Toward a Better Understanding of Help Seeking Behavior: An Evaluation of Help Mechanisms in Two IR systems

Hong (Iris) Xie

School of Information Studies, University of Wisconsin-Milwaukee, Milwaukee, WI 53201 hiris@uwm.edu

Colleen Cool

GSLIS Queens College/CUNY, Flushing, NY 11367 ccool@qc.edu

Help-seeking can be viewed as a multi-dimensional information behavior which often overlaps with both information seeking and searching. Within IR, though, there has been little research devoted to understanding how people learn to use help functionalities effectively. Research reported in this paper addresses this gap. After searching in two IR systems, fifty participants completed a self-administered questionnaire which consists of their ways of leaning how to use the help mechanisms, difficulties associated with this learning process, their general evaluation of the help mechanisms, with specification of features that they liked and disliked, specific aspects of the help mechanism that assisted participants in the search process, and their evaluation of the interaction between the searcher and the help mechanisms. The results show that that people prefer specific help, visual help, and help with demos instead of general help, text help, and help with description. The theoretical and practical implications of this study are further discussed.

Introduction

The central goal of information retrieval (IR) systems is to support, within a single framework, the variety of interactions with information people engage in while trying to resolve some problems. The same can be said about digital libraries, which can be viewed as types of IR systems. In their argument for a faceted classification of information, Cool and Belkin (2002) cite Wilson's (2000), claim that interacting with information is a form of information behavior that can be viewed from both micro and macro levels of analysis,

wherein information *searching* represents the micro level of analysis and information *seeking*, which is more general and includes all purposive seeking for information - with IR systems, human and other resources - represents a more *macro* level of behavior. This distinction between levels of granularity is important in directing the researcher's questions, hypotheses and system development.

Help seeking, especially learning to use help systems on an IR system as we discuss in this paper can be viewed as a multi-dimensional information behavior which often overlaps with both information seeking and searching, insofar as it is one of the multiple information seeking behaviors that people engage in during episodes of information searching with the goal of interacting with information (Cool, 2006). Within the information science literature, limited attention has been given to theoretically disambiguating or integrating the concept of help seeking as it relates to information behavior generally, and to information searching more particularly. At the same time, much time and effort has been devoted to the development of help mechanisms or functionalities that assist information searchers to effectively use IR systems, including digital libraries (Jansen, 2005). As further noted by Jansen, research and development in this area has largely proceeded without attention to either the evaluation of automated help assistants, or to the pre-cursors of help seeking behaviors within the context of IR. In other words, the development of help functionalities found in virtually all IR systems, including digital libraries, is proceeding without parallel attention to the effectiveness of these tools for the very users they are designed to assist.

As a support mechanism in such IR searching, the dynamics of help seeking need to be understood. In this paper we take a step in this direction, within the context of information searching in digital libraries and image retrieval systems. We understand that people use a variety of help resources in the information retrieval process, such as human or online help provided by an IR system. Some types of online help also offer professional human help. A fundamental point that needs to be stressed, however, is that although learning to use the help mechanisms of an IR system is highly associated with learning to use the IR system itself, they are different processes which need to be examined separately. Different interface designs might lead users to engage with help mechanisms while others might not lead users to seek help at all. In another word, help mechanisms are part of an IR system, but they are also independent of it. In this paper, we focus on how people use the existing help mechanisms in two different IR systems. Here help mechanisms refer to any explicit as well as implicit help features of an IR system, not just a button on the screen labeled "help".

A variety of help features are found in virtually all information retrieval (IR) systems. People typically invoke some form of help mechanism when they find themselves in what

we refer to as "help-seeking situations," which are related to some inability to move forward in the use of the IR system. The intention of the help mechanism in this situation is to effectively guide a searcher through his or her interaction with the information resource by providing assistance and answers to user problems related to using, or learning to use, the particular IR system. It is now commonly recognized that the information retrieval process is inherently interactive, and as such, help mechanisms need to create a climate of effective interaction that enables users to resolve the "help-seeking situation" in order to move forward in the process of interacting with information items that address the larger tasks and goals that bring the user to the IR system in the first place.

Related literature

As noted by Jansen (2005), although there has been much research attention in the IR community to the development of intelligent interfaces that try to provide automatic help assistance to searchers through a variety of mechanisms, there has been very little *evaluation* of these mechanisms. For the most part, help mechanisms have been construed as assistants in the query formulation process, rather than as ongoing partners during the information seeking episode. Furthermore, research within IR has shown that although people frequently report that they believe help mechanisms to be important components of the overall IR system, they use these help functions infrequently, even though they might potentially improve search results (Cool and Xie, 2004). Clearly, there is a need for better understanding of the factors which influence people's use and avoidance of these potentially helpful functions, as well as their knowledge of how to use them, in order to make help mechanisms more accessible and usable. In order to understand these issues, we need to take a deeper look at the help seeking situation from multiple perspectives.

We realize that help-seeking has long been studied from a variety of disciplines outside of, but related to, information science. Within the field of educational psychology, several researchers have attempted to address these questions through studies of user behavior in computer based interactive learning environments (ILE). The ILE provides an especially useful application area for the study of automatic help mechanisms because of the variety of help functions it offers learners - from specific hints, glossary functions, hypertext links to additional information (Bartholomé, Stahl & Bromme, 2004; Ryan, Pintrich & Midgley, 2001; Schommer, 1990; 1993; Wood & Wood, 1999). In one particularly interesting project, Bartholomé, Stahl, & Bromme (2004) studied the effectiveness of computer assisted help on learning effectiveness for one ILE, known as "Plant Identification Online." They found a positive relationship between gains in learning and several user variables

including learner motivation, self-confidence, interest and prior knowledge. Their study was purely quantitative and the researchers suggest future studies which examine these variables at a finer level of granularity, employing qualitative analyses.

Aleven et al (2004), writing from the field of cognitive science, look at help seeking as a meta cognitive process and focus their research on intelligent tutoring systems. In particular, they raise questions about why students use, misuse or avoid these systems. Of interest to the IR community is their taxonomy of help seeking errors, or "bugs". Their taxonomy includes the following four categories: a "help abuse" category which occurs when a learner spends too little time with the help suggestion, for example, a "try-step abuse" category which occurs when the user tries the help suggestion too hastily; a "help avoidance" category is which a user has insufficient knowledge to solve a problem but chooses to skip the help suggestion, and a final category labeled "miscellaneous bugs" which includes a variety of mistakes such as reading the text too quickly.

Researchers in the field of human-computer interaction (HCI) have paid extensive attention to the design and usability of a variety of help functionalities, some of which is relevant to designing better help support for users of IR systems. Focusing specifically on the interactions that take place within e-commerce environments, Qiu and Benbasat (2005) studied the conversations between consumers and Live Help assistants at the retailer end. In their study, conversations were real time, mixed initiative dialogs in which the help assistant was a human. Retailers employing this form of Live Help had higher productivity after the implementation of this feature. The authors also cite the findings of field work studies conducted by Aberg and Shahmehri (2000; 2001; 2003) in which the inclusion of human assistance on the Web was associated with greater trust by users of the site as well as increased enjoyment in using it.

Other HCI researchers have looked at people's interactions with anthropomorphic and virtual help assistants, in order to better understand how to design optimal "human-like" helpers. Much research is needed to determine the salient norms of interaction within the IR context, and for this paper, the interaction norms specific to help seeking situations. The literature cited above provides evidence of the recognized importance of understanding the help-seeking process in a variety of forms and situations. Furthermore, this body of research across disciplines suggests that greater exploration of the help-seeking situation is needed, within the context of IR and in other contexts as well. Once again, the purpose of this study is to explore the types of help that users use, need to learn to use, and the interaction strategies they employ to accomplish this within the context of using an IR system. As mentioned earlier, the type of help that we are interested in studying is not confined to the "Help" box appearing on most system interfaces, but rather to the varieties of assistance people need throughout their searches.

Research questions

The research project reported in this paper addresses the following research questions:

- · How do people learn to use help mechanisms of IR systems? · What are the problems that people encounter in using help mechanisms? · What are the most preferred and least preferred help features of IR systems? · What additional types of help mechanisms would users like to have available? · To what extent do help mechanisms of IR systems assist users in the retrieval process?

Methodology

Twenty-nine graduate students at the University of Wisconsin-Milwaukee and twenty-one graduate students at Queens College of CUNY participated in this research project. The findings we report here are drawn from a larger study, in which these 50 subjects utilized and evaluated the help functionalities of the American Memory Digital Library hosted by the U.S Library of Congress and the image retrieval system at the Hermitage Museum Web site.

Of the 50 participants in our study, 64% were female and 36% male. The majority (54%) of our sample was in the 30-49 year old age group, with 36% aged under 30 and 10% reporting being over the age of 49. All of our participants were fluent in English. Eighty percent claimed that English was their native language, while 20% said that their native language was "non-English."

When asked to rate their skill level as computer users, according to the following scale: 1=no knowledge; 2=beginner; 3=intermediate user; 4=advanced user; 5=expert user, the average (mean) rating reported by our sample members was 3.68, making them fairly proficient in the use of computers, but by no means experts. The respondents were also asked about the frequency with which they used a variety of IR systems, using a 5 point scale in which 1=never use and 5=use daily. Responses to this question, illustrated below in Table 1, show that search engines were by far the most frequently used IR system (x= 4.06), while frequency of using online databases, image retrieval systems and other types of IR systems not listed on the questionnaire lagged significantly behind.

Table 1. Frequency of IR system use

Types of IR Systems	No. of Subjects	Mean

Search engines	50	4.06
Online databases	50	2.80
Image retrieval systems	50	2.42
Other IR systems	22	2.31

Multiple data collection methods were used in this larger project. A pre-questionnaire focused on 1) demographic information, 2) frequency of use of different information retrieval systems, 3) participants" perception of the importance or usefulness of the help mechanisms, 4) reasons for avoidance or non-use of these help mechanisms, and 5) The subjects' overall perception of help mechanisms. Participants were instructed to search for four pre-determined questions and one self-generated question in each system. The students at the University of Wisconsin-Milwaukee were also instructed to keep a diary about their experiences in using help features for these two systems when needed. After completing their searches, all the participants were asked to complete a post-questionnaire that consists of 1) methods used for leaning how to use the help mechanism, and 2) difficulties associated with this learning process, 3) general evaluation of the help mechanism, with specification of features that they liked and disliked, 4) specific aspects of the help mechanism that assisted participants in the search process, and 5) evaluation of the interaction between the searcher and the help mechanisms. The preliminary results of the pre-questionnaire were reported in a previous paper (Cool & Xie, 2004). This article is mainly based upon the analysis of post-questionnaire data. Quantitative data were analyzed for descriptive analysis, while qualitative data were analyzed by using open coding (Strass & Corbin 1990).

Sampling and data collection methods of this study have limitations. For sampling, the ideal subjects for the recruitment are diverse users who represent the general users of an IR system. However, this is just a pilot study for a larger project. The graduate students are a convenient sample representing one type of frequent users of IR systems. Further research will recruit members of the general public with different backgrounds and different information retrieval skills as subjects. For data collection methods, the pre-questionnaire and diary might sensitize users to the help mechanisms and perhaps lead to an increase in their use. Since we are not asking research questions about frequency of using help systems, this limitation is minimal. Future research could provide a more natural context that allows users to interact with a variety help resources as they like when they encounter problems in the information retrieval process, without any pre-priming having taken place.

Results

In this section, the authors address the five research questions listed above.

Different ways of learning to use Help Mechanisms

In the post-questionnaire, the participants of this study were asked to describe how they learned to use the help mechanisms of the two systems. Four methods of learning behaviors emerged from the data: 1) trial and error, 2) using past experience, 3) looking for help icons and 4) using related help functions.

Many participants took the trial and error approach to learn to use help mechanisms. Just as one subject explained, "I played around until I found information." The typical help learning interactions we found are:

- · "Trial and error, repeated attempts, then click on a link, read, try again." · "Trial & error & browsing through them." · "Using each one and reading through it." · "Played around before searching to orient myself to each system." · "Quick checks/scan what was available; exploring and playing with the system. Guesses!"

Using past experience is another way to learn how to use help mechanisms. Our study participants learned how to use a new help mechanism by drawing upon their knowledge of a familiar one. One subject described her experience, "I learned the help on the digital library on another system and transferred the knowledge." The main reason for taking this approach is that these subjects know there are same tools in different systems. "I used my past experience, and used the same tools I know I would find on every system," reported one subject who used this method.

Looking for and reading help is the third approach to learning about help mechanisms. This strategy involves two related behaviors: finding help and reading through it. Here are some typical behaviors described by the subjects:

- · "Looked for "help" icon, then looked for help titles in "search" menu." · "Using each help and reading through it." · "Reading the "help" sections of each."

Interacting with multiple related help functions to learn new help mechanisms is the

fourth approach we found. Participants turned to either "read search tips" or "go through demo" to learn about using specific help content.

Types of problems encountered in using Help

When participants learned to use help mechanism in these two systems, they encountered several problems. The first problem is lack of knowledge about where to start. One subject complained about "taking time to re-learn when changing systems. Having too many choices, but not knowing where to start." Another related problem is that users normally are not familiar with these systems, and need directions. Just as one subject said, "I have little familiarity with these systems. Sometimes directions were not very specific or helpful."

The third problem arises when the help provided is not specific or personal enough. Here are some reasons illustrated by subjects:

- · Lack of context, e.g. "Review before searching didn't help - hard to put information in context." · Not helpful to specific questions, e.g. "They didn't help me answer questions." · Not precise, e.g. "The system was not as precise as I expected." · Don't know how to use it, e.g. "The help on the digital library gave no demo and no way of knowing how to use it."

The fourth problem is that the help provided is difficult to understand. One subject criticized, "They were hard to understand, and didn't give straight directions to what I was looking for."

Most preferred Help Features

Without doubt, the most preferred help feature is the Search Help option. When they encountered problems in searching, people especially liked the search tips, and here are the reasons:

- · "Search Tips was easier to understand. " · "Search Tip is useful, not that wordy." · "Search Tips - gives specifics on making an accurate search, for example, what to do if too many hits are returned." · "Tips for new users seemed like a good overview."

Interestingly, users don't want to spend time reading help. They prefer something easy and quick to learn. Demonstration is one of the effective tools that subjects loved to use. Here are the reasons:

- "I liked the demonstration because it showed the action I had to perform to use the system correctly."
- "Color and layout search demos - very precise, easy to follow instructions."
- "The demo. It showed me how to use the system."

At the same time, users like to seek help from another human being. Chatting with a librarian is a preferred help feature for them. One subject was satisfied by her experience, "Talk by chatting with people who can help. This gives immediate and more effective help." Browsing collections is another well-liked help feature. To one subject, "Collection finder is the only usable 'help' that actually explained some issues." Finally, the advanced search feature was also preferred by subjects. "I like the advance search best because it helps give a narrower view of what I'm looking for," one subject explained the reason. Another one stressed, "Having 'Advanced Search' as an option on main page of 'digital collection' - clarified what kind of search this option would handle."

Least preferred Help Features

Least preferred and most preferred help features are interrelated to each other. To some users they are most preferred; to other users, they might be the least preferred. Here are some users' comments about why they did not like search tips:

- "Search tips were meant for beginning users."
- "[they are] written text help. Because it takes long time to locate the required information."
- "Search tips - too broad."

One subject also mentioned "tips for precision searching" as her least preferred help feature because "some of it was confusing."

Advanced search was criticized for "couldn't get to the advanced search from the first page." The help icon was disapproved since "the 'help' tab is too small, hard to find, and does not link back to digital collection page to begin search." Finally, the glossary was disliked "because not nearly as comprehensive as I thought. I thought it would contain art terms," one subject noted.

Comparison of Help Mechanisms in two systems

After searching for information in American Memory (AM) Digital Library and Hermitage Museum (HM) image retrieval system, participants accessed the help mechanisms when they encountered problems. After assessing the help mechanisms, a majority of the subjects (75%) preferred the Hermitage Museum help mechanism while 25% liked the American Memory help mechanism. The comparison can be summarized as specific versus general, visual versus textual, and demo versus description.

First, subjects preferred specificity in the HM's help mechanism than the generality of AM's help mechanism. According to one subject, "I preferred the Heritage help feature, since I couldn't find the specific American memory help feature, and the general search function wasn't much help." Another one further stated, "The image retrieval help mechanism was more advanced, more specific, and more useful. The digital library help mechanism was simple and did not address enough search problems. I preferred the image retrieval help feature because it contained enough information that really was useful."

Second, subjects preferred the visual format of the HM help mechanism than the text format of the AM help mechanism. A subject compared the two, "One was more image-visual, and the other was text. The text one was no help." "One focused on text, the other on image. In this case I liked the image one - it was interesting to me in itself and the interface looked nice overall," echoed by another one. The third subject further illustrated, "Digital library help - descriptive, image retrieval help - visual. I prefer image retrieval - simple categories, intuitive connections between options."

Third, subjects preferred the demo in the HM help mechanism than the description in the AM help mechanism. They wanted to know how to make the search work. One subject stated, "I like the Hermitage Museum Help better because of the demos." Another one stressed, "The demo showed exactly how the image retrieval system worked. The digital library help consisted of only boxes with search format suggestions."

Fourth, subjects preferred the ease of access of help in HM. "The Hermitage help was

much clearer and easy to find. The help link is on each page of the site; always accessible. Not so with the American Memory help. Hermitage help is superior," one subject well summarized the difference.

Of course, some of the subjects liked the AM help mechanism for its ease of use. Here is one subject's opinion, "AM search tips were much easier to follow. The HM was very difficult to work with. I prefer the AM to HM." Another one agreed, "Image retrieval system had demo feature however it seemed more complex therefore I preferred American Memory Digital Library help system."

the assistance of Help Mechanisms in the retrieval process

Users need help in the information retrieval process. They need assistance in identifying and expressing help problems that they encountered, in locating the desired help information regarding the problem, in obtaining relevant help information, and in understanding the explanation provided. Table 2 presented the mean score of the extent to which the two help systems assisted subjects to solve their problems.

Table 2 Mean score of the help mechanisms in assistance of subjects solving problems

Type of Assistance	American Memory	Hermitage Museum
Identifying and expressing problems	2.35	3.65
Locating information	2.1	3.7
Providing relevant information	2.5	3.5
Understanding the explanation	2.0	3.8
Overall interaction	2.5	3.7

In terms of to what extent the help mechanisms assist users in identifying and expressing help problems, Hermitage Museum help system (x =3.65) is doing a better job than the American Memory help system (x =2.35). A subject highly praised the HM system, "very well done help. When needed, I could identify & express problems just looking through the help." Another one described her experience, "The information retrieval system (HM) covered a wider range of possible problems. At times it was frustrating, but I eventually found what I was looking for." At the same time, subjects were complained their experience in using help to identify and express their problems. Here are two examples, "The DL (AM) help mechanism did not address all the problems I encountered searching for these documents. It was too brief and too vague." "I did not feel I could identify why I

was having problems in the digital library.

In terms of to what extent the help mechanisms assist users in locating the desired help information, there is also a big gap between the mean scores of the two systems. Hermitage Museum help system (x =3.7) is much more useful in locating information than American Memory help system (x =2.1). Just as one subject noted, "[Hermitage Museum help system is] very efficient in locating the information once identified. At the same time, a subject complained, "The American Memory help mechanism did not offer information on how I could locate the information. I could not figure out what else to do after that."

Comparatively speaking, the gap between Hermitage Museum help system (x =2.5) and American Memory help system (x =3.5) in providing relevant help information is smaller than other types of assistances. More coverage and specific information is essential for the usefulness of the help system. However, the help system in Hermitage Museum is still doing better than in American Memory. One subject made the comparison and concluded, "The HM help system offered more information that was helpful." Another one pointed out the specific problem of the AM help system, "Search tips did not have the info I wanted."

The biggest gap between the Hermitage Museum help system (x =3.8) and American Memory help system (x =2) is to what extent the help assists users' understanding the explanation provided by the help mechanisms. A subject praised the HM help system, "It provides very clear explanations on how to search, perform tasks." "I felt I learned how to move around the image retrieval system quickly and found everything I wanted to find," added by another one. General and vague is the problem of the AM help system. One subject commented, "The DL help mechanism offered little information which was too general and too vague. I was having problems that are not mentioned in this mechanism." Another one mentioned relevancy issue of AM help content, "They were confusing and not relevant to what I wanted."

Not surprising, the overall Hermitage Museum help system is more highly rated than American Memory help system. One subject well summarized and expressed her opinion, "The HM help system addressed problems more specifically. I consulted the demo and other help features, and after practice, was able to solve my problems. For improvement, I would suggest including more information or maybe making color & image searches easier." The same subject also suggested improvement for Hermitage Museum help system, "The AM help feature was not very helpful to me. I had difficulties in locating documents and it did not provide me with the information I needed. This help feature should be revised and expanded to accommodate users to solve more types of problems." Another one further suggested, "I feel there is a room for lots of improvement in the digital library - lead the user through steps instead of offering so many choices." "American

Memory should make help links more prominent throughout the site, especially in each of the collections," added by a subject.

Discussion and conclusion

This study has both theoretical and practical implications. Theoretically, this study demonstrates that people engage in multiple information seeking behaviors in the information retrieval process. Moreover, help seeking is one of the essential components of information retrieval. Help seeking has its unique characteristics. Help seeking itself has its own process of information retrieval. This study only focuses on one type of help seeking: using help mechanisms of IR systems. Further research needs to explore how users use all types of help resources in a variety of IR system environments, and incorporate the results into the design of better help mechanisms and interfaces of IR systems.

This study reveals that users have to learn how to use help mechanisms of IR systems. They encountered problems in using IR systems to retrieve information, and they need the help mechanisms of these IR systems to assist them in identifying the help problem, locating the desired help information to solve the problem, and understanding the provided information that will help them solve the problem. In order to support users' help seeking process, we need to understand more about the precursors that lead to help seeking. In another word, what brings people to seek help? What are the similarities and differences between help seeking and general information seeking? Furthermore, we need to identify patterns of the problematic situations that users encounter and help seeking behaviors that they exhibit.

This study also raises another issue of help seeking: personal preference in using help mechanisms. Just like people engage in different information seeking strategies in information retrieval, people also employ different help seeking styles. While some people prefer more ease of use of the help mechanisms, some of them like more user control of the help mechanisms. That is similar to findings identified from previous IR research (Xie, 2003). If the findings of this study are replicated in other investigations, researchers and designers may need to consider ways to "personalize" help functionalities.

This study indicated that users' evaluation of help mechanism of an IR system is related to evaluation of the IR system. At the same time, their use of help mechanisms of an IR system is also associated with their use of the IR system. It is interesting to investigate the relationships between the evaluation of help mechanisms of IR systems and the evaluation of the IR systems, between their use of IR systems to their use of help

mechanisms of the IR systems, and between the design of interfaces of an IR system and the use of help mechanisms of the IR systems.

Practically, the results of the study suggest that people prefer specific help, visual help and help with demo instead of general help, text help, and help with description. As stated in the introduction of this paper, there is a discrepancy between existing help mechanisms of IR systems and the help mechanisms that users need because these help systems are designed without paying much attention to users' help seeking situations. We need more knowledge about help behaviors and the help seeking process, especially how users interact with help mechanisms in IR systems. Based on the results of this study, we propose several design principles for the design of interactive help mechanisms of IR systems:

- · Provide context-sensitive help to facilitate users to identify their problems since users sometimes cannot specify their problems or cannot find their problems in the existing help systems. Context-sensitive help can also solve the problem of help access, so users don't have to look for help when they encounter problems. · Provide visual help or demo to illustrate how to use help since even tough users find help, they might not be able to understand the help information. For example, interactive computer characters with verbal and non-verbal cues suggested by Isbister and Nass (2000) for computer systems can be applied to the design of help systems. · Support users with different help seeking styles. One approach is to provide different levels of help for different levels of users to support ease of use as well as user control. More studies are needed to identify different help seeking styles, therefore help system design can facilitate these styles. · Support collaborative help seeking since people like to use human help, either from librarians, information specialists, or from other users who have similar problems. The results of this study show that chatting with librarians is one of the preferred help features. It is important for help system design to incorporate intermediary help mechanisms that facilitate a user-specialist interaction as well as a users-user interaction. Brajnik and his colleagues (Brajnik, et al., 2002) have approached similar problems of providing personalized assistance, from an IR perspective that stresses the importance of better help system design. These authors have developed a conceptual framework of "collaborative coaching" between users and IR systems, stressing the importance of interaction in the design of intelligent help mechanisms that can provide strategic support to users in help-seeking situations. More studies are needed to investigate patterns of collaborative help seeking.

This study explores users' use and evaluation of help mechanisms in the two IR systems. There are remaining questions needed to be answered. Once again, more studies are needed to understand users' help seeking behavior and the help-seeking situations that lead them to look for help.

References

Aberg, J. & Shahmehri, N. (2000)   The role of human web assistants in e-commerce: An analysis and a usability study   *Internet Research: Electronic Network Applications Policy* 10, 114-125

Aberg,J. & Shahmehri, N. (2001)   An empirical study of human Web assistants: Implications for user support in Web information systems   *Proceedings of SIGCHI Conference on Human Factors in Computing System, Seattle, WA* pp. 404-411

Aberg, J. & Shahmehri, N. (2003)   Live help systems In J. Ratner (Ed.) *Human Factors and Web Development* Erlbaum Associates, Mahwah, N.J. pp. 287-309

Aleven, V., McLaren, B. Roll, I. & Koedinger, K. (2004)   Toward tutoring help seeking: Applying cognitive modeling to meta-cognitive skills In   *Proceedings of the Seventh International Conference on Intelligent Tutoring System* pp. 227-239

Brajnik, G.; Mizzaro, S.; Tasso., C. & Venuti, F. (2002)   Strategic help in user interfaces for information retrieval   *Journal of the American Society for Information Science and Technology* 53(5), 343-358

Bartholomé, T., Stahl, E., & Bromme, R. (2004)   Help-seeking in interactive learning environments: Effectiveness of help and learner-related factors in a dyadic setting In Y. B. Kafai, W. A. Sandoval, N. Enyedy, A. S. Nixon & F. Herrera (Eds.) *Proceedings of the International Conference of the Learning Sciences: Embracing diversity in the learning sciences* Mahwah, NJ: Lawrence Erlbaum. pp. 81-89

Cool, C. (2006)   Human information behavior in the help-seeking process: implications for the design of interactive automated help functionalities in digital libraries Presented at *Libraries in the digital age. (LIDA)* Dubrovnik, Croatia. June 2006

Cool, C. & Belkin, N.J. (2002)   A classification of interactions with information In H Bruce, R. Fidel, P. Ingwersen & P. Vakkari (Eds.) *Emerging frameworks and methods. Proceedings of the Fourth International Conference on Conceptions of Library and Information Science (CoLIS4)* Greenwood Village, CO: Libraries Unlimited. pp. 1-15

Colleen, C. & Xie, H. (2004)   How can IR help mechanism be more helpful to

users? *Proceedings of the 67th American Society of Information Science Annual Meeting* Medford, NJ: Learned Information Inc. pp.249-255

Isbister, K. & Nass, C. (2000) Consistency of personality in interactive characteristics: verbal cues, non-verbal cues, and user characteristics *International Journal of Human-Computer Studies* 53, 251-267

Jansen, B.J. (2005) Seeking and implementing automated assistance during the search process *Information Processing and Management* 41, 909-928

Qiu, L. and Benbasat, B. (2005) An investigation into the effects of text-to-speech voice and 3D avatars on the perception of presence and flow in electronic commerce *ACM Transactions on Computer-Human Interaction* 12, 329 - 355

Ryan, A. M., Pintrich, P. R., & Midgley, C. (2001) Avoiding seeking help in the classroom: Who and why? *Educational Psychology Review* 13, 93-114

Schommer, M. (1990) Effects of beliefs about the nature of knowledge on comprehension *Journal of Educational Psychology* 82, 498-504

Schommer, M. (1993) Epistemnological development and academic performance among secondary students *Journal of Educational Psychology* 85, 406-411

Strauss, A., & Corbin, J. (1990) *Basics of qualitative research: Grounded theory procedures and techniques* Sage: Newbury Park

Xie, H. (2003) Supporting ease-of-use and user control: desired features and structure of Web-based online IR systems *Information Processing and Management* 39, 899-922

Wilson, T. D. (2000) Human information behavior *Information Science Research* 3, 49-54

Wood, H., & Wood, D. (1999) Help seeking, learning and contingent tutoring *Computers and Education* 33, 153-169

Acknowledgments