer or citation.” Their model included a “continue” loop at the “satisfy” stage. If the citation did not satisfy the generated information need, then the model returned to the beginning stage, which then generated a new search query in the index.

Brown (1991) developed what she referred to as a “general model” for describing information seeking behavior. She felt that information seeking behavior was a developmental behavior that improved throughout the course of an individual’s life. The more one practiced this behavior; the better one became at information seeking. Brown developed the model not from studying individual populations but synthesizing the research of other researchers. Her model contained the five elements of “condition,” “context,” “process,” “interaction,” and “barriers.” “Conditions” involved the sensory

perceptions and an individual's ability to discriminate and evaluate these stimuli to one's senses. The "context" referred to the individual's role and the organization or discipline within which the individual belonged or practiced. The "process" involved the various stages of seeking information as depicted in a flow chart. The "interaction" between "conditions," "context," and "process" affected the flow within the model and the direction of how information was found and used by the information seeker. The fifth element in Brown's model was represented by the various "barriers" to the search process. These "barriers" could include "self," "role," and the "environment" ("context") and in turn they could inhibit the flow within the model. "Barriers to the seeker's (patron's) information-seeking behavior can occur at multiple time location[s] in the process, can arise from multiple sources, and may not be recognized as barriers to the seeking behavior; rather, as boundaries of that behavior" (p. 13). Brown hoped her model would produce information to aid administrators of information providing services in designing new services and improving the delivery of information to their users.

Downs (1997) provided a practical application of developing web-based, access features to the holdings and resources of a research library. He designed these access features from his research of how scholars used Web-based resources. These features could assist scholars in their use of the electronic library.

Olaisen (1984) developed a model similar to Brown in his study of information seeking behavior of Norwegian scientists and scholars. Olaisen's model included "cognitive," "affective," and "physiological" motivational factors that depicted the individual's behavior in the information seeking process. Olaisen's model also included

the concept of barriers. Olaisen felt that “The situational context will decide how urgent the need is. The willingness to ignore the need will be dependent on how large a perceived penalty the faculty member is willing to accept for the time being. This is also dependent on the cost of using a source” (p. 297). These perceived barriers would then influence the decision to pursue the information need.

Cognitive/Conceptual Models

Although her model was for the search process with high school students and college students, Kuhlthau’s research (1999, 1994, 1993, 1991, 1988, & 1983) has become one of the best known cognitive models of the information seeking process. She defined information seeking from the user’s perspective as “a process of sense-making in which a person is forming a personal point of view” (1991, p. 361). Kuhlthau developed her Information Search Process Model (ISP) based on high school and college students’ perceptions of their information seeking behaviors. The ISP model provided the user’s viewpoint on the information seeking process. The ISP consisted of six stages: “Initiation,” “Selection,” “Exploration,” “Formulation,” “Collection,” and “Presentation” (1991, p. 367). These stages have three common realms: “the affective (feelings), the cognitive (thoughts), and the physical (actions)” (p. 366). For additional information on the model, see Table No. 1.

Kuhlthau and her associates did further research which generalized the model to college and public library users. (Kuhlthau, Turock, George, & Belvin, 1990; Kuhlthau, Turock, Varlejs, George, & Belvin, 1989; & Kuhlthau, Turock, & Belvin, 1988). Their

findings did indicate that the model held for users in academic, public, and school libraries.

Table No. 1

Summary of Concepts for Information Search Process (Kuhlthau, 1991, p. 367)

Stages in ISP	Feelings Common to each stage	Thoughts Common to each stage	Actions Common to each stage	Appropriate Task According to Kuhlthau Model
1. Initiation	Uncertainty	General/Vague	Seeking back-ground information	Recognize
2. Selection	Optimism			Identify
3. Exploration	Confusion/ Frustration/ Doubt		Seeking relevant information	Investigate
4. Formulation	Clarity	Narrowed/ Clearer	Formulate	
5. Collection	Sense of direction/ Confidence	Increased interest	Seeking relevant or focused information	Gather
6. Presentation	Relief/ Satisfaction or Disappointment	Clearer or focused		Complete

Devlin (1997) adapted a conceptual model of information retrieval to the process of choosing the Internet for satisfying information needs. From the conceptual model of information retrieval, Devlin developed a decision tree to determine when to use the Internet and for the best search strategy. Because of the chaotic nature of the Internet and the numerous unreliable sources accessible, Devlin cautioned that “The Internet should be chosen if the question is unlikely to be answered elsewhere, if other sources have proved unsuccessful or if a comprehensive search is required” (p. 367).

Thomas (1993) studied a group of entering doctoral students as they sought information on their degree programs and studies. Although her study was not directly

related to faculty members, she did offer insights on what factors an individual used to determine the relevancy of information retrieved on a particular topic. She conducted extensive interviews with her subjects. From these interviews, she concluded there were four major themes pertaining to why they sought information: “information and knowledge sources, uncertainties, endurance and coordination, and relationships” (p. 127). For these new students seeking information on their programs, relevance was most influenced by “situational differences, individual expectations, the perceived credibility of information sources, and the timing of the presentation of particular kinds of information” (p. 128). Although Thomas was not studying information retrieval in an on-line environment, the last two factors (“the perceived credibility of information sources, and the timing of the presentation of particular kinds of information”) influencing relevance could easily be applied to information found on the Internet.

Walster (1994) studied the adaptability of the Fishbein and Ajzen model of attitude-behavior consistency to library and information science research topics. The Fishbein and Ajzen model tried to provide a framework to develop a connection between “beliefs,” “attitudes,” “subjective norms,” “intentions,” and “actual behaviors.” The model depicted a linear progression from an individual’s beliefs as modified and weighted by the individual’s attitudes and the perceived influences of others (“subjective norms”) on the intentions and behavior or actions.

In essence, the model attempted to provide an explanation of how an individual could hold certain beliefs; but, their actions/behaviors did not necessarily reflect those beliefs. Specifically, the model studied how one’s attitudes (strength of likes and

dislikes), subjective norms (susceptibility to influence by others' opinions), and intentions (what one plans to do) modified one's beliefs into observable behaviors and actions. This model did provide some potential for understanding a relationship between faculty members beliefs about on-line public access library catalogs, electronic databases, and Internet related resources as contrasted with their actual usage of these on-line resources. The model could also be used to study the types of assignments faculty members require students to do in relation to their recommendations on using library related research tools and on-line information access tools.

Anthropology Models

Two researchers adopted the anthropology models of hunting and foraging to describe faculty members behavior in searching for information. Sandstrom (1999, 1998, & 1994) employed the "optimal foraging approach" from evolutionary ecology to describe the information seeking behaviors of scholars. Anthropologists used optimal foraging "to analyze dietary choices, habitat usage, group size and settlement, and time allocation among human hunter-gathers" (1994, p. 415). There were three choice areas from optimal foraging applicable to understanding faculty members' information seeking behaviors. The first was "prey choice and diet breadth." Most scholars "seek a steady diet of information of particular types, searching more extensively or further afield in times of scarcity, focusing more narrowly when information seems abundant. . ." (p. 427). The second area was "time allocation and patch choice" (pp. 431-435). The scholar's territory was the home institution and academic discipline area. In turn, many scholars felt it was more timely to exploit personal library collections for needed information than allocating

extensive amounts of time in the institution's library. To search the institution's library, the scholar had to learn how to use the library's "complex organizing schemes" vs. the organizational patterns of the personal library. The final area was "group formation and settlement" (pp. 437-442). This involved a cost benefit analysis of whether it was better to forage alone or with others. This would be especially true in the sciences where collaborative work was often the norm. "Routine monitoring, informal communication and maintaining active social ties between producers and consumers facilitate information foraging in these high-density micro-habitats" (1999, p. 19).

Sandstrom's description of scholars' selective diet of information resources was similar to Leckie's (1996) "expert researcher" model. In both cases, the faculty member/scholar developed a highly specialized area of interest. The faculty member/scholar developed a specialized, personal information network (personal library and a network of colleagues) to exploit a steady diet of new information. They often bypassed the traditional storehouses (libraries) for known items of value. Faculty members/scholars often saw these personal information networks as more timely and easier for accessing information than the library.

After participating in a study at Rutgers University which was used for preparing for another Text Retrieval Conference, Hawkins (1996) wrote a short commentary using the anthropological metaphor of hunting and gathering to describe on-line information retrieval behavior. He explained hunting for information as "finding information on a topic." Once the hunter found a "database" or electronic resource that could provide useful information, the hunter regularly "grazes" that database or resource for new

information. In essence, the hunter was fed a steady diet of information from the database or electronic resource. If the hunter became interested in a new topic that the regular feeding area could not supply, then the hunter began to “browse” in new fields (databases and other electronic resources) for additional information. Hawkins felt “The Internet could conceivably be used for all three retrieval methods [hunting, grazing, and browsing], but how it is used depends heavily on how a user accesses it and what services he/she uses” (p. 73). In order for the Internet to support these three retrieval methods, any search interface development must take into account these three approaches (hunting, gathering/grazing, and browsing) and be able to provide the proper feedback to the hunter.

Survey and Descriptive Reports and Research

Many of the articles and reports written on information seeking simply described the types of resources and systems individuals used to satisfy their information needs and/or why they sought information. These types of articles and reports did not attempt to build models that represent the behavioral or cognitive processes involved in information seeking. The following review of articles and research reports presents a representative sample of this descriptive research into information seeking by faculty members and related groups.

Prior to the advent of easy access to the Internet resources, researchers often studied faculty members’ usage of on-line and CD-ROM databases, on-line information vendors, library’s on-line public access catalogs, and other types of electronic services. Horner and Thirlwall (1988) and Clark and Gomez (1990) studied end-user searching

(without going through an intermediary such as a librarian to perform an on-line database search) at two separate universities. Despite a great interest in on-line searching by the faculty, Horner and Thirlwall found few end-users at the University of Manitoba. Clark and Gomez reported on end-user searching among the faculty members at Texas A&M University. They found that only 21% of the faculty had personal accounts with commercial on-line information vendors. Those who were end-users reported that convenience was the main reason for being an end-user and doing one's own searches.

Lehmann and Renfro (1991) examined the attitudes of humanities faculty members at the University of Pittsburgh toward the usage of on-line databases. They found four determinants that influenced the use of on-line databases by these humanities faculty members. These determinants were "content," "connectivity," "user-friendliness," and "cost." The humanities faculty members saw "content" as the more important determinant. They felt that "cost" was the least important of the determinants.

Hernon (1984) examined information needs among social scientists in a pre-automated library setting. Following a familiar scenario, he concluded that social scientists will probably choose between one's personal collection, electronic or mass media (commercial information vendors such as Dialog), colleagues, or an institutional provider (library) to obtain any needed information.

Hurd, Weller, and Curtis (1992) examined the use of abstracts and indexes by scientists and engineers at the University of Illinois at Chicago. From their review of the literature, Hurd and her colleagues concluded that "scientists were found to rely more on informal communication with colleagues, attendance at conferences, and references in

journal articles than on secondary services as means of identifying the existence of relevant articles” (p. 138). However, much of the previous research had not included interactive retrieval systems using electronic databases. Their research studied faculty members’ usage of eight databases accessible from the library’s on-line catalog located at both the Chicago and Urbana branches of the University of Illinois. They conducted their study to provide baseline data for future research. They did discover that faculty members who made the most use of their desktop computers for other types of research were more likely to use it for accessing the databases available through the on-line catalog. The authors recommended that university computing centers and libraries reach out to scientists who were not presently using these electronic systems and resources.

These same researchers (Curtis, Weller, & Hurd, 1993) also studied the information seeking activities of faculty members in the health sciences at the University of Illinois at Chicago. Curtis and her colleagues concluded that “as new formats become available for accessing literature, the traditional formats for information continue to be used” (pp. 389). Faculty members continued to use “the traditional methods of asking a colleague, scanning a personal copy of a journal, perusing material in a departmental collection, and, of course, going to the library” (p. 383). The most effective training sessions for faculty members were those that were tailored to a specific audience. The authors also noted that even if a university had a sophisticated computer system, not all faculty members would use this resource.

Bao (1998) reported on the results of a survey of Internet users at Seton Hall University. Although there was only a small number of faculty members included (3.8%)

of the total number of respondents, Bao found that Internet users at Seton Hall spent an average of at least 30 minutes on each Internet search session. When performing Internet searches, their most common problem was finding too many hits. The respondents also complained that they did not find enough full-text resources on the Web. In nearly half the cases, the searchers did not find the information they were seeking on the Internet. Bao was surprised that so few respondents made use of the library's Web page. Most respondents reported they used a search engine or simply typed in an URL to search for needed information.

He and Jacobson (1996) conducted a similar study at the State University of New York's Albany campus. Their survey sample also included a small number of faculty members (6%). Of their respondents, 97% found the Internet very useful or somewhat useful. "They consider it [Internet] an important information resource" (p. 39). These authors also indicated there could be confusion over what constituted an Internet resource (Web site or homepage) instead of using the Internet to merely connect with a commercial information provider. "We found that faculty find the Internet a useful way to find citations, but they may be referring to materials found through RLIN, OCLC's FirstSearch, and other bibliographic databases" (p. 44) available over the Internet through a commercial vendor for which the library or the university paid subscription charges.

In her doctoral dissertation, Ashley (1995) surveyed nearly 900 faculty members on the campus of the University of Arizona. She studied their use of network information retrieval (NIR) systems available on the campus. Usage of NIRs was the process of searching for and retrieving information through a computer network. Access to the

Internet was just one of the services available to faculty members at the University of Arizona. Ashley's methodology included qualitative and quantitative components. In addition to her quantitative survey form, Ashley conducted 21 in-depth interviews. Ashley discovered that less than 40% of the faculty used network information retrieval to satisfy their information needs.

In her dissertation research, Reneker (1993 & 1992) studied information seeking by the Stanford University academic community. In particular, she wanted to answer "what is the set of questions/information needs in an individual's mind at the point of time of his or her participation in the study" (1993, p. 494)? She discovered (p. 495) that individuals at Stanford University had a wide variety of information needs. Some of these needs included "personal, scholarly or academic, work-related, political, and entertainment." To satisfy these needs, individuals sought facts, instructions on using research tools, or "improving the current state of knowledge about a subject. . . The study's findings showed the informants to be proactive, successful information seekers, actively engaged in building their information sources and in both negotiating and creating their environment to satisfy those needs" (p. 495).

In another general survey of faculty members, Hart (1997) surveyed the faculty at the State University of New York's Fredonia campus. This was a small, comprehensive college campus. He found that the faculty members used both formal and informal sources to satisfy their information needs (p. 22). The formal sources included the faculty member's personal library, the campus library, and access to other libraries through interlibrary loan. The informal sources included colleagues within the faculty member's

own department or elsewhere on campus and through attendance at professional meetings or contact with colleagues from other campuses. The Fredonia faculty members ranked these formal and informal sources by level of importance, “personal library, college library, interlibrary loan and other libraries, off-campus colleagues and professional meetings, departmental colleagues, and other on-campus colleagues” (p. 25). Most of Hart’s respondents used more formal sources than informal sources of information. At the time of his survey, the use of electronic resources was not wide spread on the campus. As more electronic and on-line resources became available, Hart felt “It might be expected that a heavy user of informal sources in 1990 has become a heavy user of e-mail [sic] in today’s electronic environment. Similarly, those faculty who reported active use of other libraries in 1990 may now be heavy users of internet access to other library catalogs” (p. 26).

Hart had a second article (1998) based on his research with the Fredonia faculty members. This second article examined the relationship between a faculty member’s roles (research, teaching, and service) to the faculty member’s information gathering needs and the use of formal and informal information resources. “It is clear that a faculty member’s commitment to the roles of teaching, research, and service does have an impact on the sources of information he or she uses” (p. 179). The level of courses taught was a key factor in determining the types of sources used for information in the classroom or improving one’s teaching abilities. In the service role, Hart found that faculty members made more use of informal sources of information. In the area of commitment to

research, “a strong commitment to research results in active use of many, but not all, of the available sources of information” (p. 182).

Marchionini (1995) described information seeking in terms of two types of strategies: “Analytical Search” strategies and “Browsing” strategies. The concept of “Analytical Search” strategies (pp. 76-99) involved a more formalistic approach to using information retrieval and database search engines. This type of strategy was more “goal oriented” and involved a systematic use of system commands and operations to narrow large data sets into useful retrieved sets of information on the topic of interest. Professional information retrieval experts were more likely to use this approach to finding information.

“Browsing” strategies (pp. 100-138) involved more of the traditional serendipity approach to finding information. This approach was depicted as the faculty member wandering through the library’s book stacks seeking information while chasing the footnote trail of an article or monograph in hand. Marchionini described information seekers who used the browsing strategy as employing a “variety of informal, heuristic strategies” to find information. In an electronic environment, especially where on-line connect fees are assessed, browsing could be very expensive, inefficient, distracting, and time consuming. Marchionini felt “The key to using browsing strategies is selectively using them for appropriate problems and with those systems that best support it” (p. 119). The cost effective nature of the Internet and surfing the Web could certainly be such a system to support the browsing strategy.

Obviously one of the important roles faculty members have always played is teaching students how to conduct research and find information. As previously discussed, mastering information literacy skills becomes more important in the electronic access environment of the Internet. Amstutz and Whitson (1997) researched this topic at the University of Wyoming. They also researched what resources faculty members used to acquire needed information, the characteristics of faculty members who made use of electronic resources, and how faculty members encouraged students to use technology to find information. In their survey, Amstutz and Whitson found that over 35% of the faculty members used the Internet on a “very often” basis. However, 47% used the more traditional approach of using the library as the first site to find needed information. A slight majority of the faculty members encouraged or required their students to use the Internet and E-mail to complete assignments or seek information. “This reliance on traditional sources may indicate that faculty are most comfortable acquiring and using information in the way they were trained. The percentages of faculty who never mention CD-ROM sources (50 percent), the Internet (44 percent), or the computer library catalog system (52 percent) suggest that faculty pass on their biases when presenting information sources” (p. 23). Unfortunately in training students for the information age and the use of technology, these faculty members could be failing their students’ needs. “There appears to be a stronger connection between technology use and reason for information needs: faculty who declared research as their main information need were more likely to use electronic tools such as the Internet” (pp. 23-24).

Closely related to research concerning higher education faculty members' use of the Internet and their information seeking behavior was research on higher education administrators and those professions involving credentialing. Sprague (1994) studied work-related information seeking by administrators and professional staff members at Ohio State University. Her research was very similar to those that studied faculty members' information seeking behavior and resources used to satisfy those information needs. Much like studies involving faculty members, Sprague found that administrators and professional staff members preferred to satisfy information needs through a personal network and print resources located in an office library over the more traditional library-located resources in either print or electronic formats. A second finding was that these administrators and professional staff members were less concerned about the cost of finding information. They also wanted "accurate, current, and understandable information" (p. 383). If this group (administrators and professional staff members) used library related resources, they were likely not to have used traditional findings aids, on-line access, or professional assistance (i.e., librarians) to find the information. It would appear that administrators and professional staff members at Ohio State University had similar feelings and attitudes as other faculty members did towards academic libraries and the information retrieval services they provided for their users.

Bergland (1985) completed a similar descriptive survey of deans at two-year institutions in California. She found that they most often used sources of information that were in their local institutions, conveniently located, and personally owned.

Sieving (1991) studied how users of scientific and technical information went about solving their “quests” for information. They often employed one of three strategies. The first one Sieving named the “Big Filter or Controller.” Here the user attempted to place a copy of everything found into files or they tried to build a personal library/collection of information resources. The second strategy was called “Ask Frank.” Personal contacts served as the most efficient means of finding needed information. Sieving called the last strategy “the Ostrich.” She described the ostrich user as feeling “The information problem is ignored, assuming: (a) I already know everything I need to know; or (b) I will run across anything of real importance at a conference . . . [these individuals] have a real tolerance for uncertainty and ambiguity” (p. 79).

Two studies examined the information seeking practices of engineers. In the first study, Pinelli (1991) synthesized previous research and concluded “These studies show, among other things, that engineers and scientists, and aerospace engineers and scientists in particular, devote more time, on the average, to the communication of technical information than to any other scientific or technical activity” (p. 20). In the second study, Holland and Powell (1995) carried out a longitudinal study of engineering students after they graduated from the University of Michigan. During the course of their studies, these engineering students received a special course in information resources for engineers. Holland and Powell did a follow up after these students had been in the field for three years to determine the impact of this course on their information seeking activities. The authors concluded their subjects showed a greater awareness of “electronically available sources and services, and they read a wider range of both professional society-produced

and engineering-related technical literature” (p. 13). The authors also felt “[the study] may well also provide both a framework for longitudinal study of information use in other disciplines and the indication of widespread need for training in information use throughout professional careers” (p. 14).

Two English researchers (Swan and Brown, 1996) examined the difference in information needs between academic and professionals in the business world. In both areas, individuals needed access to “relevant, accurate and timely” information. In the area of accessing information through the Internet, their respondents felt that it was the obligation of their respective parent institutions to provide them with access to information via the Internet without any charges for the access. “It seems that Internet-delivered information is perceived as ‘institutionally-provided,’ on a par with information delivered to libraries on tape or CD-ROM and networked campus-wide” (p. 8).

Academics in developing countries do not enjoy the same level of access to electronic resources as their counterparts in American universities. Research on their information seeking habits usually involved the use of print related resources. Guha (1994) studied the information seeking activities in six institutions of higher education in Delhi, India. “The Indian scientific community has also been carrying forward the same scientific tradition and hence have very similar information gathering/communication behaviour” (pp. 101-102) as their counterparts in other universities around the world. Their primary research sources were the traditional printed indexes and reference sources. There was virtual no use of on-line databases and resources. Their preferred method of keeping abreast of new developments was to “scan” tables of contents from the current

periodical collections in the institution's library. They also made use of abstracting and indexing resources as well as personal contacts.

Ocholla (1996) reported on a preliminary study of information seeking behavior by faculty members at Moi University in Kenya. Their primary means for obtaining information were reliance on the university library, personal contacts, and textbooks. "Information-seeking behaviour is likely to differ from one discipline to another and between levels of programmes, such as undergraduate and graduate. This we believe will apply to the level of research and teaching emphasis in an institution or programme. Information resources used by academics are likely to differ depending on the programme level, the discipline, or nature of institutional/departmental emphasis" (p. 354). As with the Indian faculty members, there was virtual no use of Internet or other electronic resources by these Kenyan faculty members.

Summary

All disciplines of study within higher education are adapting to the use of the Internet to find information and aid in scholarly communication and exchanging ideas. "Within the context of modern information development, faculty are building and revising their search patterns. Techniques of finding, managing, and sharing everything from listserv postings to printed books are developed and considered regularly" (Westbrook, 1999, p. 23).

Although there has been considerable research on and model development to describe the information seeking behavior and activities of faculty members, there has been little research on the use faculty members make of the Internet. The developed

models described in the preceding pages do not include the influence and effects of electronic information access through the Internet and how that may affect information seeking behavior and activities. Most of the research simply described the types of resources used or the preferred types of information for various subject researchers. Most of the models of the information search process concentrate on describing either behavioral actions or cognitive processes in the search process. Ellis and Kuhlthau respectively represent these two major types of models. Much of the newer research focused on “a micro-approach, studying small groups via observation or unstructured interviews” (Ellis & Haugan, 1997, p. 385). Many of the researchers used both quantitative and qualitative approaches to analyze their data.

CHAPTER 3

METHODOLOGY

Introduction

Most of the existing models of information seeking by faculty members were developed before the availability of the Internet. This research project studied faculty members at a Master's I university (Angelo State University) and attempted to determine if the Internet searching behavior and activities of Master's I university faculty members varied from Ellis' behavioral model of information seeking by faculty members. If the behavior did vary, then these variances would be described and modifications suggested for the Ellis' model. The research design yielded information on how faculty members at a Master's I university used the Internet in their roles of researcher, teacher, and service provider.

Research Design

This research project used a combination of quantitative and qualitative methodologies to gather data necessary to answer the proposed research questions. The research was conducted in the following phases. Phase one involved collecting quantitative data. A questionnaire was sent to all tenured and tenure-track faculty members at Angelo State University. The questionnaires were analyzed using an available statistical analysis program (StatPro). The questionnaire (see Appendix B) was designed to solicit opinions of tenured and tenure-track faculty members' concerning the Internet's usefulness for assistance in finding information to complete research,

communicating with colleagues, teaching and service activities, and frequency of use. The “Comments” section allowed the faculty members to supply additional information concerning their views on the Internet’s role in aiding their work as researchers, teachers, and service providers.

Kuhlthau’s work (1994, 1993, 1991, 1988, & 1983) and that with her colleagues (Kuhlthau, Turock, George, & Belvin, 1990) guided the development of the questionnaire used in this research project. Kuhlthau’s questionnaire design solicited participants’ “perceptions of six areas of library use: topic selection, research assignments, focus formulation, procedures for gathering information, frequency of library use, and role of mediators” (1991, p. 364). Kuhlthau and her colleagues used this questionnaire design in replicated studies with all types of library users (public, school, and academic). Data she collected from the questionnaire and from qualitative research methodology led to the development of her “Information Search Process” model. Her questionnaire results have consistently proven reliable over the development of the model and through replicated studies. The questionnaire developed for this research project merely changed library concepts and wording to those relating to the use of the Internet. In a recent doctoral research project, Byron (1999) adapted Kuhlthau’s “process” survey questionnaire to study the “Information Search Process” model in a virtual learning environment. Similar to the questionnaire used in this research project, Byron merely adapted terminology from the virtual learning environment to the “process” survey questionnaire.

Phase two involved the collection of qualitative data. Based on the responses from the returned questionnaires and by using theoretical sampling techniques (Ellis, 1993 &

1989a; Strauss, 1987; Glaser, 1978, & Glaser & Strauss, 1967), a selection of faculty members was made for in-depth, semi-structured interviews. The semi-structured interviews followed an interview guide (See Appendix No. J.). Ellis (1993) felt the interview guide “lists the questions or issues that should be covered in the interview but leaves the interviewer free to explore and probe the issues. This should ensure that each interview covers basically the same ground but gives the interviewer considerable discretion in the actual conduct of the interview” (p. 475). The interviews were analyzed using the Grounded Theory approach (Ellis, 1993; Glaser, 1992 & 1978; Strauss, 1987; Strauss & Corbin, 1990; & Glaser & Strauss, 1971 & 1967).

The interview guide used in this research project was an adaptation of the one Ellis used in his research work to develop the behavioral model of information seeking by faculty members (1989a, p. 211-212). As with the questionnaire, wording changes were necessary to reflect Internet usage and activities.

Phase three involved reporting and interpreting the results of the research findings. A summarization of findings and suggestions for further research was also included in phase three.

Using both a quantitative and qualitative research design enabled easier capturing of data and provided a richness in detail concerning the information seeking behavior and activities of faculty members. Fidel (1993) noted “As a method of studying behavior, qualitative research centers on processes. It neither provides snapshots nor concentrates on products. It examines the dynamics of a process (e.g., interaction during a search), rather than the static attributes of a process (e.g., users’ levels of education, cognitive

styles, or system capabilities)” (p. 225). Ellis (1993) felt that a quantitative approach was “ideal for obtaining an overall . . . picture of information use by a particular group but it is ill-suited for providing a more authentic picture of researchers’ perceptions of their information environments and more integrated accounts of their information-seeking activities” (p. 469). To obtain this “more authentic picture” Ellis recommended using the qualitative approach of Glaser and Strauss’ Grounded Theory.

Procedures for Data Collection

Upon obtaining Institutional Review Board approval at both the University of North Texas and Angelo State University, all tenured and tenure-track faculty members at Angelo State University received a packet containing a cover memo (Appendix A) and questionnaire (Appendix B). The cover memo explained the purpose of the research project and the definition for Internet usage. The cover memo also indicated that the questionnaires were coded for identification of potential candidates for the in-depth, semi-structured interviews. The cover memo also included the usual reassurances concerning confidentiality of all responses. Finally, the cover memo provided instructions for returning the completed questionnaires.

Faculty members were given approximately two weeks to return the questionnaires. There were provisions for sending a reminder (Appendix C) through the campus E-mail system at intervals of one week and at one and half weeks. This reminder utilized the “Faculty” group address for the E-mail system. All ASU faculty members have an E-mail account on the University’s network. After the two week time period elapsed, individual notices were sent to non-respondents.

From the questionnaire respondents, a theoretical sample was drawn for the in-depth, semi-structured interviews. To answer the research questions posed in Chapter 1, selections were made from both tenured and tenure-track faculty members in the discipline areas of the humanities, social sciences, and science. The interviews were conducted using an interview guide (see Appendix J) based on the model used by Ellis (1989a). All interviews were transcribed for later analysis.

Population – Sample

Angelo State University (ASU) became a four-year school in 1965 (Angelo State University summary of institutional data, 1999). Since that time, ASU grew to become a Master's I university with a student enrollment of approximately 6,200 students. The university offers one associate degree program, 48 undergraduate degree programs, and 28 masters degree programs. In the fall of 1999, ASU had 102 faculty members with tenure and 52 faculty members classified as tenure-track. An additional 65 faculty members were classified as non-tenured. These non-tenured and non-tenure-track individuals were at the rank of instructor, lecturer, or visiting faculty members. Over 70% of all full-time faculty members hold the doctorate.

From the questionnaire respondents, a theoretical sample was drawn for conducting the in-depth, semi-structured interviews. The theoretical sample consisted of tenured and tenure-track faculty members who used the Internet and were from the humanities, social sciences, and sciences disciplines. Glaser and Strauss (1967) described theoretical sampling as “the process of data collection for generating theory whereby the analyst jointly collects, codes, and analyzes his data and decides what data to collect next

and where to find them, in order to develop his theory as it emerges” (p. 45). Glaser (1978) added “Theoretical sampling is, then, used as a way of checking on the emerging conceptual framework rather than being used for the verification of preconceived hypotheses” (p. 39).

Ellis (1989a) described a theoretical sample as “The choice of these groups [social science and science disciplines] was based . . . in that both the choice of initial and subsequent groups to interview was decided with reference to the perceived theoretical and comparative requirements of the project as it progressed” (p. 172). The ongoing analysis of the interviews would determine the need for additional interviews. The interviews continue until saturation is reached in the categories generated by constant comparison methods. It was anticipated that no more than 20 interviews would be needed to reach the saturation level of categories and comparisons.

Data Analysis

With the exception of question 13, an estimate of the number of hours per week the faculty member spent on the Internet, the responses to questions 1 to 12 and 14 were considered nominal level data for the purposes of analysis. An Excel spread sheet was used to obtain descriptive statistics and measures of central tendencies. For questions 1 to 12 and 14, the null hypotheses was stated as there is no statistically significant differences between tenured and tenure-track Master’s I university faculty members’ opinions concerning the use of the Internet as well as no statistically significant differences among the broad discipline areas. For question 13, the responses were considered true ratio level data. The null hypothesis was stated as there is no statistically

significant differences between the average amount of time spent on the Internet per week by tenured and tenure-track Master's I university faculty members as well as no statistically significant differences among faculty members in the broad discipline areas.

For the in-depth, semi-structured interview transcripts, analysis followed the Grounded Theory approach of Glaser and Strauss (Ellis, 1993; Glaser, 1992 & 1978; Strauss, 1987; Strauss & Corbin, 1990; & Glaser & Strauss, 1971 & 1967). "Grounded theory, a form of field methodology, aims to generate theoretical constructs which explain the action in the social context under study" (Stern, 1994, p. 118).

Charmaz (1994) described Grounded theory as a "method stress[ing] discovery and theory development rather than logical deductive reasoning which relies on prior theoretical frameworks" (p. 96). Westbrook (1994) stated that the constant comparative method in Grounded Theory "is generally recognized as the most effective means of content analysis. It involves joint coding and analysis during the continual review of data to gradually form categories" (p. 246).

In using Grounded Theory methodology, the researcher employs a constant comparative method. "This [method] has four aspects: comparing incidents applicable to each category, integrating categories and their properties, delimiting the theory, and writing the theory" (Ellis, 1993, p. 477). As the researcher uses these methods to analyze the transcribed interviews or field notes, categories of behaviors or incidents emerge from the comparison of codings and categories. Specific incidents are tied to each category. "These categories are carefully defined and made mutually exclusive so that relationships

can be identified between those elements that fall into the categories” (Westbrook, 1994, p. 246).

The first task in creating categories is to code the data (interviews, field notes, etc.). “Coding does not descriptively paraphrase the notes; instead it identifies the main categories as well as associated subcategories so that, eventually, all units of data can be categorized according to these codes” (Westbrook, 1994, p. 247). There are three kinds of coding in content analysis for Grounded Theory (pp. 247-248). The first type is called “open coding.” This is the first step where the researcher tries to create as many categories and codes as the data allows. From this initial step, the researcher slowly pares down the categories by determining “major categories” that include many of the initial codes. This second phase of coding begins towards the end of open coding and is called “axial coding.” Hert (1995) described this first phase of coding as “the researcher is involved primarily in collecting and grouping the data. The grouping process consists of assigning codes to data instances. The groups are called categories. Data instances may be grouped in multiple ways. . . .” (p. 82). It is not until the axial coding that the major categories emerge. “Selective coding” is the last phase. This final type of coding forms the core categories that will encompass the initial coding and categories created in the first two phases. Computer software programs exist that aid in the analysis of the transcribed interviews or field notes. These programs help to identify and code words and phrases from the transcribed interviews. Some of these programs include NUD*IST 4, Ethnograph v5.0™, or Folio 4.

As the researcher analyzes and codes each occurrence, it must be assigned to a category. Eventually the properties of the category are determined and matched against other categories. Often categories are merged because their properties are similar. “The objective is analytical exhaustivity. This involves ensuring that no major category or property has been missed and that the interviews have been completely analyzed” (Ellis, 1993, p. 478).

As the researcher nears completion of the analysis, the categories and their defined properties should be “saturated” where no further occurrences (interviews) are needed to understand and analyze each category. “After all the data is finally coded, analysis gradually reveals a framework of patterns and contrasts from which, in many cases, theory can be developed” (Westbrook, 1994, p. 248).

As the theory or model emerges, the researcher must select quotes from the interview transcripts that will show the reader examples of the categories and their properties. “The result should be that the reader has some authentic feel for the overall model, its categories and properties, and the specific instances from which it is derived” (Ellis, 1993, p. 478). In turn, “The model derived should organize the features of the data in a coherent form that relates both to the perceptions and concepts of those studied and to the viewpoint that the researcher is developing” (p. 479).

CHAPTER 4

RESULTS AND FINDINGS

Introduction

This section reports the results of the questionnaire phase of the research project and of the responses to the interview phase with tenured and tenure-track faculty members in the humanities, social sciences, and sciences at Angelo State University. In addition to these results and findings, a model of Internet information seeking activities by faculty members at a Master's I university is presented with a comparison to Ellis' behavioral model of information seeking by faculty members in the social and physical sciences. Finally the results of this study are presented in relation to the eight research questions detailed in Chapter 1.

Questionnaire Procedures

The tenured and tenure-track faculty members at Angelo State University served as the subjects for the questionnaire phase of the project. By the 2000 Spring Semester, there were 157 tenured and tenure-track faculty members. There were three additional (one tenured and two tenure-track) faculty members hired for the 2000 Spring Semester. For the purposes of analysis and comparisons, the faculty members were also divided by the broad disciplines of the humanities (art, drama, english, history, modern languages, and music), social sciences (accounting, business administration, communications, economics, education, finance, government, journalism, kinesiology, psychology, and sociology), and sciences (agriculture, biology, biochemistry, chemistry, computer

science, mathematics, nursing, physical therapy, and physics). Table No. 2 shows the division by the number of tenured and tenure-track faculty members and by broad discipline areas.

Table No. 2

Tenured & Tenure-Track (Ten.-Track) Faculty Members by Discipline Areas

	<u>Humanities</u>	<u>Social Sciences</u>	<u>Sciences</u>	<u>Totals</u>
Tenured	30	43	30	103
Ten.-Track	20	13	21	54
Totals	50	56	51	157

Since this research project was conducted at Angelo State University, it was necessary to seek approval from the Institutional Review Boards at both Angelo State University and the University of North Texas. In February 2000, the respective Boards granted approval for the research project to proceed.

Upon receiving this approval, the questionnaire form (see Appendix B) was sent to 12 instructors and lecturers (four each in the humanities, social sciences, and sciences). These individuals were not in the tenure-track path at Angelo State University. This was under taken to field test the questionnaire and determine if any changes needed to be made before sending the form to the tenured and tenure-track faculty members. This field test was completed in early March 2000. The only significant change noted was a research memo to send more reminders to increase the return rate among tenured and tenure-track faculty members.

On the afternoon of March 17th (Friday of Spring Break), 157 questionnaire forms were placed in academic departmental mailboxes for distribution the following Monday. Appendix A depicts the template for the cover memo that accompanied the questionnaire form. The cover memo and questionnaire form were coded by broad discipline areas and by individual code numbers for each faculty member within each of the discipline areas. The coding served to track return rates and facilitate individual reminders to return the questionnaire. The coding also facilitated identifying potential candidates for the interview phase of the research project. Besides the faculty member's name and individual code number, the cover memo included the faculty member's title and academic department. April 3rd was the required due date for returning the questionnaire through an enclosed envelope via the University's intra-campus mail system.

Two follow-up E-mail reminders were sent through the campus network's "faculty" address option. Appendix C provides an example of the E-mail reminder. These reminders were sent on March 24th and March 29th. Following the April 3rd deadline, individual reminders were sent to non-responders. (See Appendix D for an example of this reminder.) The final completed questionnaire form was returned in early May. Table No. 3 details the response rate for the questionnaire portion of the research project.

All questionnaire responses were entered into an Excel spreadsheet. Excel and StatPro were utilized to obtain descriptive statistics and analyze the responses for statistically significant differences. For questions 1 to 12 and 14, the responses were considered nominal level data. A chi-square test was used to test the null hypothesis of no statistically significant differences between tenured and tenure-track Master's I university

faculty members' opinions concerning the use of the Internet as well as no statistically significant differences among the broad discipline areas. The .05 level of significant difference was used to test the null hypothesis. For question 13, the responses were considered to be ratio level data. The null hypotheses was stated as there is no statistically significant differences between the average amount of time spent on the Internet per week by tenured and tenure-track Master's I university faculty members as well as no statistically significant differences among faculty members in the broad discipline areas. The statistical operation for testing the differences between tenure status was a one-tailed T-test using the .05 level of significant difference. The statistical operation for testing the differences between discipline areas was a one-way ANOVA using the .05 level of significant difference. Appendix E contains a complete listing of the responses to each of the questions on the questionnaire and statistical values and probabilities.

Table No. 3

Response Rate by Tenure Status and Discipline Areas

	<u>Hum.</u>	<u>Soc. Scis.</u>	<u>Scis.</u>	<u>Totals</u>	<u>% Returned</u>
Tenured	22	29	19	70	68.0%
Ten.-Track	17	11	16	44	81.5%
Totals	39	40	35	114	72.6%
% Retn.	78.0%	71.4%	68.6%	72.6%	

Analysis of Questionnaire Responses

Overall, the tenured and tenure-track faculty members at Angelo State University were active users of the Internet. They held high opinions of the Internet's resources, potential for accessing information, and communicating with colleagues and students. There were four statistically significant differences between tenured and tenure-track faculty members and five statistically significant differences among faculty members in the broad discipline areas of the humanities, social sciences, and sciences.

In question 1, "I use the Internet to gather information for my research activities," there was a statistically significant difference between tenured and tenure-track faculty members. (Chi-square values and responses may be found in Appendix E.) Tenure-track faculty members held a higher, positive agreement rate of the value of the Internet to meet their research needs. In the division by broad discipline areas, there was general agreement on the importance of the Internet for research activities, but no statistically significant differences.

On question 2, "I use the Internet to gather information for my teaching activities," again there was a statistically significant difference between tenured and tenure-track faculty members. Tenure-track faculty members had a higher, positive agreement rate than their tenured colleagues over the use of the Internet in their teaching activities. There was also a statistically significant difference among the faculty members in the broad discipline areas. Faculty members in the social sciences had the highest positive agreement rate on the use of the Internet in their teaching activities. There

appeared to be slightly less use of the Internet in teaching activities than in research activities. The only exception to this was the use by social sciences faculty members.

Both tenured and tenure-track faculty members made considerable less use of the Internet in their service activities. There were no statistically significant differences by tenure status or discipline areas on question 3, "I use the Internet to gather information for my service activities."

As was theorized in the assumptions, tenure-track faculty members tended to regard the Internet as the first place to check when researching a topic (question 4). The difference between tenure-track and tenured faculty members was statistically significant. Although the difference was not statistically significant, the social scientists had the highest positive agreement rate on the Internet as the first place to check when researching a topic.

In question 5, "the Internet provides quicker access to information than other information providers," the discipline areas had a difference that was statistically significant. Again the social sciences faculty members had the highest positive agreement rate on being able to quickly access information through the Internet rather than through other information providers. The difference by tenure status was not statistically significant.

There were no statistically significant differences on question 6, "researching a topic on the Internet takes more time than I anticipated." All groups tended toward the middle of the agreement scale concerning the amount of time it takes to research a topic on the Internet.

For question 7, “when searching on the Internet for a topic, I need a librarian’s assistance,” the only statistically significant difference was among the broad discipline areas. Humanities faculty members were most likely to seek a librarian’s assistance and science faculty members were least likely to seek assistance.

There were no statistically significant differences on question 8, “when searching on the Internet, I need a colleague’s assistance.” The responses to both questions 7 and 8 revealed either a reluctance to seek assistance with Internet searching or these respondents felt sufficiently skilled to search the Internet on their own. In looking forward to the responses to question 14, the majority of the respondents rated their Internet searching abilities as either expert (21.0%) or intermediate (64.0%) and there were no statistically significant differences either by tenure status or by discipline areas. By contrast a frequent comment on both the questionnaire and in the interview phase of this research project was frustration with not being able to search the Internet and find needed information or retrieving so many irrelevant sites with the use of search engines.

There were no statistically significant differences on question 9, “I feel that I can find the majority (50%+) of the resources I need for my research, teaching, and service information needs from the Internet.” The responses tended to cluster around the middle of the agreement scale.

The responses to question 10, “the Internet has become the most important place for me to find information,” revealed a difference that was very statistically significant among the discipline areas. The humanities faculty members had the most negative agreement rate of the Internet as the most important place to seek information. The social

scientists held the highest positive agreement rate of the Internet. Sciences faculty members were in the middle of the agreement scale. By contrast the opinion responses by tenure status were relatively the same for both groups.

Again on question 11, “more often than not, I can find exactly what I want on the Internet by using a search engine,” there was a statistically significant difference among the discipline areas. Social sciences faculty members held the highest positive agreement rate on using search engines to find information on the Internet. Faculty members in the humanities and sciences held relatively the same opinions. There was not a statistically significant difference by tenure status.

There were no statistically significant differences on question 12, “I use the Internet as the primary means . . . to stay in touch with my colleagues.” All the groups indicated that the Internet was an important tool for contacting and communicating with their colleagues both on and off campus.

Unlike the other questions on the questionnaire, question 13, “based on the definition supplied in the cover memo, please estimate the number of hours per week you spend on the Internet,” provided true ratio level data. A simple t-test revealed a statistically significant difference based on tenure status. Internet usage was defined in the cover memo and in Chapter 1 as “the use (on at least a weekly basis) of the Internet to read and participate in listservs and discussion groups, accessing Web sites and remote databases for needed information, and/or for collaborative work (E-mail) with colleagues on research projects.” Tenure-track faculty members reported averaging nearly 10 hours a week on the Internet. Their tenured colleagues estimated their average time spent on the

Internet per week at 7.6 hours. This finding would tend to support the assumption that tenure-track faculty members would have had more exposure to using the Internet to conduct research and in the classroom and would be more likely to make more use of the Internet than their tenured colleagues.

Although there appeared to be a large difference in usage among the discipline areas, this difference was not statistically significant. It was interesting to note that social sciences faculty members reported the highest average weekly use of the Internet. They averaged nearly 1.3 hours a week more than their colleagues in the humanities (9.15 hours as compared to 7.9 hours). Sciences faculty members reported an average of 8.5 hours per week of Internet use.

As previously noted, there were no statistically significant differences on question 14, “how would you rate your ability to use the Internet: expert, intermediate, or novice?” Responses by either tenure status or by discipline areas tended to be either expert or intermediate. Among the tenure status groups, tenured faculty members responded with the highest percentage of novice searchers (18.6%). In the discipline areas, sciences faculty members reported the highest number of expert searchers (34.3%).

The questionnaire also included a “Comments” section. Appendix F reproduces these comments by discipline area and tenure status. The analysis of the comments is included in the section concerning the interview phase of this research project.

Interview Procedures

Following the techniques of theoretical sampling as outlined in Chapter 3, a selection of 14 tenured and tenure-track faculty members in the discipline areas of the

humanities, social sciences, and sciences who responded to the questionnaire was made for conducting semi-structured, in-depth interviews. These 14 faculty members were selected on the basis of being heavy users of the Internet as reported on question 13 of the questionnaire. On April 10th, an E-mail invitation (see Appendix G) was sent to potential interview subjects. From this group of approximately 20 individuals, 14 subjects were eventually selected for the in-depth, semi-structured interviews. Several individuals refused to participate or never acknowledged receipt of the E-mail. After analyzing the 14 interviews, the investigator determined that the categories were sufficiently saturated and there was no need to conduct further interviews. Table No. 4 provides details on the interview subjects.

Table No. 4

Interviewed Tenured & Tenure-Track Faculty Members by Discipline Areas

	<u>Humanities</u>	<u>Social Sciences</u>	<u>Sciences</u>	<u>Totals</u>
Tenured	3	2	2	7
Ten.-Track	2	3	2	7
Totals	5	5	4	14

On the day before the scheduled interview, each interview subject received an E-mail reminder. (See Appendix H). Only one individual failed to keep an interview appointment. This missed appointment was rescheduled and held at a later date. The interviews were held between April 19th and May 16th. At the interview session, conducted either in the Library's Lecture Room or the faculty member's office, the

subject read over and signed the informed consent document (see Appendix I) and then sat for the interview. The interviews generally lasted for 30 minutes with the longest lasting nearly one hour. Each interview was taped for later transcription. The investigator also took notes during the course of the interview.

Each of the in-depth, semi-structured interviews followed an interview guide. (See Appendix J.) Ellis (1993) felt the interview guide “lists the questions or issues that should be covered in the interview but leaves the interviewer free to explore and probe the issues. This should ensure that each interview covers basically the same ground but gives the interviewer considerable discretion in the actual conduct of the interview” (p. 475).

In a research memo following the first interview, the investigator noted that additional interview questions were needed on how the Internet may have changed the research methods and processes for the faculty member; whether the faculty member obtained ideas for future research projects from his or hers use of the Internet; and what current research projects the faculty member was pursuing. These questions were added to the rest of the interview sessions. The investigator also noted a confusion on the part of some respondents to both the questionnaire and in the interviews over the Angelo State University Library’s RAMNET service. This service is a gateway from the Library’s homepage to on-line database search services such as OCLC’s FirstSearch and Lexis-Nexis’ Academic Universe. In some cases, the use of this gateway service could have represented the majority of the respondent’s perceived use of the Internet. This type of use would still fit within the definition of Internet usage, “. . . accessing Web sites and

remote databases for needed information , . . .”, as described in Chapter 1 and in the cover memo to the questionnaire.

Analysis of the In-depth, Semi-structured Interviews

For a summary of interview responses, please see Appendix K. All quotations in this section were taken from the transcripts of the interviews. In order to maintain confidentiality, no identification beyond tenure status and broad discipline area was given to the respondents’ quotations or paraphrases of their opinions. This was necessary given that many of the academic departments at Angelo State University were small and have only one or two individuals in some specialized fields.

On the interview questions concerning for what purposes and types of resources these faculty members searched and used the Internet, the responses clustered around both academic and personal use. For academic use, the respondents reported using the Internet from home and the office to gather information for both research purposes and for classroom activities. Other academic purposes included communicating with colleagues and with students. One respondent, a tenure-track faculty member in the sciences, noted that he posted class notes, grades, and assignments either through personal E-mails or through the class’ Web site. He used the Internet to access information within the classroom and received homework from his students via the class Web site. One tenured faculty member in the social sciences felt most of his Internet use was student driven. He used the Internet to verify good information and refute incorrect information students had given in his classes. For all of the respondents, most of the information gathering for academic purposes involved using on-line serial publications or

databases, known Web sites with academic oriented information, or using search engines to find relevant sites. In the area of personal use, these faculty members reported using the Internet to make travel and vacation arrangements, purchasing personal items, E-mailing friends and acquaintances, catching up on favorite TV programs or to listen to music, and managing personal financial portfolios. To a much lesser extent, these faculty members used the Internet for service related activities.

Only three of the interview subjects indicated they tested their research ideas, findings, and conclusions by utilizing listservs or E-mail discussion lists. One tenure-track faculty member in the humanities stated “I couldn’t do this if the Internet wasn’t available.” Several other subjects indicated they did collaborative work with colleagues at other institutions and used E-mail to accomplish this collaboration. All of the interview respondents indicated they did use E-mail to stay in touch with their colleagues. One tenured faculty member in the social sciences felt that E-mail replaced the telephone and “snail” mail for staying in touch. A tenured faculty member in the humanities commented that she used the Internet and E-mail to organize her professional life (running conferences, acquiring information for administrative assignments on campus, and for professional association commitments). Several subjects noted they routinely monitored listservs for developments in their respective research interests; submitted via E-mail abstracts, proposals, publications, and papers; and participated in on-line discussions.

Recurring themes of the responses given by these interview subjects concerning why they used the Internet were the easy nature of browsing and searching, the accessibility from home and the office, and the staggering amount of information

available over the Internet. The currency of the information allowed them to keep in touch with the latest developments in their research interests and monitor personal financial investments. As one tenure-track faculty member in the humanities stated that because the scope of the Internet was very broad, this was where he could find the most current information on his research topics. A tenured faculty member in the social sciences felt that the Internet was so “massive and the content and breadth of information” made the Internet a “universal library.” A tenure-track faculty member in the humanities felt the Web was better for information on lesser-known, minority authors than for well-established authors. She also felt the Internet provided better information on multiculturalism than printed sources.

Mashhadi and Han (1996) noted that “The information and communications revolutions that have resulted in the Internet have built a means of information exchange which has ‘annihilated’ distance and time, and accelerated the process of creating a global community of inquiry” (p. 4). A tenured faculty member in the social sciences agreed with these authors when he stated “The computer destroys two things: distance and time.” The Internet allowed him to contact colleagues and access information from wherever he was located either on campus, at home, or out of the city.

Other factors cited for using the Internet were the inexpensive nature of access; how fast information could be retrieved; and how easily the Internet allowed one to search and research topics that previously were ignored because of time and distance constraints. At the same time, these interview subjects reported being frustrated with the

amount of information retrieved (“information overload”) even with simple searches, weeding out irrelevant retrieved sites, and retrieving unwanted pornographic sites.

Along with the classroom activities already mentioned, many of these subjects reported an active mentoring role in training students to use the Internet. All of the subjects indicated they either required students to use on-line databases or made specific assignments for finding information on the Internet. Several subjects had taught Internet-based courses and/or used class Web sites to distribute information and received homework from students.

One tenure-track faculty member in the humanities required her students to evaluate Web sites on specific writers. She taught her students how to evaluate the sites and admonished them not to assume every site was a “reputable source.” A tenured faculty member in the sciences also required her students to “judge” Web sites and provided guidance on how to evaluate the sites. Another tenure-track, social sciences faculty member commented that he tried to dispel students’ notions that “everything is digitized.” Most of the subjects did state a preference that their students should be familiar with or use the printed resources, especially peer-reviewed periodicals, before using Internet sites.

For most of the subjects, the Internet influenced their teaching styles. One tenured faculty member in the humanities stated it has “become obvious that students don’t read books. They do read Internet pages . . . I changed to their style of learning.” By contrast, a sciences, tenured faculty member felt that her teaching of an Internet-based course had

also enriched her traditional class presentations. Teaching the Internet-based course made her better prepared for the traditional classroom.

Other faculty members felt the Internet allowed them to have greater contact with their students. They were no longer tied to set office hours. They were now available “24 by 7” through E-mail.

The classroom accessibility of the Internet allowed faculty members to create more lively class discussions. Instead of filling a chalkboard with problems and their solutions, a tenure-track faculty member in the sciences gripped the attention of his students with various Internet sites and visual images readily available from Internet sites. Instead of the mathematical equations and attempts to depict three-dimensional objects on the chalk board, he could now show them real-life situations and the science behind them.

One tenure-track faculty member in the humanities felt that the “Internet is a tool for teaching, not a teacher in itself.” She felt the Internet had not changed her teaching style. She did have, however, less sympathy for students who claimed they could not find materials for their assignments or reported that they could not contact her.

Similar to their responses on why they used the Internet when asked to compare Internet retrieval of information with the more traditional information providers, these faculty members felt it was the ease of use, accessibility, convenience, and amount of information available over the Internet that made the Internet superior to the more traditional information providers. The factors of access, convenience, and speed of retrieval were the most noticeable changes to the research process caused by the Internet.

Several subjects noted that because of the convenience, accessibility, and ease of use, they used the Internet and on-line databases before they would come to the library. A tenure-track faculty member in the humanities cited the fact that his bibliography building was much easier since all he had to do was download bibliographic information from an on-line database. A tenured, social sciences faculty member felt he was now more productive because of information access over the Internet. The time he spent on the research process of gathering and retrieving information was greatly reduced because of his Internet usage.

Other subjects felt they were more thorough in their literature searching because of the vast number of on-line databases and Web sites available over the Internet. Several noted that the Internet had broadened their research interests. A tenured faculty member in the social sciences reported that when questions were raised by students in his classroom, the Internet allowed him to research topics in entirely new fields he previously would not have bothered to check. The Internet's convenience and speed of access gave him the freedom to research these questions and respond back to the students at the next class session. Previously he would not have pursued the topics and questions because that would have required time in the library and making the trip to the library. One tenured, sciences faculty member commented that the Internet connected her to the world. She could share research ideas and collaborate with colleagues she normally would not be able to coordinate with her work. As another respondent noted, this type of collaboration made possible by the Internet would strengthen research because of the cross-cultural data gathering and analysis of findings.

Four faculty members (two tenured and two tenure-track in the humanities and social sciences) reported that they did get ideas for future research projects from their use of the Internet. One tenured faculty member in the humanities stated that getting ideas from the Internet was the same as from when he read books but just faster. He felt the Internet caused him to be more disciplined and helped him focus the dimensions of his research outline.

All of the respondents reported using search engines to find information on the Internet. Very few, however, reported using meta search engines. By far Yahoo was the most popular search engine among these subjects. They all reported using a variety of search engines. For most, if they did not find information with one search engine, they simply reran the search using a different search engine. As one social sciences, tenured faculty member commented “they [search engines] are virtually the same. They are merging to become equally good.” He felt, as did many of the other subjects, that most of the searches retrieved far too many sites. Many of these sites were not relevant to the topic of interest. Nearly every subject expressed frustration over retrieving too much information.

The primary criteria for judging a useful Web site were the content and validity of the site. In simple terms, if the site had the information needed by the faculty member and that information was reliable, then the faculty member judged it as a useful site. Many of the subjects reported that they relied on “.edu” sites or sites sponsored by professional associations. They felt those types sites were more reliable than ones sponsored by some

“.org” or “.com” entities. Sites sponsored by some organizations and some commercial sites often had biased information or contained pure “propaganda.”

Some of the subjects stated that they also applied ease of use and/or the way information was organized on the site as criteria for judging a useful site. For Web page designers, these subjects presented a difficult dilemma. Some liked bright color, motion, sound, and other typical “bells and whistles.” Other subjects reported they were “turned off” by these same “bells and whistles.”

Again, the most important criteria as previously stated were the content and validity of the site. As a tenured faculty member in the social sciences commented “it was information content. Content validity. Multiple sites saying the same thing. Convergent validity.”

With the exception of one subject (tenured faculty member in the sciences), all of the subjects reported that they followed embedded links within Web sites. As was true with the criteria for judging a useful Web site, these respondents followed links that provided them with easy access to reliable information or to links with the “best” content. Many respondents expressed frustration with sites that did not update their links, “the dreaded 404 message,” or did not allow one to easily backtrack to the originating Web site or search statement. As one tenured faculty member in the social sciences stated he stopped following links when he acquired the “content” he needed or he reached “analysis paralysis,” also known as information overload.

The respondents were evenly split (seven to seven) on who cited Web sites in their own research. There were four tenured (one from humanities, two from the social

sciences, and one from the sciences) and three tenure-track (two from social sciences and one from the sciences) faculty members who reported citing Web sites in their published works or professional papers. Several of those who did not currently cite Web sites expected to do so in the near future. Several also indicated they preferred finding the original printed document or article and citing that format rather than the on-line equivalent.

When queried about their problems and “ugly” experiences with searching the Internet, these subjects felt the most common problems were information overload (retrieving too much information), information reliability, and not being sure how or where to search on the Internet. One tenured faculty member in the humanities reported that he was frustrated by misleading or unclear directions and by having to “wander” around to find a useful site. Another tenured faculty member in the humanities expressed frustration with the lack of retrospective information in on-line databases and other types of Web sites.

Many of the respondents felt there were major concerns about the unreliable nature of information from various Web sites. Many faculty members reported spending considerable time trying to validate information found on Web sites.

Another common area of complaints was technology problems. These types of problems involved equipment failures, slow retrieval speeds at home and on campus, lack of robust equipment, and problems with 404 messages for sites that no longer existed or were temporarily out of service.

In many ways these subjects had a love/hate relationship with the Internet. They loved the ease of access, content, speed of retrieval, and convenience of the Internet. At the same time, they were frustrated by the amount of information retrieved and by how much of it was not reliable or irrelevant to their research request.

Most of these subjects (ten) reported that one of the ways they learned to search the Internet was by teaching themselves how to search the Internet. In addition to being self-taught, others also stated they learned from a colleague or someone in the office (in one case, a work-study student assistant). Three respondents indicated they had taken or attended a formal course or workshop in Internet searching. A tenured, social sciences faculty member felt it was extremely easy to learn to search the Internet. "A monkey can learn it. It is not difficult." Despite his opinion, and as noted above, many of the respondents reported problems with using search engines and formulating search statements.

Many of the subjects wished they could learn more about Internet searching techniques. A tenured faculty member in the sciences commented that she wished she had more time to read about and to learn more effective search strategies. This was in spite of the fact that she had extensive experience in using the Internet. A tenured faculty member in the humanities reported that he regretted his general ignorance of what opportunities the Web provided.

In one final comment, a tenured, social sciences faculty member hoped that the Internet would not create a "distortion in funding." He did not want to see the demise of books at the expense of providing more technological applications and access.

Appendix F provides a listing of all of the responses contained in the “Comments” section of the questionnaire. The most frequent comments (16 from tenured faculty members and 20 from tenure-track faculty members) concerned both good and bad experiences searching for or gathering information from the Internet. A tenure-track, social sciences faculty member commented “I wish I had this resource when I was a student. It is a major aid to my work.” By contrast a tenure-track, sciences faculty member commented “The internet (sic) is, so far, no substitute for books. It is an impressive communications medium, but is not going to supplant my book research any time soon.” There were many (13 tenured and 11 tenure-track faculty members) comments about the quality and validity of the information found on the Internet. A tenured faculty member in the sciences commented “I only look on the net (sic) for things likely to be on the net (sic). Much of the information on the net (sic) is biased more than other common sources. Only ‘true believers’ seem to want to take the time to post their information (or misinformation).” A tenured faculty member in the social sciences commented “Major concern is credibility of posted materials/information.”

Despite these negative feelings, 34 individuals (19 tenured faculty members and 15 tenure-track faculty members) did express praise for the Internet. A tenure-track faculty member in the social sciences commented “The Internet has become an integral part of pedagogy and research activities. Therefore I rely very heavily on the Internet to assist me in those activities.”

Model of Internet Information Seeking Activities

The Internet Information Seeking Activities Model detailed below attempts to highlight the major activities faculty members at a Master's I university performed in their Internet use. The model was developed based on the analysis of the in-depth, semi-structured interviews. This section also includes a comparison of the Internet Information Seeking Activities Model with the major stages in Ellis' behavioral model of information seeking by faculty members.

Stage 1 of the Internet Information Seeking Activities Model is a "Gathering" activity. This stage simply combines both academic (research and teaching) and personal or pleasure information seeking activities on the Internet. Faculty members have either a specific or general information need and choose to use the Internet to seek information to satisfy that need. They choose the Internet because of the vast amount of information available over the Internet and because it is so convenient to use the Internet from their homes or from their offices. They spend this stage in activities that search the Internet for information and then actually retrieve that information for their use. A tenured faculty member in the humanities stated that the Internet had definitely aided his information seeking activities by providing him with new information that was "so topical." A tenured faculty member in the social sciences noted that the Internet had "speeded . . . up" his information seeking activities.

Stage 2 of the Internet Information Seeking Activities Model involved "Validating" activities. Because of deep concerns about the reliability of information found on the Internet and the dubious sponsorship of some Web sites, faculty members

spent a great deal of time looking for reliable sources of information or determining the validity of retrieved information. A tenured faculty member in the social sciences called this unreliable information “scandal mongering.” He felt his students accepted too much of what they found on the Internet as being true without taking the time to verify the information. A tenured faculty member in the sciences commented “[you] can’t rely on everything you find.” An Internet user has to develop and use critical thinking skills in utilizing materials from the Web.

Stage 3 of the Internet Information Seeking Activities Model is a “Linking” stage which concerns chaining the links embedded in Web sites to seek additional information. Most Web sites have embedded links which either lead a user to additional sites with further information on the original topic or to new pages within the original Web site. Links can also send a user to sites with related information on specific aspects of the topic in question. Included in this stage is a sub-stage of “Re-validating.” Each time the user goes to a new link, the user must go through a validation process to determine the reliability of the retrieved information from the linked site.

The fourth and final stage in the Model involves “Monitoring” activities. Once a faculty member finds a useful and reliable site, the faculty member will often bookmark that site in order to easily return to it and check for new and updated information. This activity stage also includes monitoring listservs and discussion lists on a particular research field or topic. This stage also includes activities of traditional monitoring of on-line databases for references to new articles of interest on a research area or monitoring electronic journals for new developments on research topics of interest. A tenure-track

faculty member in the sciences commented that he had between 100 to 150 bookmarked sites. This allowed him to quickly find sites that he needed to retrieve information to meet his research and teaching activity needs.

Parallel to these stages of information seeking activities are two other stages of frequent Internet activities: “Communicating” and “Mentoring.” The “Communicating” stage was simply staying in touch with colleagues and students by using the E-mail capabilities provided by the Internet. These activities included exchanging ideas, submitting drafts of papers and articles, answering student questions and accepting their homework assignments, and collaborating with distant colleagues on research projects. A tenure-track, humanities faculty member stated she could not do the work with her colleagues and students “if the Internet wasn’t available.”

The second parallel stage of “Mentoring” involved the faculty members working with their students. These activities included teaching students how to use the Internet and developing critical thinking skills in formulating search statements, evaluating Web sites, and helping them integrate electronic and print resources. Several of the faculty members commented on their class assignments where they had their students evaluate Web sites and use retrieved information in their semester projects. Table No. 5 depicts the Internet Information Seeking Activities Model.

With the exception of the greater emphasis placed on validating information retrieved from the Internet, the Internet Information Seeking Activities Model depicted in Table No. 5 does not fundamentally change Ellis’ behavioral model of information seeking by faculty members. The “Gathering” stage in the Internet Model is the

equivalent of Ellis’ “Starting” and “Browsing” stages. Ellis (1989a, pp. 178-200) called the “Starting” stage as the “initial search for information.” He referred to the “Browsing” stage as when a faculty member found a source or “area” that had useful information, the faculty member began to browse the area for additional information on the topic of interest. The “Gathering” stage in the Internet Model was also similar to Ellis’ “Extracting” stage where the faculty member began to work through the source to “locate material of interest.”

Table No. 5

Internet Information Seeking Activities Model

<u>Stage</u>	<u>Type of Activities</u>	<u>Parallel Stages</u>
Gathering	Fulfilling information needs through searching and retrieving information from Internet sites	Communicating through E-mail with colleagues and students and participating in listservs
Validating	Determining the reliability of retrieved information from the Internet	Mentoring of students to search for, use, and validate
Linking & Re-validating	Following information from the Internet page and determining the reliability of that site	
Monitoring	Keeping up-to-date on personal areas of interest, general news topics, or on research topics of interest	

Ellis’ “Chaining” stage, following the footnote trail, was similar to the “Linking” stage in the Internet Information Seeking Activities Model. In both models, a faculty member uses the footnotes or embedded links to find additional information on the topic of interest.

The “Validating” stage in the Internet Information Seeking Activities Model was similar to Ellis’ “Differentiating” stage and the “Verifying” stage found in his work with his colleagues (Ellis, Cox, & Hall, 1993). In both models, the faculty member was attempting to determine what sources or sites have the best and most reliable information to meet an information need. The Internet Information Seeking Activities Model places a greater emphasis on the validation activities than Ellis’ behavioral model. The “Linking” stage also included a sub-stage of “Re-validating” each time a faculty member followed an embedded link in a Web site which re-emphasizes the importance of validating the retrieved information.

The “Monitoring” stages in both models held a similar purpose. Once the faculty member discovered the desired resource(s) or reliable site(s), the faculty member would continue to return to the resource(s) and site(s) for new developments or additional information.

The “Ending” stage added to the original Ellis’ behavioral model was not probed in the research for the Internet Information Seeking Activities Model. This activity of finishing the project was implicit in the work of the subjects interviewed for this research project.

Findings in Relation to the Research Questions

This section provides an analysis of the research findings in relation to the eight research questions posed in Chapter 1.

Research question 1: What research, teaching, and service information needs influence a Master's I university faculty member to choose to use the Internet to find information?

From information gathered in the interview phase of this research project and from the "Comments" section on the questionnaire, Angelo State University faculty members used the Internet to satisfy a variety of information needs. These included academic needs related to research for publication and professional papers, classroom activities for lectures and interacting with students within and outside of the classroom, communicating with colleagues and students, and monitoring various Internet sites for ongoing information and keeping up to date. These faculty members also used the Internet to satisfy many personal information needs such as making travel arrangements, shopping for new products, and managing personal finances.

Research question 2: What time- and convenience-related factors influence a Master's I university faculty member to use Internet information resources over more traditional information resource providers?

In responding to the interview questions and from comments on the questionnaire, faculty members at Angelo State University felt one of the primary reasons for using the Internet over traditional information providers like the library was the convenience of accessing the Internet from their offices, classrooms, and homes. The Internet provided quicker and easier access to information than previously available through a traditional information provider. This type of access was cost efficient in both resources and time spent finding and retrieving the information. Many of the respondents felt that the

massive amount of information available on the Internet contributed to their use of the Internet over making a trip to the library. From the responses to the questionnaire, the majority of these respondents held a very high opinion of the Internet's ability to deliver information more quickly than traditional information resource providers.

Research question 3: How do Master's I university faculty members use Internet search engines to find information on the Internet?

Like most users of the Internet, faculty members at Angelo State University used a wide variety of Internet search engines to find relevant sites with information to fulfill their information needs. They quickly adapted from one search engine to the next depending on the amount of relevant sites retrieved while executing search statements. They recognized that no one search engine indexed all of the Web. Some preferred the weighted average feature of some search engines or how the information was displayed by the search engine. All respondents to the interview phase of this research project made use of search engines.

Research question 4: What criteria and factors do Master's I university faculty members use to govern the choice and usefulness of a Web site/homepage to meet an information need?

Again based on the responses to the interviews and comments from the questionnaire, these faculty members felt the primary concern for choosing a useful Internet site involved the content and validity of information found in the site. They were very concerned with finding reliable information while filtering out the unreliable or non-

relevant sites. Simply put, if the site had the needed information and it was deemed valid, then these faculty members felt it was a useful site.

Research question 5: What differences in opinions concerning the usefulness of the Internet for research and the classroom exist between tenured and tenure-track faculty members as well as among faculty members in the three discipline areas of the humanities, social sciences, and sciences at a Master's I university?

Based on the responses to the questionnaire, tenure-track faculty members at Angelo State University held a higher, positive agreement rate than their tenured colleagues for the questions concerning the use of the Internet to gather information for their research and classroom activities needs. They also held a higher positive agreement rate on the concept of the Internet being the first place they check for information. Faculty members in the social sciences held a higher positive agreement rate on the question of using the Internet to gather information to meet their classroom activity needs. This same group of faculty members (social scientists) also felt the Internet provided quicker access to information than other information providers. The majority of the faculty members in the humanities disagreed with the statement that the Internet was the most important place to find information. The majority of the faculty members in the social sciences either agreed or strongly agreed with the same statement. Finally a majority of the social sciences faculty members agreed with the statement that they could find exactly what they wanted by using an Internet search engine.

Research question 6: What differences in usage of the Internet exist between tenured and tenure-track faculty members as well as among faculty members in the three

discipline areas of the humanities, social sciences, and sciences at a Master's I university?

Again based on the responses to the questionnaire, tenure-track faculty members averaged over two hours more per week of Internet usage than tenured faculty members. There were no statistically significant differences among faculty members in the three discipline areas. Social sciences faculty members had the highest average usage per week. Humanities faculty members had the lowest average usage. The differences in usage among the discipline areas was most likely due to the perceived value of the Internet to meet research and classroom information needs. In both questions 1 and 2, social sciences faculty members had the highest positive agreement rate on using the Internet to meet information needs for research and classroom activities.

Research question 7: What do Internet using Master's I university faculty members perceive as barriers to easy access to information available on the Internet?

The respondents to the interview phase of the research project at Angelo State University indicated there was a significant problem with the reliability of the information found on many sites located on the Internet. This sentiment was echoed in the "Comments" section of the questionnaire. Faculty members reported spending considerable amounts of time validating this retrieved information. At the same time many respondents felt overwhelmed by the amount of materials retrieved even with simply Internet searches. These faculty members either agreed with or used the term "information overload." They were also concerned with their abilities to search the Internet. Even though the majority of questionnaire respondents rated themselves as

either expert or intermediate searchers, several of the interview subjects admitted they often were not sure they used proper search terms or what sites to use to find needed information. Several comments on the questionnaire and from the interview respondents indicated they wanted to learn more about searching the Internet or to improve their existing skill levels.

Research Question 8: How does the Internet searching behavior and activities of Master's I university faculty members vary from Ellis' behavioral model of information seeking activity of faculty members?

Based on the responses to the interviews, an Internet Information Seeking Activities Model was developed and compared to Ellis' behavioral model of information seeking activity by faculty members. The Internet Information Seeking Activities Model consisted of four stages which included "Gathering," "Validating," "Linking" with a sub-stage of "Re-validating," and "Monitoring." The Internet Model also included stages of the parallel activities of "Communicating" and "Mentoring." Although the Internet Model concentrated on the electronic access to information and communication aspects of information seeking, there were no major changes suggested to the Ellis Model. The Internet Model did place a greater emphasis on the "Validating" activities of verifying information retrieved from Web sites and their embedded links.

Conclusion

During the questionnaire phase of this research project, 114 faculty members at Angelo State University returned questionnaires for tabulation. These questionnaires were analyzed for statistically significant differences between tenured and tenure-track

faculty members and among faculty members in the broad discipline areas of the humanities, social sciences, and sciences. Tenure-track faculty members were found to make more use of the Internet than tenured faculty members and generally held higher positive agreement rates with the statements about the usefulness of the Internet to meet their information needs. The assumption about the tenure-track faculty members making more use of the Internet was upheld by the results of the questionnaire. In the broad discipline areas, social sciences faculty members held higher, positive agreement rates with the statements about the usefulness of the Internet to meet their research and classroom needs.

The responses to the interview phase of this research project were used to develop the Internet Information Seeking Activities Model. This model depicted how these faculty members used the Internet for finding information, communicating with colleagues and students, and for classroom activities.

CHAPTER 5

DISCUSSION OF FINDINGS

Introduction

As noted in Chapter 1, the growing phenomenon of the Internet and the World Wide Web permeated higher education campuses. The Internet provided scholars and students with quick and easy access to colleagues and electronic information resources located around the globe.

The findings of this research project confirmed the widespread use of the Internet by tenured and tenure-track faculty members at Angelo State University a Master's I institution. These faculty members used the Internet to access on-line databases and retrieve information from academic, commercial, and personal Web sites, as well as for meeting non-academic information needs. They communicated with their colleagues and students. As several faculty members commented, the Internet was indispensable in making it possible for them to be productive scholars; to be more in touch with their students; and organize their professional lives.

Conclusions

Despite problems with unreliable information, faculty members at Angelo State University viewed the Internet as a valuable tool to meet both academic and personal information needs. Many of the faculty members reported that the Internet was the first place they went to seek information. On average, tenure-track faculty members used the Internet nearly 10 hours a week. Social sciences faculty members reported the highest

average rate of use among the three discipline areas studied in this research project.

These faculty members made use of the Internet because of its convenience, ease of use, and the vast amount of information accessible through the Internet. They used the Internet to stay in contact with colleagues, shared ideas and research, and communicated with students. Tenure-track and social sciences faculty members generally held higher positive rates of agreement on the usefulness of the Internet to meet research and classroom information needs.

The Internet Information Seeking Activities Model developed in this research project complements Ellis' behavioral model of information seeking by faculty members. The Internet Model demonstrated the activities faculty members at a Master's I university employed to satisfy information needs through the use of the Internet. The Internet Information Seeking Activities Model did show that validating information found on the Internet was a major concern for these faculty members. Use of the Internet broadened their research interests or facilitated the research process by making it easier and more convenient to search for and retrieve information. Faculty members no longer had to rely on an intermediary to search electronic information resources for needed information. The Internet also allowed these faculty members to interact more easily with their students. The Internet increased student contact time and expanded faculty members' roles as mentors to train students to use this information access tool.

Since the Internet made it easier for these faculty members to interact with their students through active use of class Web sites, E-mail contact with students, and the active mentoring of students, all of these Internet related activities with students should

help to create a more positive and better learning experience for students. This would reinforce the teaching mission of a Master's I university like Angelo State University. This interaction could also help with retention issues faced by many campuses similar to Angelo State University.

For this group of faculty members, the Internet played an important, if not central, role in meeting their research and classroom information needs. Angelo State University faculty members not currently using the Internet could be seen by students as being behind the times and providing a lesser education experience.

Because of the amount of Internet use reported by the faculty members in the questionnaire and interview phases of this research project, University administrators, Information Technology staff members, and University Library staff members must insure that increasing resources are devoted to provided more and better access to on-line sources of information. To meet the request for additional training and to make active Internet users out of non-users, Information Technology and University Library staff members must develop new and subject oriented training programs to bring non-users on-line and enhance the existing search capabilities of active Internet users.

Implications of Findings

This research project was part of the recent trend of studying the information needs and uses and the behavioral characteristics of information seekers as outlined by Reneker (1993). Dervin and Nilan (1986) first identified the shift from studying the system to focusing on the information users and their searching behaviors. Coupled with

this trend was a new emphasis on studying small groups via observation or unstructured interviews (Ellis & Haugan, 1997, pp. 384-685).

The previously developed models of information seeking behavior and activities were developed before the advent of and widespread use of the Internet. This research project helped to identify the Internet as a new tool in the information seeking behavior and activities of faculty members.

When Reneker (1993 & 1992) studied the information needs of faculty members at Stanford University, she found that they had a wide variety of information needs. Just like the faculty members at Stanford, faculty members at Angelo State University used the Internet to satisfy their personal, academic, scholarly, work-related, political, and entertainment information needs.

The findings from this research project confirmed the research of Kovacs, Robinson, and Dixon (1995) that faculty members made increasing use of the Internet to stay in touch (communicating) with their colleagues. As with the respondents to Kovacs, Robinson, and Dixon's survey, Angelo State University faculty members made use of listservs and personal contacts to test ideas, collaborate on research projects, submit abstracts and publications for review, and plan professional activities.

Beacham and Kester (1994), Cunningham (1994), Harris (1995-1996), Kenny (1995), and Olsen (1992) discussed the need for faculty members to gain skills in the use of the Internet; and, in turn, to train their students to make use of the Internet. Angelo State University faculty members provided their students with ample guidance in evaluating Web sites, opportunities to train students in searching for information on the

Internet, and communicating with students through E-mail and Web sites developed for individual classes. Many of these faculty members expressed a desire to improve their own Internet skills and to learn more about the opportunities for gathering information offered by the Internet.

Berger and Hines (1994) and Williams (1995) found that faculty members at Duke University and the University of Maine respectively made little use of the Internet. That was not true for the faculty members at Angelo State University. Tenure-track faculty members spent an average of approximately one-fourth of a typical workweek on the Internet. The Internet usage by Angelo State University faculty members was more typical of that found by Bao (1998) at Seton Hall University. Perhaps given the earlier date of Berger and Hines' and Williams' research, this could have influenced the lower amount of Internet usage. The rapid growth of the Web meant there were fewer resources available during the time periods of their respective studies.

Westbrook (1999 & 1995) developed a model of information seeking behavior of faculty members researching and teaching in the field of women's studies using methodology similar to Ellis' and this research project. Her model involved activities ("Needing," "Starting," and "Working") that were similar to the "Gathering" stage in the Internet Information Seeking Activities Model. Her fourth stage, "Deciding on the value of any results of working on the [information] need" (1999, p. 17), was similar to the "Validating" stage in the Internet Model.

Leckie (1996) developed the "Expert Researcher" model (p. 202). After years of apprenticeship, better known as graduate school, most faculty members began a life-long

process of research and scholarship. Because they were often pressed for time, most faculty members maintained extensive personal libraries and subscriptions. Similar to this “Expert Researcher” model, faculty members in this research process responded to the questionnaire that they needed little assistance with Internet searching. The majority labeled themselves as either expert or intermediate searchers in their skill level for searching the Internet. Several faculty members participating in the interview phase of this research project described using bookmarks in their browsers to easily monitor Web sites for new developments and information on their respective research topics.

Because of the chaotic nature of the Internet and the numerous unreliable sources accessible through the Internet, Devlin (1997) felt that “The Internet should be chosen if the question is unlikely to be answered elsewhere, if other sources have proved unsuccessful or if a comprehensive search is required” (p. 367). Angelo State University faculty members were aware of these problems; but they readily used the Internet as their starting point for seeking information. Respondents to the questionnaire and in the interview phases of this research project showed that these faculty members embraced the Internet as a vital information source.

Sandstrom (1999, 1998, & 1994) and Hawkins (1996) used the anthropology model of hunting and gathering to describe faculty members’ behavior in searching for information. The “optimal foraging approach” is a useful model for describing someone’s searching approach to find information on the Internet. During the interview phase of this research project, many faculty members discussed their frustration at having to do multiple searches and “wandering” on the Web to find the sites they needed to satisfy

their information needs. Additionally, they expressed frustration at having to wade through a sea of irrelevant information to find a valid site. Once found, they would return to this site to fill their “dietary” need for more information.

Bao’s (1998) study of Internet use at Seton Hall University found a similar frustration level of finding too many hits. The respondents also complained that they did not find enough full-text resources on the Web. Angelo State University faculty members made more use of the library’s Web page than faculty members at Seton Hall University. The primary use Angelo State University faculty members made of the Library’s homepage was to access on-line database services (RAMNET) linked from the homepage. This type of use was similar to what He and Jacobson (1996) found at the State University of New York’s Albany campus. “We found that faculty find the Internet a useful way to find citations, but they may be referring to materials found through RLIN, OCLC’s FirstSearch, and other bibliographic databases” (p. 44) available over the Internet through a commercial vendor for which the library or the university paid subscription charges.

Amstutz and Whitson (1997) studied the topic of teaching students to conduct research and find information at the University of Wyoming. A slight majority of the faculty members encouraged or required their students to use the Internet and E-mail to complete assignments or seek information. For the other faculty members, 47% used the more traditional approach of using the library as the first place to find needed information. “This reliance on traditional sources may indicate that faculty are most comfortable acquiring information in the way they were trained . . . [this] suggest[s] that

faculty pass on their biases when presenting information sources” (p. 23). This type of faculty member could be failing the students’ needs for training in electronic retrieval of information. Angelo State University faculty members who participated in the interview phase of this research project related the various assignments and mentoring they performed with their students to build necessary skills in retrieving information and determining its validity. They appeared to be more active users of the Internet and provided more mentoring for their students than the faculty members studied by Amstutz and Whitson.

Recommendations for Further Study

As Ellis and Haugan (1997) noted, there was a growing trend in using a “micro-approach” of studying small groups using observation and unstructured interviews (pp. 384-385). Similar research projects to the one conducted with Angelo State University faculty members that study Internet usage need to be conducted with discipline oriented groups. This approach would also be similar to Westbrook’s study of information needs and seeking behavior for scholars in women’s studies programs. This would also be similar to the studies conducted by the research team of Curtis, Weller, and Hurd (1993) and Hurd, Weller, and Curtis (1992) involving scientists, engineers, and health sciences faculty members at the University of Illinois at Chicago. Through this micro-approach, researchers will gain more in-depth observations and analysis necessary for model building of complex behavioral activities involved in information seeking (Ellis & Haugan, 1997).

Additional research is needed at other Master's I universities and other Carnegie classed institutions. These replication studies will either confirm or modify the stages in the Internet Information Seeking Activities Model developed in this research project at Angelo State University.

New research projects are needed to study why some faculty members do not use the Internet. As Magner (1999) reported on a recent survey of faculty members across the United States that found many older faculty members reported they were "being more stressed by information technology even though they aren't using it as much as younger faculty" (p. A18). As noted earlier with Amstutz and Whitson's (1997) study at the University of Wyoming, faculty members did pass on their anti-technology biases to their students. A better understanding is needed as to why these faculty members do not use the Internet and what affects this has on their students.

To learn more about information seeking behavior activities or searching techniques, research projects are needed that actually observe search tactics employed by Internet users. These types of research projects will help to determine true information seeking abilities and help design appropriate training programs for individuals, groups, and by disciplines. These types of research projects could also help search engine designers to develop better systems and provide solutions to existing frustrations with information overload problems.

Additional work is needed on how the Internet is changing classroom activities and teaching styles. The whole area of distance learning and Internet course offerings is a rapid development on most university and college campuses. Studies are needed to help

understand how students and instructors interact in this virtual classroom environment and how these courses can be adapted to individual learning styles.

In turn, more studies are needed on how faculty members serve as mentors to their students in developing their skills in electronic retrieval of information and in general information literacy skills. Academic librarians need to learn what roles they will play in the new electronic campus. Librarians need to work with faculty members to help develop information literacy units in existing courses or to develop new courses to train students for electronic information access through the Internet. They also need to determine what types of training sessions faculty members need and want to improve their Internet searching skills.

Significance of This Research Project

This research project added to the existing understanding of the uses faculty members made of the Internet in their research, teaching, and service roles at a Master's I university. Most of the previous information seeking models involving faculty members did not include Internet usage as a factor in these activities or only involved faculty members at major research universities.

Information providers and librarians can use the results of this study to learn how faculty members at a Master's I university used the Internet to fulfill their information needs. The research project provided information on training needs and what typical problems and frustrations were faced by these faculty members in using the Internet.

Higher education administrators will gain knowledge from this research project as to how important a role electronic access is playing in research and classroom activities

of Master's I university faculty members. The Internet enables faculty members to have a more interactive traditional classroom and with distant education courses. The distant education courses will allow the university to extend its reach off of the traditional campus. Because of the Internet's convenient access to vast amounts of information, many faculty members at Angelo State University would like to have more wired classrooms and access to more on-line databases and information resources. Information technology will consume greater percentages of the limited operating budgets available to higher education institutions. Despite the emphasis on the importance of electronic access, many the faculty members in this research project still found value in having access to print resources and did want to see the demise of the "book."

This research project also provided a different perspective by examining differences among faculty members in the discipline areas of the humanities, social sciences, and sciences in Internet usage and opinions of the value of using the Internet to satisfy information needs. In the questionnaire phase of this research project, differences appeared among social scientists and their colleagues in usage and opinion concerning the value of the Internet to meet information needs in research and classroom activities. Most of the previous research examined information seeking behaviors and activities as a whole or for only a single discipline.

APPENDIX A

COVER MEMO

Date:

Memo

To: [Faculty member's name & title, Academic Department, and code number]

From: Maurice G. Fortin, Library Director and UNT Graduate Student
(Maurice.Fortin@angelo.edu)

Re.: Internet Usage Research Project - Questionnaire

I am asking for your help in a research project studying faculty members' usage of the Internet. The attached questionnaire should take less than 10 to 15 minutes to complete. It may be returned to me by using the intra-campus mail. Please return the questionnaire no later than 3 April 2000.

Through this research project, I am attempting to determine Internet usage as it pertains to teaching, research, and service activities of and describe the information seeking behavior on the Internet by faculty members at a Master's I university. The questionnaires are coded to help me identify potential candidates for follow up interviews. Your participation and responses will be kept confidential. The questionnaire results and analysis along with all interview transcripts will remain within my possession. This data will be stored either in a locked desk drawer or lockable steel case in my office. Upon completion of the project, all notes and transcripts will be destroyed. The only risk to you is using a short amount of your time to fill out and return the questionnaire.

I am defining Internet usage as the use (on at least a weekly basis) of the Internet to read and participate in listservs and discussion groups, accessing WEB sites and remote databases for needed information, and/or for collaborative work (e-mail) with colleagues on research projects.

By returning this questionnaire, you are acknowledging your consent to participate in this research project and have been made aware of the procedures and risks involved with the project. If you choose to do so, you are not required to participate in the interview portion of the research project.

This research project has the approval of the University of North Texas' Institutional Review Board for the Protection of Human Subjects in Research (940-565-3940) and from Angelo State University's Institutional Review Board (915-942-2169). If you have any questions or need additional information, please let me know (942-2510). Thanks!!

ANY QUESTIONS REGARDING THE CONDUCT OF THE PROJECT OR QUESTIONS PERTAINING TO YOUR RIGHTS AS A RESEARCH SUBJECT, OR RESEARCH-RELATED INJURY SHOULD BE BROUGHT TO THE ATTENTION OF THE IRB ADMINISTRATOR, DR. CAROL DIMINNIE, 915-942-2169.

ANY QUESTION ABOUT THE CONDUCT OF THIS RESEARCH PROJECT SHOULD BE BROUGHT TO THE ATTENTION OF MAURICE G. FORTIN AT 915-942-2222, PORTER HENDERSON LIBRARY, BOX 11013, ASU STA., SAN ANGELO, TX 76909.

APPENDIX B

Code number

QUESTIONNAIRE FOR INTERNET USAGE RESEARCH PROJECT

For each of the following questions please circle one response from the following scale 5=strongly agree, 4, 3, 2, 1=strongly disagree.

- 1.) I use the Internet to gather information for my research activities.
5 4 3 2 1
- 2.) I use the Internet to gather information for my teaching activities.
5 4 3 2 1
- 3.) I use the Internet to gather information for my service activities.
5 4 3 2 1
- 4.) The Internet is the first place I check when researching a topic.
5 4 3 2 1
- 5.) The Internet provides quicker access to information than other information providers.
5 4 3 2 1
- 6.) Researching a topic on the Internet takes more time than I anticipated.
5 4 3 2 1
- 7.) When searching on the Internet for a topic, I need a librarian's assistance.
5 4 3 2 1
- 8.) When searching on the Internet, I need a colleague's assistance.
5 4 3 2 1
- 9.) I feel that I can find the majority (50%+) of the resources I need for my research, teaching, and service information needs from the Internet.
5 4 3 2 1
- 10.) The Internet has become the most important place for me to find information.
5 4 3 2 1
- 11.) More often than not, I can find exactly what I want on the Internet by using a search engine (Yahoo, Alta Vista, Lycos, etc.).
5 4 3 2 1
- 12.) I use the Internet as the primary means (e-mail, listserv, chat rooms, etc.) to stay in touch with my colleagues.
5 4 3 2 1
- 13.) Based on the definition supplied in the cover memo, please estimate the number of hours per week you spend on the Internet.
_____ hours per week

- 14.) How would you rate your ability to use the Internet?
? Expert ? Intermediate ? Novice
- 15.) What is your present classification?
? tenure-track ? tenured

Please use the comments section to indicate your feelings towards the usefulness of the Internet in fulfilling your activities as researcher, teacher, and service provider.

Comments:

Please return the completed questionnaire in the enclosed envelope to Maurice Fortin at the Library. Thanks!!

APPENDIX E

QUESTIONNAIRE RESPONSES

Q1: I use the Internet to gather information for my research activities.										
	5	4	3	2	1	NR ¹	TOTAL	AVG ²	Chi-Sq	Prob.
Tenured	28	17	19	5	0	1	70	3.986	11.886	.008
Tenure-track	26	15	3	0	0	0	44	4.523		
Totals	54	32	22	5	0	1	114	4.195		
Humanities	19	11	7	2	0	0	39	4.205	4.866	.561
Social Sciences	20	10	10	0	0	0	40	4.250		
Sciences	15	11	5	3	0	1	35	4.118		
Totals	54	32	22	5	0	1	114	4.195		
Q2: I use the Internet to gather information for my teaching activities.										
	5	4	3	2	1	NR	TOTAL	AVG	Chi-Sq	Prob.
Tenured	22	25	13	7	2	1	70	3.841	10.421	.034
Tenure-track	25	15	3	1	0	0	44	4.455		
Totals	47	40	16	8	2	1	114	4.080		
Humanities	11	14	10	2	2	0	39	3.769	18.064	.021
Social Sciences	20	17	2	1	0	0	40	4.400		
Sciences	16	9	4	5	0	1	35	4.059		
Totals	47	40	16	8	2	1	114	4.080		
Q3: I use the Internet together information for my service activities.										
	5	4	3	2	1	NR	TOTAL	AVG	Chi-Sq	Prob.
Tenured	9	14	16	16	12	3	70	2.881	7.517	.111
Tenure-track	11	6	15	10	2	0	44	3.318		
Totals	20	20	31	26	14	3	114	3.054		
Humanities	8	7	7	8	9	0	39	2.923	14.385	.072
Social Sciences	7	10	9	11	2	1	40	3.231		
Sciences	5	3	15	7	3	2	35	3.000		
Totals	20	20	31	26	14	3	114	3.054		

¹ NR=no response.

² Even though the responses for questions 1 to 12 are on a nominal scale, numerical averages are provided to provide a quick reference to compare overall opinions.

Q4: The Internet is the first place I check when researching a topic.

	5	4	3	2	1	NR	TOTAL	AVG	Chi-Sq	Prob.
Tenured	14	13	18	15	9	1	70	3.116	9.724	.045
Tenure-track	13	17	7	4	3	0	44	3.750		
Totals	27	30	25	19	12	1	114	3.363		
Humanities	3	10	10	9	7	0	39	2.821	13.146	.107
Social Sciences	14	11	8	6	1	0	40	3.775		
Sciences	10	9	7	4	4	1	35	3.500		
Totals	27	30	25	19	12	1	114	3.363		

Q5: The Internet provides quicker access to information than other information providers.

	5	4	3	2	1	NR	TOTAL	AVG	Chi-Sq	Prob.
Tenured	23	23	15	8	0	1	70	3.884	4.067	.397
Tenure-track	19	15	5	4	1	0	44	4.068		
Totals	42	38	20	12	1	1	114	3.956		
Humanities	8	12	13	6	0	0	39	3.564	23.490	.003
Social Sciences	24	12	2	2	0	0	40	4.450		
Sciences	10	14	5	4	1	1	35	3.824		
Totals	42	38	20	12	1	1	114	3.956		

Q6: Researching a topic on the Internet takes more time than I anticipated.

	5	4	3	2	1	NR	TOTAL	AVG	Chi-Sq	Prob.
Tenured	9	18	19	14	8	2	70	3.088	6.092	.192
Tenure-track	6	6	20	5	7	0	44	2.977		
Totals	15	24	39	19	15	2	114	3.045		
Humanities	5	10	16	3	4	1	39	3.237	11.005	.201
Social Sciences	8	8	8	9	7	0	40	3.025		
Sciences	2	6	15	7	4	1	35	2.853		
Totals	15	24	39	19	15	2	114	3.045		

Q7: When searching on the Internet for a topic, I need a librarian's assistance.

	5	4	3	2	1	NR	TOTAL	AVG	Chi-Sq	Prob.
Tenured	1	7	11	21	27	3	70	2.015	4.621	.328
Tenure-track	1	2	4	11	26	0	44	1.659		
Totals	2	9	15	32	53	3	114	1.874		
Humanities	2	6	5	6	19	1	39	2.105	16.741	.033
Social Sciences	0	3	5	17	14	1	40	1.923		
Sciences	0	0	5	9	20	1	35	1.559		
Totals	2	9	15	32	53	3	114	1.874		

Q8: When searching on the Internet, I need a colleague's assistance.										
	5	4	3	2	1	NR	TOTAL	AVG	Chi-Sq	Prob.
Tenured	2	3	10	18	34	3	70	1.821	2.120	.714
Tenure-track	0	1	8	14	21	0	44	1.750		
Totals	2	4	18	32	55	3	114	1.793		
Humanities	0	3	8	7	20	1	39	1.842	13.837	.086
Social Sciences	1	1	2	17	18	1	40	1.718		
Sciences	1	0	8	8	17	1	35	1.824		
Totals	2	4	18	32	55	3	114	1.793		
Q9: I feel that I can find the majority (50%+) of the resources I need for my research, teaching, and service information needs from the Internet.										
	5	4	3	2	1	NR	TOTAL	AVG	Chi-Sq	Prob.
Tenured	5	17	18	23	6	1	70	2.884	5.455	.244
Tenure-track	2	17	14	7	4	0	44	3.136		
Totals	7	34	32	30	10	1	114	2.982		
Humanities	1	8	9	15	6	0	39	2.564	13.321	.101
Social Sciences	4	15	13	8	0	0	40	3.375		
Sciences	2	11	10	7	4	1	35	3.000		
Totals	7	34	32	30	10	1	114	2.982		
Q10: The Internet has become the most important place for me to find information.										
	5	4	3	2	1	NR	TOTAL	AVG	Chi-Sq	Prob.
Tenured	6	18	19	16	10	1	70	2.913	1.559	.816
Tenure-track	7	11	12	8	6	0	44	3.114		
Totals	13	29	31	24	16	1	114	2.991		
Humanities	0	5	12	12	10	0	39	2.308	28.059	.000
Social Sciences	7	16	13	4	0	0	40	3.650		
Sciences	6	8	6	8	6	1	35	3.000		
Totals	13	29	31	24	16	1	114	2.991		
Q11: More often than not, I can find exactly what I want on the Internet by using a search engine (Yahoo, Alta Vista, Lycos, etc.).										
	5	4	3	2	1	NR	TOTAL	AVG	Chi-Sq	Prob.
Tenured	6	26	24	6	6	2	70	3.294	5.254	.262
Tenure-track	8	15	13	7	1	0	44	3.500		
Totals	14	41	37	13	7	2	114	3.375		
Humanities	4	10	15	7	3	0	39	3.128	17.589	.025
Social Sciences	8	18	13	0	0	1	40	3.872		
Sciences	2	13	9	6	4	1	35	3.088		
Totals	14	41	37	13	7	2	114	3.375		

Q12: I use the Internet as the primary means (e-mail, listserv, chat rooms, etc.) to stay in touch with my colleagues.

	5	4	3	2	1	NR	TOTAL	AVG	Chi-Sq	Prob.
Tenured	25	26	11	4	3	1	70	3.957	3.934	.415
Tenure-track	23	15	3	2	1	0	44	4.295		
Totals	48	41	14	6	4	1	114	4.088		
Humanities	18	16	3	1	1	0	39	4.256	7.223	.513
Social Sciences	19	13	6	1	1	0	40	4.200		
Sciences	11	12	5	4	2	1	35	3.765		
Totals	48	41	14	6	4	1	114	4.088		

Q13: Based on the definition supplied in the cover memo, please estimate the number of hours per week you spend on the Internet.

	Tenured	Tenure-track	Hum	Soc. Scis.	Scis.
1 Hour	1	1	1	0	1
2 Hours	8	2	6	3	1
3 Hours	4	4	5	0	3
4 Hours	7	1	1	3	4
5 Hours	13	5	5	6	7
6 Hours	2	3	1	2	2
7 Hours	2	1	1	2	0
8 Hours	4	2	1	4	1
9 Hours	0	1	0	0	1
10 Hours	20	11	11	14	6
12 Hours	1	1	0	1	1
15 Hours	1	7	4	1	3
20 Hours	4	3	3	2	2
23 Hours	0	1	0	1	0
30 Hours	1	1	0	1	1
NR	2	0	0	0	2
Totals	70	44	39	40	35
Average	7.603	9.909	7.897	9.150	8.455

Overall average for number of hours per week on the Internet: 8.509

T-test value: -2.098 Prob.: .038

ANOVA value: .463 Prob.: .630

Q14: How would you rate your ability to use the Internet?

	Expert	Intermediate	Novice	NR	TOTAL	Chi-Sq	Prob.
Tenured	12	44	13	1	70	3.997	.136
Tenure-track	12	29	3	0	44		
Totals	24	73	16	1	114		
Humanities	4	29	6	0	39	7.281	.122
Social Sciences	8	27	5	0	40		
Sciences	12	17	5	1	35		
Totals	24	73	16	1	114		

APPENDIX F

COMMENTS FROM QUESTIONNAIRE

Comments:³

Humanities-Tenured:

The internet has become an indispensable tool.

I was teaching a course in graduate research when the library suddenly closed last year. I also needed to prepare a professional study on an unfamiliar topic. I was able to survive both experiences without the library and my class did rather well. I'd rather not repeat the experience of librarilessness, though.

The Internet can be useful in terms of keeping up with current events and trends and in communicating with distant colleagues. But, as a research tool, the quality of information (and the limited documentation) varies so greatly from site to site and is often so generic that it is seldom worth the time invested.

I use the Internet a great deal because most of my research is bibliographic, and the catalogue of large university libraries are on-line. For most research in history (my field), however, the Internet is only of some value. Most history cannot be researched on-line.

I am very satisfied regarding the usefulness of the Internet. However, I would like more access to actual tests on line.

It seems to be, overall, still in its infancy or first stages. Much is elementary or introductory. There are security concerns too. I use it primarily for stock information, and for that it is invaluable, worth easily \$1,000+ a year for Yahoo.Quote.Com alone. I gather that most content provided is worth what is paid for it. Some sites offer more than they deliver. (Q8) Usually at home alone, or they don't know . . . Each knows what they specialize in, mostly. . .

It is very useful, especially since some of the texts we use have sites to access more information & links to our lessons, as well as E-mail of homework assignments.

I think the Internet is more effective for teachers more involved with research. I do find a lot of information about composers and song literature.

Humanities-Tenure-Track:

Wonderful resource for hard to find materials/info (like newspapers/ broadcasts/ radio) on language/culture-great for classroom use. Sometimes frustrating and unreliable (info/links to sites expire, etc.)

³ Comments are reproduced with original spellings and punctuation. Each quote begins with a capital letter and ends with a period or punctuation supplied by the respondent.

The internet seems useful as a researcher when I need general information or if I need information from a current news source.

Still learning. I do find it is increasingly more useful for scholarly research.

Detailed information in my field (hands-on-teaching) is hard to come by. General information is somewhat easier. Thanks!

I use the Internet primarily as a source to stay current (i.e. on-line newspapers, e-mags, other news sites).

The Internet has opened many doors for both me & my students. I believe, however, that I need to take a class in Internet use to be able to benefit 100% from its capabilities.

Social Sciences-Tenured:

Internet is very useful. It has potential yet unrealized. It is very time consuming.

I advertised openings on the internet and corresponded with all applicants via e-mail.

There is lots of information, but it is hard to find and often not in a very useable state (e.g. not in good form to download to Excel, Word, etc. The SEC* (*Securities Exchange Commission) data files are a good example.) Often the exact data or subject just can't be found.

I recently attended a conference on technology. I'm trying to learn more.

Internet sources are of increasing importance - - the importance will grow in the future. I also use Internet for classroom support and resources. I will do more of this in the future too!

Great tool.

I wish I had this resource when I was a student. It is a major aid to my work.

Internet usage is increasingly becoming important as a teaching tool – primarily because book publishers are making more material/tools available at their web sites for particular text books.

Major concern is credibility of posted materials/information.

The Internet is essential.

Social Sciences-Tenure-Track:

The Internet makes it 100% easier to stay up to date with current events in my area of expertise.

It is a valuable resource, but much of the research materials I need are only available in published journal form at present.

Excellent source.

The Internet has become an integral part of pedagogy and research activities. Therefore, I rely very heavily on the Internet to assist me in those activities.

Sciences-Tenured:

Per [q.] 11. I only look on the net for things likely to be on the net. Much of the information on the net is biased more than other common sources. Only “true believers” seem to want to take the time to post their information (or misinformation).

Where it has made research easier, it has also expanded the expectations for quality of work. For a tool designed to make research easier the complexity of my work has quadrupled.

I find the Internet to be essential for communication among colleagues regarding research; however I am not confident that it can yet replace traditional means of obtaining information.

My internet usage is primarily to fulfill the teacher role. I have not used it for other activities on a regular basis.

I have not learned how to research on Web. I know a little but I need a lot more directions to begin to understand the interfacing of the data available on the Web.

Moderate to good for research. Still fairly poor for teaching. It contributes to the students poor understanding of peer-review in science.

I need to learn how to research to find faster & more efficiently. I also need to learn how to get only the information/articles/etc. I need & not all the extraneous ones.

Sciences-Tenure-Track:

I like to go to the Internet first, but am very careful about the information source. I do not believe that the Internet is & should be the only source of info-historical & refereed information is still the foundation for my usage.

[Q. 9] This would be true if ASU had enough electronic journal subscriptions. [In general] If ASU gets more electronic journal subscriptions in my area, I would surely be able to do more productive research, garnering much more financial support for the university.

I do use library databases to find information all of the time, but I am not classifying that as the "internet." When I think of the internet, I usually think of home pages and search engines like Yahoo.

The internet is, so far, no substitute for books. It is an impressive communications medium, but is not going to supplant my book research any time soon.

Although the Internet is extremely information-heavy, this is also a drawback to using it. Wading through a quagmire of information, both useful and ridiculous material included, can be time-consuming and fruitless. It is also difficult to teach students to be discerning about the information.

Using Agricola data base on the internet has fulfilled my research needs.

The Internet is a remarkable tool for communicating with colleagues and provided (nearly) instant access to an astounding amount of information. I believe that it is a resource that is currently grossly underutilized (especially in teaching).

I find the internet extremely useful. I would not be able to do my job effectively without it.

I am a science based researcher. Although the Internet is very useful to find journal articles, some basic information for research & teaching can be better utilized from text books because it is organized. The Internet is valuable for supplemental info to the text.

The internet is a fast way to find some information on a topic. It is not necessarily a fast & inexpensive way to find authoritative information.

APPENDIX G

E-MAIL INVITATION TO POTENTIAL INTERVIEW SUBJECTS

To: [faculty member's E-mail address]
From: Maurice Fortin <Maurice.Fortin@angelo.edu>
Subject: Internet Usage Research Project – Interview

Maurice G. Fortin
Library Director
Porter Henderson Library

Date: 10 April 2000

Memo

To: [Faculty member's name]

Re.: Internet Usage Research Project – Interview

I am asking for your help once again on a research project studying faculty members' usage of the Internet. Thank you for completing and returning the questionnaire. As I indicated in the original cover memo, the questionnaires were coded to identify potential candidates for a follow-up interview. Your participation and responses will be kept confidential. The interview transcripts will remain within my possession. This data will be stored either in a locked desk drawer or lockable steel case in my office. Upon completion of the project, all notes and transcripts will be destroyed. If you agree to participate, you will be asked to complete an informed consent document. The interview should not take more than one hour to complete.

I would like to arrange with you a convenient time and place for the interview. Please contact my secretary, Ellen Everett, at 942-2222 ext. 221 to arrange a time for the interview. I would like to conduct the interviews sometime between the weeks of April 17th through May 5th. If you choose to do so, you are not required to participate in the interview portion of the research project.

This research project has the approval of the University of North Texas' Institutional Review Board for the Protection of Human Subjects in Research (940-565-3940) and from Angelo State University's Institutional Review Board (915-942-2169).

APPENDIX I

INFORMED CONSENT DOCUMENT

Maurice G. Fortin
Library Director
Angelo State University

INFORMED CONSENT DOCUMENT Participating in Semi-Structured Interviews

Project Title: Faculty Use of the World Wide Web: Modeling Information Seeking Behavior in a Digital Environment

Investigator: Maurice G. Fortin, Library, 915-942-2222

You are being asked to participate in a research project involving semi-structured interviews conducted through Angelo State University and the University of North Texas. Both Universities require that you give your signed agreement to participate in this project.

The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask him any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher any questions you may have.

If you then decide to participate in the project, please sign on the last page of this form in the presence of the person who explained the project to you. You should be given a copy of this form to keep.

1. Nature and Purpose of the Project: Most of the existing models of information seeking by faculty members were developed before the availability of the Internet. This research proposal will study faculty members at a Master's I university (Angelo State University) and attempt to determine if the Internet searching behavior of Master's I university faculty members varies from Ellis' Behavioral Model of information seeking by faculty members. If the behavior does vary, then these variances will be described and modifications will be suggested for the Ellis Model. The research design will yield information on how faculty members at a Master's I

university use the Internet in their roles of researcher, teacher, and service provider. Additional purposes will be to determine the criteria faculty members use to determine a useful web site and the differences in usage between tenure-track and tenured faculty members. This study will use a combination of quantitative and qualitative methodologies to gather data necessary to answer the proposed research questions.

2. **Explanation of Procedures:** The research will be conducted in the following phases. Phase one involved collecting quantitative data. A questionnaire was to all tenure-track and tenured faculty members at Angelo State University. You previously returned one of these questionnaires. The questionnaire was designed to solicit tenure-track and tenured faculty members' opinions concerning the Internet's usefulness for assistance in finding information to complete research, communicating with colleagues, teaching and service activities, and frequency of use. The "Comments" section allowed you to supply additional information concerning your views on the Internet's role in aiding your work as a researcher, teacher, and service provider. Based on the responses from the returned questionnaires you were selected by using theoretical sampling techniques for an in-depth, semi-structured interview.
3. **Discomfort and Risks:** Individuals participating in the interview portion of the project will not be subject to any "risks." All they will need to do is give up approximately one hour to participate in the interview.
4. **Benefits:** For participating in the interview portion of the project, you will receive coaching to improve your Internet searching skills. This proposed study will add to the existing understanding of the uses faculty members currently make of the Internet to aid in their research, teaching, and service roles in higher education institutions. Librarians and other information providers must have recent and continuous research on how their patrons access information and which sources and mediums (print, microform, and electronic) they use to fulfill their information needs. Higher education administrators must gain knowledge of how technology is transforming the classroom and the curriculum.
5. **Confidentiality:** All interviews will take place in a private room, the investigator's office, or the faculty member's office. The interview transcripts will remain within the investigator's office. This data will be stored either in a locked desk drawer or lockable steel case in his office. Upon completion of the project, all notes and transcripts will be destroyed.
6. **Refusal/Withdrawal:** Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time without penalty.

Participant Signature: _____

Date: _____

Witness Signature: _____

Date: _____

ANY QUESTIONS REGARDING THE CONDUCT OF THE PROJECT OR
QUESTIONS PERTAINING TO YOUR RIGHTS AS A RESEARCH SUBJECT,
OR RESEARCH-RELATED INJURY SHOULD BE BROUGHT TO THE
ATTENTION OF THE IRB ADMINISTRATOR, DR. CAROL DIMINNIE, 915-
942-2169.

ANY QUESTION ABOUT THE CONDUCT OF THIS RESEARCH PROJECT
SHOULD BE BROUGHT TO THE ATTENTION OF MAURICE G. FORTIN AT
915-942-2222, PORTER HENDERSON LIBRARY, BOX 11013, ASU STA., SAN
ANGELO, TX 76909

APPENDIX J
INTERVIEW GUIDE

For what purposes do you use the Internet?

What are the primary Internet information sources you use for research, teaching, and service activities?

Do you use listservs or e-mail discussion lists to test your findings or conclusions?

Why do you use the Internet for finding information?

Compare/Contrast searching for information on the Internet with using a library or other traditional information providers.

What types of Internet assignments do you give your students?

Has the Internet changed your teaching style, syllabus and/or education objectives for your courses, testing methods, etc.?

If you use Internet search engines, which ones do you use and why?

What do you find useful about using search engines? If they are not useful, why?

What criteria or factors do you use to distinguish a useful Internet site?

Do you follow up links embedded in homepages?

How do you decide which links to follow and when to stop?

How do you decide which links to cite in your own work?

How do you use the Internet in committee work or other service activities?

Tell me about your experiences searching the Internet (the good; the bad; and the ugly).

When using the Internet, what is the most difficult problem you experience in looking for material or keeping up to date?

What other problems do you have with searching the Internet?

How long have you been using the Internet?

How did you learn to use the Internet?

Any other comments?

APPENDIX K
SUMMARY OF INTERVIEW RESPONSES BY
TENURE STATUS AND DISCIPLINE AREA⁴

Comment area	Ten. ⁵		Humanities		Soc. Scis		Sciences	
	Ten.	TT	Ten.	TT	Ten.	TT	Ten.	TT
Gathering Info.	28	33	12	9	9	13	7	11
Validating	19	12	9	1	5	7	5	4
Linking	9	10	4	1	4	7	1	2
Monitoring	8	9	3	1	2	2	3	6
Communicating	9	16	4	3	1	4	4	9
Mentoring	17	9	6	3	3	5	8	1
Classroom activities	25	19	8	3	7	9	10	7
General frustrations	7	8	4	3	2	3	1	3
Information overload	6	8	1	0	3	4	2	4
Internet access & convenience	9	13	4	2	2	7	3	4
Internet content & coverage ⁶	12	8	5	5	4	0	3	3
Internet ease of use	3	11	1	2	1	6	1	3
Internet speed	6	6	4	2	1	5	1	1

⁴ If the comment pertained to more than one comment area, the comment was counted more than once.

⁵ Ten.=Tenured; TT=Tenure-track.

⁶ The comments concerning Internet content and coverage were evenly split between positive and negative.

Comment area	Ten.	Humanities		Soc. Scis		Sciences		TT
		TT	Ten.	TT	Ten.	TT	Ten.	
Personal use	5	4	3	0	2	2	0	2
Service activities	8	3	4	1	2	0	2	2
Techno problems	2	7	1	2	0	3	1	2
Time problems	3	2	1	1	0	0	2	1
Miscellaneous ⁷	5	3	1	0	2	2	2	1

⁷ This includes problems with accessing porn sites, cost effectiveness of searching the Internet, and broadening the ability to search to topics.

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“Monitoring.” There were two parallel stages included in the model. These parallel stages were “Communicating” and “Mentoring.”

The Internet Information Seeking Activities Model was compared to the behavioral model of information seeking by faculty members developed by Ellis. The Internet Model placed a greater emphasis on validating information retrieved from the Internet. Otherwise there were no other substantive changes to Ellis’ model.