ABSTRACT
Individuals are often faced with various types of barriers and failures when they look for information. They sometimes fail to locate their desired information after trying or even exhausting all of their known sources. Research has mostly focused on the barriers people face on the Web, but experiences with information seeking failures—particularly those that involve offline channels in real life scenarios—are understudied. In an exploratory qualitative study reported here, 63 survey participants and 10 interview participants contributed a total of 230 examples of information seeking failures and various supportive measures that would/might have prevented those failures. Their narrations not only offer rich pictures of what went wrong in information seeking episodes, but also further our understanding of the types of support that may improve the outcomes of individuals’ information seeking.

Keywords
Information seeking failures, information seeking support

INTRODUCTION AND LITERATURE REVIEW
Information seeking is an essential component of our daily functioning. We adopt various strategies to look for different types of information to accomplish a variety of goals at work, at school, or in our everyday lives. The literature has shown that individuals constantly face obstacles when they look for information across various disciplines, such as medicine (e.g., Kumpulainen & Järvelin, 2011), education (e.g., Seyedarabi, 2011), and engineering (e.g., Kraaijenbrink, 2007), as well as in their everyday lives (e.g., Savolainen, 1995). These include internal barriers (e.g., lack of knowledge), external barriers (e.g., time constraint, institutional restrictions) (Savolainen, 2015), interpersonal barriers (e.g., lack of help from other people) (Świgon, 2011), etc.

Although barriers are mostly believed to negatively affect information seeking, they do not always lead to information seeking failures (hereafter ISFs). Barriers may be overcome or may even benefit information seekers by fostering creativity, developing behavioral changes, or spurring other positive effects (Savolainen, 2015). Compared to the scholarly attention that has been paid to individuals’ information seeking barriers and the ways in which they overcome said barriers, studies of their experiences with ISFs are relatively limited.

The concept of outcomes of information seeking (i.e., success or failure) was first introduced by Wilson (1981; 1999) in his model of information seeking behavior. Information users may either succeed or fail in fulfilling their information needs, which may result in making use of the acquired information or reiterating the search process. Mansourian (2008) is among the first researchers who explored users’ Web searching failures and coping strategies. He defined an ISF as “the situation in which users attempt to satisfy their information needs, but they fail to do so” (p. 29). Apart from altering search topics or tactics, users reported seeking advice from colleagues or friends as coping strategies. The investigation of bibliographic database search failures by Rosman, Mayer, and Krampen (2016) revealed that even students with higher levels of information seeking knowledge were less likely to succeed when searching in complex databases than in popular search engines that had simple interfaces. Their information seeking knowledge might even impair search outcomes if they could not put that knowledge into practice. Shenton (2007) focused on youngsters’ ISFs, which were mainly caused by five types of barriers: need/source mismatch, knowledge deficiency, skills shortcomings, psychological barriers, and social unease and inhibitions; though the findings’ applicability to adults’ information seeking cannot be assumed because they were drawn from studies of students between the ages of four and eighteen.

However, extant ISF research has been primarily limited to a specific channel (e.g., Web or database searching) or population (e.g., academic users). Web searching may only be one step in individuals’ information seeking processes. Failing on the Web does not automatically result in a failure to find desired information. In some scenarios, the Web may not even be the ideal or proper place to search for information. In order to provide a holistic picture of information seeking failures and potential remedies for those failures, other possible strategies or sources that are available or have been tried by individuals should be considered alongside Web resources.
In the study presented in this paper, 63 survey participants and 10 interview participants described their unsuccessful information seeking experiences and the support that might have helped them achieve better results. Unlike previous research on Web searching failures (e.g., Mansourian, 2008) in which some participants failed on the Web but managed to find the information through other channels (e.g., locating print materials), the participants in this study already tried multiple strategies (online and offline) before declaring defeat in the majority of the cases. Some made it very clear that they had exhausted all of their options before giving up (e.g., “you name it, I tried it”). We report here the part of our findings from this study that explored the types of support individuals needed after their failures. The analysis and discussion in this paper are guided by one research question:

**What kind of support do participants think would have improved their information seeking outcomes?**

By looking at the instances in which people faced unconquerable information seeking barriers, we narrow our focus to the help that might/would have directly prevented their ISFs. The contexts in which information seeking failures arose (e.g., tasks, tactics used) also shed light on answers to this question.

**METHODS**

This study was carried out in two stages. In the first stage, we collected 207 examples of ISFs from 63 participants by posting a qualitative survey on Amazon’s Mechanical Turk (hereafter MTurk). Data was gathered using the critical incident technique (CIT) (Flanagan, 1954) in order to study ISFs in real life scenarios. The CIT has been proven to be a valid and reliable method to gather qualitative data of memorable situations for information behavior research (e.g., Urquhart et al., 2003; Kraaijenbrink, 2007). Each survey solicited four instances in which participants failed to find the information they needed to finish a task at work, at school, or in their everyday lives (e.g., health, travel). Participants were instructed to write about the tasks that triggered their information seeking, the strategies they adopted, their perceptions of the reasons behind their failures, and the support they needed in order to achieve better information seeking outcomes. MTurk is an online platform on which we can post human intelligence tasks (e.g., surveys, rating scales) and make them available to the public for participants (who could be anyone with Internet access) to finish and receive compensation. Since this study targeted the general population, MTurk was an appropriate recruiting tool because it attracted participants from diverse backgrounds.

The survey was designed to take about 25-30 minutes. Each participant was paid $2 for completing the survey. We determined the rate of compensation ($4 per hour) after reviewing academic studies that used MTurk (e.g., Shapiro, Chandler, & Mueller, 2013) and academic questionnaires available on MTurk that took a similar amount of time. After a series of discussions with colleagues regarding the survey questions’ wording, a pilot test was conducted on MTurk with a sample of 6 participants to verify that the responses accurately reflected what the questions were asking and that the payment was sufficient. Data collected from the pilot study was excluded from data analysis.

The survey participants of the main study consisted of 58.7% males and 41.3% females. The average age was 32.6 (SD=9.7) and ranged from 21 to 65 years. 60.3% had at least a bachelor’s degree. 85.7% were located in the United States at the time of finishing the survey. Most answers to each question were concise (30-50 words), but contained enough details for us to understand participants’ experiences with a few exceptions in which participants wrote more than 100 words and were very detailed in describing their information seeking experiences.

After analyzing a portion of the survey data, we conducted 10 semi-structured individual interviews in the second stage to complement the survey findings, which added 23 examples of ISFs. However, interviewing was used as a method to obtain more detail and a deeper understanding of ISFs, rather than to simply collect more examples. Most questions included in the interviews were similar to those in the surveys with some changes that were tailored to further investigate the survey findings. The interview participants were recruited through snowball sampling. Two undergraduate students and eight graduate students from various fields of study (Communication, Computer Science, Information Science, and Biotechnology) were invited via email and interviewed.

The first author coded the survey and interview data line-by-line in NVivo. Types of desired support reported by the participants were inductively drawn from the descriptive data and later grouped into thematic categories to avoid imposition of preconceptions. Glaser and Strauss’s (1967) constant comparison method was adopted to ensure that new codes emerged with extant analysis. We analyzed parts of the survey data before conducting interviews so that resulting questions were brought up in the interviews to further our analysis and understanding. The interviews added a richness beyond what the survey data could have provided.

**RESULTS**

The tasks associated with participants’ ISFs were quite diverse, ranging from large work related projects with multiple goals, such as running an advertising campaign, to small or routine daily life tasks, such as baking croissants or curing a wound. There were a few topics that occurred more frequently than the others, including writing research papers, fixing computer problems, apartment hunting, and health related information problems. Participants were able to somewhat describe the support they needed after their ISFs in 84.6% of the cases, though the extent to which they could specify details of their desired support varied. In some cases, they were very specific about exactly what kind of help they wanted, such as new features on a Website or updated information from a particular source. In most cases, however, they only wrote about the types of information or people they needed without indicating what kind of help they would need.
to find said information or people (e.g., “easier, more intuitive websites”).

Eight general categories of support emerged from the data (Table 1), which are not mutually exclusive and sometimes concurrent. Our analysis in this section is arranged around three frequently occurring categories.

**Direct Support from People**

The No.1 desired support is direct informational or search support from people—such as subject experts, those in similar situations, etc.—most of whom were not in the participants’ personal networks and therefore unable to be located and consulted. For example, one participant was learning game design as a hobby and looked for a person in a similar situation to recommend a suitable design engine:

“If there’s another person who is a hobbist ... had gone through what I have gone through, thought one engine would be better than the other. That would be helpful.”

Although he believed that a person like this would exist, he had difficulty finding one. Getting direct support from people was sometimes associated with needing financial support because experts can cost money (e.g., “I really need to enlist the help of a professional but I just don’t want to have to pay for it”).

Some participants tried to seek help from experts by posting questions in online forums or Q&A sites, but had no luck. This could sometimes be partly attributed to Web design issues. For instance, one participant stated that one community-based Q&A website did not offer a way to make old questions fresh, so some good questions were submerged by new questions and never answered. The website also prevented users from asking duplicate questions, so they had to wait for the original question to be answered. He called this, “falling into Q&A hell,” and expressed that a “re-asking” button could have been helpful in his case. But more frequently, the right people just did not visit online forums. One participant suggested that online forums could hire more experts to answer questions (some sites already did, but not enough), yet he also understood that it would be costly and somewhat unrealistic. Occasionally, the participants found the right people to consult, but did not gain sufficient cooperation. This often happened when the participants were seeking work-related information from peers or people who held higher ranks (e.g., “My coworkers could have been more eager to give their input.”).

In spite of participants’ inclination to ask other people for help, they rarely mentioned pursuing support from information professionals like librarians, particularly in cases of working on research papers in which librarians could have been very helpful. Only one participant brought up the possibility of asking librarians, and stated that, at the time, she preferred to find the resources on her own, which was later proven to be a mistake.

Interestingly, failing to find information was not always undesirable, and participants sometimes simply needed an excuse (e.g., the information does not exist) to move on:

“If the assessor’s office had been clearer that the file was lacking information because the assessor did not have it, it would have been easier to move on.”

In this case, knowing that the information did not exist was more important than knowing the information itself.

**Support from Information Systems**

System support, which included adding features to existing information systems or creating new systems (e.g., specialized databases) to support information seeking, was brought up in 45 cases. Notably, some recommended new features are already very common in today’s Web development, such as proper filters, chat features, and cross-referencing, only they were not added to the systems used by participants. Non-textual information seeking, such as looking for the color of a nail polish in a picture or the name of a specific type of bird, was extremely challenging. One participant answered that he needed a search engine that enables reverse image search (e.g., search engines that allow users to upload pictures in order to find similar images or information about the items in said pictures). A reverse image search feature has already been included in some search engines, however, the functionality is still in its early stage and the accuracy may not be up to that participant’s standard.

In 27 cases, the participants needed specialized databases, directories, or forums on particular subjects to find their information (e.g., “a good locksmith forum”). In some cases, those databases/directories/forums did not exist or failed to meet participants’ requirements, likely because the target subject areas were too specific (e.g., “a piece of paper with all the vendor’s emails on them”), or too broad (e.g., “a recipe site that would give you all the recipes”). In some cases in the survey data, desired tools did exist (e.g., “a database of the best rehabs, with trusted reviews of each”, “an herbal reference”) and were retrievable, and thus it was unclear why participants did not find or use them. One interview participant did mention that time constraints (limited amount of time) prevented him from making use of some available sources to look for an answer regarding a computer hardware problem.

The above two sub-sections only summarize responses in which participants pointed out that they wanted help from people or systems. There were also examples in which desired help could come from either systems or people, but participants did not specify which they wanted (e.g., better search keywords). These were classified into two separate categories as shown in Table 1 (knowledge support and informational support).

**Better Information Documentation or Organization**

In some ISF examples, nothing could have helped because the failures were caused by problematic information
documentation or organization in the past, and most of those mistakes were irreversible (e.g., “I failed to write it down when it was originally given to me”; “It would have been helpful if whomever put it back in the wrong place hadn’t done that.”). However, we believe it is necessary to separate this category from the “nothing could have helped” category because the participants did know what went wrong in these cases, and these realizations may help them prevent future ISFs.

**Not Sure or Nothing Could Have Helped**

In quite a few cases, all participants needed was more time, which was unfortunately often very limited. Several participants mentioned that they could have tried more tactics if they had additional time. Failures caused by time constraints might be irreversible once the time had passed. Yet, time constraint was not always a purely external factor, and could stem from participants’ problematic time management (e.g., “If I had not waited until the last day to accomplish it”), in which case failures could be educational and prevent future mistakes. This might sometimes be due to the non-existence of their desired information. For instance, one participant pointed out that support was not an issue and he was good at researching. There was simply not much research done on his topic. Several participants even joked in their responses (e.g., “If the IRS didn’t exist then I wouldn’t have this problem”), which also indicated their helplessness.

**DISCUSSION**

Generally speaking, although participants described various types of support that could improve their chances of successful information seeking, not all suggestions have the potential to be translated into design implications for new or better information systems or services. Some types of support associated with system design may be easily provided if attentions are given; these include cross-referring or filtering features, which are not new and have been included in many information systems.

In most cases, desired support could be obtained, but may require considerable efforts and expertise. For instance, participants often wished to directly consult people after their ISFs, but faced great challenges in finding the right individuals. Despite online forums’ and Q&A sites’ user-generated collective wisdom, they have limitations in fulfilling complicated or specific information needs. We are still in need of systems that can accurately match information seekers to people who have the expertise and the willingness to help in a timely manner. Systems of that kind should also consider providing incentives for those experts or professionals to contribute. In a few cases, the type of support participants needed might not be realistic, and thus they may need to work around their difficulties. For example, in one case in which a participant looked for “a catalog of boat prices per year and by make,” boat prices may not be universally regulated and may frequently change, and thus could not be summarized into a master catalog. Also, even if nothing could have helped in some situations (e.g., mistakes in documentation), those failures revealed participants’ difficulties or problems in documenting or organizing information, and may have practical implications for the design of information systems or educational programs.

**CONCLUSION AND FUTURE RESEARCH**

In this paper, we reported a part of our findings from a study of individuals’ failures in fulfilling information needs in all contexts and situations. The analysis here concentrated on the support individuals needed after their unsuccessful experiences. This exploratory qualitative study serves as the first step towards designing new and better systems or services that improve individuals’ information seeking outcomes. Our findings open up several opportunities for future research.

First, we may explore new solutions for assisting people with finding experts that could provide personalized informational help. Instead of simply relying on information retrieval systems’ ability to support personalized search among existing information, we should also leverage the Web’s function as a medium to enhance human-human

<table>
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<tr>
<th>Categories of Support</th>
<th>Quotes or Examples</th>
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<tbody>
<tr>
<td>Direct informational or search support from other people (e.g., subject experts, peers, etc.) (95)</td>
<td>“Someone who knew more about cars and the ins and outs of engines.”</td>
</tr>
<tr>
<td>Support from information systems (45)</td>
<td>Chat feature, filters, monitoring, specialized databases, etc.</td>
</tr>
<tr>
<td>Knowledge support (knowledge that facilitates information seeking, e.g., better search keywords, subject knowledge) (23)</td>
<td>“Suggestions for other possible variations of the title.”</td>
</tr>
<tr>
<td>Be more patient or have more time (21)</td>
<td>“It would have been helpful to have more time to work on the project.”</td>
</tr>
<tr>
<td>Informational support (participants did not specify if they needed this support from people or systems) (19)</td>
<td>“Less conflicting information to help make an accurate decision.”</td>
</tr>
<tr>
<td>Better documentation or information organization (14)</td>
<td>“To protect the previous work calculations and documents are helpful.”</td>
</tr>
<tr>
<td>Financial support (7)</td>
<td>“A lot of resources are really expensive.”</td>
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<tr>
<td>Technical support (2)</td>
<td>“Access to internet.”</td>
</tr>
<tr>
<td>Not sure or nothing could have helped (32)</td>
<td>“I don’t think much could have helped me.”</td>
</tr>
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Table 1: Categories of Support for Information Seeking (# of occurrence in the parenthesis).
communication. Second, we may look for new ways to ensure a smooth communication between system developers and users, as quite a few respondents reported design suggestions that were simple enough to be easily added to systems. That being said, due to the limitations of the survey data, we could not speculate why some participants did not make use of preexisting free and retrievable research tools while they mentioned that those tools would have been helpful. One possible explanation would be that some participants were not aware of the relevant sources due to different knowledge backgrounds or experiences. Also, participants seldom contacted librarians who would very likely be available and willing to help, particularly for academic-related assignments. We hope to investigate the factors that influence individuals’ choices of information sources/channels in the future through conducting more interviews or field observations. In addition, this study only inquired about the support that participants would like to receive, which did not necessarily correspond to the support they actually needed. There could be gaps between how they objectively should approach their information problems and what they thought they should do. We, as the researchers, may also make our own judgements concerning appropriate information seeking help, especially under those circumstances in which the participants provided vague descriptions or were not sure what they needed.

Meanwhile, future research efforts could study the extent to which participant-suggested support is realistic. For instance, we may differentiate between problems that originate from issues in information systems or services and those caused by people’s own insufficient subject knowledge, as the former are more likely to pertain to information scientists’ areas of expertise.

The findings may not be generalizable due to our relatively small sample size, and the percentage and numbers included in the paper were used for illustrative purpose. However, this work contributes a distinctive approach to examining individuals’ information seeking failures. This is only the first phase of our research that investigates information seeking failures, making this poster an ideal way to communicate our preliminary findings and seek feedback on further research. The next phases of our work may result in implications for system and/or service designs that help the searcher in overcoming thus far unconquerable barriers in information seeking.

ACKNOWLEDGEMENT

The work reported here is supported by the Institute of Museum and Library Services (IMLS) grant no. RE-04-12-0105-12. We wish to thank all of our participants and members of the InfoSeeking Lab at Rutgers University for their helpful input on the survey instrument.

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