Collaborative Information Seeking (CIS) Behavior of LIS Students and Undergraduate Students: An Exploratory Case Study

Shabnam Shirley Shahvar  
Graduate School of Library & Information Science, Simmons College  
300 The Fenway, Boston, MA 02115  
shahvar@simmons.edu

Rong Tang  
Graduate School of Library & Information Science, Simmons College  
300 The Fenway, Boston, MA 02115  
rong.tang@simmons.edu

ABSTRACT
This study investigates the collaborative information seeking (CIS) behavior among three different user groups: LIS students, undergraduates, and a mixture of LIS and undergraduate students. Each group consisted of a pair of participants. Out of 28 participants, 16 were graduate students of library and information science and 12 were undergraduates from different majors. Results of this case study revealed that undergraduate groups visited library website and library databases more frequently than other groups. They had the highest average frequency in reading an abstract or a full text article compared to two other groups. Undergraduate groups also held the highest success rate. Mixed groups had the highest frequency of verbal dialogue and spent the longest time on tasks. Most of the LIS student groups found search results faster and spent the shortest time on completing tasks and reading the abstract and full texts. Surprisingly, LIS groups had the lowest success rate among the three groups. Participants described the positive aspects of collaborative search as gaining greater search insights, good learning process, positive partnership and being more efficient with task completion. They also pointed out that collaboration drawbacks may include not having equal control/sharing of keyboard or mouse and other obstacles in the collaborative decision-making process. Participants further provided suggestions on database and search engine design to facilitate the collaborative search process.

Keywords  
Collaborative information seeking, User study, Task-based scenarios

INTRODUCTION
Collaboration is often desired or even necessary for solving problems that are complex and somewhat difficult for an individual (Denning, 2007). Even when a task can be completed by an individual alone, there are additional benefits of collaboration, including taking advantage of diverse skills and promoting social engagement (Shah, 2010). The merit of collaboration applies not only to sophisticated, involved projects, such as engineering infrastructure, but could also be relevant to a family planning a vacation, coauthors working on a scholarly article, an engaged couple designing their wedding, or a recruitment committee working on a new hiring project. All of these situations require people coming together to achieve their common goals by looking for and sharing information, and making sense out of it. Despite the natural tendency to collaborate in difficult situations, there has been a considerable lack of specialized tools that promote and support collaborative information seeking (CIS) activities (Shah, 2012).

In many social situations, it is also common to collaborate. These situations span cultural, gender, and age differences. Using students at Simmons College as the case for this study, the current research focuses on collaboration among three different user groups; LIS student groups, non-LIS groups (undergraduates from different majors) and mixed group of students (undergraduates and LISs), to study their collaborative search behavior as they search electronic resources provided through Simmons College Library system.

Recently, research studies on collaborative web searching have emerged in a growing rate. Some studies focused on external issues such as the roles individuals can adopt in collaborative information seeking (Prekop, 2002), attitude changes in collaboration (Caskey, 2003), and gender differences in group-based information seeking (Large, Beheshti & Rahman, 2002). Another line of research centers on designing interfaces and support tools to facilitate collaborative information seeking activities (Druin et al., 2003; Twidale & Nichols, 1998). Yet, none of these studies report how different groups of users (as opposed to individuals) organize and perform their search process together (Lazonder, 2005).

Undergraduate students have been the study population in several CIS studies. Twidale et al. (1995) observed a number of collaborative learning interactions among students, such as students often working in groups, discussing ideas, comparing results, competing to find information, and planning their next actions. In a study on graduate students' collaborative information seeking, Lee (2013) examined how graduate students seek and use information in group-based work and how other factors,
such as social, cognitive, and level of collaboration, affected their collaborative seeking behavior.

In summary, existing empirical research on collaborative search mainly focuses on the development of search systems and search tools but very few investigate various steps involved in users' collaborative search process when they interact with library databases systems. The significance of this study is two-fold: (1) by examining three different user groups’ collaborative search behavior when they search library database systems, this study fills in a gap and further advances the CIS research of library users; (2) recommendations may be developed to help: (a) redesign existing library database systems or search tools to better support collaborative learning, and (b) improve current library services to better facilitate collaborative learning.

METHODOLOGY

The study intends to investigate the following research questions:
1. What are the self-reported proficiencies of e-resources (internet, computer, and databases) and frequency of library website and library database usage among different user groups?
2. What are the performance results among different user groups?
3. How do various user groups describe positive and negative aspects of their collaborative experience?
4. How do participants explain their likelihood of being involved in collaborative search?
5. What are the participants' suggestions with regards to database design to facilitate collaborative information seeking?

An exploratory case study approach was employed to investigate and understand the collaborative information seeking behavior among different user groups. Each study session included a pre-session questionnaire, a task scenario, and a post-session questionnaire. Data collection was performed using think-aloud protocol and observation method. Study sessions were conducted at Simmons College Usability Lab with 14 pairs of students, from a variety of majors and levels of education. The respondents were selected through convenience sampling, along with snowball sampling. Out of 28 participants, sixteen were graduate students of library and information science and twelve were undergraduates from different majors. Participants were then paired into three groups of undergraduates, five groups of LIS students and six groups of “mixed” undergraduates and LIS students. There were three different sets of tasks which required the use of two library subscribed databases including “ProQuest”, “EBSCO” and Google Scholar. Search topics ranged from "causes of depression after giving birth", "health status in overweight children between 6-12 years old" to "USA foreign policies in regards to Arab spring."

RESULTS

Results reported here are preliminary; meanwhile further analysis is currently under way.
Quantitative results include task performance, level of proficiency and frequency of library database and website use. Task performance measures consist of levels of difficulties, time on task, frequency of verbal dialogue among each group, and in-depth reading of results. Questionnaire responses including positive/negative aspects of collaboration, likelihood of future collaborative activities, and system improvement suggestions were coded for content analysis.

Participants Self-Reported Data

When asked how frequently they use the internet, among three types of participant groups, mixed groups reported the same distribution of 33% for spending time on the internet within all three categories; time ranges were from one to three hours, four to six hours and more than six hours. Half of the LIS groups spent four to six hours per week on using the internet. Fifty percent of undergraduate participants spent more than six hours per week on the internet. In terms of the frequency of visiting Simmons’ Library website, close to 20% of the participants in all three groups visited the site frequently. Thirty-three percent of mixed group participants visited the library site often. As shown in Figure 1, undergraduate groups had the highest frequency in occasionally visiting the website (67%). Surprisingly, 20% of LIS students reported that they rarely visited or used the library website.

![Figure 1: Use of Library Website](image)

Half of the undergraduate group participants used library databases "occasionally." All three groups reported that the occasional usage level of library databases had been their typical level of use.

When asked to provide their own assessment of their proficiency levels with computer, the internet and library databases on a seven-point scale, mix group participants had the highest average of computer proficiency at 5.50 and internet proficiency at 5.75. Undergraduate groups reported the lowest average of 3.83 for their database knowledge. Table 1 shows relevant data.

<table>
<thead>
<tr>
<th>Group</th>
<th>Computer Pro</th>
<th>Internet Pro</th>
<th>Database Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Max</td>
<td>Min</td>
</tr>
<tr>
<td>Mix</td>
<td>5.50</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>LIS</td>
<td>5.20</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Undergrad</td>
<td>5.17</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 1: Self-Reported Proficiency and Knowledge
**Task Performance**

With regard to level of difficulties in task completion, time on task, verbal dialogue, and in-depth reading, LIS groups had the higher rate of completed with ease (56%) and failure to complete the task rate (16%), and the lowest rate of complete with difficulties (26%). Figure 2 shows the success level data of all three groups. Success rate was defined as the percentage of tasks that the participant completed correctly. In this study, a successful task would be considered to include both "completed with ease" and "completed with difficulty" (Nielsen, 2001).

![Figure 2: Success Distribution among Different Groups](image)

In terms of time on task, mixed groups spent an average of 5.71 minutes per task, which was the longest task completion time. LIS groups spent an average of 4.47 minutes per task, which was the shortest time. Further analysis was done in examining the total number of times that each group held conversations during tasks. Figure 3 presents the frequency of mixed group participants having verbal dialogues during different tasks. Mixed groups had the highest frequency in holding communication and conversation when performing tasks.

![Figure 3: Frequency of Having Verbal Dialogue during Task Completion among Mixed Groups](image)

**Participants' Perception on Positive and Negative Aspects of Collaboration**

Participants’ comments on the positive aspects of collaboration included different insights, learning process, partnership, and time saving. The majority of participants claimed that the most positive aspect of collaboration was to "bounce the ideas", "determine the keywords together," and "having a second set of eyes to scan the results." Almost all of the participants believed that collaboration induced a positive learning process for involved members. They argued that by collaborating with others, they learned more about search engines and search strategies. Several participants also indicated that a good partnership is beneficial through helping each other find the best results, and assisting each other in a subject area that they were not familiar with. One of the undergraduate participants pointed out:

"Being able to find quality in each other’s answers and agreeing on one thing or another being the right answer or resource. Having different ideas and going in with different expectations definitely impacts collaboration."

Some participants cited negative aspects of collaboration, including not having control of keyboard or mouse, partnership issues, search engine issues and decision-making process. Several participants described that they wanted to skim the results more quickly but were unable to, since they were not in charge of the keyboard or mouse. Participants felt somewhat strange about sharing the screen, keyboard, and mouse. Participants explained some of the issues they had with their partners. For instance, they had to wait for the partner to finish reading the results. The other challenging aspect of this collaborative search process was that several participants were uncomfortable searching topics with someone that they did not know, especially when they encountered an unfamiliar topic. Participants experienced some difficulties when searching Google Scholar. A good number of participants expressed their frustration with looking for filters, finding search terms and even deciding which results were the best fit for the task. Almost all participants stated that they had a hard time deciding what to pick. They were also very specific on not being too selective about their choices and gave their partner the chance to select as well.

**Future Likelihood of Collaboration**

Participants indicated their likelihood of participating in future collaborative search as either "Yes," "No," or "Depends." The ones who answered "Yes," summarized their reasons as willing to work together, getting a second opinion and being more motivated. Participants who said "No" explained their hesitation as originating from not knowing their partner and the style that he/she may use to perform the search process. One of the LIS students commented, "Collaboration is really related to the situation and the topic." Several participants were used to working on their own because they thought that the process may take less time and cause less confusion. Participants who
answered "No" to future collaboration stated that it would be easier to get the search done on their own and being unable to collaborate physically or virtually due to unavailability of being at the same time in a specific place with a partner.

**System Design Suggestions**

Several participants provided their suggestions for improving the design of search systems and tools to support collaborative search. Their suggestions were mainly related to adding certain features or functions, such as adding more tabs for the advanced search on Google Scholar, presenting recommendations for more results when nothing was found, adding a sharing space or communication option such as chat or IM on all search engines and databases, and providing summaries of search history.

**DISCUSSION AND CONCLUSION**

One of the surprising results of the study concerns undergraduate groups. Undergraduate participants visited library website and library databases more frequently than other groups. Although their self-reporting on database knowledge and computer proficiency was the lowest among three groups, they had an 89% success rate, which is the highest among all three groups. They also had the highest average on reading the abstract and full text of results. Mixed groups had the highest score on the frequency of having verbal dialogues and spent more time on tasks than the other groups. This could indicate that when members of a team come from different academic levels and disciplines, more verbal communication is needed to establish common ground for searching. No specific pattern was found when comparing verbal dialogues and time on tasks among three groups. This might suggest that there is no relationship between the amount of verbal communication and the time spent on each task. In contrast with the undergraduate groups, most of the LIS groups found results faster, and all of them read only the first page of results and tried to select the answer by reading only the title; therefore, they spent very little time on tasks and on reading the abstract and full text of the results. In this study, LIS groups had the lowest success rate, which is somewhat shocking as one could imagine with their academic background and training, LIS students should have outperformed other groups; however, in this case, they were outperformed by undergraduate students.

Participants enumerated several positive aspects of collaboration. Almost all of them agreed that having a second opinion was the most beneficial aspect of collaborative search. Participants mentioned that by collaborating on different tasks, they gained knowledge on new search strategies, features, filters, and limitations available on different databases and search engines and distinctive searching styles. As a positive aspect of collaboration, one of the undergraduate participants commented:

"...we were able to help each other in areas we weren’t partially good at."

In terms of the drawback of collaborative search, several participants mentioned having to spend longer time than searching alone. A number of participants also felt that decision making was difficult during CIS, as they needed to achieve consensus when two people may have very different ideas or going in with different expectations. Participants also indicated that their likelihood of being involved in a collaborative search situation depends on the task, the environment, and motivation. Participants also suggested adding more sharing and communication features and functions to search interfaces to support collaborative search.

As an exploratory case study, results reported here present very interesting insights to CIS behaviors that are worthy of further analysis. The performance contrast of LIS participants with undergraduate/non-LIS participants warrants more in-depth investigation. The prior training and over-confidence in their search skills may have led LIS students to become causal and careless searchers under a collaborative situation, and thus negatively impacted the quality of their search performance. Such a finding will have practical implications for librarians helping users in searching for their research topics. Currently more systematic analysis of the research data is under way, based on which a descriptive process model of CIS may be generated to help deepen the understanding of library users’ collaborative search behavior.

**REFERENCES**


