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# Information-seeking Behavior of Social Sciences and Humanities Researchers in the Internet Age

Xuemei Ge

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To the Graduate Council:

I am submitting herewith a thesis written by Xuemei Ge entitled "Information-seeking Behavior of Social Sciences and Humanities Researchers in the Internet Age." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Information Sciences.

Peiling Wang, Major Professor

We have read this thesis and recommend its acceptance:

Carol Tenopir, Kendra Albright

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Carol Tenopir

Kendra Albright

                                            Accepted for the Council:

                                            Anne Mayhew
                                            Vice Chancellor and
                                            Dean of Graduate Studies

(Original signatures are on file with official student records.)

# INFORMATION-SEEKING BEHAVIOR OF
# SOCIAL SCIENCES AND HUMANITIES RESEARCHERS
# IN THE INTERNET AGE

**A Thesis Presented for the**
**Master of Science**
**Degree**
**The University of Tennessee, Knoxville**

**Xuemei Ge**
**December 2005**

# DEDICATION

This thesis is dedicated to my beautiful daughter, Emily Shen, who needed me when I was not there.

This is also dedicated to all those who helped to make this thesis a reality.

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# ABSTRACT

This study focuses on how Internet technology influences and contributes to the information-seeking process in the social sciences and humanities. The study examines the information-seeking behavior of faculty and doctoral students in these fields and observes and extends Ellis's model of information-seeking behavior for social scientists, which includes six characteristics: *starting, chaining, browsing, differentiating, monitoring, and extracting.*

The study was conducted at Tennessee State University. Thirty active social sciences and humanities faculty and doctoral students were interviewed about their use of Internet resources, their perception of electronic and print materials, and their opinions concerning the Ellis model and how it might be applicable to them. The research confirmed all the continuing relevance of all characteristics of the Ellis model, and theorized that an extended model could potentially include two additional characteristics: *preparation and planning* and *information management.*

Based on the interview results, the researcher provides suggestions on how current information services and products can be improved to better serve social sciences and humanities researchers, discusses the implications of these new characteristics for information-searching needs, and makes recommendations for improving library services and technologies that will meet the needs of future social sciences and humanities scholars.

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# CHAPTER 1

# INTRODUCTION

## Statement of the Topic

"Information-seeking" is a term describing the ways individuals seek, evaluate, select, and use information. In the course of seeking new information, the individual may interact with different people, analog tools, and computer-based information systems (Wilson, 2000). Information seeking is a process in which humans engage in order to advance and potentially alter their state of knowledge. It is also an important cognitive function related to learning and problem solving, sometimes thought of as a "higher cognitive process" (Marchionini, 1995). The behavior is one of the most important research areas in library user studies and is affected by different factors.

"Information-seeking behavior" is different from the actual "information need." The "information need" is a subjective, relative concept in the mind of the experiencing individual (Wilson and Streatfield, 1981), and is defined as the "recognition of the existence of uncertainty" (Krikelas, 1983). Information-seeking behavior which results from the recognition of some need (Wilson, 1981) is defined as "any activity of an individual that is undertaken to identify a message that satisfies a perceived need" (Krikelas, 1983).

Studies of researchers' information-seeking have revealed similarities and differences, but the crucial fact remains that knowledge of information-seeking behaviors of social sciences and humanities researchers is crucial for meeting their information

needs. This knowledge can be used to enhance existing information models, or even develop new ones. Modern modes of technology have changed the information environment in which the social sciences and humanities researchers work. The pursuit of knowledge has been revolutionized, mainly through the vast expansion of accessible data, especially electronic resources, available via the Internet.

The electronic resources examined in this study include:

1. *Electronic mail*: transmission of letters and other documents form one computer to another through a telecommunications network (Keenan, 2000).

2. *Listserv*: a widely used, US-originated, mail server program frequently used when setting up Mailing lists (Prytherch, 2000).

3. *Web*: Short name of the World Wide Web (WWW), which is a network of a vast and growing number of information servers. It covers information on many different subject areas in many forms (Keenan, 2000).

4. *FTP (file transfer protocol)*: a function that permits the logging on to a remote computer host, the location of publicly available files (e.g. electronic texts, programs, graphics files) and the downloading of those files to the home machine (Prytherch, 2000).

5. *Online catalog*: up-to-date and complete list of a library's holdings accessible via a computer terminal (Keenan, 2000).

6. *Electronic journal*: usually an electronic counterpart to a conventional printed journal. Some electronic journals do not have a printed equivalent (Keenan, 2000).

7. *Database*: file or systematically organized collection of bibliographic references or unit records representing original items, published literature or other recorded material; data that is stored in some form (usually electronic) which can be retrieved and manipulated; a collection of information that can be organized in some way (possibly very simply) to facilitate storage and retrieval of individual items. Today this implies computer storage, but could include card indexes (Keenan, 2000).

8. *Portal*: gateway to the web, which is often subject-specific, that includes a search engine, other links to relevant sites, a new service, e-mail and chat groups, as well as a list of search hits (Keenan, 2000).

David Ellis (Ellis, 1989) proposed a behavior model of information-seeking behavior based on observations of social scientists. The model depicts six fundamental characteristics of information-seeking:

*Starting*: activities in the initial search for information.

*Chaining:* following "chains" of citations or references.

*Browsing:* casually looking for information in areas of interest.

*Differentiating:* using known differences as a way of filtering the amount of information obtained.

*Monitoring:* keeping abreast of developments by regularly following selected sources.

*Extracting:* activities associated with going to particular sources and selectively identifying relevant material.

The present study was conducted to discover how technology contributes to the current information-seeking process; and to explore the applicability of David Ellis's model in the electronic information environment.

## Research Purpose and Significance

This study seeks to understand how Internet technologies affect the information-seeking processes in the social sciences and humanities, and to observe and develop a fuller description of the work of David Ellis. The results of this study can provide suggestions on how current information services and products can be improved to better serve social sciences and humanities researchers in their information seeking.

In an information world changed by the Internet, it would seem prudent to carry out new studies on the information-seeking behavior of these important user groups. An update of Ellis's model is important because the model was developed prior to the Internet, and the conclusions were based primarily on a sample of researchers from a university in the United Kingdom. It is important to know how information technology contributes to information-seeking activities, and if there are new information-seeking activities that are being brought about by changes in information technology. If so, what are these activities, and what implications do they hold for the enhanced design of information services and systems? Researchers use tools that are available and adapt them to their needs. The next generation of library services and technology should attempt to incorporate such adaptations.

In today's electronic information environment, an understanding of the information-seeking behavior of social sciences and humanities researchers is important to the success of information professionals. Such an understanding could theoretically assist them to be more effective in designing and providing information services. Furthermore, information professionals must also be aware of how the information-seeking behavior of social sciences and humanities researchers is changing. Studies that provide clues on how social scientists and humanists might use electronic resources are needed. Understanding such behavior should help librarians and other information professionals design services and products, which transmit the requisite information most effectively. Such different needs in turn may necessitate offering services like user education and customizing search services in academic libraries. With insights into information-seeking behavior, libraries can determine their effectiveness as providers of

information to constituent groups. Libraries need to provide new services, redesign study and research facilities, and acquire collections that will meet the needs of future social sciences and humanities researchers. Knowledge generated by studies of information-seeking behavior can help develop information services and systems to assist the researcher as he/she navigates this new data rich environment.

## Research Questions

This study will address the following research questions:

1. What roles do Internet technologies play in social sciences and humanities researchers' information-seeking?

2. How do social sciences and humanities researchers use Internet information resources in their information-seeking?

3. Which factors affect use of Internet information resources?

4. To what extent is Ellis's behavior model applicable to the electronic information environment?

# CHAPTER 2

# LITERATURE REVIEW

## Introduction

The newer studies about information-seeking behaviors of social sciences and humanities incorporate the older research and provide more relevance to information-seeking behaviors in the electronic information environment. Research findings about social scientists and humanists' use of electronic resources vary. More recent studies show an increase in the use of electronic resources. For clarity and brevity, the literature review section is composed of five sections: information seeking in the social sciences, information seeking in the humanities, comparisons of social sciences and humanities information seeking behaviors, models on the information seeking of social sciences and humanities researchers, and the Ellis model and subsequent related studies, especially those which focus on electronic information resources.

## Information Seeking in the Social Sciences

Few significant studies of information-seeking behaviors in the social sciences were undertaken before the 1960s. It was not until the growth of newer disciplines in the social sciences (particularly "softer" sciences such as Sociology) did clear differences between the sciences and social sciences begin to emerge and gain recognition. Appel and Gurr report on the "bibliographic needs of social and behavioral scientists" (Appel and Gurr, 1964) that social scientists avoid formal bibliographic tools, and rely primarily

on informal contacts and citations in books and articles as their chief means of attaining relevant information. The authors concluded that the data strongly suggest that only a few forms of bibliographic organization are widely regarded as satisfactory (Appel and Gurr, 1964). The authors point out that this phenomenon is not necessarily the fault of librarians or the bibliographic tools. The problem is compounded by the chaotic fashion in which social scientists look for information. Luck seems to play a disproportionately important role in the process.

This hypothesis is crucial in another early inquiry about the literature searching methods in the social sciences, by L. Uytterschaut. No relationship was found between the research procedure and the subject being investigated: instead, the research strategy was largely determined by the number of years the subject had conducted research. The inexperienced beginner is likely to dig through "all sorts of library and documentary material with no objection to time-consuming and redundant work" (Uytterschaut, 1966), while the experienced attempts to "avoid redundancy at the outset" by relying on his or her own "experience and knowledge of documentation" (Uytterschaut, p.25). While both beginner and experienced researcher preferred to work independently, experienced faculty were more critical of bibliographic tools, calling them time-consuming and ineffective. Faculty generally failed to recognize bibliographic tools such as indexes as relevant for discovering new information. Instead they looked upon the library as "some kind of central browsing room" (Uytterschaut, p.25) by which they could locate materials through their own devices.

The understanding of how social scientists use information took a quantum leap forward as a result of groundbreaking studies done at the University of Bath in England

from 1968 to 1971 when the massive INFROSS (Investigation into Information Systems in the Social Sciences) project sampled some 1,100 social scientists by questionnaire and interviewed 75 researchers and 50 practitioners under the leadership of Maurice Line (Morrison, 1979). The results of these studies formed the basis for DISISS (Design of Information Systems in the Social Sciences) and EISISS (Experimental Information Service in the Social Sciences). The five volumes of "INFROSS" reports are important and are the most cited. The INFROSS studies are significant because they not only characterize the information needs of social scientists extensively for the first time, but also argue that these needs are distinct from those in the natural sciences.

Line classified disciplines into "hard" and "soft" ones on the basis of their factual and conceptual content and concluded that knowledge in social sciences does not grow by accumulation of new discoveries, but more by gradual growth in understanding concepts (Line, 1971, 1973). Because social sciences structure and terminology are unstable, and because they are concerned with matter which is not merely current but constantly shifting, they differ fundamentally from the hard natural sciences (Line, 1971).

Cronin examines the well-documented phenomenon of information transfer within invisible colleges, with particular attention to the social sciences. He observes that invisible colleges exist primarily for two purposes: 1) to ensure that participants in networks are able to keep abreast of current developments and 2) to reinforce the group's sense of identity and purpose. Noting that "boundary spanning is commonplace in the social sciences" and that "social sciences are a more variegated population than physical or natural sciences" (Cronin, 1982, p. 230), Cronin admits that generalizations about informal communication networks may be too simple, and "a number of comparative

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studies to identify the particular information needs and information-seeking habits of different categories of social scientists could be profitably instituted" (Cronin, 1982, p.230).

Another groundbreaking study was conducted by the Office of Scholarly Communications and Technology of the American Council of Learned Societies (ACLS), which distributed a survey to 5,385 scholars targeting seven disciplines in the humanities and social sciences. The study reports on faculty use of libraries, computers, and scholarly publications, including utilization of on-line databases, OPACS, and other library services. The survey showed more faculty were conducting on-line literature searches, often with the assistance of a librarian. Even in 1985, one in five researchers used remote access to connect to the institutional library's on-line catalog (at the time 37% of them were using computers to perform statistical analysis, and 11% were using e-mail) (Morton and Price, 1985).

Hurych investigated the behavior of social scientists within the context of on-line searching as a corollary to INFROSS. The results at the time indicated that the information needs of social scientists at that point remained relatively unchanged. They tend to understand the scope of their requests and can generally express or define their search subjects. A high percentage of "online searches in the social sciences were retrospective, including more than ten years" (Hurych, 1986). Social scientists use more types of databases than researchers in other disciplines, requesting a raw total of 55.2 different databases, as opposed to 11.5 in the natural sciences, and 9.5 in the humanities (Hurych, 1986), reflecting the wide scatter of materials in the discipline. Citing social scientists' clear lead in the number of databases used, Hurych concludes that social

scientists have much to gain by using on-line systems to maintain current awareness. Folster reviewed social scientists' information-seeking patterns and found that social scientists prefer journal articles to books, prefer the "chaining" process of following citations rather than using indexes, and generally don't find librarians helpful (Folster, 1995).

Since the early 1990s, the widespread usage of computers and explosive growth of electronic resources changed the way many social sciences researchers do their research. Naturally information professionals began to explore how these technologies affected their information-behaviors. The *SuperJournal* project was a series of studies of e-journal usage by natural and social scientists that began in 1995 in the United Kingdom in response to the information explosion and limited budgets. The researchers used a variety of research methods to study how nature and social scientists interact with e-journals, and what features they value. *SuperJournal* found that users vary in their patterns of use, depending on their subject discipline and status. Social scientists tend to retrieve recent articles of interest through vertical chaining (going from table of contents, to abstract, to full-text). *SuperJournal* researchers concluded that social scientists seemed to be more task-driven, visited the library less often than scientists, used databases in the library without mentioning any particular database, and expressed less anxiety about keeping up to date (Tenopir, 2003A).

Tenopir and King also studied the use of electronic journals and found that traditional scholarly journals continue to be the single most important information source for scientists and social scientists (Tenopir and King, 2000). In Tenopir's study about electronic publishing (Tenopir, 2003B), the author finds that journals may still be

delivered on paper (in fact, a vast majority still use print-on-paper as at least one option), but may also be delivered digitally, either directly from the publisher or through an aggregator such as LexisNexis, ProQuest, or OCLC. Collection development policies for journals now often favor online versions of journals over print.

Stoan observed that social scientists were more frequent database users than natural scientists, but Stoan also found that Internet resources were still not widely used by social scientists due to not understanding the resources and technology (Stoan, 1991). Shoham found that about 50% of Israeli social scientists use computer databases (Shoham, 1998). Another study found that 64% of Canadian social scientists using government statistics preferred to access them electronically (Nilsen, 1998). A study of Brazilian social sciences researchers found that although print resources are still the most frequently used resources; electronic resources are becoming increasingly popular. Access to networked computers is the main obstacle to the use of databases and other electronic resources (Costa and Meadows, 2000).

Francis in a recent article focuses on a study which describes the information-seeking behavior of social sciences faculty at a University in West Indies (UWI) (Francis, 2005). One finding of the study is that the social scientists show a preference for journal articles in electronic format over print, which is an indicator that they have embraced electronic publishing and electronic access capabilities. Foster and Ford's paper about the empirical study for the information-seeking behavior of interdisciplinary scholars considered the nature of serendipity in information-seeking contexts, and reinterprets the notion of serendipity as a phenomenon arising from both conditions and strategies (Foster and Ford, 2003).

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## Information Seeking in the Humanities

There were little early studies about the information-seeking behavior of humanists. Although some researchers have pointed out that humanists may have their own information-seeking patterns, researchers have usually included humanities, more or less with the social sciences in their studies (Urguhart, 1960).

The portrait of the humanities scholar drawn by Stone included the characteristics of working alone, needing to browse collections, and adopting a variety of approaches to identifying material. Stone found that books and journals were cited as the most frequently used research material with conflicting evidence as to which is used more heavily. Original material of whatever date appeared to be more important than current material. Bibliographies, indexes and guides, abstracts and databases were the chief secondary services to which humanities researchers turned in identifying research material. She suggested that computers and related technologies would become more important in the future because such tools make humanities researchers think through what they want, forcing them to define ideas and concepts into more precise language (Stone, 1982).

Line speculated that there may be similarities between the humanities and the natural sciences, based on the factuality and stability of the subject matter which the humanists study (cited in Hurych, 1986). Tibbo found that scholars in the humanities use a wide variety of textual, graphic, and aural materials in their research. Research into the nature of these materials and humanists' information seeking behaviors indicate that indexing and surrogation models from the sciences are no longer adequate to meet the

humanist's information access needs. New controlled vocabularies and indexing

frameworks that reflect the nature of humanistic scholarship are needed (Tibbo, 1994).

Watson-Boone found that studies of the research methods of academic humanists

indicate they typically work alone and interact with research materials with a grazing

methodology. She found that humanities researchers prefer to use references in primary

sources rather than bibliographic tools or other secondary services (Watson-Boon, 1994).

Bates also found that humanities researchers did not use indexes and abstracts or consult

librarians (Bates, 1996).

Others, like an empirical study of historians and electronic text files by Case,

found that metaphors and subjective categories were frequently applied to documents

collected and created by referent historians. Spatial configuration and document-form

were often considered before topics, in determining document storage locations in the

office (Case, 1991A). Case found that historians choose topics mainly based on past

interests. Investigations were guided less by sources and more by questions or problems

that led them to particular sources. All respondents used computers in some aspects of

their research (Case, 1991B).

Ellis and Oldman's study explored the extent to which the information-seeking

behavior of researchers active in the field of English Literature in the universities of the

UK in the Internet age (Ellis and Oldman, 2005). The article concluded with

recommendations for further study of the use of electronic resources in relation to

information literacy and browsing and other facilities for subject access on the Internet.

**Comparative Studies of Social Scientists and Humanists Information-Seeking Behaviors**

Information science researchers have always been interested in investigating disciplinary differences. Thus there are fortunately several studies on the information-seeking and information use in the social sciences and humanities. Cheng compares humanities' information-seeking behavior with the social scientists in the study of information seeking behavior of the humanists in Taiwan (Cheng, 1992). The paper concludes that humanists' information-seeking behavior is different from those of social scientists mainly because humanists work independently, are concerned with achievements which make up a cultural heritage, and rarely conduct research under tight deadlines. Because the databases of the humanities are few, and coverage inadequate, humanists do not regard information retrieval systems as being useful. Books are the materials most often used.

Ucak, in a recent paper on information needs and information-seeking behaviors of scholars at a Turkish university, concludes that regardless of nationality, information-seeking behavior is largely dependent on the scholar's discipline. Social scientists prefer books to periodicals, but they also follow periodicals more than humanities scholars (Ucak, 1998). It is important to point out that social scientists admit a lack of familiarity with the electronic retrieval systems, and that this is an impediment to their finding the information they seek. No such reservations were voiced by the humanities scholars in their study. In contrast, Romanos de Tiratel investigated the information-seeking behavior of Argentine humanities and social sciences scholars, and found no substantial

differences between them, concluding they have similar information-seeking behaviors (Romanos de Tiratel, 2000).

## Research Models for Information Seeking

Models typically focus more on limited problems than do theories, and sometimes may precede the development of formal theory (Case, 2002). Wilson in a recent paper (Wilson, 1999) reviews models for information behavior (Wilson, 1981), information seeking behavior (Wilson, 1981, 1996; Dervin, 1983, 1986; Ellis, 1989, 1993; Kuhlthau, 1991, 1993), and information searching or retrieval (Ingwersen, 1996; Saracevic, 1996; Belkin, 1995; Spink, 1997). There are several models that relate to information seeking behavior: Wilson's model of information behavior (Wilson, 1981); Dervin's sense-making theory (Dervin, 1983,1986), Ellis's behavioral model of information search strategies (Ellis, 1989; Ellis, Cox and Hall, 1993), Kuhlthau's model of stages of information-seeking behavior (Kuhlthau, 1983, 1991,1993), and Wilson's 1996 model, which expands his 1981 model through an analysis of the research in fields other than information science (Wilson, 1996,1997). Ellis's behavioral model of information search strategies (Ellis, 1989) is significant on its own, and it has strong similarities with other influential models.

Both Ellis's and Kuhlthau's models were created based on empirical research and concerned with the information-seeking patterns conducted during the actual search activity. Kuhlthau's model of the stages of information-seeking behavior includes six stages *(*Kuhlthau, 1991; Swain, 1996): 1. *Task Initiation*: prepare for the decision of selecting a topic. 2. *Topic Selection*: decide on topic for research. 3. *Prefocus*

*Exploration*: investigate information with the intent of finding a focus. 4. *Focus Formulation*: formulate focus from the information encountered. 5. *Information Collection*: gather information to define, extend, and support focus. 6. *Search Closure*: conclude search for information. Although Kuhlthau doesn't claim her process to be linear, she presents the model as stages based on her analysis of behavior. Kuhlthau also attaches the feelings, thoughts, tasks, and actions associated with each stage. For example, at "initiation", when a person first becomes aware of a lack of knowledge or understanding, feelings of uncertainty and apprehension are common. At this point the task is merely to recognize a need for information. Thoughts center on contemplating the problem, comprehending the task, and relating the problem to prior experience and knowledge. Actions frequently involve discussing possible topics and approaches. Ellis doesn't present the characteristics in his model as stages, but rather elements of an information-seeking process that may happen in different sequences for different persons, or for the same person at different times. Ellis also suggests that the sequences of behavior in his model may vary.

Wilson's model of information behavior organizes the concepts *of information need*, *information seeking*, *information exchange*, and *information use* into a flow diagram that can be seen as the behavior of an individual faced with a need to find information (Wilson, 1981). The model suggests that information-seeking behavior arises as a consequence of need. In order to satisfy the need, the user makes demands upon various sources or services, which results in success or failure to find relevant information. If successful, the individual makes use of the information, and may be either satisfy or unsatisfied, and if unsatisfied may have to repeat the process. Part of the

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information-seeking behavior may involve other people through information transfer. Information perceived as useful may be passed to other people. Wilson also proposes a second model in the same paper regarding the circumstances that give rise to information-seeking behavior. The model suggests how information needs arise and what may prevent the search for information. It implicitly includes hypotheses about information-seeking behaviors that need to be tested. In 1986 Wilson expanded his 1981 model, drawing upon research from fields other than information science. He expanded his range of factors to include the psychology, demography, and interpersonal, and environmental and characteristics of the participants.

Wilson presents an outline of models of information-seeking and other aspects of information behavior, showing the relationship between communication and information behavior in general with information-seeking and information-searching in information retrieval systems (Wilson, 1999). It is suggested that these models address issues at various levels of information-seeking behavior, and that they can be related by envisaging a 'nesting' of models. Alternative models address similar issues in related ways and the models are complementary rather than conflicting. Wilson suggests that Ellis's behavioral model is a set of activities in what Kuhlthau calls 'collection' and that all three of these models are nested within Wilson's 1996 model of information-seeking behavior in general.

### The Ellis Model and Subsequent Related Studies

Earlier studies of information-seeking behavior in the social sciences focus primarily on the types of materials social scientists use, and the methods used to obtain

them. They concentrate more on the type of materials needed (e.g. books vs. articles, foreign language materials vs. English) rather than constructing models of information-seeking behavior. Representing a different paradigm, David Ellis was the first to model the process of information-seeking behavior of social scientists -- how they search for and interact with the materials, as opposed to the sources they use and the manner in which material is obtained. Ellis's model is based on the "perceptions of academic social scientists of their own information-seeking activities, from their point of view, and as a whole" (Ellis, 1989, p.172). Ellis describes six fundamental characteristics of information-seeking used by social scientists:

> *Starting*: activities characteristic of the initial search for information, such as identifying references that could serve as starting points of the research cycle. Identified references often include familiar sources that have been used before, as well as less familiar references that are expected to provide relevant information. Often, starting activities include asking colleagues or consulting literature reviews, online catalogs, indexes, and abstracts.

> *Chaining:* following "chains" of citations or other forms of referential connection between materials or sources identified during "starting" activities. Chaining can be backward or forward. Backward chaining takes place when references from an initial source are followed; forward chaining identifies and follows up on other sources that refer to an initial source of document (e.g., citation indexes).

> *Browsing*: casually looking for information in areas of interest. It not only includes scanning of published journals and tables of contents, but also of references and abstracts from retrospective literature searches.

> *Differentiating*: using known differences (e.g., author and journal hierarchies) as a way of filtering the amount of information obtained.

> *Monitoring*:  keeping abreast of developments by regularly following selected sources (e.g., core journals, newspapers, conferences, magazines, books, and catalogs).

> *Extracting*: activities associated with going to particular sources and selectively identifying relevant material. (e.g., sets of journals, series of monographs,

collections of indexes, abstracts or bibliographies, and computer databases) (Ellis, 1989).

These are characteristics, not necessarily stages, in the information retrieval process -- as Ellis states, "starting may lead to chaining, differentiating may play a role in identifying sources for monitoring, or extracting may complement monitoring" (Ellis, 1989, p. 179). Ellis noted the reason for this flexibility, observing that information-seeking patterns depend on the individual characteristics of the person, and emphasized that the study was designed to create flexible Information Retrieval (IR) systems.

Starting refers to information-seeking patterns of researchers beginning work in a new area. Starting comprises those activities that form the initial search for information, identifying sources of interest that could serve as starting points of the search. The key to this phase's success is contacting colleagues and consulting indexes to identify sources from which to start the next process - the chaining.

Chaining refers to following up chains of citations or other forms of referential connection between materials or sources identified during "starting" activities. Ellis notes that use of indexing and abstracting services "was not heavy, and confirms the frequent observations... that relatively low importance is attached to this means of locating information" (Ellis, 1989, p. 181). Far more important was the process of chaining, or following up references in publications. This was "a major characteristic of the social scientists' information-seeking patterns. All those interviewed made some mention of it, and many employed it as their principle means of gathering information" (Ellis, 1989, p.183). Noting that social scientists are often "very selective in the references they follow up" (Ellis, 1989, p.186), Ellis characterizes chaining as an interpretive process, not

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merely a random one. He concluded that in terms of IR design, chaining is best left up to the searcher.

Browsing is defined as "semi-directed or semi-structured searching in an area of potential interest" (Ellis, 1989, p.187). Particularly important was the option of browsing the tables of contents in primary journals, in a fashion reminiscent of Current Contents. During browsing, the individual often simplifies browsing by looking through tables of contents, lists of titles, subject headings, names of organizations or persons, abstracts, summaries, and so on.

Differentiating involves "identifying different sets of sources in terms of the differing probability of their containing useful material" (Ellis, 1989, p.192). During differentiating, the individual filters and selects from the sources scanned by noticing differences between the nature and quality of the information offered. The differentiation process is likely to depend on the individual's prior or initial experiences with the sources, recommendations from personal contacts, or reviews in published sources.

Monitoring is an activity limited to those people following developments in specialized areas. It involves investigating developments within a discipline. It is the activity of keeping abreast of developments in an area by regularly following particular sources. The individual monitors by concentrating on a small number of the perceived core sources. Core sources vary between professional groups, but usually include both key personal and professional publications. Cultivating informal contacts and scanning primary journals are important components of this process.

Finally, extracting refers to "the activity of going through a particular source selectively identifying relevant materials from that source" (Ellis, 1989, p. 198). This

activity resembles a kind of focused monitoring, and is employed by persons consulting

primary sources in their areas of expertise. As a form of retrospective searching,

extracting may be achieved by directly consulting the source, or by indirectly looking

through bibliographies, indexes, or online databases.

Ellis concludes by noting how his findings could be potentially incorporated into

a flexible information retrieval system. He expected that to incorporate hypertext links,

bibliographic descriptions, citation searching capabilities, and graphic images of pages of

contents. His vision could actually be called a prophecy, considering the way the Internet

has facilitated his ideas. Ellis is credited with constructing one of the most important

models of information-seeking behavior in the social sciences. His model has been

widely cited in the literature, and used in many subsequent studies with various users.

Most of the information -seeking behavior categories in Ellis's model are

supported by capabilities available in common Web browsers. Thus, an individual could

begin surfing the Web from one of a few favorite starting pages or sites (*starting*); follow

hypertextual links to related information resources - in both backward and forward

linking directions (*chaining*); scan the Web pages of the sources selected (*browsing*);

bookmark useful sources for future reference and visits (*differentiating*); subscribe to e-

mail based services that alert the user of new information or development (*monitoring*);

and search a particular source or site for all information on that site on a particular topic

(*extracting*) (Choo, Detlor, and Turnbull, 1998, 2000).

Case, in "Looking for Information" indicates that the Ellis (1989) model makes

no claim to consider the many factors and variables generally considered in information-

seeking: the type of need and what sort of information or "help" might satisfy it or the availability of sources, and their characteristics (Case, 2002).

It should also be noted that Ellis conducted another study about information-seeking patterns of academic researchers (Ellis, 1993). The study focused on the employment of the grounded theory approach to derive models of the information-seeking patterns of academic researchers in social sciences, natural sciences, and humanities. The process of comparison of the different activities reported by social scientists led to the conclusion that despite superficial differences, six categories were sufficient to represent the different generic features of their information-seeking patterns. Another study Ellis conducted departs significantly from Brittain's contention that natural and social scientists obtain and use information in fundamentally different ways (Ellis, D. Cox, & Hall, 1993). Ellis's comparison shows no significant differences between the two groups. Although the extent of usage of sources may differ, the characteristics of information-seeking patterns of chemists, physicists, and social scientists are basically the same. The main difference between information-seeking patterns of the chemists and social scientists are two extra categories of behavior - verifying and ending - which were not identified for social scientists. The importance of personal contacts, chaining, differentiating, and monitoring, as well as perceptions of the values of books, journals, and conferences are virtually interchangeable. The value of indexes and abstracts are also similar. However a difference in the value of secondary services by the scientists compared with the social scientists was apparent, particularly in relation to respected sources such as *Chemical Abstracts*. Ellis also conducted a study about modeling the

information-seeking patterns of engineers and research scientists in an industrial environment, in which he created a longer model for the scientists (Ellis, 1997).

One of the most recent studies is Meho & Haas's specialized study on information-seeking behavior of social sciences faculty studying stateless nations (Meho and Haas, 2001). It is a study of government information use by social sciences faculty, in which they interviewed faculty conducting research on stateless nations, in this case the Kurds. The findings were consistent with many earlier social science faculty studies, with some important exceptions. The study is significant because it reveals a frequent use of information technology, with 88% of participants responding they use electronic resources. It is also interesting in that it finds that access problems are a major issue for selected materials, with 83% of faculty reporting they travel to special collections or archives to locate historical documents

Another study is Meho and Tibbo's study on modeling the information-seeking behavior of social scientists (Meho and Tibbo, 2003). Mehe and Tibbo revised Ellis's information-seeking behavior model of social scientists. The study used social sciences faculty researching stateless nations as the population and developed a new model, which, unlike Ellis, groups all the features into four interrelated stages: searching, accessing, processing, and ending. The searching stage can be defined as the period where identifying relevant and potentially relevant materials is initiated. It includes both information-gathering activities using traditional tools (e.g., online catalogs and indexes and abstracts) as well as communication with people and other sources of information (e.g., publishers, booksellers, and government agencies). The accessing stage can be defined as the bridge between the searching stage and the processing stage, especially

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when indirect sources of information are used (e.g., online catalogs, indexes and abstracts, and bibliographies). The processing stage is where the synthesizing and analyzing of the information gathered takes place. Also taking place in the processing stage is the writing of the final product. The ending stage marks the end of the research cycle of a project. Although it was not discussed in this study, an ending stage was assumed as all interview questions were geared toward discussing the entire research cycle of a project (e.g., "When you write a book or a paper for a journal, where and how do you start looking for information?").

## Need for New Models in the Internet Age

The reasons for studying the information habits of social sciences and humanities researchers have evolved and changed over time. In the 1960's and 1970's when library relevance was assumed to be directly related to the size and scope of the collection, studies focused more on what information social scientists used (information use) as opposed to how they sought it (information seeking). In the mid 1980's the paradigm shifted as researchers began to recognize that holistic studies based on semi-structured interviews with actual users could yield results not easily obtained in quantitative surveys. This approach was key to the formulation of some of today's most influential information retrieval models, including the Information Search Process model formulated by Carol Kulthau (1991, 1993) and David Ellis's six-pronged model (1989).

Information technology and electronic resources have improved significantly in recent years. Recent studies showed a dramatic increase in the use of electronic resources for social sciences and humanities researchers. In the present study this researcher

investigates how information technology affects the information-seeking behaviors of social sciences and humanities researchers. This vast group of professionals, with their critical role in academic and professional society, deserve serious examination of their research needs. There is a need to study changes in their use of technology, and examine as a whole the work of social sciences and humanities researchers in today's electronic information environment. An update or new model for information-seeking patterns of social sciences and humanities researchers would be useful in the Internet age.

# CHAPTER 3

# METHODOLOGY

Qualitative studies intend to gain insight into human experience and behavior (Powell, 1991, p.47). This study adopts a qualitative approach to information-seeking behavior using the interview method as a tool for data collection. The interviewer is a neutral medium through which questions and answers are transmitted (Babbie, 1998). Face-to-face interviews allow for in-depth discussion and interactions between the researcher and the participants to obtain informative and rich data about thoughts and reasons underlying behavior (Wang, 1999). The presence of an interviewer improves response rates and quality of answers, in that interviewers can clarify questions as well as ask follow-up questions.

The interviews were recorded and transcribed. The data analysis focused common themes, patterns, and concepts. These themes, patterns, and concepts were coded by categories, which emerge to increase the sense of the data as the process continues. The codes are helpful in making comparisons between participants, comparing data from the same participants with themselves, and comparing categories with other categories. Sharing by listening to and interacting with the participant results in a more comprehensive view of the respondent.

This chapter reports on the design of the instrument and the interview process. The analysis and results are reported in Chapter 4.

## Instruments and Measures

The interview design was semi-structured, and included both closed and open questions. Based on a review of the existing literature, interview questions were developed to encompass information use patterns, methods of locating information, and use of information technology, with a particular emphasis on electronic resources. An interview guideline was designed to systematically collect data (See Appendix A and B). The interview guide consisted of a series of thirteen questions to direct the interview process. Initial interview questions were developed from domains that emerged from literature review in concert with the researcher's experience. The first question asked the interviewee to describe briefly a recent research project in which information resources were used. This question helps to bring both the interviewer and the interviewee into the research situation for the subsequent questions about information resources used to support research. Questions two to nine are structured questions about the use of eight types of electronic resources, such as the Web, email, ftp, etc. (See Chapter 1). Each question has three subsequent sections regarding frequency and years of use, as well as the importance rating. Question ten asks the interviewee to compare the use of print resources and electronic resources. Question eleven, an open question, provides the interviewee the opportunity to freely comment on the mentioned electronic resources and to elaborate on how and why each source is used. Question twelve, also an open question, moves the interview to Ellis's behavior model. The model is presented to the interviewee and comments are solicited. The final question offers the interviewee another opportunity to add any comments to the interview. The questions in the interview guide will answer the research questions about what roles Internet technologies play in social sciences and

humanities researchers' information-seeking, how do social sciences and humanities

researchers use Internet information resources in their information-seeking, which factors

affect use of Internet information resources, and to what extent Ellis's behavior model is

applicable to the electronic information environment.

## Pilot Testing

Before embarking on the interview process, a test interview was conducted by the

researcher to test the interview guideline for validity and reliability. The purpose of the

test was to verify the clarity of the questions, and modify them based on feedback

received. The pre-testing of the instrument indicated that the instrument was appropriate.

It was concluded that the interview questions were a valid method of collecting data, and

could offer a valid empirical approach to testing the research questions. The test also

indicated that the participant preferred to answer all interview questions in one session at

researcher's own office, and also resulted in a slight modification of the interview guide.

For example, the researcher adjusted the scale for measuring the importance of the

electronic resources, and changed the question for frequency of usage to an open-end

question.

## Population and Sampling

The study was conducted at Tennessee State University in Nashville, TN, where

the researcher works as a library assistant. Tennessee State University is an urban land-

grant university with particularly strong programs and departments in the social sciences

and humanities: Education, Sociology, Business, Communications, History, Geography,

Political Science, Woman's studies, African Studies, Literature, Philosophy and

Interdisciplinary Studies. Tennessee State University has more than 460 full time and

part-time faculty members, many of whom publish regularly. The university library is

relatively small with less than 500,000 monographs and 1,700 journals, but with rich

electronic resources, including more than 100 electronic databases.

The pool of social sciences and humanities researchers that was invited to

participant in the study were identified by searching the university directory and

department web pages, and a "snowball method" using interviewees supply the names of

other interviewees. These were contacted via email. The e-mail outlined the project and

what would be required from them, asked if they would be willing to participate in the

study. Appointments were confirmed with a follow-up phone call or e-mail for the ones

who replied e-mail and showed interest. Interviewees consist of two types: faculty

members and doctoral students. The researcher contacted forty-six potential participants

via e-mail to inquire about their interest in the project. Thirty active and productive social

sciences and humanities faculty and doctoral students at Tennessee State University

(TSU) participated in this study.

### Data Collection Procedure

The interviewer provided a short introduction of the research topic. The

participant was informed that his/her participation was voluntary and that he/she could

withdraw from the study at any time. Permission was asked to record the interview. The

participant was asked to sign a consent form (See Appendix C) prior to interview. After

giving definitions of the electronic resources, the researcher followed the interview guide (See Appendix B).

Participants were asked about their work, their usage of eight different electronic resources to obtain information, their opinions about the e-resources and David Ellis's information searching categories. Interviews revealed their research habits, how they conduct their research, and their use of information technology during the course of seeking information. The researcher took notes on a response sheet that lists the questions asked. With the permission of the participants, all interviews were recorded on tape.

## Consent and Anonymity

Research Involving Human Subjects approval was obtained from the University of Tennessee by using Form B and from the Tennessee State University by using a research proposal form. Each participant signed an informed consent form addressing voluntary participation before the interview (See Appendix C). To preserve anonymity, both the notes and tapes were given an identifying number retained only by the researcher. No personal identification of the study participant was recorded on the response sheet and the tape, and no personal information was retained that would allow a respondent's anonymity to be compromised. All responses were identified only by that number during data analysis. Recorded data was transcribed into text with the identification numbers by the researcher as well. The responses were analyzed for themes, common terms, categories and conceptual preferences.

## Data Analysis

The interview data was coded and tabulated to facilitate analysis and comparison. For the qualitative portion of research, as there was no perfect way to analyze data (Patton, 1990; Tesch, 1990); the analysis was mainly undertaken in a flexible manner, using the inductive approach suggested by Patton (1990) and Tesch (1990) to find emerging patterns. The inductive approach means that patterns, themes and categories came from the data rather than being decided prior to data collection and analysis (Patton 1990; Rice & Ezzy 1999; Boyatzis 1998). An inductive approach begins with the experiences of each individual where the focus is on "full understanding of individual cases before those unique cases are combined or aggregated" (Patton, 1990, p. 45). Individual responses were identified by the identification numbers assigned. In addition, the individual responses were coded with the identification numbers to enable identification of the sample set from which the individual response was taken. Using both the quantitive and the qualitative analysis method, the responses were analyzed to identify how information technology may contribute, alter, or supplement the information-seeking process in the social sciences and humanities, and if there was an extended model of information-seeking behavior for social scientist comparing to the model of David Ellis. The researcher estimated the participant's current information-seeking behavior, and modified Ellis's model.

The study focused on discussing new findings and on comparing these findings with relevant information-seeking activities from Ellis's six information-seeking categories. The search for patterns and themes was meant to begin the process of development, intended to produce or confirm a final list of characteristics. Findings are

reported in a manner which explicitly links the data results to the research-question summary section. That leads from the "factual" information in this section to the "interpretive" information in the next one.

## Limitations of the Study

Tennessee State University is mainly a teaching-oriented university and does not have many doctoral programs in social sciences and humanities. There are individual and institution-specific differences. The study should be extended to include more participants and conducted in another or more institute/university. Ellis's model is complex, and it was hard for the participants to provide their opinions about the model based on a brief description of the six characteristics. There is still a need for more studies to verify the results reported in the study. In order to provide efficient and customized services to different social sciences and humanities researchers, further studies to investigate and observe differences and relationships about information-seeking behavior between different disciplines are also needed.

# CHAPTER 4

# FINDINGS AND DISCUSSIONS

## Interview Results

All interviews were conducted from June 2004 through December 2004 in the participants' own departmental offices. The length of the interviews ranged from forty-five minutes to one hour and half, with the majority lasting about an hour. After the interviews were completed, the data was analyzed. By the end of the data collection process, all interview data, relevant portions of the taped interviews, and notes, were transformed into MS Word files and printed out. Each interview produced about 1400 to 3600 words per transcript. The amount of data obtained was substantial, and the transcripts generated enough data to provide a detailed and accurate account of researcher perceptions in their information seeking activities. These included researchers' use of electronic resources, perceptions of electronic and print resources, problems encountered in the research process, methods of keeping abreast of new developments in the field, help-seeking behaviors, and opinions about how David Ellis's information-seeking behavior model was applicable for their research. The overall goal was to assess how technology contributes to the information-seeking process in social sciences and humanities; and how well Ellis's model works with new technologies. The research verified the Ellis model and revealed potential new features.

<p style="text-align:center"><b>The Participants</b></p>

Forty-six researchers were contacted. Thirty participated in the research. Twelve didn't respond to the invitation, three were too busy for an interview, and one withdrew. The thirty participants interviewed were diverse in terms of gender, rank, discipline, and research topics. Nineteen participants were male and eleven were female. Nine were doctoral students, eight were assistant professors, five were associate professors, and eight were full professors. Social sciences researchers in the study included individuals who conduct research in the fields of Educational Administration, Teaching & Learning, Hotel Management, Sociology, Business Administration, Geography, and Political Science. Individuals who conduct research in the fields of History, African Studies, Women's Studies, and Literature & Philosophy were considered as humanities researchers. The professor from the Communications department is also considered as a humanities researcher, since the professor teaches Theater classes and does research close to humanities (See Table 1 and 2).

Table 1. Participants by Rank and Gender (n=30).

| | Doctoral Student | Assistant Professor | Associate Professor | Professor | Row Total |
|---|---|---|---|---|---|
| Male | 4 (13.3 %) | 4 (13.3 %) | 4 (13.3 %) | 7 (23.3 %) | 19 (63.2 %) |
| Female | 5 (16.7 %) | 4 (13.3 %) | 1 (3.3 %) | 1 (3.3 %) | 11 (36.6 %) |
| Column Total | 9 (30.0 %) | 8 (26.6 %) | 5 (16.6 %) | 8 (26.6 %) | 30 (99.8%)[*] |

[*] Due to rounding

Table 2. Participants by Discipline (n=30)

| Broad Category | Discipline | Number of Participants |
|---|---|---|
| Social Sciences | Ed. Administration | 10 (33.3%) |
| | Teaching & Learning | 5 (16.7%) |
| | Hotel Management | 3 (10.0%) |
| | Sociology | 2 (6.7%) |
| | Business Administration | 1 (3.3%) |
| | Geography | 1 (3.3%) |
| | Political Science | 1 (3.3%) |
| Humanities | History | 2 (6.7%) |
| | African Studies | 2 (6.7%) |
| | Women's Studies | 1 (3.3%) |
| | Literature & Philosophy | 1 (3.3%) |
| | Communication | 1 (3.3%) |

**Use of Internet Information Resources in Research**

The data on the use of various Internet information resources provide answers to question regarding the role of the Internet information technologies in information seeking. This section reports on the aggregated results of the collected data. Specifically, the researcher reports on the number and percentage of the participants who use the Internet information resources to gather information for their research needs, the years and the frequency of such use, and their perceived importance of the type of Internet resources.

*Use of Internet Information Resources for Research* - Among the eight types of Internet information resources, the Web is used by 29 participants (96.7%) for research information gathering, databases are used by 27 participants (90.0%), e-journals are used by 26 participants (86.7%), e-mail is used by 25 participants (83.3%), online catalogs are

used by 24 (80.0%) participants, both listservs and portals are only used by 10 (33.3%) participants, and ftp is only used by 9 (30.0%) participants (See Table 3). It is worth mentioning that one participant did not use the Web as an information resource for research. This participant just didn't consider the Web as an effective information gathering tool, and did all the research by using the physical library and other Internet resources such as databases and e-journals. Similarly, five participants did not use email for research purposes. All these participants are users of the Web and email.

*Frequency and Years of Use* - Among the users for the Web, more than 48% use the Web as an information gathering tool daily or multiple times a day for the research. On average, the participants have used the Web for 6.8 years. The earliest participant used the source for 12.5 years; the newest user just started using it 2 years ago. For email users, 40% use the email as an information gathering tool daily or multiple times a day. On average, users have utilized email for 6.7 years. The earliest user took advantage of the source for 17 years; the newest user has just started using it about 1.5 year ago. Sixty percent of listserv users use the source daily, and on average users have used listservs for 5.4 years. The earliest user started using it for 16 years; the newest user has just started 1 year ago. More than 80% of the respondents use databases daily or weekly. On average, they have used databases for 6.1 years. The earliest user has used the source for 14 years; the newest user just started using it 1.5 years ago. More than 70% of the users access e-journals daily to weekly. On average, they have used this source for 4.8 years. The earliest user has used it for 12 years; the newest user started using it 1 year ago. More than 80% of the participants use online catalogs weekly or monthly. On average, the

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Table 3. The Use and the Years of Using Internet Resources (n=30)

| Type of Internet Resources | Number of Users | Average Years of Usage | Standard Deviation | Range (Min-Max) |
|---|---|---|---|---|
| Web | 29 (96.7%) | 6.8 | 2.8 | 2-12.5 |
| Databases | 27 (90.0%) | 6.1 | 3.2 | 1.5-14 |
| E-journals | 26 (86.7%) | 4.8 | 3.1 | 1-12 |
| E-mail | 25 (83.3%) | 6.7 | 4.3 | 1.5-17 |
| Online Catalogs | 24 (80.0%) | 7.4 | 5.0 | 1-17 |
| Listserv | 10 (33.3%) | 5.4 | 5.1 | 1-16 |
| Portals | 10 (33.3%) | 6.6 | 3.7 | 2 -12 |
| Ftp | 9 (30.0%) | 6.7 | 4.0 | 3-12 |

participants have used online catalogs for 7.4 years. The earliest user used the source for

17 years; the newest user started using it 1 year ago. Seventy percent of the users use the

portals daily or weekly. On average, the users have used the source for 6.6 years. The

earliest user has used it for 12 years; the newest user has just started using it 2 years ago.

More than 77% of the users rarely use the FTP. On average, the users have used the

source for 6.7 years. The earliest user has used the source for 12 years; the newest user

started using it 3 years ago (See Table 3 and 4). Years of use is related to the use and

frequency of use for some electronic resources, but does not necessarily relate to the use

and frequency of usage. For example, the average years of usage for FTP is 6.7 years, but

FTP is rated as the least used electronic resource in this study. Less than one third of the

participants use this resource.

Table 4. Frequency of Using Internet Resources

| Internet Resources | Multiple Times a Day | Daily | Weekly | Monthly | Rarely |
|---|---|---|---|---|---|
| Web | 4 (13.8%) | 10 (34.5%) | 13 (44.8%) | 0 (0%) | 2 (6.9%) |
| E-mail | 2 (8.0%) | 8 (32.0%) | 10 (40.0%) | 2 (8.0%) | 3 (12.0%) |
| Listserv | 0 (0%) | 6 (60.0%) | 1 (10.0%) | 2 (20.0%) | 1 (10.0%) |
| Databases | 0 (0%) | 7 (25.9%) | 15 (55.6%) | 4 (14.8%) | 1 (3.7%) |
| E-journals | 0 (0%) | 4 (15.4%) | 15 (57.7%) | 5 (19.2%) | 2 (7.7%) |
| Online Catalogs | 1 (4.2%) | 2 (8.3%) | 13 (54.2%) | 6 (25.5%) | 2 (8.3%) |
| Portals | 0 (0%) | 2 (20.0%) | 5 (50.0%) | 2 (20.0%) | 1 (10.0%) |
| Ftp | 0 (0%) | 0 (0%) | 0 (0%) | 3 (33.3%) | 6 (77.7%) |

*Importance of Internet Information Resources* - On a five-point scale (1 for the least important and 5 for the most important), the Web received the highest ranking with the score of 4.5 on average, thus qualifying as the most important Internet information resource type for research. The Web has become an obvious choice and comes into place for diverse collection of information. Participants mainly use the Web as a research tool for initial information. Google is the most popular search engine (one professor mentioned enjoying using Google Scholar). Problems mentioned by the participants include information overload, difficulty in conducting precise searches, the mixture of substantive and irrelevant sites, and difficulty in evaluating the credibility and actual source of some data.

Databases were rated as number two for importance on average. Many participants have used databases in traditional index forms, and have caught up with the "transformed type" of databases, taking it as a powerful tool. Many prefer to search mixed-journal title databases to find articles, as opposed to searching just one e-journal.

Several users have only used the free databases that are available on the Web, and ignored the library's quality-controlled**,** fee-based databases. Databases are therefore a related collection of structured information searchable by computer. To gain access to the databases (the invisible Web), one needs to visit a site that has been set up for searching databases or know about a database and go directly to its home site to search. Participants have encountered difficulties from systems, poor searches, terminological problems and lack of or unawareness of suitable databases. Many were concerned about the availability of archival, recent and full-text journal articles through databases.

Electronic journals were rated as the third most important. Although e-journals are valuable research sources, some researchers easily miss them since they are relatively new to Tennessee State University. Some participants only use free e-journals on the Web, with e-journals from the library being lesser known. Some participants were unclear of the relationships between e-journals and databases and didn't see any differences between them. Some prefer e-journals because they can browse journals by tables of contents and usually find full-text articles. Many of them use JSTOR to locate a core set of scholarly journals on their topic of interest. JSTOR is a digital archive of a core set of scholarly journals that includes scanned complete sets of journals from first issue of publication. To access JSTOR the library needs to have a subscription. Like with databases, participants encountered various difficulties with these systems. There are also concerns about the availability for some archival, recent, and full text articles, as well as rare or lesser-known journals.

Online catalogs were rated as the fourth most important electronic resource. Some participants used library computer catalogs before remote access. Online catalogs, a

bibliographic searching tool, provide a more efficient means of retrieving library holdings, and play a role in the authentication of remote users. Participants use online catalogs to locate the library's existing print and online resources. Many search online catalogs of other libraries, or union catalogs (such as Athena, which includes major libraries in middle Tennessee) or publisher or vendor's online catalogs. Libraries, with the best of intentions, present their catalogs as the gateway for all their resources, integrating access to all material - regardless of format.

E-mail was rated as the fifth most important electronic resource, compared to number six for listservs. E-mail has become a common communication and networking tool for the participants. It is a method for them to make contacts with experts, conduct interviews or surveys, and network with colleagues. Problems mentioned by participants are junk mail and unstable e-mail accounts. Following is one example of the participant's positive perceptions of e-mail.

> Research is easier now, because before if I needed to find an article from doctor so and so from other colleges, I had to make long distance phone call. With e-mail, if I read somebody's article, I can e-mail the author to ask about the methodology and findings. I have e-mailed some authors before, and they almost always e-mail me back. People can respond at any time. If you try to make a phone call, the person might be busy, or somebody might not answer the phone. (20G)

Listservs are still fairly new to some participants. Some non-users claimed that they are not familiar with the source or haven't been able to find any good listservs in their respective fields. Users use listservs to ask or answer questions, browse current information in their fields, locate information on conferences, discover new publications, and locate relevant calls for papers, etc. One pitfall mentioned by the participants of signing up with listserv is one's e-mailbox can get clogged with messages from members

of the group each day. Listservs, especially moderated ones, tend to be more focused and relevant to serious research.

Web Portals were rated as the seventh most important e-source. About two thirds of the participants were not familiar with these or had no idea about the source at all. The Web Portal concept seemed new for many participants. A Web portal would be an entry point that makes sense out of the inherently chaotic Web. Portals are intended to gather an individual's chosen research tools into a personal toolbox, where they are always available and up-to-date. The participants enjoy using trusted portals because they provide shortcuts, and are ideal for people working on specific projects or who want to keep up with special research interests. Some libraries have developed Web sites that provide customized information for certain types of users, and may even refer to them as "portals". One professor uses Vanderbilt's portals for census data (13S). For portals, problems mentioned by the participants are that portals are of very different quality and there are many amateur ones. Also information gets outdated pretty quickly, so many times the user ends up tracking useless information or even dead links.

FTP is rated as the least important electronic resource covered in this study. Users only occasionally need to transfer or download files using FTP since the browser can easily handle most of their downloading jobs. Data show that FTP played more important roles when the Web was more vulnerable. It has since become an older and less-used utility and download tool now. Traditional FTP has been overtaken by the Web (See Table 5).

Table 5. Participants' Ranking of Importance for Each Type of Internet Resource

| Rank | Internet Sources | Importance Score | Standard Deviation | Range (Min-Max) |
|------|------------------|------------------|--------------------|-----------------|
| 1 | Web | 4.5 | 0.9 | 1-5 |
| 2 | Databases | 4.4 | 0.8 | 2-5 |
| 3 | E-journals | 4.2 | 0.9 | 2-5 |
| 4 | Online Catalogs | 4.1 | 0.9 | 2-5 |
| 5 | E-mail | 3.6 | 1.4 | 1-5 |
| 6 | Listserv | 3.2 | 1.0 | 2-5 |
| 7 | Portal | 3.2 | 1.2 | 2-5 |
| 8 | Ftp | 2.4 | 1.1 | 1-4 |

**Use of Electronic Resources vs. Print Resources**

It is generally agreed that social scientists tend to rely heavily on journals, periodicals and monographs, while humanities researchers rely more on books. Both formal and informal information channels are important for their information-seeking process. They draw upon mass media data (newspapers, magazines, etc.), interviews, conferences, experimental data, and government documents, etc. Many participants took conferences and personal contact as important sources to gather information. They rely upon a wide range of information sources, and use electronic sources increasingly.

Overall, the participants use electronic resources to satisfy 58% of their information needs and print sources to satisfy 42% (See Table 6). New technology has a profound impact on researcher's information-seeking behavior; many researchers show a marked preference for electronic resources over print. One participant said that the TSU library had weak print collections - but if one included electronic resources, plus opportunities to use other university libraries in the area, that opened up more doors and

Table 6. Percentage of Needs Satisfied by Print and Electronic Information Resources(%)

| Type of Sources | Average Percentage Satisfied by Type | Standard Deviation | Range (Min - Max) |
|---|---|---|---|
| Print Information | 42 | 19 | 10 -90 |
| Electronic Information | 58 | 19 | 10 -90 |

made the library more competitive (23Ho). To find information for research, one has to know how to use the traditional library, but also be familiar with new technologies. Participants are not only walking through the doors of the library, they are using more electronic resources and taking advantage of the broad services the library offers. Most of the participants have ever more diverse means for accessing an increasingly diverse body of information. Services provided to users through electronic sources are as valuable as those provided within the library.

## Special Cases for High Use of Print Resources

The participants' general opinion towards the use of electronic resources had been positive. Their satisfaction of information needs using either types of information resources ranges from 10% to 90% for both print and electronic resources. Even though 58% of the researchers' information needs are satisfied by electronic resources on average, there are also special cases when the participants' information needs are mainly satisfied by print. The results are interesting and useful to bear in mind when discussing the varying opinions held by the sample providing data for this paper. The researcher took a close look at the special cases in Table 7.

Table 7. Satisfaction Percentages in Comparison between Print and Electronic
Information Resources for Special Cases. (%)

| Case | Disciplines | Percentage Satisfied by Print Resources | Percentage Satisfied by Electronic Resources |
|------|-------------|------------------------------------------|----------------------------------------------|
| Case 1 | Teaching & Learning | 90 | 10 |
| Case 2 | Communication | 80 | 20 |
| Case 3 | History | 70 | 30 |
| Case 4 | African Study | 70 | 30 |
| Case 5 | Literature and Philosophy | 60 | 40 |
| Case 6 | Education Administration | 60 | 40 |

The participant for Case 1 is a full professor for the Teaching & Learning department. The participant has used print resources for years and is not familiar with new technologies, and finds electronic resources hard to use and manage. The participant for Case 2 is a senior researcher from the Communications department. The professor mainly teaches Theater classes, and didn't use the electronic resources for the same reasons as the professor from Case 1. The participant also has some concerns about the availability of the electronic resources for his research projects.

The participant for Case 3 is a full professor from the History department. This participant is mainly concerned about the availability of the archival materials for the discipline. The participant for Case 6 is a doctoral student from the Education Administration department. This participant also had concerns about the availability of the archival materials.

The participant for Case 4 is a professor in the African Studies department. The participant is not familiar with the library's e-resources, and thinks it is hard to evaluate

electronic resources on the Web. The professor does a lot of field studies, and prefers the print resources because of the nature of his research projects. The participant thinks that one has to go to the country to collect data to study a culture and an ancient country.

The participant for Case 5 is a professor for Language & Philosophy department. The participant is a frequent electronic resources user, but is concerned about the electronic resources availability at the institute. The professor had requested a database for his field from the library before, and is planning to request a few more.

**Use of Print vs. Electronic Resources by Rank and Gender**

Participants can be segmented into groups that display different and similar preferences. The researcher examined the relationship between academic rank and the usage of the electronic resources. Data show that academic rank is one variable that related to comfort and use of electronic resources. Doctoral students and assistant professors were more enthusiastic adopters of electronic resources than associate and full professors. They relied on electronic resources more heavily for their research than associate and full professors. Junior researchers have been brought up with computers. Many couldn't remember a time when computers and the Internet were not around, resulting in a higher satisfaction percentage - 61.7% (12.2 SD) for the doctoral students and 70.0% (15.1 SD) for the assistant professors for electronic resources. Some doctoral students, especially some assistant professors, considered themselves experts in using electronic resources. Some senior researchers did not have much exposure to new technology, resulting in a higher satisfaction percentage - 52.0% (22.8 SD) for the

associate professors and 52.5% (21.9 SD) for the full professors for print resources (See

Figure 1). Again, the participant responses reflect this fact:

> Have you interviewed a lot of young people? I just didn't grow up with computers, so I am learning. ...... Probably you need to interview the younger people who are more familiar with the electronic resources. All my background in research has been using the card catalogs, print books and journals in all these years. .... I have only begun to learn how to access electronic resources recently. Even at this early stage I find that they are efficient. I would like to get more training in the skills. (25T)

> The computer is a wonderful tool, but I didn't grow up in the computer age. I am using the e-resources, but I am just using a fragment of them. I know these sources can do a lot more, and I can get a lot of more from them, but I need to find somebody to teach me more skills, and learn how to use them more effectively. Hope this interview will push me to learn and to use more e-sources. I always encourage my students to use both the physical library and the library's electronic resources. (10A)
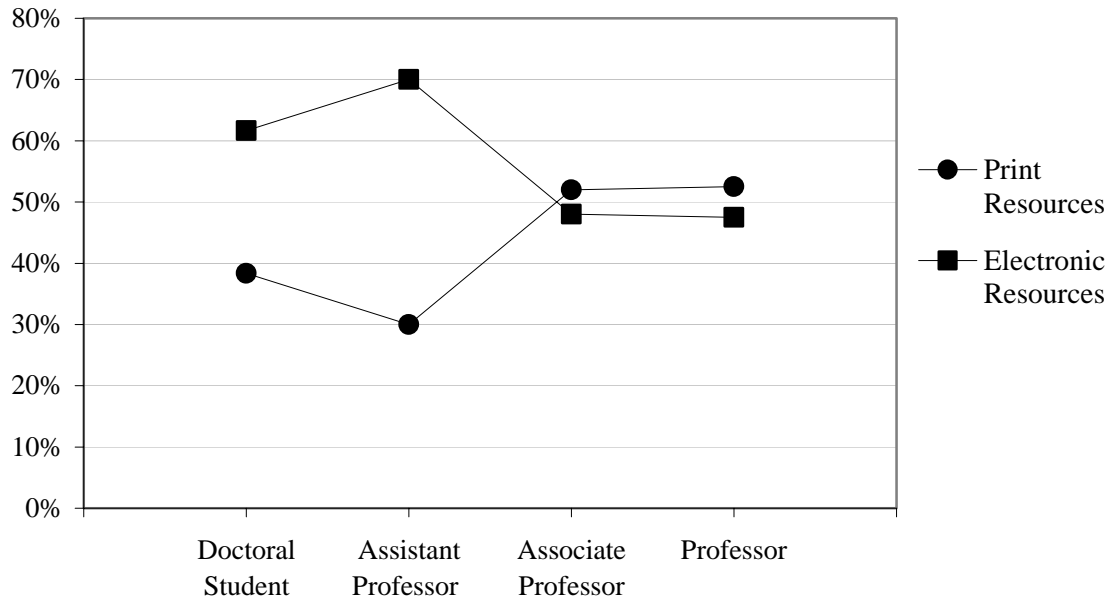


Figure 1. Participant's Average Satisfaction Percentage in Using Print and Electronic Resources for Different Academic Ranking Groups.

Gender is another relevant factor that the researcher examined. The use of electronic resources to satisfy information needs seems slightly higher for male than for female researchers. Due to the uneven distribution of participants in terms of gender and rank, the comparisons of the means and standard deviations can only be made for two groups: doctoral students and assistant professors. For male doctoral students, 63.8% (SD 18.0) of the need was satisfied by electronic resources while for female doctoral students, the number was 60.0% (SD 7.1). For male assistant professors, 80.0% (SD 8.2) of the need was satisfied by electronic resources while female assistant professors, the number was 60.0% (SD 14.1). It seems that male participants tend to be more diverse although slightly used more Internet-enable resources to satisfy information needs for research purposes.

## Reasons for Use of Electronic Resources

Electronic resources provide a number of advantages over print resources. Several factors were mentioned by the participants:

*1. Availability in Electronic Format* - Information is increasingly available in electronic format in recent years. Researchers are using a wide variety of formats and means to get access to the information that is essential to their research. The ability to access and navigate information sources in a convenient and efficient way has become increasingly important. The participant responses reflect this fact:

> It takes a big space to store my journals. I just don't subscribe to those very common journals now, such as American Journal of Sociology, because usually there is an online version, and I read the on-line journals. It saves money and space. (12S)

Well, the major historical journals are available online. American Historical Journal, Journal of Modern History and New York Review of Books are the e-journals that I read frequently. (14Hi)

*2. Accessibility* - Many participants select electronic resources as their first choice, because electronic resources are conveniently accessible anywhere and network for the users. This can be explained by the "Least Effort" principle. It is clear that participants approach the information that is convenient for them. Data show that users have greater expectations due to technological advances. Many of them not only gather information, but also stay in close contact with information professionals and colleagues. They even meet people in the field through these new technologies. Interlibrary loan is a helpful tool for many researchers. Many participants who find information in catalogs and databases from different libraries expect the library to be able to obtain the information and deliver it to them. They are basically satisfied with TSU library's services and they can get the material requested online most of the time. Bibliographic access is now viewed more as a tool with the primary focus on the information itself. Academic libraries are in a transition phase, moving from ownership to information access. Again, the participant responses reflect this fact:

Electronic resources are so convenient and effective. Instead of going to different institutes and libraries, or calling different colleagues, just stay in my office I can get information in an easy and fast way. (10A)

I started my research back in the 70's. I used to drive to a lot of libraries, and to search their card catalog to see what they have. It is so convenient and effective to use e-sources. So much information is on-line. I can at least find what a library has through their on-line catalogs. If I really need something, I can get it through interlibrary loan. (12S)

*3. Usability* - Many participants prefer many features of the electronic information systems. They enjoy the advantages of desktop and timely availability, speed, accessibility, convenience of saving and printing, frequency of updating, availability to specify the needs and search multiple files by using multiple searching keywords, easily sharing information and sending papers to other researchers, etc. For example:

Electronic resources are convenient, easy to use and easy to access. (8E)

It is easy to do the searches. With the computer, I can do "Boolean" searches and use multiple terms. The computer does all the searches for me that I used to do the long way. (5Ho)

*4. Source Quality* - Both print and electronic resources from the library are created specifically for researchers. Since these researchers are affiliated with the university, reliable electronic resources from the university library are optimal choices for their information retrieval. The participants also enjoy using the quality information available on the Web, such as government information and e-journals. The following are examples of the participant's positive perceptions of electronic resources:

I use databases to search for peer-reviewed journal articles. (4E, 8E, 11B,.....) I use e-journals to search for peer-reviewed journal papers. (12S,....)

If you see something like New York Times, National Journal on the Web, you technically assume these have gone through the same referee process, or if you see American Political Science Review on the Web, you assume what is there have gone through the same peer-reviewed process. You see these publications on the Web; you assume they go through the same peer-reviewed process, same referee process in that publication. (16P)

*5. Disciplinary Constraints* - The nature of the discipline or research topic may influence the usage of electronic resources. There are also differences in useful electronic resources across disciplines. All researchers in this study use electronic resources for their research to some extend. Many participants would have used more electronic

resources if more had been made available in their discipline or area of interest. These

responses verify that:

### *Nature of Discipline*

We try to train students to use the computer as a tool, and we try to train them to use web, databases and other electronic resources to find journal papers. So I have to be knowledgeable myself. (2T)

I used these web sites to search and keep me informed of the updated information, research, and/or events regarding the education around the U.S. (9T)

### *Nature of Research Topic*

I use their catalogs to find what they have in sociology and the historical information. For example, for my project about history of sociology, I use the university's online catalogs to find who wrote the dissertations about sociology at the beginning of the program for those universities. (12S)

If I am working on a very current cutting edge topic like teaching e-poetry or digital poetry, it works multi-dimensionally and includes a wide scope of activities. E-poetry cannot exist in a traditional journal. The e-poetry is mixed with words, images, job descriptions, and many other interactions. These are things that cannot exist in a traditional journal. (18W)

*6. Affectivity* - Many participants have positive attitudes toward using and learning

electronic information skills. With the knowledge of the electronic resources and

effective information retrieval skills, many researchers prefer and are increasingly using

the electronic resources. Most of the users take electronic resources as a time saver,

convenient and efficient. For example:

I love electronic resources. ...... Anything to avoid stacking papers I am delighted. It gives you more opportunities to find information. (23Ho)

I am a big fan of electronic resources. (18W)

**Reasons for Low Use of Electronic Resources**

The verbal data were analyzed to derive reasons for nonuse or low use of electronic resources for information gathering. Several factors were mentioned by the participants:

*1. Availability in Electronic Format* - knowledge of availability of the needed Internet-enabled information resources can affect use. Few humanities electronic resources are available compared to the abundance of social sciences electronic resources. Data support the notion that creation of digital archives for infrequently held materials would be an enormous benefit to certain faculty. It would be interesting to see if the results of this study were supported by larger scale studies across a wider range of disciplines. Again, participants were concerned about the availability of archival, recent, full-text materials and books in the electronic format. Following there are examples of responses for this issue:

> Before the 1990's census data was not online, and only the data from 1990 to current are online. If I want data previous to 1990, I use print. (20G)

> Most of the books don't have an electronic version. Therefore we rely on print. (13S)

*2. Accessibility* - the availability of the resources and the convenience in gaining access to them is growing. Electronic resource availability varies in different institutions. A library's services, the individual's awareness of the resources, and the person's research skills also influence the accessibility of the information. Even though participants live in the Internet age, they still have problems accessing information. It is clear that the majority of participants see access as a first priority. The primary deficit in library services appeared to be access to information. Data show that many participants

encounter significant obstructions to information access, such as availability of desired sources, missing or lost materials, and unstable or hard to use systems. In order to eliminate obstructions to information access and obtain more useful information, users employ a variety of tasks and seek information from different resources, modes, or other libraries. As one researcher claimed, he is like a detective, and tries to dig out information for research through different sources and different ways. (12S)

The data suggest that a primary goal of the library should be to obtain access to as many appropriate bibliographic finding aids, electronic journals, and databases as possible. Libraries must develop better systems, provide training or technology-delivered education to users, and develop online learner supports and services.

With the traditional role of the library as an archive, libraries are expected to provide access to information in all formats now. It is incumbent on information professionals to explore ways to facilitate the best use of these resources to ensure that users are obtaining faster access to greater quality and quantity of information. Professionals must create collaborative relationships and networks with other libraries to provide various types of electronic reference services for the remote users. Technology offers a means to improve personal communication and delivers services to each researcher's workstation. Digital reference is a means for meeting the needs of remote users where they need help the most. Providing e-mail service at the library is one option. Libraries should continue to manage resources wisely in the mixed print and electronic environment, and to increase cooperation, networking, and provide faster interlibrary loan services. It is up to libraries to produce more quality electronic materials and create different modes of document delivery to allow researchers to reach more archived

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materials, databases with full text and much more. The provision of access to facilities in

member institutions is one of the easy ways of collaboration. The following are two

examples:

> I can't get many recent journals and databases, and I have to access them from
> Vanderbilt. Sometimes I try to get them through interlibrary loan. (13S)

> Many times I can't find full-text for many articles through the e-resources, and
> can't access most recent and archived issues. ...... I can get online and order the
> articles through interlibrary loan, which is wonderful. But interlibrary loan takes
> one to three weeks to come in, and some times I need a lot of material. So if I am
> hot on the trail and need full text articles right away I can't always rely on the
> interlibrary loan. (22Ho)

*3. Usability* - the content organization and the interface and computer system

affect the usage of electronic resources. Data show that a well-designed library

homepage, information literacy skills, and user-education are needed. This can be

decisive in determining the quality of a library's level of service. For example, one

professor (12S) complained that the TSU library's version of *Dissertation Abstracts* is

not as good as Vanderbilt's. The database is the same content-wise, but not the same

interface-wise. The vendor or library Web design might also affect how interaction can

be done. One professor (13S) complained TSU's JSTOR was not as good as Vanderbilt's

and thought they were the same database, with different content levels. In this case, since

there is only one vendor for this database, they should have the same interface. Two

professors (13S, 14Hi) complained that the TSU library didn't have ProQuest, and said

they had to use Vanderbilt's. In fact, the library listed the databases from ProQuest

separately (Vanderbilt has more). The researcher mentioned this to the librarians and

added ProQuest to its database list. Some participants also mentioned that some

electronic resources or system features are unstable or difficult to use. Following are

examples of responses which reflect the issue:

I hope the electronic resources are user-friendly and easy to use. (1E)

I think the computer system is hard to use and find information. The system and the computer doesn't work right sometimes either.  (21T)

The library can help make online catalogs easier to use through improved training

and documentation, that is based on information-seeking behavior, as well as purchasing

more intuitive systems that require a minimum of instruction. On-line catalogs should

contain as many synonyms and cross-references as possible. One topical issue is the

cataloging of digital material, because of the fast growth of information in the electronic

format. It is important to provide more consistent digital cataloging, especially PURLs.

*4. Source Quality* - The question is whether the information resources provide

accurate, reliable, and high quality information. Because of the sheer volume of

electronic information, particularly massive inflows of information received via e-mail,

listservs and Web searches, there were questions regarding the relevance of online search

engine results and evaluation of information quality found through electronic resources.

Searching the Web can be tricky and one doesn't easily distinguish the valuable from the

trivial information. The research data suggests that finding reliable, credible sources on

the Web may be difficult. There is an enormous need for understanding what is on the

Web and how to best pinpoint what one needs.

Critically evaluating and verifying information is an important skill in the Internet

age. Evaluating the quality of information, particularly information found through

electronic resources, is critical. This would address some of the problems involved with

information overload in the Internet age. Data show that many of the participants suffer from information overload, and they are trying to get more specific and accurate information for their research. The researchers are trying to find meaning in vast amounts of data while struggling to learn new technological skills. These patterns must be considered when determining the resources, technology and services. With the explosion in growth of electronic material, one task is cataloging and organizing these materials, especially materials from the Web. Useful web pages can be created which provide descriptions for authorship, publishing body, title, and classifications for subject matter and intellectual contents. Libraries could provide reliable sources to facilitate evaluating and verifying electronic materials. Technological or service problems or confusion with information systems also influence the quality of the source**.** Following are examples of responses reflecting the content and technology aspect of the source quality:

### *Content*

Anybody can put anything on the Web. So even if you find a paper that is on topic, it might be a high school project and posted online by an eleventh grade student. It may be good, but you still have to question its validity. (20G)

There is so much false information and garbage on the Web. Information on the Web increases rapidly, and a lot of it is just garbage in and garbage out. (24A)

### *Technology*

I don't use e-mail to gather information, because it is unreliable and unstable. Somebody might e-mail me at TSU, but the message might get caught or something like that. Certain other ways are more stable than e-mail. (13S)

It is much easier for me to read, store and organize print material, and it is more reliable for me too. I always prefer a hard copy. Once I have it, I always have it. (21T)

*5. Disciplinary Constraints* - The nature of the discipline or research topic may influence the usage of electronic resources. The information-seeking behavior of the social sciences and humanities researchers can be different as reported by some studies. In the humanities, electronic resources are used less often than in the social sciences. Participants in social sciences disciplines tend to more satisfy their information needs by using electronic resources, while participants in the humanities tend to rely more on print resources. Some disciplines and research projects require less extensive information gathering from published resources. Table 8 indicates that the two broad disciplinary categories show different usage patterns. There are other activities for obtaining research information, including field studies and interviews. Participant responses in this matter follow:

<u>*Nature of Discipline*</u>

I do a lot of historical projects and I need to use some historical materials, but many of them don't have digital versions, so I use print material. (12S)

Historians use probably less digital information than most of the social scientists, because they are using primary sources and archives so much. (14Hi)

<u>*Nature of Research Topic*</u>

When you do field studies, they are kind of connected to the technology in the field. But technology doesn't do everything, and some of these have to be done by people. Human intelligence is needed. Just like you and me, you can't get everything from computers. You have to physically come to my office, talk to me and ask questions, and get information from me. Technology is good in many ways, but it still can't do everything for field studies. (24A)

If I am going to write a paper about the Beijing Opera, and I can sit down with somebody who has participated in the Beijing Opera face to face and ask about to what roles he/she played, the production impact on the audience, how they felt about the production, what are their motives, the government reaction, etc. (19C)

Table 8. Needs Satisfied by Print and Electronic Resources by Social Scences and Humanities Researchers

| Broad Disciplinary Category | Percentage Satisfied by Print Resources | Percentage Satisfied by Electronic Resources |
|---|---|---|
| Social Sciences | 36.7 (Mean)<br>18.0 (SD) | 63.3 (Mean)<br>18.0 (SD) |
| Humanities | 60.0 (Mean)<br>14.0 (SD) | 40.0 (Mean)<br>14.0 (SD) |

*6. Affectivity* - Many participants mentioned the discomfort of reading from the computer screen, and consequently printed out materials they found through the electronic resource. Many participants like print because of the characteristics of portability and physical comfort, convenience and easier-to-read format, and print materials can be easier to access, browse and manage. Following is an example:

> I can read print materials without a computer and Internet, and take them with me and read them anywhere comfortably. (21T)

*7. Awareness* - data show that participants may not be fully aware of some useful electronic resources or the electronic resources available to them through the library. Recommendation of specific sources, such as a library database or a specific Web site, can influence a researcher's use of sources. Libraries have the challenge of providing a full range of information sources that are more complex, maximizing users' current awareness and providing instruction programs to meet the demand in how to access and use resources effectively and efficiently. The following is one example of the responses reflecting this issue:

> I am not familiar with this resource, but it sounds interesting. (4E)

*8. Personal Constraints* - personal constraints are situational. If users cannot overcome the personal constraints, such as too busy, too hard or too old to learn, they may not be able to know the useful electronic resources or become fully effective in using the resources. Participant responses in this matter follow:

> I have heard about portals. I am too busy and don't have time to try portals. (21T)

> I don't have time to sit there and browse the Internet for hours a day or a whole day and participate in chat rooms that younger people are doing. I am still old fashioned. (24A)

## Interview Results and the Ellis Model

The six characteristics of the Ellis model are supported reasonably well by the participants responses. For example, "browsing" web pages or e-journals does not seem radically different in nature than browsing tables of contents in journal articles or book chapters. Many responses given by the participants in the study clearly confirm the relevance of many stages in Ellis's information-seeking model, as is particularly evident in the responses given to the chaining, monitoring, browsing, differentiating and extracting stages. Some examples follow:

*Starting*

> I know a lot of times I have taken part in several professional society discussion groups that I subscribe to. I might have an idea jammed in the back of my head, and see a call for papers that comes across one of these discussion groups, and realize that that is an idea I have been having. Then I start my research and start collecting (18W).

> My e-mail account stays open the entire time in my office. So I might get a call for a paper, or a call to do research at any moment. In the matter of a second, I can begin a research project based on something through a search. .... There was a call for a paper across one of my listservs. That wasn't something I work in, but I have two friends who work in that area, so I forwarded it to them immediately. (18W)

*Chaining*

For me, the most important aspect of the model is "chaining". The reference lists from e-journals are excellent starting points. (8E)

I found a bibliography about religion and spirituality on the Web yesterday. I bookmarked the site, and also saved it on the disk. I can try to find some materials from that bibliography later. (10A)

*Browsing*

I do a lot of browsing. Now I browse on the Internet a lot, but before I might have gone to a library to look at the latest copies of various journals. I look at the tables of contents, abstracts and references. Now I can do that online. (21Ho)

*Monitoring*

I monitor a chat room for the former members of Franciscan priests, and I get a lot of quotes from that chat room. Then I don't have to interview those people. I also monitor four print journals regularly. (12S)

I think because of the Web and other electronic resources, monitoring almost precedes starting. Sometimes one doesn't have an idea until he/she picks it up in the medium... I think we rely more on monitoring and browsing now. I think monitoring has become a constant step. With the changing media, it is no longer a linear process. I monitor even before I start a specific research topic, because that is where I am going to gain a lot for the topic in some ways. I think browsing and monitoring have become things that are no longer part of the process, but that supercede the process. I have them going on all the time. (18W)

*Differentiating*

Now differentiating and extracting have become a lot more complicated. Evaluating, depending on where you get the materials from, can be difficult. One has to figure out where the material comes from, who produced it, and how current it is. The whole idea about how current information is has changed radically. (18W)

I definitely do differentiating. I will look for the article by the same author, particularly in the educational field. Some authors are well known in the field. When I was working on my dissertation, I would read five, six or seven articles from the same author to see if that author changed his/her perception over time. (23Ho)

*Extracting*

> I take differentiating and extracting as two different levels of sorting. You initially sort, and then sort finer when you get close to what you need. (17Hi)

> Once I confirm the topic of my research, I go to the website, mainly TSU online databases to search for sources related to my research. I read the abstracts and then scan the contents of the materials in order to decide whether or not to use the materials. If I need the materials and they are full-text linked, I will print them out right away. If not, I go to the library and copy the materials, or request the materials through the interlibrary loan. (9T)

All of the interviewees agreed that Ellis's model covers the basic information searching characteristics. They have used part or all of the stages in the model at one time or another and many of the respondents' answers fit the model extraordinarily well. The analysis of the data indicated that some revisions to the basic model are needed because several information-seeking activities or tasks cannot be categorized into the six characteristics. Two new characteristics emerged inductively during the course of data analysis.

"*Preparation and planning*" exist as one possibility. Effective searching of information requires planning, attention to detail and search strategies. Faced with an overload of information and recognizing that potential barriers to the utilization of information exist, it is important to find out which sources might usefully be consulted, and to find effective and simple search procedures. To undertake an effective search of sources one must use a range of tools and technology that enable information to be identified, located and obtained. For example, in order to conduct an effective search one needs to figure out what one is really researching, come up with keywords and synonyms, and use phrases, truncation, Boolean, and field searching when appropriate. Data show that "*preparation and planning*" can be counted as a qualifying stage:

Before starting, I explore and diagnose the research problems, create a visual or mental picture to see how I should proceed with my research, and develop valid solutions. (1E)

I have been working on sending requests for books and other things for the TSU library, but not in terms of electronic material. I don't have to go to the library for library orientation because my students do it online. I try to catch up on things when they do a presentation for the faculty to show their new resources. (18W)

There is an increasing importance of information management since researchers are using more resources in an information-rich world. The researcher can cope with large quantities of information through a variety of resources and modes. "*Information management*" thus could potentially qualify as a new character, as indicated by these participant responses:

"Revising" is one stage that I use for my information gathering. I go back and update or discard information as the knowledgebase expands. For instance, I gathered some information about six months ago for an ongoing research project. As information expands so fast today, I found more relevant materials for the project in recent several months. Some of the information I found about six months ago is not important to me anymore, so I went back to reorganize the material I have, and discarded some of it. (8E)

When you put information together in your own way, then that is another stage. (16P)

I mostly use electronic resources now and am learning to use more. I download things I read online. I try to copy and paste things online. Hardcopy is nicer. But I am adjusting myself and learning to read more on-line, because we can get so much through e-resources, and we can't get away from it. (13S)

Data show that "*preparation and planning*" and "*information management*" are major information-seeking activities that could be added to David Ellis's behavioral model.

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# CHAPTER 5

# CONCLUSIONS

This study interviewed thirty social sciences and humanities researchers about their information-seeking behavior in the electronic information environment. It is found that Internet-enabled resources play a significant role in their information seeking. Among the eight types of Internet information technologies, the Web, databases, and e-journals are ranked top three in importance, followed by online catalogs and email. The researchers in social sciences seem to use more electronic resources to satisfy their information needs than those in humanities. High use of electronic resources is found by doctoral students and assistant professors, who both are academically junior. All the participants appreciate and utilize some electronic resource for their research, and will continue to use electronic resources as a means of gathering information. Easy access to information anytime and anywhere is preferred by these researchers, thus they feel the need and increasing desire to make more information available through the Internet. For certain disciplines, however, electronic resources are perceived to be less available or vital.

Ellis's model can be extended by including two additional characteristics. In addition to the six characteristics: *starting, chaining, browsing, monitoring, differentiation, extracting*, this study suggests two new characteristics: *preparation and planning,* and *information management.* These characteristics are not necessarily co-occurring or in the above sequence during the social sciences and humanities researchers'

information searching. They move from one activity to another, and the use of these characteristics depends on the researchers' needs and situations. These characteristics reflect the social sciences and humanities researchers' general interests and similar methods in locating relevant information. These characteristics are key features in their perceptions concerning information gathering. Although not all of these characteristics constitute activities for information searching, they play significant roles in facilitating information retrieval. Both new characteristics identified in this research suggest a need for additional tools, more flexible and user-friendly information systems, which provide better service at individual level.

The research indicates that some of the obstructions to use of electronic resources include availability and usability. The library needs to address capabilities and deficiencies of various electronic information sources, advise on when to seek information sources beyond the library, compare and contrast information gathered, develop systems to make information more useful and easy to use and provide more instruction to ensure information literacy. To facilitate research and education, libraries need to design an information environment and offer intermediary service to assist users in managing information.

As a recommendation, the library should create more user education programs which are tailored to different users to make learning easier and more convenient. This should be a cooperative effort between librarians and researchers, so that both sides can contribute their own expertise to increase the usage and relevance of appropriate resources. It is also recommended that librarians and information professionals conduct

additional studies about users' information-seeking behavior so that they can provide more suitable resources and services to different user groups.

With research data becoming more accessible than ever before, there are many new opportunities for libraries to expand their functions in today's electronic information environment. These new areas include interfacing, information retrieval, standardization, user education, facilitating classification, information management, and organization of networked information sources that focus more on users. Academic libraries have to integrate technology and traditional services, making libraries the gateways to this vast resource of print and electronic information, which will encourage library usage and enhance user satisfaction.

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# APPENDICES

# APPENDIX A

## Interview Preparation

**Introduction**
This interview guide outlines some aspects of what to do before and during an interview. It is impossible to decide on what to say or do at every point.

**Preparations**
Send out e-mails to the interviewees before going on the visit. This e-mail should include confirmation of the visit, a brief background of the researcher, the project and an agenda.

**What to Bring**
Interview introduction letter and consent form
Interview work sheet
Pens in different colors
Pencil and eraser
Ruler
Plastic files (to keep the papers in order afterwards)
Paper clips (same reason as above)
Tape recorder, for taping the interview.

**Conducting the Interview**

**Setting**
Participating faculty and doctoral students will be visited in their offices by the researcher.

**Pace and Length**
The interviews will use a semi-structured interview protocol and each interview will be between 45-60 minutes in length.

**Prepared Questions**
The researcher will have a series of 13 general questions planned in advance.

**Informed Consent**
Show participants the informed consent form. Tell them that the purpose of the form is to make them aware of their rights as a participant in the project.

Go over the consent form with them, and ask them to let the researcher know if they have any questions. Make sure he/she signed and dated the form. The researcher signs and dates the form as well in the space provided for the researcher's signature.

**Introduce the Project**
The researcher takes the opportunity to briefly describe the project and put the interviewees at ease. It should include the following points:

It is a project that will contribute to the completion of the researcher's master's thesis in Information Sciences.

The main goal of this study is to observe how technology contributes to the information-seeking process for the social sciences and humanities researchers, and test how technology contributes to the David Ellis's six information-seeking categories of social scientists' behavioral model, and to get a fuller picture of the information-seeking process for social sciences and humanities researchers.

General background information about the social sciences and humanities faculty and doctoral students will be asked. Tell the participant that the researcher is simply interested in their feedback. There is no right or wrong answer. The researcher will take time and listen, and allow for quiet time. The researcher will not force things, but let the participants take their time.

# APPENDIX B

## Interview Guideline

Task Analysis

This is the core part of the interview. The participates will be asked to respond to a series of questions, such as their information use patterns, methods of locating information, problems encountered in the research process, methods of keeping abreast of new developments in the field, help-seeking behavior, and use of information technology, with a particular emphasis on electronic resources.

Initial interview questions.

Rank of the Participant: _____ Department: _____ No. _____

[Greet, explain the project briefly, consent form, & set recording]
1. Could you briefly describe one of your recently completed research projects, in which you have used various information resources?

2a. Do you use email to gather information for your research?
        __ Yes.
        __ No. Reason for not using the
source_____
        [If no, go to question 3]

2b. How often do you use email to gather information for your research?

2c. How long have you been using email to gather information for your research?

2d. How would you rate the importance of email as a tool for gathering information for your research? Let's use a scale of 1 to 5, 1 for the least important and 5 for the most important.
1        2        3        4        5

3a. Do you use listserv to gather information for your research?
        __ Yes.
        __ No. Reasons for not using the
source_____
        [If no, go to question 4]

3b. How often do you use listserv to gather information for your research?

3c. How long have you been using listserv to gather information for your research?

3d. How would you rate the importance of listserv as a tool for gathering information for your research? Let's use a scale of 1 to 5, 1 for the least important and 5 for the most important.
1      2      3      4      5

3e.Would you please give me a few examples for your most frequently used listserv for the research?

4a. Do you use Web to gather information for your research?
          __Yes.
          __ No. Reasons for not using the
source_____
          [If no, go to question 5]

4b. How often do you use Web to gather information for your research?

4c. How long have you been using Web to gather information for your research?

4d. How would you rate the importance of Web as a tool for gathering information for your research? Let's use a scale of 1 to 5, 1 for the least important and 5 for the most important.
1      2      3      4      5

5a. Do you use ftp to gather information for your research?
          __Yes.
          __ No. Reasons for not using the
source_____
          [If no, go to question 6]

5b. How often do you use ftp to gather information for your research?

5c. How long have you been using ftp to gather information for your research?

5d. How would you rate the importance of ftp as a tool for gathering information for your research? Let's use a scale of 1 to 5, 1 for the least important and 5 for the most important.
1      2      3      4      5

6a. Do you use online catalogs to gather information for your research?
          ___ Yes.
          ___ No. Reasons for not using the
source_____
          [If no, go to question 7]

6b. How often do you use online catalogs to gather information for your research?

75

6c. How long have you been using online catalogs to gather information for your research?

6d. How would you rate the importance of online catalog as a tool for gathering information for your research? Let's use a scale of 1 to 5, 1 for the least important and 5 for the most important.
1       2       3       4       5

7a. Do you use e-journals to gather information for your research?
        __ Yes.
        ___No. Reasons for not using the
source_____
        [If no, go to question 8]

7b. How often do you use e-journals to gather information for your research?

7c. How long have you been using e-journals to gather information for your research?

7d. How would you rate the importance of e-journals as a tool for gathering information for your research? Let's use a scale of 1 to 5, 1 for the least important and 5 for the most important.
1       2       3       4       5

7e. Would you please give me a few examples for your most frequently used electronic journals for the research?

8a. Do you use databases to gather information for your research?
        __Yes.
        __ No. Reasons for not using the
source_____
        [If no, go to question 9]

8b. How often do you use databases to gather information for your research?

8c. How long have you been using databases to gather information for your research?

8d. How would you rate the importance of databases as a tool for gathering information for your research? Let's use a scale of 1 to 5, 1 for the least important and 5 for the most important.
1       2       3       4       5

8e. Would you please give me a few examples of your most frequently used databases for the research?

9a. Do you use portals to gather information for your research?

__ Yes.

__No. Reasons for not using the

source_____

     [If no, go to question 10]

9b. How often do you use portals to gather information for your research?

9c. How long have you been using portals to gather information for your research?

9d. How would you rate the importance of portals as a tool for gathering information for your research? Let's use a scale of 1 to 5, 1 for the least important and 5 for the most important.
1     2     3     4     5

9 e. Would you please give me a few examples for your most frequently used portals for the research?

[For non-users of e-resources, go to question12 and 13.]
10. How are the above information resources used in your research process?
{This is the most important question of all. Make sure they elaborate on how the e-sources were used, and why.}
email:
listserv:
web:
Ftp:
online catalogs:
databases:
electronic journals:
portal:

11. In comparison between print information resources and electronic information resources, which percentage of your research information needs is satisfied by each type?
Print information_____
Electronic information_____

12. There is a model that depicts six types of information seeking. I am interested in your experiences in finding information for your research. Could you look at the model [give the interviewee a copy of the model] and provide your comments?

13. Is there anything you would like to add to what we have discussed?

{Thank you very much!}

Checkpoints to Keep in Mind:

Keep the atmosphere positive.

Formulate clear questions.

Ask the questions so as to encourage the user to elaborate on the answer, not just answer "yes" or "no".

The researcher will ask the interviewee for permission to tape record, and explain to the interviewee that the purpose of tape recording is to be able to go back later if clarification is needed.

The interviewer who is taking notes must make sure that the discussion is slow enough to get everything down on paper clearly. The notes must be detailed enough. If time is flying - check if it is OK to continue longer than planned with the interview. If not - try to speed it up!

Paper Work

The researcher will take notes on a response sheet that lists the questions asked and tape record the interview if possible.

After the Interview Playback

The aim with this section is to make sure that the activity graphs are clear and correctly understood. This is also the time to tie up any loose ends, or fill in missing information.

1. Go through the interview work sheet. The interviewer tells the interviewee how the workflow has been understood and the interviewee comments if the notes are incorrect or incomplete.

2. Ask if interviewee can see any categories that the interviewer has missed. Thank the interviewee for his/her time, and ask if it is OK to contact the interviewee again for clarifications.

3. Label the response notes and tape with an identifying number upon finishing, and place them in the envelope.

# APPENDIX C

## Consent Form

*Information-seeking Behavior of Social Sciences and Humanities Researchers in the Internet Age.*

This is a Masters' thesis research project at the University of Tennessee, Knoxville. The purpose of this study is to observe how new technologies have contributed to the information-seeking behavior of faculty and doctoral students in social sciences and humanities. The results will be used to explore and extend a prior model of information-seeking process, which was developed in the context of older technologies. With a better understanding of how academic users look for information, information professionals can develop effective user services.

The interview will be in a semi-structured format and last about 45-60 minutes. I will take notes of your answers. With your permission, I will also record this interview on tape. Both the notes and tapes will be given an anonymous identification number for data analysis. Data will not be linked to your name. Recorded data will be transcribed into text with the identification numbers by the researcher. After completion of the project, audiotapes will be destroyed, and consent forms will be locked in an UT location for three years.

Your participation is voluntary; you may withdraw from the interview at any time. If you agree to participate, please sign this form. This signed form does not obligate you to participate again, nor does it obligate the researcher to extend another interview.

CONTACT INFORMATION

For further information, you may contact the researcher, Xuemei (Sherry) Ge, at (615) 963-5237, or xge@tnstate.edu.

CONSENT TO PARTICIPATE

Your signature below signifies that you have read and received this consent form.

Participant's signature_____    Date _____

Researcher's signature _____    Date _____

# VITA

The author holds a BA in English Language and Literature from the People's Republic of China. From 1997 to 1999 she worked as a library assistant at the Nashville & Davidson County Public Library. Since 1999, she has been employed as a library assistant in the cataloging department at Tennessee State University. The author completed the requirements for the Master of Science Degree in August 2005.