On the Web at Home: Information Seeking and Web Searching in the Home Environment

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As more people gain at-home access to the Internet, information seeking on the Web has become embedded in everyday life. The objective of this study was to characterize the home as an information use environment and to identify a range of information seeking and Web-search behaviors at home. Twelve Northern California residents were recruited, and the data were collected through semi-structured at-home interviews based on a self-reported Search Activities Diary that subjects kept over a 3–5 day period. The data were analyzed on four levels: home environment, information seeking goals, information retrieval interaction, and search query. Findings indicated that the home, indeed, provided a distinct information use environment beyond physical setting alone in which the subjects used the Web for diverse purposes and interests. Based on the findings, the relationships among home environment, Web context, and interaction situation were identified with respect to user goals and information-seeking behaviors.

Introduction

Traditionally, people have accessed information retrieval systems in public places via proprietary databases or library catalog systems. Consequently, work roles of scientists, engineers, scholars, and health professionals have provided the most common structure for investigating information seeking behavior (Case, 2002). Only a few studies have explored the information seeking behavior of ordinary people such as low-income African Americans (Bishop, Tidline, Shoemaker, & Salela, 1999; Spink & Cole, 2001a) and impoverished people (Chatman, 1991). The increase in information available on the Web has affected information seeking behavior, demonstrating that Web resources have become integral to people's lives and work (Hsieh-Yee, 2001). However, most studies on Web information seeking behavior have focused on work roles such as those of scholars (Rieh & Belkin, 2000), librarians (Scull, Milewski, & Millen, 1999), information technology workers (Choo, Detlor, & Turnbull, 1999), college students (Hsieh-Yee, 1998), and high school students (Fidel et al., 1999). Little research has been done on the Web information seeking behavior of ordinary people in everyday life, with few exceptions (e.g., Hektor, 2001; Savolainen, 1999).

Haythornthwaite and Wellman (2002) identified various trends in Internet use and noted that one of the most significant trends was "the domestication of the Internet." According to Cummings and Kraut (2002), computer and Internet use is shifting from workplaces to homes, from economic purposes to more pleasurable pursuits, and from work to personal interests. A 1995 National Science Foundation report showed that only about one fifth of respondents had at-home Internet access; since then, home access has jumped to 58.4% in 2001 and 59.3% in 2002 [UCLA Center for Communication Policy (CCP), 2003]. The Pew Research Center (2002a) found that approximately 24 million Americans (21% of all Internet users) had high-speed connections at home and that the number of high-speed home users had quadrupled from 6 million to 24 million over the past 2 years (2000–2002).

As the Internet becomes more integrated into everyday life, it is time for researchers to take into account how increased at-home Internet access has influenced "everyday life information seeking (ELIS)." The premise of this study is that a shift in Internet use from work to home involves far more complex factors than physical setting alone, because home provides social context for diverse information activities including seeking, use, and evaluation. To better understand the relationship between information seeking and the home as an information use environment (Taylor, 1991), this study investigates environmental factors of the home and their influences on information seeking and Web-searching behavior.

The concepts of context and situation are lately receiving increased attention as requisites to understanding information seeking behavior. Two special issues of *Information Processing and Management* have dealt with context: in-

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formation seeking in context (Kuhlthau & Vakkari, 1999) and context in information retrieval (Cool & Spink, 2002). Since 1996, information seeking in context (ISIC) has been the theme of a series of international conferences. Research on context highlights an approach to the study of information seeking that emphasizes real users with actual information needs prompted by situations arising in daily life (Kuhlthau & Vakkari, 1999). Cool and Spink (2002) identified four levels of understanding of the concept of context: information environment level, information seeking level, information retrieval (IR) interaction level, and query level. Context can be construed as those information environments within which information behaviors take place; these environments include institutional, organizational, and work task settings. The information seeking context level focuses on the goals, tasks, and intentions of people in problematic situations. The IR interaction level of context explores user-system interaction within search sessions, and the query level of context explores IR system performance in user queries.

Accordingly, four research questions will explore how the home setting can be understood and characterized as an information use environment and how context and situation can be conceptualized in at-home information seeking.

1. What are the environmental factors of the home that influence information seeking and Web searching?
2. What are the goals that make people turn to the Web for seeking information at home?
3. How do people interact with Web information during search sessions at home?
4. How do people formulate search queries when searching for Web information at home?

Literature Review

Situation and Context of Information Seeking

Although the situation and context concepts have appeared increasingly in studies of human information behavior, they are not new. Over 20 years ago, Wilson (1981) pointed out that the factors determining information seeking behavior and use must include environmental aspects such as work environment, social–cultural environment, politico–economic environment, and physical environment. This is because "the situation in which information is sought and used are social situations; however, purely cognitive conceptions of information need are probably adequate for some research purposes in information science, but not for all" (p. 9). Wilson's framework is a good starting point for understanding the concept of situation given his discussion of the relationship between types of situational environments and information seeking behaviors. However, understanding the concepts of situation and context remains difficult because, as Cool (2001) states there exists no standard definition of situation or context, and, worse, context and situation are used interchangeably. Vakkari (1997) noted that "The terms situation and context were mostly commonly used without taking much trouble in seeking their meaning, and not so seldom concepts which were not aimed to be used as primitives were also left open" (p. 460). Dervin (1997) also pointed out "there is no term that is more often used, less often defined, and when defined, defined so variously as context" (p. 14). She preferred the term contextual approaches to emphasize a variety of perspectives in context.

More recently, Johnson (2003) explored the concept of context in three different senses: context as equivalent to situation, context as contingency, and context as framework. The first sense refers to context as "an elaborated specification of the environment within which information seeking is embedded" (p. 739). The second sense refers to contingency approaches to context that are concerned with specifying key situational factors producing predictable states of information seeking. Both senses suggest that there are objective features of an environment that provide real context. The third sense refers to the ways in which the same world can be viewed differently given interpretive assumptions. Talja, Keso, and Pietiläinen (1999) described two approaches to context: the objectified and the interpretative. The main difference between them is that context in the objectified approach is evoked and described philosophically and theoretically while context in the interpretative approach is not understood as an independent entity but rather as a carrier of meaning.

Recently, researchers have attempted to describe the conceptual differences between context and situation. In Sonnenwald's (1999) framework, context and situation are treated as separate foundational concepts and situations are characterized as being embedded within context: "a context is larger than a situation and may consist of a variety of situations" (p. 180). Allen and Kim (2001) viewed context as a socially defined setting such as the workplace. They held that different situations occur within each of these broad contexts and that "individuals may be situated in different ways in the context" (p. 1). Cool (2001) defined context as a framework of meaning and situation as a dynamic environment. That is, in interacting with information resources people construct a situation within some context, making their information seeking process dynamic and iterative. Context, on the other hand, serves as a framework for bringing the world into focus while filtering out certain stimuli.

Cool (2001) identified six major treatments of situation: internal cognitive state, social interaction theory, situated action, situation awareness, person-in-situation model, and situation as information environment. Of these, the environmental or ecological treatment of situation is particularly relevant to this paper because home is considered to be a socially defined setting rather than merely a physical setting in which people play diverse social roles while engaging in various social activities. Taylor (1991) said that the choices of information useful to people are based not only on subject matter but also on the other elements of the context

within which people live and work. Taylor called these contexts information-use environments, containing "the elements (a) that affect the flow and use of information messages into, within, and out of any definable entity; and (b) that determine the criteria by which the value of information messages will be judged" (p. 218).

Information Seeking and Internet Use in Everyday Life

Savolainen (1995) defined everyday life information seeking (ELIS) as "the acquisition of various informational (both cognitive and expressive) elements which people employ to orient themselves in daily life or solve problems not directly connected with the performance of occupational tasks" (pp. 266–267). ELIS receives its meaning through people's values, attitudes, and interests and furthermore it is often directed by assumptions about channel and source availability and their ease of use. Spink and Cole (2001b) argued that the library and information science field has contributed to ELIS research because of its tradition of analyzing information access in terms of channels. In comparing ELIS with occupational or school information seeking, they pointed out that active information seeking in ELIS framework may start with a sense of coherence while occupational or school information seeking starts with a gap. Therefore, the information in ELIS is used for general preparation to everyday problems while information in work- or school-related information seeking purports problem-solving activities.

More recently, Savolainen (1999) investigated the major factors associated with selecting and using networked services among various sources and channels of information seeking. Savolainen differentiated people's preferences for networked services and those services' actual use, recognizing various barriers such as lack of computer skills or inconvenience of Internet access. His interview data, collected in Finland in early 1997, revealed that for both job-related and non-work information seeking, the major criteria for preferring the Internet (e-mail, WWW, discussion groups) are ease of accessing large amounts of data, savings in time, savings in money, the opportunity to consult several experts with a single request (via discussion groups), and greater independence from specific times and places for information seeking.

Hektor (2001) conducted a comprehensive study of information seeking in the context of everyday life investigating 10 people in their environments in Sweden. He proposed a model of human information behavior in which information process was divided into four parts: environment, information and communication technology (ICT) setting, information-activities, and outcome and change. In his model, environment encompasses contextual elements in terms of the people in question and the social and physical location of activities. Information and communication technology is the part of the information use environment that includes information and communication technologies (e.g., computer, telephone, television) that deliver information. These are resources upon which people draw in information activities. Outcome and change are individual's feelings, thoughts, and actions.

A few studies on the use and impact of the Internet at home have focused on domestic relations, community, civil involvement, alienation, activities, and work (Haythornthwaite & Wellman, 2002). One of the best known studies here is Kraut's HomeNet project at Carnegie Mellon University (Kraut, Sherlis, Mukhopadhyay, Manning, & Kiesler, 1996; Kraut et al., 1998). Employing various sources of data including logs, questionnaires, help requests, and interviews with families, the research group investigated what motivated ordinary citizens to use the Internet and how residential Internet services affected their lives. Another large-scale research project of home environments is the HomeNetToo project at Michigan State University (Jackson et al., 2002), which used server logs, surveys, and interviews to focus on Internet use by low-income adults. Its results revealed that while half of the participants never used e-mail, their main Internet activity was finding information on the Web.

Research Design

Sample

The study subjects, 12 residents of Northern California, were recruited through a local recruiting agency. They constituted a convenience sample due to three constraints in sampling. First, they had to live in San Francisco Bay Area to save the researcher travel time and expense. Second, they had to have high-speed Internet connections in their home. This is because Excite@Home, sponsor of this research project, wanted to study broadband users. Third, the subjects had to offer their home as a study site. Because the nonprobabiliy sampling method was used, it cannot be claimed that the 12 subjects represented the general public or California residents. However, seven screening questions were used to select subjects based on predetermined criteria of adequacy. For instance, subjects had to have a home computer used for Internet access and had to search on the Web for more than an hour weekly. As this study aimed to investigate ordinary people, those candidates who worked in the Internet industry were excluded. For details of the recruiting procedures and screening questions, see Rieh (2003).

Data Collection

The researcher contacted each subject 5–7 days before the interview and asked each to make notes on their Web information seeking activities using the Search Activities Diary sent either by post or e-mail. On the Diary's first page, general written instructions were given along with search activity log examples as shown in Table 1.

The research team, a researcher and a transcriber, visited the subjects' homes from March 7–16, 2001. Upon arrival at a subject's home, the subject was asked to take the research team to the room where the Internet was accessed. Once

TABLE 1. Search activities diary: Web search activity log examples.

Date/Time	Activity (What kind of information you were looking for?)	Duration time (How long did this activity take?)	Starting point (How did you start your search—using a search engine or going to a site directly?)	Successful or failed? (Did you find what you were looking for?)
1/23/01 12:30 p.m.	Searched for apple pie recipes	10 minutes	Went to Excite site, and typed in "apple pie recipes" in the search box	Successful
1/23/01 1:00 p.m.	Checked out a conference schedule	5 minutes	Typed in the URL of the conference site (www.asis.org)	Successful
1/23/01 3:00 p.m.	Looked for the map of the restaurant	15 minutes	Went to Mapquest site, and entered the addresses	Successful
1/26/01 7:00 p.m.	Downloaded an anti-virus software	10 minutes	Went to CNET site	Failed
1/27/01 5:00 p.m.	Searched for movie schedule	5 minutes	Went to Excite site, and typed in the movie title	Failed
1/27/01 5:05 p.m.	Searched for info about parenting for preschoolers	30 minutes	Went to Excite site, and typed in "preschooler discipline guide"	Successful

Note. The following general introduction to the study was given.

For this study, we are interested in trying to understand how people search and retrieve information on the Web. For the next five days, we ask that you keep a log of your Web search activity. To do this, please make a note in the log below each time you are looking for information on the Web. Since we are only interested in searching and finding information, you do not need to make a note when you use the Web for e-mail, newsgroups, chat, and instant messaging. Later, an interviewer will be asking you some questions about the various search activities that you engaged in. Jot down any notes that will jog your memory about what you were doing so that you will be prepared to discuss the activities in some depth with the interviewer.

there, the researcher explained the study purpose and the data collection process. While the subject signed the consent form, the researcher scanned the Search Activities Diary completed by the subject and the transcriber set up a camcorder to record the computer screen and prepared to type the interviews on her laptop computer.

The interview was initiated by asking the subject background questions on general information seeking and use as well as searching on the Web. The researcher then asked questions about each activity entered in the Diary. The subject was sometimes asked to demonstrate search behaviors on a Web browser. The transcriber recorded observations on search behaviors in the field notes. At the end of the interview, the subject was asked to describe some difficulties in Web searching and general information seeking at home. Table 2 presents related interview questions for each research question. The entire interview session, on average 1.5 hours long, was videotaped for subsequent transcript and analysis.

Verification of the internal validity of this study can be claimed through triangulation: Search Activities Diary, interviews, and observations. Multiple data collection methods allowed the researcher to assess the aspect of searching behavior at home in various ways. For instance, the subjects' reports in the Diary were verified with the interviews. Likewise, interviews were compared with observations. Triangulation enhanced the plausibility of explanations on the relationships among critical variables such as home environmental factors, Web use context, and interaction situations.

Data Analysis

Interview videotapes for the 12 subjects were transcribed. The transcribed interviews, the observation, field notes taken in the homes, and the recorded Diary forms were integrated for analysis. Because this study intended to better understand information seeking and Web searching in real settings, attempts were made to reflect the reality of data rather than merely to break it down into coding categories. Content analysis was employed to find evidence of an empirical connection between data and inferences (Krippendorff, 1980). Responses to interview questions directly related to research questions were first classified, as shown in Table 2. However, evidence of data for research questions was also found in the field notes and the Diary; these data were grouped together when there were similar meanings in sentences or phrases, and classified texts were labeled with appropriate thematic titles. Texts were then organized to correspond to the four levels identified in the research questions: home environments, information seeking goals, information retrieval interaction, and search query.

Results

Characteristics of the Subjects

Twelve Web users in 10 households participated in this study. Their occupations included architect, attorney, homemaker, artist, instructional designer, and meeting planner. Seven were females and 5 were males, ranging in age from 26 to 55. To access the Internet, four households used the PacBell DSL (Digital Subscriber Line) service and three used the Excite@Home cable modem connection. The rest used Megapath DSL, Concentric DSL, and AOL. Other characteristics of the subjects are summarized in Table 3.

Research Question 1: What Are the Environmental Factors of the Home that Influence Information Seeking and Web Searching?

As most people play the variety of social roles at home including partners, parents, consumers, patients, etc., infor-

TABLE 2. Research questions and interview questions.

Research questions	Interview questions
RQ1: What are the environmental factors of the home that influence information seeking and Web searching?	• How many hours a week do you use the Internet at home? • How many hours a week do you search on the Web at home? • Why did you want to get the broadband service and what do you think about it? • Does anybody else in your family use the Internet on this computer? • Since you have broadband service at home, are you using the Web in different ways than you used it with slower Internet connection? • Are the kinds of search you conduct at home different from the ones that you search at other locations such as work or school? • Which homepage do you start on a Web browser? Can you please open it? • What do you most often do from there [their initial homepage]? • What are the Web sites that you visit most often? • Can you think of any other information searching experience that you had at home? • Overall, what are the difficulties in looking for information at home?
RQ2: What are the goals that make people turn to the Web for seeking information at home?	• Please describe how you usually use the Internet. What kinds of things do you typically search on the Web at home? • Let's look at your search activities in your notes (Diary). The first task you did was ____. Is that right? • What were you trying to find? • What were you trying to use the search results for?
RQ3: How do people interact with Web information during search sessions at home?	• Why did you decide to go this site? • Why did you choose this search engine? • What kinds of information did you expect to find? • Would you tell me why you indicated that this particular search was successful (or failed)? What made you think so? • What are you going to do next for this task?
RQ4: How do people formulate search queries when searching for Web information at home?	• Can you run through this search activity again for me? • Where did you start and what words or phrases did you type?

mation seeking involves diverse kinds of information tasks and activities. These differed from work roles with which people have relatively highly specified job descriptions and tasks and engage in information seeking within domains of interest. The subjects reported that in general they searched the Web for information more often at home than at work. When they did conduct searches at work, their topical areas were much narrower, and they visited only a few known Web sites directly related to their job tasks. Interestingly, they rarely used search engines on the job. Subject 01 (S01) said that she did not use the Web much at work, but when she did she used it technically: "I tend not do searches on search engines when I am at work. At home, I do. I search for all kinds of things, almost any time I think of a question."

The above may be because, as per some subjects, people often need to find information with which they are unfamiliar at home. In fact, the Search Activities Diary indicated

TABLE 3. Participant profiles.

Subject #	Occupation	Age	Gender	Hours of Web searching at home	Internet connection	Default homepage
S01	Executive Director	26–35	F	7 hours a week	Megapath DSL	Linux.com
S02	Waitress	26–35	F	7–10 hours a week	AOL	AOL
S03	Architect	26–35	M	21 hours a week	PacBell DSL	Drudgereport.com
S04	Homemaker	36–45	F	7 hours a week	PacBell DSL	Yahoo.com
S05	Executive Director	46–55	M	10 hours a week	Concentric DSL	Ebay.com
S06	Meeting Planner	26–35	F	4 hours a week	Excite@Home cable modem	My Yahoo
S07	Homemaker	26–35	F	1–2 hours a week	Excite@Home cable modem	My Yahoo
S08	Attorney	36–45	M	1–2 hours a week	Excite@Home cable modem	My Yahoo
S09	Program Coordinator	26–35	F	7–14 hours a week	PacBell DSL	Hotmail
S10	Artist/Consultant	26–35	F	25–40 hours a week	PacBell DSL	Alltheweb.com
S11	Instructional Designer	36–45	M	7 hours a week	Excite@Home cable modem	Ebay.com
S12	Supervisor	26–35	M	1–4 hours a week	PacBell DSL	Google.com

Note. S07 and S08 are a couple in the same household; S09 and S10 are a couple in the same household.

that although subjects searched a few topics regularly such as movies, restaurants, stocks, news, weather and traffic reports, in most cases, they sought information for needs that would arise infrequently. For example, S07 and S08 planned to buy a new house, and they searched for price-trend information. Subjects 09 and 10 planned to relocate in Oregon and so they wanted to learn more about the state. Subject 01 wanted to know about the ingredients in a medicine she was taking for the first time. When the subjects encountered information tasks in unfamiliar areas, they turned to the Web.

Notably, the computer was not often located in the family "hanging-out space" (Mateas, Salvador, Scholtz, & Sorensen, 1996). According to Mateas et al., hanging-out space is where family members greet each other, discuss their day, use the phone, and share physical closeness. Interestingly, while the subjects who lived alone (S01, S02, S03, S12) appeared to position their computers in the center of their house, the subjects who lived with family placed their computer in a bedroom (S06), a small room for household chores (S04), a study room (S05), and a large second-floor room (S07 and S08). This indicated that while the Internet served the entire family and information seeking often involved more than one family member's interests, the computer still carried the notion of a work tool. This can be contrasted with other home electronics such as TVs, VCRs, and home theater systems placed centrally in the "hanging-out space" in most households.

Unlike in a workplace or school where information can be obtained from colleagues or information experts in libraries, homes usually have no one to whom questions can be directed. Subjects then turn to the Web, making it the most accessible and sometimes the only available information resource. To S10, the Web replaces books: "We barely have to buy a book anymore . . . but with the computer it becomes its own huge book." S06, a home-based meeting planner, said that she was "having success finding information [on the Web]" as she found out "you just need to find it and pull out what you need."

A high-speed Internet connection may well contribute to reliance on the Web for information seeking. Some subjects explicitly mentioned that having a high-speed Internet connection changed the way they searched for information. Subjects more frequently mentioned the nature of the "always on" feature of the high-speed connection than their use of high bandwidth Internet activities (e.g., online games, videos, and multimedia). Most subjects said that their computer stayed on all the time, that they accessed the Web any time they wanted to, and that they did not accumulate search tasks. The subjects also searched the Web in shorter intervals and less intensely after signing up for high-speed connection.

Research Question 2: What Are the Goals that Make People Turn to the Web for Seeking Information at Home?

User goals are the essential factor in information seeking, but are often defined only on the search result level. Xie (2000), however, ranked user goals on four levels: (a) long-term goals; (b) leading searching goals; (c) current search goals; and (d) interactive intentions. According to her definition, a long-term goal is a user's personal goal over a long period and a leading search goal is a user's current task-related goal leading to a search. A current search goal is the specific search result a user seeks, and interactive intention is made up of the subgoals a user needs to achieve in the search process. Xie (2000) pointed out that the classification of user goals not only covers different levels of goals but also imposes goal structure. That is, long-term goals influence leading search goals, and current search goals are determined by leading search goals. Interactive intentions are the subgoals of current search goals.

Table 4 shows several examples for each level of user goals found in this study. Subject 05 searched for writings and critiques of a philosopher named Kaplan. Here, S05's current search goal was to look for papers about Kaplan, and this goal was determined by his leading goal of preparing a presentation for his book club. His long-term goal was related to professional achievement given his directorship of a religious organization. For his current search goal, he conducted searches on the Excite search engine by entering the search query Kaplan. After he searched Excite for the broader topic of theology, he changed to Amazon.com because he had decided to search for a book. Subject 05's current search goals changed only once, from looking for papers about Kaplan to buying a book on theology. Subject 05's interactive intentions changed several times as he found, read, viewed, evaluated, and found again. His long-term goal and leading search goal did not change in the process of information seeking.

Subject 03 wanted to find a restaurant at which he could entertain his visiting friend. Subject 03's long-term goal was entertainment, and his leading search goal was to prepare an event. To achieve this leading goal, he looked for restaurants, which became his current search goal. Here he wanted to find an entertainment website, so he entered Entertainment Search and San Francisco on the HotBot search engine, eventually located a website called *downtown.com* which he e-mailed to his friend. Subject 03's information seeking included multiple interactive intentions such as find, locate, record, and disseminate.

Subject 03's case revealed another interesting aspect of information seeking at home: looking for information not always for oneself but for other family members or friends. While most search topics concerned interests common to family and friends (e.g., vacations, houses, cooking, shopping), some were purely for helping others. Subject 02's friend was getting married, so S02 looked up various wedding topics. Subject 03 looked for travel agencies for his mother. Subject 01 often looked for information on products such as printers for her mother. This kind of search goal led to a series of interactive intentions because subjects had to record the information in various ways so that they could share the information with family and friends, discuss for issues arising from it, and make decisions based on it.

TABLE 4. Levels of information-seeking goals on the Web.

Long-term goals	Leading search goals	Current search goals	Interactive intentions
Gain knowledge	Prepare for an event	Look for papers	Locate
Problem solving	Prepare for online class	Look for products	Find
Communication	Prepare presentation for a book club	Look for books	Read
Curiosity	Plan for vacation	Look for news	View
Entertainment	Play around with my interests	Look for recipes	Compare
Professional achievement	Buy a gift	Look for houses	Verify
Help other people	Buy house goods	Look for hotels	Evaluate
	Sell house goods	Look for pictures	Record (save, download, write)
	Learn health information	Look for artists	Disseminate
	Keep up with news	Look for musicians	Use (edit, call)
	Share information with others	Look for restaurants	Follow links
		Look for maps	
		Look for medical terminology	
		Find movie show times	
		Find a phone number	
		Look at the weather	
		Look at traffic reports	
		Look at stocks	
		Check for available flights	
		Know what's happening today	

Subjects saved the Web site in bookmarks, downloaded or printed out the Web pages, or took notes on paper. They also sent information items by e-mail to their friends and family: URL of the Web page, news information, text copied and pasted from the Web. It was noted that information seeking behaviors were closely related to communication behaviors in at-home settings.

Research Question 3: How Do People Interact With Web Information During Search Sessions at home?

For this research question, subjects' information retrieval interaction behaviors are discussed with regard to search systems, search skills, successive searches, and search success determination. One interesting finding was that general search engines such as Google, Altavista, or Excite were not the first place that subjects went to in looking for information. Rather, for most subjects a search engine was the last site to turn when they could not think of any topic-specific sites. For instance, subjects went to *SFStation.com* for movie information (S01), *citysearch.com* for travel and restaurant information (S03), *space.com* for space information (S12), *nfl.com* for football information (S05), and *marketwatch.com* for stock quotes (S11). Subject 01 said "I only start at Google if I don't know anything about what I'm doing." Subject 02 spoke similarly, saying "If I don't know what I am looking for, if I am on the broad search, I'll go straight to Yahoo." Reasons for preferring topic-specific sites to search engines were given by S01: if she was looking for finance software, she would start at Linux.com instead of Google.com because "that [Linux site] is one level deeper while Google is totally random." It seemed to her that Linux was a site "that is a little more tailored to what I need."

Despite this finding about non-use of search engines as the first choice, all subjects except S05 had already determined their "most favorite" search engines or portals and showed strong loyalty. If they failed to find what they were looking for with their favorite engine, they tended to try two or three other search engines. However, unlike their first-choice engine, they tried the second- and third-choice search engines from whatever came first to mind. Some experienced subjects differentiated search engines from portals, and kept their favorite sites separate. Interestingly, subjects relied on different criteria for portal sites from those used for search engines. Pure search engines sites such as Google (S01, S12), Alltheweb.com (S09, S10), and HotBot (S03) were used for two major reasons: "no feature" and "just information." On the other hand, sites such as Altavista (S08), AskJeeves (S06), and Yahoo (S01, S04, S09, S10, S12) were selected for particular features such as image searches, natural language queries, yellow pages, maps, and e-cards. The following three examples illustrate subjects' preferences and reasons:

> The reason why I use Google and I like Google so much is that they don't have a lot of other functions on there. It's like I want to have a multi-functional search engine site and then I also want to have a simple one. And Google is my simple one that works for most everything, and then Yahoo is my second choice site to get more details like what I said before to get Yellow Pages or maps . . . things like that. (S12)

> What I think is so cool about their site [Google] is that it has no features. I've been using it since it was a beta and since then I think they've added like three links. There's no extra stuff. When I use a search engine, I really just want a big box I can type in. I don't want weather or anything like that. (S01)

> Exactly, there are no functions or features. That's what I like about it [Alltheweb.com]. It's very put information in, get information out. There is no bells or whistles. And that makes it very kind of like grabbing a book and looking in the information. You've got pure data and it's not flashy and annoying. It's just information. (S10)

Subjects considered themselves to be active seekers who had first to develop search strategies and eventually make judgments about information. They described search episodes as interactive dialogues between themselves and the Web. Apparently, as shown in the examples below, they had developed certain attitudes toward Web searching.

> I always think it's the user that's having the problem. That you need to qualify your parameters, figure out another way of thinking about it, see if there's another website. (S10)

> If you tell the system that you are looking for a contractor, the system is going to give you millions of names . . . I was having problems browsing the Internet, and I was getting frustrated. But the more I was getting into it, I was kind of fighting with the system 'No, that's not what I want.' So, I told the system, 'Give me this, don't give me that.' (S03)

> You need to be persistent, yes. I'm trying to teach my daughter there. When she's looking for things, she's has very short attention span, you know, if she can't find it right away, it's just not there, but I'll first try to find it in one search engine and then if I don't find it there I'll go to another search engine and go through the links. And I know it's important to keep on some of the more obscure things that you really need to try hard. I mean, and then a lot of times I'll find what I'm looking for. (S11)

On the other hand, subjects were keenly aware of their search skills and constantly evaluated their own skill levels. While most appeared to be confident about their search skills, some expressed anxiety and frustration over the search process, as seen in the following examples. Subjects from both groups wanted to become more knowledgeable about Web searching.

> I think overall I'm pretty much computer illiterate. I think overall the computer is friendly, or I should say the Internet is friendlier than other aspects of the computer, which is cool. I'm not as apprehensive as I used to be but still it kind of scares me. And even now, talking to you, I really can't foul things up. It's always in the back of my mind, if I hit a wrong button. My anxiety is high because I don't do it all the time. (S04)

> I would probably wait until I knew exactly what I wanted and go back and do it again rather than go through the frustration of trying to find something and hoping the computer, you know, the Internet could help me. I've never been trained in school or college or anything to work on a computer. I know a couple of my other friends have and it's very easy for them, but I never had any training on it. The only experience I've had is what I taught myself or what AOL provides, so I'm not that great at it, so it can get frustrating. (S02)

> My own personal outlook on searching is maturing. I'm becoming more like a Yahoo user. I'm using Yahoo more now than I used to. When I first started using the Internet I never used Yahoo, because I thought it was like 'why would you need a category?' . . . But I think that's a more sophisticated use, I didn't come to that until I used the Internet for a couple years. (S01)

Subjects often conducted successive searches on the same or evolving information problem (Spink, Wilson, Ford, Foster, & Ellis, 2002). Although successive searching is not a new concept, findings here showed successive searching to be related to communication and information behavior among family members. In some cases two family members separately conducted searches on the same topic and then needed to return to specific Web sites to discuss their search results and possibly make decisions. One couple, S07 and S08, were looking for information about Lake Tahoe ski areas. During the daytime, S07 searched in Yahoo by typing in search queries such as Lake Tahoe and Kirkwood ski area but failed to find what she wanted. She then entered another search query, ski areas, clicked on California, and after getting a list of ski areas in that state, stopped there. Later, S07 and S08 searched together for that topic from the point at which S07 stopped earlier.

"Feeling successful" was the term sometimes used when subjects were asked to describe their search results. Interestingly, "feeling successful" did not always mean that subjects actually found the information they were seeking. Sometimes they indicated in their Diary that the search was successful even though they did not actually complete their search tasks because they were aware that they might not finish the search within one search session due to time constraints or the nature of complex or long-term tasks. As long as they knew where to return to continue their search, they considered their information seeking successful.

Research Question 4: How Do People Formulate Search Queries When Searching for Web Information at Home?

When using general search engines, subjects frequently looked for *sites* that contained a topic of interest, entering queries such as travel agency (S03) or recipe (S04). What subjects expected to find were Web sites devoted to travel or recipes; once they found those sites, they searched again in that topic site with more specific search terms. Spink, Jansen, Wolfram, and Saracevic (2002) analyzed approximately a million query logs over a period of several years and found that search queries on the Web tended to be shorter than in traditional information retrieval systems; they did not, however, speculate on the reasons for that finding. This study's results indicate that shorter queries on the Web may be related to different search strategies, that is, to locating a Web site first, and then searching for information within the topic-specific site.

Some subjects entered search queries in terms of type of information source rather than topic of information. Subject 05's wife told him that there had been another school shooting that day (March 8, 2001). Knowing only that a young girl had allegedly shot someone, S05 typed in "Headlines" in a query box because he wanted to read "a news story that's happened in the last 12 hours." He spoke clearly about the type of information source he wanted: "I don't want books about school shootings, and I don't want the psychological studies about the kids in the Colorado school shooting." However, he failed to get the expected results. In the end, he expressed his frustration: "I cannot believe a search engine would not have something as obvious as news. So I know that I'm probably doing something fundamentally wrong."

Study results indicated that, unsurprisingly, one of the most common problems that subjects encountered in searching the Web was coming up with appropriate search terms. Furthermore, once subjects formulated their search query, they kept the same query when switching search systems. This search pattern occurred more frequently than changing the query itself within the same system. In S09's search activities the same query, "roasted walnuts," had been put to four different sites. Until the interviewer pointed it out, S09 even did not realize that she was repeating the same query without trying any different search terms. Another subject, S07 entered the search query "Hindi classes" and continued to look at numerous search results. During the interview, it was discovered that she was actually looking for Hindi educational resources in the Bay area. She said that it had not occurred to her to attempt other terms.

Most subjects started their searches with general terms and then shifted to more specific ones. For instance, S05 started with "Kaplan" and changed the query to "Kaplan AND the concept of God" saying "I might try to narrow the search." However, other users such as S11 said that their strategy was to "first try to make it very specific and if that doesn't work, make it less specific." Subject 11 commented: "Because you know you get millions of links that come up for very general things, so it can't hurt to be very specific. . .. It can only help to be specific if it zeros it in, you know, to exactly what you're thinking about right away."

Discussion

Taking a qualitative research approach, this study did not apply pre-existing concepts of home information environments nor operationalize context and situation. Rather, it began simply with two premises: (a) home provides far more factors than physical setting alone; (b) home provides social context as an information use environment. The results revealed that the home indeed provides a distinct information use environment, indicating that people conduct information seeking at home in ways different from those of the workplace. Taylor (1991) suggested that data about information use environments could be broken down into four categories using the following questions: (a) what are the demographic and nondemographic characteristics of a set of people; (b) what are the characteristics of typical problems about which this particular set of people is concerned; (c) what is the nature and variety of settings in which these groups of people live; and (d) what constitutes resolution of a typical problem and what kinds of information (amount, quality, format) do people anticipate. Taylor's first component, sets of people, did not seem to be appropriate for this study because people at home are dissimilar in terms of occupation, knowledge, search skills, and the family status (e.g., married or not, children or not). The remaining three components will be discussed here in summarizing the findings of this study.

The findings on user goals indicated that people at home engaged in far more diverse kinds of goals for information seeking on all four levels (long-term goals, leading search goals, current search goals, interactive intentions), compared to those tasks in workplaces (Algon, 1997) or goals in libraries (Xie, 2000). In this study, subjects did not always initiate the search process because they had specific information problems to be solved. A number of subjects stated that they used the Web for entertainment or that they were looking for information out of idle curiosity. Interestingly, subjects also looked for information with which they wanted to help other people or prepare events involving other people (e.g., vacations, birthday gifts, weddings). All these findings support Cummings and Kraut's (2002) discussions on the domestication of the Internet, which refers to a shift from workplaces to homes not only in terms of physical places but also purposes and interests.

The results revealed that the Internet substantially influenced information seeking at home and that the Web has become embedded in everyday life. It was noted, however, that many subjects placed the computer at a distance from the family hanging-out space. They seemed to consider the Web as a work-related device rather than a family-shared information channel, possibly because computers and information retrieval systems have traditionally been used in work or school settings so the perception of them as work tools persists. During the interviews, subjects sometimes expressed their search resolutions in terms of "feeling successful." They felt successful when they found some information to start with or specific Web sites to which they would later return. This seemed to relate to another interesting finding about successive searches, which revealed that Web users often conducted searches over time on the same or an evolving task.

This study attempted to identify the relationships of various concepts and factors involved in information seeking at home. The findings showed that home not only provided an information use environment but also offered the most conventional context for everyday life information seeking (ELIS). Home itself is not separate context that affects people's information behavior; rather, it should be understood as contextual entities interplaying with other social, cultural, situational, and individual factors that variously constrain and motivate information seeking. Rapid

advances in information and communication technology, especially the growth of the Web and the proliferation of information channels, provide an important dimension of context on the societal level (Johnson, 2003). This dimension of context couples with home environment and generates another level of context, a unique and discrete entity influencing information seeking at home.

On the other hand, the concept of situation comes closer to individuals because the situation apparently comes into play on the level of information retrieval interaction. At the beginning of this study, the situation was narrowly understood on the level of environmental or ecological treatment. However, the results suggest that home is not only influencing the information seeking behavior level as a socially defined setting but also Web searching on the interaction level. Subjects did not appear to concentrate on search tasks and conducted Web searches incrementally, involving intervals of hours or days. For these users, there was rarely any sense of urgency in the search so there was little time pressure. Additionally, most subjects reported feeling relaxed when engaging in search activities and even enjoyed the process. These findings indicate that home provides a unique interaction situation in which people conduct searches on the Web in ways different from searching in public settings such as workplaces, schools, and libraries.

Conclusion

This study has contributed to three research areas of information seeking: situation and context of information seeking, everyday life information seeking (ELIS), and Internet use at home. First, it has enhanced understanding of environment, contexts, and situation by looking at the relationships of these three concepts. This study suggests that home provides a broad information use environment for information seekers in which the home constitutes objective reality. In this model, context is defined as information and communication technology and information channels available at home. Particularly, the Web is considered to be a primary information channel. The results indicate that people at home relied on the Web extensively in pursuing a variety of goals. The Web was interpreted variously as an information retrieval system, an information organization tool, a collection of books, and a communication channel. Situation was understood on the level of information retrieval interactions as it affects search goals and seeking strategies directly. It can be argued that situation is more subjective, dynamic, and interactive than context and environment.

With regard to ELIS, in this study we addressed the dynamics of information seeking and use among family members. Thus far, ELIS studies have focused on individual users' information seeking and especially on information channels and access issues (Spink & Cole, 2001b). The findings of this study suggest, however, that people in fact frequently conduct information seeking for their significant others and once they have found the information, they often record, share, and disseminate that information. Additionally, the home computer and the Web were frequently shared among family members, and the family then needed a good mechanism for saving and continuing their search process so that they could use the information for sharing common interests or for making family-related decisions.

The last contributing area of this study is Internet use at home. Most previous studies on Internet use at home have conducted large-scale surveys to determine the usages and impact of the Internet on everyday lives (e.g., Pew Research Center, 2002b; UCLA CCP, 2003). This may be a useful research approach for investigating increased access, usage, commitment, and domestication. As Haythornthwaite and Wellman (2002) pointed out, however, the Internet does not function in isolation but is embedded in people's real-life. Thus, instead of asking only "what" questions about Internet use, it is now important to ask "how" and "why" questions to understand people's real tasks in real settings. Relatedly, the methodology used in this study is useful in view of the fact that the Search Activity Diary permitted subjects to amplify upon their information seeking and Web search experiences during the interviews.

Suggestions for future research are related to the limitations of this study. This study did not collect the data comparing at-home and workplace searching behavior. Related questions were directly asked during the interviews. In the future, this study can be extended by directly observing people's at-home and workplace information behaviors. Additionally, it would be interesting to investigate how people who occasionally telecommute to work make transitions in access to information between two different venues. Another way to extend the study's findings would be to explore post-information seeking strategies and activities in a more detailed level by examining how people save, organize, distribute, exchange, and provide Web information after they find the information at home.

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