

How Can IR Help Mechanisms Be More Helpful to Users?

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The Help system is often the only resource that users can consult when they are faced with problems associated with the use of IR systems of all types, including web search engines, digital libraries, online databases, and other systems. Despite the importance of Help systems in interactive IR, people use this resource infrequently, for a variety of reasons that are not fully understood. In this paper we report results of a study designed to investigate users' perceptions of the overall importance of IR Help systems; the frequency with which they use them; evaluations of the helpfulness of various Help functions; and reasons for not using Help systems at all. Fifty participants completed a self-administered questionnaire which contained structured and open-ended questions about IR Help systems, along with other background questions about the respondents.

Results of this study reveal that respondents perceive IR Help systems to be important; yet, they use them rarely or infrequently. Many of the Help mechanisms are not very useful in enabling users to effectively interact with IR systems. Based upon an analysis of the open-ended answers to questions about why help systems are helpful or not, we identify major areas in which Help systems need improvement if they are to improve IR interaction.

Introduction

Help mechanisms play an essential role in assisting users to effectively use computers and to retrieve information. While using computers in general, and especially during the information retrieval (IR) process, users need a variety of types of assistance when they encounter problems, especially when they use systems that are new to them. As long noted in the human-computer interaction literature, and recently within IR and digital library research, the design of the Help mechanism greatly impacts on a users' perception of ease-of-use and user control of an IR system (Xie,

2002; Xie & Cool, 2000), which can ultimately affect the outcome of the search.

Despite the recognized importance of Help mechanisms, there is little consensus at this time about the specific Help functionalities that best assist users in a variety of situations. More research needs to be directed at questions such as: are Help functions really helpful to the end users? If so, in what ways? If not, what are their weaknesses? While most online databases, OPACs, Web search engines and digital libraries offer a variety of Help functions, in many cases the intended users do not find the Help functionalities particularly useful in solving their problems, because they are difficult to use, especially in interactive contexts. Consequently, people tend to use Help systems infrequently and ineffectively. As we argue below, one of the primary reasons for the limited helpfulness of most Help systems is that they are modeled after traditional non-interactive tutorials, and as such have not evolved into interactive help *partners* which can more effectively assist people in help-seeking situations. In order to improve Help mechanisms in this direction, we need more research to better understand the help-seeking situations people encounter during episodes of information searching, the strategies they employ in such situations, and the help-seeking dialogues that can best respond to them. In this paper, we begin to address this general problem area by presenting the results of a study which attempts to understand the general perceptions users have of Help systems, and the reasons that determine when and why they use them.

Related Literature

In recent years there has been a significant amount of research on the evaluation of IR systems, but relatively little focused directly on the study of Help functionalities. Novice users are the main users of Help mechanisms. Slack's (1991) Ph.D. dissertation research looked at the effectiveness and use of online Help features in five different OPAC's. She utilized "enhanced" transaction logs, mailed surveys and focus groups and found that even though the Help feature was utilized by one-third of the novice users, it did not assist the users' in their help-seeking situations. It has

been suggested that utilizing natural language searching abilities may improve a user's interaction with the Help feature. However, a study reported by Kreymer (2002) found that although natural language may be useful for average end users during some parts of the searching episode, when using IR system Help, the results vary widely and are generally not very effective.

Other researchers have stressed the importance of personalized assistance and interaction in order to address problems that arise during online searching. In a library study of CD-Rom and OPAC usage conducted at Arizona State University, all students surveyed listed personal assistance by library staff members as very important in helping them to use these systems effectively (Anderson, 1995). 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. Results of their preliminary evaluation of a prototype help module demonstrate the effectiveness of this approach and underscore the importance of further studying different types of interaction in the help-seeking process.

Approaching this topic from a social perspective, Clifford Nass has argued consistently that computers ought to be viewed as social actors, rather than merely as inanimate objects, and his research has found that users do interact with computers on a social interaction level. This framework casts a slightly different perspective on the process of help provision in IR systems; one in which interaction and communication between user and Help system are central dynamics. To cite one study, Nass, Steuer, and Tauber (1994) found that humans interact with computers using forms of communication that are functionally unnecessary when working with computers as machines, but are considered normal when communicating with other humans. In exploring the question of why some users prefer to resolve their problems with other people versus a computer system, several factors have been suggested by Nass and his colleagues. Foremost is the ability of the human interactant to interpret and make inferences about the intentions of the searcher in help-seeking situations, by relying on cues that go beyond the verbal query. Although human searchers may treat computers as social actors, these anthropomorphized entities are limited by the knowledge that has been programmed into them. To date, this has not included

many of the communication skills that make a human assistant so valuable. One of these skills is knowing the correct follow-up questions to ask of the help-seeker. Another is the ability to recognize and interpret non-verbal as well as verbal behaviors. Both of these are lacking in current operational Help mechanisms, therefore limiting their ability to engage in "social interaction" with users who consult them. On this point, Nass makes the argument that computers must be more humanized, and be able to create "a feeling of presence" with their users (Lee and Nass, 2003). In another study, Isbister and Nass (2000) compared users' responses to verbal or text laden information to non-verbal cues of personality in interactive characters, and found that interactive computer characters need to have both verbal and non-verbal cues in order for people to understand them. In a separate study, Lee and Nass (2003) concluded that a user's feeling of social presence can be influenced merely by manipulating paralinguistic cues, such as pitch, range, speech rate and frequency.

Although all of the suggestions made by Nass and his colleagues are directed at computers in general, they are especially relevant to the particular functions performed by the Help mechanism. If we adopt Nass's view of computers as social actors, the Help mechanism must be able to interact and communicate with help-seekers in ways that approximate social interaction, rather than merely disseminating information. This requires the Help function to engage in a dialogue with the user that will build a personalized model of the help-seeking situation and at the same time enable users to build a mental model of the Help system's representation of his/her problem and its solution.

It has long been recognized in the information retrieval community that more attention needs to be paid to the design of better mechanisms to support effective interaction between users and IR systems of all kinds. However, research in this area has for many years confined itself to a more narrow focus on retrieval algorithms and other systems oriented retrieval methods; at the same time, mechanisms to provide supportive help to users have for the most part been non-interactive; instead, taking the form of online tutorials. Today, information retrieval systems of all kinds are interactive, and as such, require supportive Help functionalities that are also interactive with users. Over fifteen years ago, Belkin (1988) argued for the need to develop intelligent help systems that would assist users through the greater use of "explanation" in an interactive dialog between users and systems during problem situations. The increasing development of digital libraries, and the growth of the World Wide Web, make this an ever more important research area

that can no longer be overlooked. The novice user of today's online information resources needs help more than ever, and we argue strongly that the tutorial-based Help mechanisms that are available to them are significantly inadequate.

Research Questions

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

- What is the perceived importance of IR Help systems among users?
- What is the frequency of use of IR Help systems among users?
- What are the reasons for use and non-use of IR Help systems?

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.

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. After completing their searches, all the participants were asked to complete a post-questionnaire that consists of 1) methods for learning 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 mechanism. The preliminary results reported in this study are based upon the pre-questionnaire data only. Quantitative data were analyzed for descriptive

analysis, while qualitative data were analyzed by using open coding (Strass & Corbin 1990).

Results

Description of the sample

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 (\bar{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

*Based on 5 point scale in which 1=never use and 5=use daily.

Perceptions about Help System Mechanisms

During the pre-questionnaire, the respondents were asked a series of questions about their use, perceived importance and perceived usefulness of IR Help mechanisms. By IR systems, our participants understood search engines to be included. When we asked, "To what extent do you think IR Help mechanisms are important?" using a 5 point response scale in which 1=not at all and 5=extremely important, the mean response was 3.5. Table 2 presents responses to this question in terms of percentages.

Table 2. Perceptions of the importance of IR help mechanisms (N=50)

Level of Importance	Percentage
Not at all important	0
A little important	10%
Somewhat important	42%
Somewhat more important	32%
Extremely important	16%
Total	100%

From this table we see that in general the people in our sample, who were fairly experienced computer users and searchers, believed that Help mechanisms were important. Not a single person said that they were “not at all important,” while almost half (42%) said that they were “somewhat important” and an even greater percentage (48%) said that they thought Help systems were more than just somewhat important. Given this relatively high level of perceived importance of Help systems, we might expect that our respondents used them frequently. However, our results showed just the opposite pattern.

Frequency of Using IR Help Systems

When asked how frequently they used IR Help system mechanisms, the average response on a 5 point scale, in which 1=never use and 5=use every time, was a surprisingly low 2.3. In other words, although our respondents thought that IR Help systems were important, they used them infrequently. Table 3 presents frequency of use in terms of percentages of response to each category.

Table 3. Frequency of using IR help systems (N=50)

Frequency of Use	Percentage
Never	8%
Rarely	58%
Occasionally	30%
Often	2%
Every time IR system used	2%
Total	100%

Table 3 shows quite dramatically that IR Help systems are not used by the people in our study, despite the importance ascribed to them. Two-thirds of this sample said they use IR Help “rarely” or “never” and just under a third (30%) use it only occasionally. Two possible explanations lend themselves to this discrepancy between perceived importance of IR Help and limited use of it: one is that users in this study don’t need to use IR Help, because they don’t have any problems using the systems they use; the other is that IR Help is not effectively providing the assistance that users need and believe to be important. The research cited above and our results reported below suggest

support for the latter explanation. In this next section of our analysis we explore this question in greater detail.

Usefulness of IR Help

One section of the pre-questionnaire asked how well Help mechanisms assist respondents in various search related activities. For each activity, we once again used a 5 point scale, in which 1=not at all and 5=extremely well. These activities for which Help systems might play a role in assisting the user are listed below, along with the mean score received by each, in Table 4.

Table 4. Extent to which help systems are useful in IR activities

Types of IR Activities	No. of subjects	Mean
Assist in identifying problems	50	2.62
Assist in locating information	48	2.71
Assist to find relevant information	48	2.54
Help to understand explanation	48	2.37
Rate interaction with Help mechanisms	47	2.51

From Table 4 we see that all of the help-seeking activities that an IR Help system might assist a user with during the course of a searching episode receive low evaluations among our sample members. These Help systems are especially poor at providing explanation about the IR system. In fact Help explanation received the lowest score on usefulness among our respondents. It is also interesting to note that areas that might provide interaction assistance in general received lower score as well.

These findings lend support to our earlier argument that a major failing of most IR Help systems is their lack of interactivity. Or, as Nass would state, they are poor social communicators when it comes to help-seeking situations that users typically find themselves in during a search episode. Such lack of support in guiding new users of IR systems may partially explain why less than half of our sample reported using “other” or “new” IR systems (Table 1).

How Can Help be More Helpful to Users?

The descriptive profile we have presented above gives us the following picture: users in the sample we studied view IR Help systems to be important; yet, they don’t use them frequently. When we look at individual activities that might be performed by Help systems to assist users, we find that they uniformly

perform limited assistance to the users we questioned. This leaves us with the obvious question of how to make IR Help systems more useful or helpful to users. In order to begin to address this question, we turn next to the qualitative data collected in our study. Here, we are particularly interested in the reasons people gave for using or not using IR Help systems. These open-ended responses have been coded into several categories, described below.

- Preference for Human Help
- Lack of Solutions or Relevant Help
- Overly General Help
- Unclear Instructions: Inability to Use Help
- Individual Problem Solving Style
- Lack of Knowledge of Help Systems
- Lack of Adequate Explanation
- Insufficient instructions

The following quotes more fully explain these categories:

Preference for Human Help

One of the reasons that participants avoid using IR help systems is that they believe they can receive better assistance from humans. For example:

- “In most instances it is easier to ask someone for help.” (S30)
- “Easier to ask someone if nearby” (S3).
- “Usually I don’t need to. I ask someone else who has used it before or keep trying.” (S5)
- “If there is no one around to ask I can use help.” (S14)

Lack of Solutions or Relevant Help

Another reason that our respondents don’t use help systems is that they don’t think that help systems can provide solutions that they need as stated by the respondents:

- “Sometimes they don’t offer a comprehensive solution.” (S4)
- “Options offered by help menu not often relevant to my particular questions.” (S23)
- “I don’t use help mechanisms more often because so often they do not provide me with adequate help.” (S6)
- “They are not really that helpful. They seem to be written by people who are too involved in the subject area to teach others.” (S26)

Overly General Help

According to some respondents, the assistance that is provided by the Help system is often too general to meet their needs.

- “Often the help offered is too general.” (S15)
- “It doesn’t provide detailed help or offer a variety of help topics.”(S28)
- “They provide answers to basic questions.” (S19)
- “They only cover a small range of problems which aren’t much help.” (S8)

Unclear Instructions: Inability to Use Help

Another weakness of the Help system, according to our respondents, is the instruction is poorly written. In another words, the communication is unclear.

- “They give the instructions that are unclear. Or the subject index they give you to choose from isn’t exactly what you need.” (S17)
- “The help mechanisms are poorly written.” (S8)

Individual Problem Solving Style

Some respondents in our study avoid help systems because they prefer to solve their problems on their own.

- “I rarely use help mechanisms because I like to do things with my own thought process.” (S9)
- “Most IR systems are similar, and I use a trial-and-error approach. Or I ask in person” (S27)

Lack of Knowledge of Help Systems

Another common problem that prevents our respondents from using Help systems is simply that they don’t know how the systems work. In fact some of them don’t even know the existence of Help systems.

- “ I don’t use them because I have little experience with them and am unaware of how they function and the benefits they provide.” (S18)
- “I didn’t look for a help mechanism, therefore I was unaware that there was one available on IR systems.”(S11)

Lack of Adequate Explanation

Of all the reasons cited for not using Help mechanisms, lack of understanding between systems and users stands out as a very significant interaction problem. This often reflects inadequate explanation, as in the following :

- “Too confusing. Assume that you know all about computers so it uses terms that you may not understand or know what keys to press. (S17)
- “I might not understand what they are telling me to do.” (S14)
- “A lot of the time I find what terms I use to describe something are not the terms the help mechanisms use. (S21)
- “Most don’t offer any help, expect users to understand.” (S23)

"The people who create these things do not apparently understand how someone cannot understand them. (S26)

Insufficient Instructions

Quite a few of our respondents mentioned that Help systems do not provide enough guidance to help them use IR systems effectively.

"There is not great detail to explain." (S28)

"Sometime information seems vague or abrupt." (S4)

"Numbered, step by step procedures are ideal." (S12)

"Very few examples." (S25)

Discussion

These examples identify major areas that need to be addressed, in order to provide more effective interaction between users and Help systems. The argument that we have tried to make is that in order to improve current Help systems, we need to design them to function as "interactants" in the help-seeking process. Our findings raise several other questions about the optimal design of Help systems and leave us with questions about how better help mechanisms might improve IR more generally. With respect to the latter comment, we argue here that the information retrieval process itself is a process of communication between individuals who are attempting to resolve some *problematic situation* and retrieval systems that are capable of providing such assistance. The help-seeking interactions between users and systems are extremely instrumental in moving toward the resolution of problematic situations.

Our data leave us with questions about how to design better Help systems that can effectively function in the capacity mentioned above. For example, how can we best tailor Help mechanisms to the individual needs of diverse communities of users? Right now, most IR systems adopt a "one size fits all" approach, and this doesn't match the unique characteristics of people who turn to these mechanisms. In our paper, we have identified several different interaction strategies that influence the use or non-use of Help systems. Certainly, these different interaction strategies and different information seeking behaviors need to be better studied and the results taken into account in the design of future Help systems that may be able to offer more personalized assistance. Users also differ in the tasks, goals and communication norms that they bring to the IR situation. However, the clearest message of all, from our paper and the work of others, is that our research agenda should focus on greater attention to help-seeking dialogues in different situations; what works and what doesn't. This includes attention to the

interface issues of where and how Help appears to the user; but it also includes when and why the Help system lets the user down. Over time, such failures of Help systems to help the user lead to non-use and cynical attitudes about the functionality. On the other hand, if IR systems consistently provide effective help to users-in-need, this may lead to greater trust in the IR system itself. We know from current research, that user trust is an increasingly important issue, especially with the growth of the web. If we can improve user trust through the design of better Help systems, this is indeed a major accomplishment that we should strive for.

Conclusions

This paper begins with the argument that interactive Help can be more effective than the non-interactive Help functions currently present in most IR systems, and addresses questions about the perceived importance, frequency of use, and overall evaluation of Help system mechanisms among a sample of graduate students at two large universities. The major finding of the study is that while people in our study generally view Help systems to be important, they find these systems to be lacking in usefulness in a variety of areas, and they tend to use Help mechanisms infrequently. Our qualitative analysis of reasons given for not using IR Help point to general inadequacies in the interactive capabilities of these systems as partners in help-seeking situations. Clearly, there is a need for future research in this area. One of the goals of this research should be to discover which elements or types of interaction are most important in resolving different types of users' help-seeking situations; and from this information, to suggest new design principles for the implementation of Help systems in IR system interfaces.

IR systems are all constructed somewhat differently, which creates a difficult situation for the end user who must learn how to use every different one. As IR systems of all kinds proliferate, this problem will only increase. The great promise of universal access to information will go unrealized if people can't learn to use these systems effectively. A long history of research in information science tells us that people repeatedly use the same searching tactics and strategies that they first learn. Far less is known about how people respond to new searching environments; the types of problems and help-seeking situations they encounter, and the strategies they employ to resolve these situations. Without such knowledge, supportive Help mechanisms cannot be developed in a manner that will equally benefit people of all levels of computer experience, intelligence, problem solving ability, learning style, literacy, and other important variables. Future equality in information access

depends in no small measure on the usefulness of the Help mechanism for all users. Results of our research lead us to suggest that future studies begin with a focus on users' help-seeking interactions in a variety of information seeking contexts, and to proceed with the design of improved Help system functionalities based upon the knowledge gained from such studies.

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