

# Information Seeking in Academic Research: A Study of the Sociology Faculty at the University of Wisconsin-Madison

Yi Shen

*This study examines how social scientists arrive at and utilize information in the course of their research. Results are drawn about the use of information resources and channels to address information inquiry, the strategies for information seeking, and the difficulties encountered in information seeking for academic research in today's information environment. These findings refine the understanding of the dynamic relationship between information systems and services and their users within social-scientific research practice and provide implications for scholarly information-system development.*

The information needs and information-seeking behavior of social scientists have been the focus of inquiry within library and information science (LIS) research for decades. Folster reviewed the major studies that have been conducted in this area over the past three decades.<sup>1</sup> She found that research methods had developed through several stages. Research prior to the 1960s usually consisted of questionnaire-based user studies that gathered basic demographic data and quantitative data on the type of information used. Following that were citation studies in the mid-1960s, and then the combination of questionnaire and interview techniques to develop profiles of users and their needs in the 1970s. The information environment of the 1980s witnessed a major transition in research design. The former practice of studying large groups via questionnaires or structured interviews gave way to the use of unstructured interviews or observation of smaller groups, resulting in a more holistic picture of social scientists' research practices. More fully developed techniques for behavioral models emerged in the 1990s. Folster summarized these studies done over decades and concluded that (1) social scientists place a high importance on journals; (2) most of their citation identification comes from journals; (3) informal channels, such as consulting colleagues and attending conferences, are an important source of information; (4) library resources, such as catalogs, indexes, and librarians, are not very heavily utilized; and (5) computerized services are ranked very low in their importance to the research process.

There are many examples of studies about the information-seeking behavior of social scientists. For example,

the INFROSS project (Investigation into Information Requirements of the Social Scientist) studied the information needs of British social scientists in the late 1960s and early 1970s and found that they preferred to use journal citations instead of traditional bibliographic tools, and that they tended to consult with colleagues and subject experts, rather than library catalogs or librarians in order to locate information.<sup>2</sup> Other social-scientist studies reinforced the findings of the INFROSS project.<sup>3</sup> Several studies indicated that computerized literature searching was ranked low as a source of information among social scientists and suggested the promotion of electronic information services by librarians to enhance their roles as information providers.<sup>4</sup>

In an influential study on social scientists' information-seeking patterns, Ellis developed a behavioral model with six features based on the stages they went through in gathering information:

- **Starting**—includes activities characteristic of the initial search for information, such as asking colleagues or consulting literature reviews, online catalogs, and indexes and abstracts;
- **Chaining**—following chains of citations and other forms of referential connection between materials;
- **Browsing**—semi-directed searching in an area of potential interest, such as scanning published journals, tables of contents, references, and abstracts;
- **Differentiating**—using differences (authors or journal hierarchies) between sources as a filter on the nature and quality of the material examined;
- **Monitoring**—maintaining awareness of developments in an area through the monitoring of particular sources such as core journals, newspapers, conferences, magazines, books, and catalogs; and
- **Extracting**—systematically working through a particular source to locate material of interest, for example, sets of journals, collections of indexes, abstracts, or bibliographies.<sup>5</sup>

Meho and Tibbo revised Ellis's information-seeking model by studying the information-seeking behavior of social-science faculty who study stateless nations.<sup>6</sup> They confirmed Ellis's model and derived four additional features—accessing, networking, verifying, and information managing. Accessing is getting hold of the materials or sources of information once they have been identified and located. Networking includes communicating and maintaining a close relationship with a broad range of people such as friends, colleagues, and intellectuals. Verifying is checking the accuracy of the information found, and information managing includes filing, archiving, and organizing the collected information to facilitate research.

---

**Yi Shen** (yishen@wisc.edu) is a Ph.D. candidate in the School of Library and Information Studies, University of Wisconsin-Madison. Her article is the winner of the 2006 LITA/Endeavor Student Writing Award.

---

With the exception of Ellis's work in 1987–1990 and the follow-up study by Meho and Tibbo, studies investigating academic social scientists have been in steady decline since the mid-1970s.<sup>7</sup> According to Line, in an information world radically changed by the Internet, it is essential to carry out new studies of information uses and needs.<sup>8</sup> Most of the studies discussed in this paper were conducted before the development of the Internet. The present study focuses on the information-seeking behavior of social scientists in a new information environment featuring the Internet and other dramatic technological advances. Kling and McKim pointed out the growing importance of information technology and the resulting major shifts in scientific practice.<sup>9</sup> Costa and Meadows studied the impact of computer usage on scholarly communication among social scientists and found that major changes in their communication habits were occurring.<sup>10</sup> The most significant impacts of information technology were greater interactivity, widened community boundaries, extended access to information, and an increasing democratization of the international research community. They suggested that the developments were influenced by new pressures (social, economic, political) from the research community and the institutional environment, and by newly available resources (infrastructure, services, sources) being introduced into the academic environment by information technology. It could be expected that social scientists' information-seeking behavior would change within a new social-technical environment. The purpose of this study is to extend the findings of the previous studies by examining social scientists' information needs and their activities and perceptions in relation to today's information systems and services.

This paper provides a theoretical framework for the study, discusses the methods for data collection and data analysis, and summarizes findings. Finally, it discusses results, reflects on the theoretical and practical implications that ensue, and notes the limitations imposed by the study design.

## **Theoretical framework**

The theoretical frame for this study is the idea of "communities of practice." Wenger, McDermott, and Snyder define a community of practice as "a group of people who share a common concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis."<sup>11</sup> Within communities of practice, people share common values, observe and interact with each other, exchange views and ideas, and contribute to the knowledge-creation process.<sup>12</sup>

According to Wenger, communities of practice are combinations of three elements: a domain of knowledge, which defines the key issues in the community; a community of people who care about the domain; and the shared practice that they create.<sup>13</sup> Communities of practice are loosely connected, informal, and self-managed. They are about knowledge sharing, and the best way to share knowledge is through social interaction and informal relationship networks. Effective communication and mutual understanding are important factors in fostering communities of practice. This form of social construction is highly situated and highly improvised.<sup>14</sup> It essentially suggests that researching some thing is inseparable from its own historical and social locations of practice and should be carried out in the process of actually doing that thing.<sup>15</sup>

A process organizes knowledge in a way that is especially useful to practitioners whose shared learning brings value to a community.<sup>16</sup> Pragmatically, the examination of context-based research processes draws "attention away from abstract knowledge and cranial processes and situates it in the practice and communities in which knowledge takes on significance."<sup>17</sup> What is learned is highly dependent in the context on which the learning takes place, as it is central to the transfer and consumption of information. This requires "looking at the actual practice of work, which consists of a myriad of fine-grained improvisations that are unnoticed in any formal mapping of work tasks."<sup>18</sup> Such beliefs are utilized in this present study to approach and explain information-seeking behavior among social scientists.

Researchers used communities of practice in organization and business studies to investigate knowledge sharing and knowledge-creation processes within organizational settings to cultivate the building of knowledge-management systems. Researchers also used this approach in the field of computer-supported cooperative work (CSCW) to study the social interactions of groupware systems and community computing and support systems. This study selected communities of practice as the theoretical frame because it has been widely applied in the study of knowledge sharing and has been tested and verified through empirical research. This study represents an exploration of the usefulness of communities of practice for research on information-seeking behavior within a knowledge-intensive scholarly community.

The primary purpose of the present study is to provide empirical evidence on social scientists' information seeking in scientific research. The main research questions are: (1) how do social scientists make use of different information sources and channels to satisfy their information needs? (2) what strategies do they apply when seeking information for academic research? and, (3) what difficulties are encountered in searching for supporting

information? Information service providers should find the results of this study interesting because identifying users' perceptions of the information environment provides guidance for information-system development that will closely reflect or accommodate the information-seeking activities of social scientists.

## Methods

The research questions described in the preceding section were tested in the context of information use in scientific inquiry by faculty in the department of Sociology at the University of Wisconsin-Madison during March and April 2003. The participants were selected from the faculty list on the department Web page and then contacted by e-mail to arrange face-to-face interviews. Four people were interviewed based on their willingness to participate. Three of them are full-time professors and have teaching experience of more than twenty years (one of them has been teaching for more than thirty years). The fourth is an assistant professor with four years of teaching experience. All of the participants are female. Each interview lasted from forty-five minutes to an hour.

All participants were interviewed in their campus offices to allow for easy access to supporting materials as examples of how they go about their work. After explaining her identity, the purpose of the research, and assuring the confidentiality of the interview, the researcher asked initial questions in a relatively structured way to glean background-related information and research context. The second part of the interview dealt with information-related behavior, such as information sources and channels used to address research inquiry, and the major strategies for selecting needed information. The third part focused on problems the participants encountered in information seeking.

The researcher took field notes and tape-recorded all interviews. As a consistency check, the participants were sometimes asked to comment on disciplinary work practices gleaned from other interviews. The selection of four participants reflected the practicalities of collecting data with limited time and resources.

## Findings

Based on the idea of communities of practice that what is learned is highly dependent on the context in which the learning takes place because it is central to the transfer and consumption of information, the present study

provides a holistic picture of information use situated in actual research practice and academic context among these social scientists.<sup>19</sup> These findings can be summarized into several interrelated stages as shown in figure 1.

The figure shows that the social scientists' information seeking moves from academic information needs, choice of information sources, searching for information, to use of the information. The researchers move back and forth between stages until the information inquiry is satisfied. Searching for information involves the implementation of strategies, confrontation of difficulties, and continuous decision making. Choice of information channels goes through the whole information-seeking process based on researchers' momentary or changing information activities and information needs. This figure is intended to provide a general view of the information seeking behavior in this specific case, but is not intended to generate a model or pattern of information seeking.

The findings are organized into the use of information resources and channels to address information inquiry, the strategies for information seeking, and the difficulties encountered in searching for information, which together constitute the major information-seeking practice of the participants.

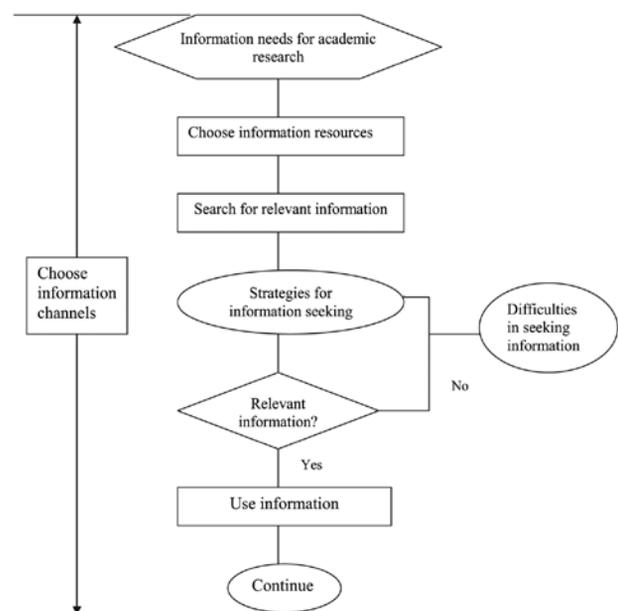


Figure 1. Stages of the social scientists' information seeking

---

## Use of information resources and channels to address information needs

### Information needs

The respondents reported their research-oriented information needs in the context of their research activities. Those information needs can be grouped into seven categories. Examples of responses follow.

1. General academic issues and current research discourses in the field.  
"I find conferences are more useful for seeing what kinds of general things are going on. I guess some of these are research, some are academic politics kinds of things, and what's happening in the discipline as a whole."  
"In conferences, you find out what other people are doing research on. The most current research is not published yet, so you know what's happening now."
2. Feedback from colleagues on personal research.  
"The best thing about conferences is that when I present my own research, I get comments about it."  
"You show your paper to people and ask them for comments, and they show you their papers and ask you for comments. This is kind of the normal part of academic life."  
"I usually send a copy of a paper or something and get actual comments through e-mail."
3. Current research topics and activities of specific authors.  
"I'll look for key people, and see what they've done. . . ."  
"Knowing who is doing what where. . . ."  
"You sort of inevitably talk about your research with other people doing comparable research and find out what they are doing to keep current to what the different research projects are."
4. Existing datasets (existing survey research databases) and statistics for secondary data analysis.  
"There are online statistical sources that I get to put in the papers."  
"I use the Internet to download all the . . . data that we analyze. . . ."  
"I do a lot of data research, so I use government sites on the Internet, like the Science's Bureau, or the National Center for Health Statistics. We also have a little Center for Demography and Ecology Library. I use our in-house databases too."  
"In social science, there are many existing sets of data. We have something called Data and Program

Library Service here. They have all kinds of databases that will tell you where there are data sources that have certain variables in them. . . . So you can go and do your own statistical analysis on those data."

5. Information needed for management purposes, such as the cooperation and coordination of research activities.  
"In this department, we conduct community business by e-mail. We pass messages around. . . . A decision is usually made through this dialogue."  
"I am constantly in interaction with people by e-mail to cooperate on research projects."
6. Community recognition and inspirational support from colleagues. For example, one respondent commented, "In conferences, I feel invigorated when sitting and talking to field colleagues who are interested in my research. The whole conversation makes me feel excited and inspired." Another respondent indicated, "To see people face-to-face that you respect and they think your work is good, that's good." It is echoed by a third respondent: "You just talk about your work, and people act like what you are doing is very interesting, then it makes you more inspired."

Those needs for information constitute a major research practice of the participants and thus determine how they go about seeking information.

## Information resources

Supporting information resources could be divided into internally built university resources and external resources. Moreover, these internal and external resources could be further subdivided into human resources and nonhuman resources based on their physical forms.

### Internal, nonhuman resources

The participants identified two major categories of internal nonhuman information resources for academic research based on their intended use. The first of these categories is books and journals that are available in the university libraries for literature reviews and to provide awareness of current research. However, because of physical inconvenience, campus libraries are not often used. One participant indicated, "The library is down the hill, so even before there were lots of good Internet resources, I wasn't going down to the library a lot." On the other hand, the participants reported that they frequently used the library online public access catalog (OPAC) to order

---

document delivery from the libraries. "I find Madcat (the library online catalog system) very useful for a whole variety of specific searches for journals, books, and different online information." Another participant remarked, "I can request a book online through the document delivery services."

Another internal nonhuman resource consists of existing survey datasets that are collected by the Center for Demography and Ecology Library for secondary data analysis and research. It was indicated that in social science, as more and more survey research databases were available, there was an increasing amount of research conducted on secondary data. The Data and Program Library Service provides all kinds of databases informing researchers of the location of data sources and the variables contained in certain datasets.

### External, nonhuman resources

The participants identified three types of external nonhuman resources based on their medium. Some of these resources are purchased and managed internally by the campus libraries but developed and maintained externally by outside library and information professionals. One type is electronic resources, such as electronic newspapers, external OPACs, electronic full-text databases, online statistical reports, survey databases, and government or personal Web sites. Some named examples include *Sociological Abstracts*, Lexis-Nexis, Science Bureau's Web site, the National Center for Health Statistics Web site, *Web of Science*, and online British newspapers. The second type is printed resources, such as books, newspapers and magazines, archives, and newspaper indexes that are available from outside of the campus. Named examples include the paper indexes for the *New York Times* and *Los Angeles Times* back in the 1960s. The third type is audio-video resources, such as radio broadcasts, tapes, videotapes, and television.

One major finding was that the participants depended primarily on electronic information resources. All looked for information on both literature and research data via the Internet. Literally, each participant had her own frequent visit to search engines or OPACs for information on specific research topics and general research subjects. Examples of responses include:

"I start with Internet Explorer and go to Google."

"I work a lot online. . . . I just do Internet searches. Both these journal and newspaper databases, I use a lot for various purposes."

"I want to find out if there is work on this specific topic or concept. I would almost always start with *Sociological Abstracts*."

"The citation index is terrific for finding contemporary work building on something important."

Moreover, the respondents also conducted research on the Internet to study Web behavior or social networks on the Internet.

"There are more and more people actually doing research on the Internet, studying Web sites or connections between Web sites. . . . They collect data online. . . ."

"In social-movement research, more and more researchers study how people coordinate transactional movements, protest movements, various ethnic movements, and political movements through the Internet."

"Online is a big way of doing cooperation as well as doing research. It is one of the reasons that we are interested in studying what kind of connections there are on the electronic network."

"A current research project that I am doing is looking at network of . . . Web sites. So we are gathering primary data from the Web sites."

Thus, the electronic mechanism for information systems and services dominates the manner in which the participants carry out their research.

### Internal, human resources

The faculty participants were not only electronic-information consumers, but also electronic-information producers. For example, one described, "I maintain my own Web page, on which I post my research and add links to outside resources that I collected for years. I have my own gateway to organize the link pages, which can be used for my future reference and by my students. The library links to my Web page as well." Moreover, this participant advocated the creation and collection of electronic materials by her colleagues as well. "It's an evolving process. The more people put their information on the Internet, the more useful it is to be on the Internet. We are right in that transition."

The department can easily take a step further to build a shared pool of information and information resources in its internal system.

A second type of internal human resources comes from the technical staff who provided announcements of technical developments and product information, as well as technical assistance for social-science research. Working as the Social Science Computing Cooperative (SSCC), the technical staff provides the faculty with detailed instructions and useful tips for creating electronic materials as well as with directions for publishing them. Librarians, as a third type of human resource, provided reference services and collected necessary information resources for their academic research.

### External, human resources

The external human resources that the respondents gathered and contacted are of two types: people shar-

---

ing similar research interests and concerns, and people having different fields of interest. The former types were valued for supporting suggestive and creative communication and interaction as well as potential cooperation. For example,

“when it comes to really think[ing] about things, sit down in one place and talk, and then stuff comes out. You don’t even know what you are thinking until you sit down and talk to people. It’s idea generating.”

“Knowing who is doing what where in the field is important. . . . I am working on a . . . research topic, which requires the awareness of other people with similar interest around the world. . . . I cooperate with the scholars from different countries and with different knowledge background.”

The latter types are used for current awareness of research works in other fields and general disciplinary activities and academic trends. For example,

“I need to know people who know what’s going on in other fields, and they tell me what’s going on.”

“I get a lot in terms of contemporary research at conferences, which are useful for things that haven’t been published in journals.”

“[A conference] will generate a lot of interesting interchange.”

“[At conferences], I think about how what other people are doing is related to what I would want to do, or how they can do it differently. A lot of times, I think about whether the methods they are using would be useful for my work at all.”

## Channels

The major information channels through which the participants delivered and exchanged information included e-mail, telephone, face-to-face communication, and project reports or other documents. E-mail was a dominant communication and information-acquisition tool in research. Face-to-face or oral communication channels in this case were often used as a supplementary means.

“Mostly, e-mail is how I communicate with people, occasionally telephone, but not very often. Even with people here and we can walk right next door, mostly we just e-mail each other. It’s nice, because you have a record.”

“I get hundreds of e-mails a week. . . . I live on e-mail. My colleagues know I am easier to reach by e-mail than in person.”

“[Face-to face] it’s just the more personal and emotional mode [of communication] . . . you can see the

person’s expression, and figure out what they are really thinking.”

E-mail communication helped accomplish several scientists’ tasks, including quick exchange of timely information, teamwork coordination, non-work-oriented message exchange, field discussion, field information seeking and finding communities of interest. For example, one participant indicated the coordination of community activities through e-mail.

In this department, we conduct community business by e-mail. Community members rarely meet face to face. The chairperson finds out what the research task is, and sends out messages. People exchange opinions through e-mail messages. And a decision is usually made through this dialogue, instead of talking face to face.

When scholars are going to have a face-to-face meeting, they deliver the data, records, and reports beforehand, and share their initial viewpoints with supporting information through e-mail.

The following factors affected a scholar’s choice of channels for information delivery and exchange: the characteristics of the information receiver, the characteristics of the information, the task or purpose of delivering or sharing information, and the immediacy of response. For example, one respondent mentioned that she usually delivered data, records, and research documents via e-mail for formal announcement and record keeping by the receivers. When there was no stress of immediate response, she preferred e-mail communication for the thoughtful input and feedback allowed by the asynchronous-exchange feature of e-mail. “Intellectual questions are more easily handled by e-mail because I have the time to think about it and formulate my responses.” She continued, “I usually e-mail a copy of my paper to colleagues for detailed feedback.”

In another case, a participant indicated, “Some of us are well aware that e-mail is archived, it’s not anonymous and not private. If you are concerned about something and want to say something that you don’t want to have an e-mail record of, you may want to go to talk to somebody about it, instead of writing it in an e-mail.”

Another participant explained that because of her research topics, she usually adopted the face-to-face method of communication and attended all kinds of international academic conferences. In other circumstances, when collecting opinions for resolving certain questions, she chose to use e-mail.

## Strategies for information seeking

The participants indicated certain strategies applied to gathering information and tracking resources to address

---

their information needs. Those strategies with response examples are:

1. Extracting abstracts: "I use abstracts to get the parameters of what's happening and then know more narrowly where to focus."
2. Tracking citations: "The citation index is terrific for finding contemporary work" that builds on previous major work in a subject area.
3. Restricting the search to a limited set of sources or types of sources to achieve satisfactory results within an acceptable timeline.
4. Constantly filtering and interpreting the search results by referring to the summary description of Web sites: "In most searches that I do, the first ten hits are book dealers. I don't bother with them. I go to the next page and try. . . . I look at the summary of what the site is and try to figure out what the worthy things are."
5. Avoiding search terms prone to commercial information: "When searching for something without a lot of commercial stuff, you are more likely to get what you want on the top."
6. Setting the default for the number of search results with consideration of information completeness, information usefulness, importance of research, and timeliness: For example, one participant stated, "I usually set my least default to a hundred citations. Five hundred is too many, but it depends on what you're looking for, how much you care about your findings, how much faith you have for the existence of useful information. If you think it's not worth a minute of your time, you just forget it. But if you are sure it's there, you just have to keep looking for and work[ing] harder at it."

As shown in the findings, the participants employed certain criteria for evaluation of the information they gathered. Those judgment criteria were: importance of research, usefulness, accuracy, completeness, and timeliness. The results imply that to accomplish the research tasks on hand in a fast-paced and distributed digital-information environment, the practicalities of time and human effort have come into play in the ways in which the participants sought information.

## Difficulties in seeking supporting information

The problems encountered by the participants when collecting information through various resources were identified and are grouped into categories, including:

- Information is scattered in different places and with different qualities; it is difficult to have a complete

and valuable picture of a research phenomenon. The participants described this difficulty as "how tricky computerized search is."

- There is too much information on the Internet to filter, and the current search techniques and ranking tools are not intelligent enough to capture the most relevant information of interest. The participants described trying alternative search strategies as a "game-playing" and "brainstorming" process.
- No sources of information or mechanisms assist in the identification of people with similar research interests and their activities in the broad virtual space. For example, one participant described:

I am trying to find what's in public debate on controversial topics. And it's very common to have trouble finding both sides of the debate. I started with diffuse searches on the Internet trying to see if I can find the potential academic community and tag into their debate. I basically searched on [the search term] on the whole Internet because I had no idea where it would be, who got involved, and how it was formed. When doing [the research] issue, it's easy to find the people in favor of [a topic], but difficult to find anybody who was an opponent. Eventually, I got hundreds of hits [search results], and I had to wade through a lot of proponents to find the opponents. Sometimes, it's an issue to find [an] ethnic minority perspective of a topic.

- Technology upgrades and system integration arouse another concern. As one participant expressed it, "technology is changing [so] fast that lots of computer files from the 1970s are no longer readable. The danger of an information system lies in the tradeoff between the accessibility provided by digitization and the long-term survival of intellectual properties."
- There are no digital sources of information for some historical documents and no retrievable databases for book chapters. One participant noted, "The online strategy is very good for really current stuff, but not for older stuff. The people who started the . . . research were actually writing before the online revolution, so they are not turning up so much in keyword searches online." Another participant also mentioned the inconvenience of using hard-copy indexes for newspapers from the 1960s and archival data that go back to the 1970s and 1980s.

## Discussion

This study shows how the 'communities of practice' perspective situates the process of using information in the actual practice of scientific research. It provides an information context in which knowledge takes on sig-

---

nificance. The results provide empirical evidence of the participants' activities as well as insights into the ways they seek information.

In his discussion of user-oriented evaluation and qualitative analysis of information use, Ellis emphasized a small-scale qualitative analysis of users' perceptions of system performance to construct insights into the complex reality of the information environment.<sup>20</sup> He argued that a detailed understanding of the complexity and interaction of information systems and services and their users can be used to explain problems and provide guidance on the development of information systems. The present study is in accord with Ellis's idea by focusing on a specific sample of academic social scientists working in a university setting. The choice of University of Wisconsin-Madison is based on the grounds of convenience and ease of access. The restriction to one specific sample also avoids the added complexity and compound problems of information use situated in different practice and contexts.

Ellis also considered the feasibility of interviews to "provide enough information for a detailed and accurate account of the perceptions of the social scientists of their information-seeking activities to be made, and to enable an authentic picture to be constructed of those activities."<sup>21</sup> He thought the information-seeking activities of social scientists were too diffuse to carry out triangulation of methods. By applying the interview method, this current study complies with Ellis's suggestion.

On the other hand, Ellis's information-seeking behavior-model of social scientists presented six generic features. These conclusions are far too general for specific application. From the perspective of communities of practice, the current study examines the way social scientists use information in their research practices and specific circumstances; it also presents specific information-related behavior, strategies, and difficulties. This study also extends the understanding of the way information is used by social scientists in a new information environment with dramatic technical advances.

The findings of this study support the conclusions of Kling and McKim and Costa and Meadows by showing the growing importance of information technology and the resulting major shifts in information-seeking practice among social scientists.<sup>22</sup> Unlike research findings prior to the 1990s, the social scientists in this study make extensive use of a variety of information sources and channels, primarily electronic-information systems and services, in seeking information. In the new information environment, these new information mechanisms also presented limitations and difficulties.

Moreover, many LIS researchers have examined users' relevance criteria in information seeking.<sup>23</sup> Great emphasis is given to the "situational dynamism of user-centered relevance estimation."<sup>24</sup> Situated in their research

practices, the present study also identified the social scientists' applications of certain criteria for evaluation of information.

Although the small-scale study has limitations for research generalization, the rich description of social scientists' perspective on the information environment has some practical implications for information-system-and-service design for academic social scientists.

### **Plan for system-to-system integration**

This study identified technology upgrades and system-integration problems existing in current academic information systems. Technology was developed and applied without the capability of intergenerational communications and transactions at the cost of intellectual properties. Kling and Star addressed the same issue that "computerized systems appear like the layers of an archaeological dig, with newer systems built upon older systems with various workplace surveillance capabilities."<sup>25</sup> They stated that such "legacy systems" are fragile and inflexible for information use and knowledge management. Therefore, planning for system integration should be underway.

### **Enhance the Web resource-retrieval system**

The study identified the difficulties encountered by faculty in locating relevant, complete, and valuable information effectively and efficiently on the large and dynamic Web. An advanced Web resource system thus is required that allows Web content to be indexed and retrieved more intelligently. Moreover, the findings of information-seeking strategies in this case study suggest a one-way user-system interaction process. There is no interactive query refinement between the user and the system. Thus, the users have to brainstorm and play with alternative search strategies in the hope of significant results. To enhance system effectiveness, a relevance-feedback mechanism that takes into account the users' relevance judgment is thus needed. This mechanism should have a two-way user-system interaction component.

### **Construct an internal information system**

The findings of the study point to a need for a shared pool of information resources in the University of Wisconsin-Madison Department of Sociology. Through the leverage and reuse of existing internal knowledge assets in the

---

Department, this system could help collectively create or gather information resources for cross-reference by colleagues.

## Construct a collaborative information mechanism for the social-scientific community

According to the findings, there are no sources of information or mechanisms that assist the identification of people with similar research interests and their activities on the broad virtual space. However, awareness of shared interests and experiences constitutes an important external human resource that is valued for suggestive and creative interaction and for potential cooperation. Thus, a collaborative information mechanism for identification with personal academic interests will be helpful.

## Limitations

Certain limitations inherent in the study need to be acknowledged. Due to the time and resource constraints, the study sample includes only four scholars. Given this small sample, results cannot be generalized. Although Ellis mentioned the feasibility of interviews in a user-oriented study of information use, dependence on a single method has the disadvantages of the restriction of views. For example, interviewer characteristics, expectations, and verbal idiosyncrasies, and participants' socially desirable responses are recognized in many studies as potential sources of method biases (Podsakoff et al.).<sup>26</sup> If time and resources permit, triangulation of methods—for example, combining interviews with observations and diaries—would increase the level of specificity and justify the validity and reliability of the research results.

## Conclusion

Drawing upon the idea of communities of practice that what is learned: (1) is dependant on the context in which the learning takes place, and (2) is central to the transfer and consumption of information, this study examined the information-seeking behavior of four social scientists. Results were drawn about their use of information resources and information channels to meet their information inquiries, their strategies for information seeking, and the difficulties encountered in searching for relevant information, situated in the course of their actual scientific research.

This work has two primary contributions. First, it provides a rich description of social scientists' perspectives on their research-oriented information-seeking behavior in the context of today's information environment. Second, it situates information seeking behavior in a socially constructed practice and presents specific features of information seeking. These results will help refine the understanding of the dynamic relationship between information systems and services and their users within scientific research.

Several areas remain for future research. Researchers could make a comparative study of academics in different institutional settings. Future research could also study the dynamic interaction of information systems and services and their users within each stage of Ellis's model of information-seeking patterns among social scientists to get insights into the specific features of their information seeking behaviors and to enrich their general patterns of information inquiry with specific details. Research on information-seeking behaviors of social scientists could also focus on specific research tasks or certain research stages to decide differences or similarities of information-seeking behaviors across academic practice. Similar research could also be done on faculty in other disciplines.

## References

1. M. B. Folster, "Information-Seeking Patterns: Social Scientists," *The Reference Librarian* 23, no. 49/50 (1995): 83–93.
2. M. B. Line, "Information Requirements in the Social Sciences: Some Preliminary Considerations," *Journal of Librarianship* 1, (1969): 1–19; M. B. Line, "The Information Uses and Needs of Social Scientists: An Overview of INFROSS," *Aslib Proceedings* 23, (1971): 412–34.
3. P. Stenstrom and R. B. McBride, "Serial Use by Social Science Faculty: A Survey," *College and Research Libraries* 40 (1979): 426–31; R. H. Epp and J. S. Segal, "The ACLS Survey and Academic Library Service," *College and Research Libraries News* 48, (1987): 63–69; M. Slater, "Social Scientists' Information Needs in the 1980s," *Journal of Documentation* 44, no. 3 (1988): 226–37; M. B. Folster, "A Study of the Use of Information Sources by Social Science Researchers," *The Journal of Academic Librarianship* 15, no. 1 (1989): 7–11; C. C. Gould and M. J. Handler, *Information Needs in the Social Sciences: An Assessment* (Mountain View, Calif.: Research Libraries Group, 1989).
4. Folster, "A Study of the Use of Information Sources by Social Science Researchers"; Epp and Segal, "The ACLS Survey and Academic Library Service."
5. D. Ellis, "The Derivation of a Behavioral Model for Information Retrieval System Design" (Ph.D. diss., Univ. of Sheffield, 1987); D. Ellis, "A Behavioral Approach to Information Retrieval System Design," *Journal of Documentation* 45, no. 3 (1989): 171–212.
6. L. I. Meho and H. R. Tibbo, "Modeling the Information-Seeking Behavior of Social Scientists: Ellis's Study Revisited,"

*Journal of the American Society for Information Science and Technology* 54, no. 6 (2003): 570–87.

7. H. C. Hobohm, "Social Science Information and Documentation: Time for a State of the Art?" *Inspel* 33, no. 3 (1999): 123–30.

8. M. B. Line, "Social Science Information: The Poor Relation," *IFLA Journal* 26, no. 3 (2000): 177–79.

9. R. Kling and G. McKim, "Not Just a Matter of Time: Field Differences and the Shaping of Electronic Media in Supporting Scientific Communication," *Journal of the American Society for Information Science* 51, no. 14 (2000): 1306–20.

10. S. Costa and J. Meadows, "The Impact of Computer Usage on Scholarly Communication Among Social Scientists," *Journal of Information Science* 26, no. 4 (2000): 255–62.

11. E. Wenger, R. McDermott, and W. M. Snyder, *Cultivating Communities of Practice: A Guide to Managing Knowledge* (Boston: Harvard Business Sch. Pr., 2002), 4.

12. S. Al-Hawamdeh, *Knowledge Management: Cultivating Knowledge Professionals* (Oxford: Chandos Pubs., 2003).

13. E. Wenger, *Communities of Practice: Learning, Meaning, and Identity* (Cambridge: Cambridge Univ. Pr., 1998).

14. J. S. Brown and P. Duguid, "Organizational Learning and Communities of Practice: Toward a Unified View of Working, Learning, and Innovation," *Organization Science* 2, no.1 (1991): 40–57.

15. J. S. Brown, "Internet Technology in Support of the Concept of 'Communities of Practice': The Case of Xerox," *Accounting, Management, and Information Technologies* 8, no. 4 (1998): 227–36; Brown and Duguid, "Organizational Learning and Communities of Practice; F. Blackler, "Knowledge, Knowledge Work, and Organizations: An Overview and Interpretation," *Organization Studies* 16, no. 6 (1995): 1021–46; J. Lave and E. Wenger, *Situated Learning: Legitimate Peripheral Participation* (Cambridge: Cambridge Univ. Pr., 1991); N. Hayes and G. Walsham, "Participation in Groupware-Mediated Communities of Practice: A Socio-Political Analysis of Knowledge Working," *Information and Organization* 11, no. 4 (2001): 263–88.

16. Wenger, McDermott, and Snyder, "Cultivating Communities of Practice."

17. Brown and Duguid, "Organizational Learning and Communities of Practice," 48.

18. Hayes and Walsham, "Participation in Groupware-Mediated Communities of Practice," 264.

19. K. Grosser, "Human Networks in Organizational Information Processing," in M. E. Williams, ed., *Annual Review of Information Science and Technology* (Medford, N.J.: Learned Information,

1991), 349–402; Brown, "Internet Technology in Support of the Concept of 'Communities of Practice'"; Brown and Duguid, "Organizational Learning and Communities of Practice"; Blackler, "Knowledge, Knowledge Work, and Organizations"; Lave and Wenger, *Situated Learning: Legitimate Peripheral Participation*; Hayes and Walsham, "Participation in Groupware-Mediated Communities of Practice."

20. D. Ellis, "User-Oriented Evaluation and Qualitative Analysis of Patterns of Information Use," in D. Bawden, *User-Oriented Evaluation of Information Systems and Services* (Brookfield, Vt.: Gower, 1990), 172–79.

21. *Ibid.*, 177.

22. Kling and McKim, "Not Just a Matter of Time"; Costa and Meadows, "The Impact of Computer Usage on Scholarly Communication Among Social Scientists."

23. C. L. Barry, "User-Defined Relevance Criteria: An Exploratory Study," *Journal of the American Society for Information Science* 45, no. 3 (1994): 149–59; H. W. Bruce, "A Cognitive View of the Situational Dynamism of User-Centered Relevance Estimation," *Journal of the American Society for Information Science* 45, no. 3 (1994): 142–48; S. Mizzaro, "Relevance: The Whole Story," *Journal of the American Society for Information Science* 48, no. 9 (1997): 810–32; X.-J. Yuan, N. J. Belkin, and J.-Y. Kim, "The Relationship between ASK and Relevance Criteria," in *Proceedings of the 25th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval* (New York: ACM Pr., 2002), 359–60; S. Y. Rieh, "Judgment of Information Quality and Cognitive Authority in the Web," *Journal of the American Society for Information Science and Technology* 53, no. 2 (2002): 145–61; C. N. Wathen and J. Burkell, "Believe It or Not: Factors Influencing Credibility on the Web," *Journal of the American Society for Information Science and Technology* 53, no. 2 (2002): 134–44; A. Tombros, I. Ruthven, and J. M. Jose, "Searchers' Criteria for Assessing Web Pages," in *Proceedings of the 26th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval* (Toronto: ACM Pr., 2003), 385–86.

24. Bruce, "A Cognitive View of the Situational Dynamism of User-Centered Relevance Estimation," 142.

25. R. Kling and L. Star, "Human-Centered Systems in the Perspective of Organizational and Social Informatics," *Computers and Society* 28, no. 1 (1998): 22–29.

26. P. M. Podsakoff et al., "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies," *Journal of Applied Psychology* 88, no. 5 (2003): 879–903.