Understanding Article Search Behavior through Screen Recording Analysis: A Case Study with Psychology Students

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Abstract

Performing effective library database or internet searches are key skills for student academic success. It can be challenging for students when working in unfamiliar domains, and psychology may be unfamiliar for many students. Even with some psychology coursework completed, ineffective approaches, such as “Just Google it”, can be common for students when searching for articles. They can end up scrolling through hundreds of hits or simply picking a few from the top. This pilot study analyzed 39 screen recordings of searches conducted by students for an in-class search activity at the beginning of a library instruction session for their psychology writing class. Most students completed the activity within 3 minutes and reported they found a full-text article on the worksheet. Some also utilized advanced features provided by the databases, such as the Boolean operator “AND” and limiters (e.g., publication year, peer-review, etc.). However, evaluating the worksheets showed that only about half of students found a full-text article. Additionally, utilization of advanced search features did not necessarily lead to better search outcomes, possibly due to poor choice or misuse of keywords while searching databases. Our data will help with planning for more relevant and effective library instruction.

Keywords: information seeking behaviors; video analysis; action research

Introduction

Performing effective library database or internet searches are key skills for student academic success. However, it can be challenging for students when working in unfamiliar domains, and psychology may be unfamiliar for many students. Even with some psychology coursework completed, “just Google it” can be a common approach to searching for information for students. The general goal of our current study was to assess student searching.

Although research on student search strategies has been pursued for years, this kind of studies continues. For example, significant work has recently looked at student
use of federated search resources (Dalal, Kimura, & Hofmann, 2015; Dempsey & Valenti, 2016), and others have looked at discovery layers and research databases (Evelhoch, 2018). Related work has compared student searching on Google and federated search resources (Asher, Duke, & Wilson, 2013; Georgas, 2013, 2014, 2015), while another research has looked solely at Google Scholar (Schwieder, 2016).

As is common in many university settings, a regular service at the authors’ institution involves librarians providing instruction for writing intensive courses. A goal expressed on a sample course syllabus states that one learning outcome of the course is that the student will be able to conduct “…literature searches using online research databases to find and access topic-relevant published research.”

Of course, a significant goal is to make sure that students use databases specific to a discipline; and PsycInfo is a top choice for topics in psychology; PsycInfo is a database for scholarly research in psychology and related disciplines, produced by American Psychological Association (American Psychological Association, n.d.-a). Also, a key strategy in searching has been and continues to be Boolean searching, although when to focus instruction on that may be changing (Lowe et al., 2018). Another basic goal for student success in searching is the accessing of full text (Evelhoch, 2018).

Our general goal has been to assess student learning needs and to develop library instruction with effective content and teaching strategies. To that end, the purpose of the current qualitative study was to explore undergraduate student's online searching behavior, and we focused on a common class task, finding full-text scholarly articles for research assignments. The primary research question was this, “how do students conduct searching to find full-text articles using the Internet?” Also, and more specifically, “What sources and search strategies did student use to find full-text articles on a given topic?” The findings from this kind of study can indicate for us what students know, giving us a basis for designing and developing instruction that is built on the existing skill sets of students.

Method

Exploratory research can facilitate the description of or insight into a situation or an area of social life; it has been employed in research aiming to deepen understanding of a phenomenon (Edgar & Manz, 2017; Stebbins, 2001). In the present study, screen recordings of in-class search activities and search activity worksheets were used to see how students search, to gain a better understanding of students' knowledge and ability to effectively search for research-oriented information.

Participants

Participants in the current study were students enrolled in a psychology writing intensive class at a public research university in the United States. The students, second year students, had also either completed a research methods course in psychology or were currently enrolled in that course.
Data Collection

Data were gathered from screen recordings of students' hands-on search activities during the library instruction session in a computer lab located in the library. Prior to delivering the library instruction, students were asked to complete a hands-on search activity, which involved students searching for a full-text scholarly article on the topic given to them and taking steps they would normally use. The students were also asked to write down the title of article they found. After the library instruction, students were asked to do a similar exercise again with a different topic. Both worksheets were collected at the end of the library instruction session and the computer screen of searching process was recorded.

Data Analysis

Students’ searching behavior patterns in the screen recordings were analyzed with open coding and descriptive statistics to gain insights and identify patterns of student searching behaviors. Open coding refers to identifying concepts based on its dimensions, this was used for establishing overarching themes (Merriam, 2002; Corbin & Strauss, 2008). The recurring behavior patterns identified in the screening recordings were viewed as themes and subthemes. The coding process facilitated a deeper understanding of the behavior patterns being studied. Coding was used for the following factors: 1) time spent on the activity, 2) number of sources used for their search, 3) the sources they used, 4) whether or not they found a full-text article and 5) search strategy used. The data was coded by two independent coders to ensure the validity and reliability. The process also ensured that the emerged themes corresponded to and informed answers to our research questions.

Results

A total of 39 screen recordings of search activity were collected and analyzed. Results showed that the average time the 39 students spent on this search activity was 2 minutes 40 seconds, the maximum time was 7 minutes 27 seconds, and the minimum time was 24 seconds. The majority of students (84.6%) used one source to conduct searches for this activity, four students (10.3%) used two sources, and two students (5.1%) used three sources. The results showing students completing the hands-on search activity quickly and using one source suggested that the search activity was easy for the most of students.

Looking at the sources that students used for searching, results showed that the sources most used was Discover at Kent State (DKS), accounting for 61.7% of searches. DKS is the university’s library search tool conducting searches across multiple library databases. Alternative sources used included Google Scholar (19.1%), Google (6.4%), PsycInfo (6.4%), and other sources (6.4%). Google Scholar identifies scholarly literature in many subjects and sources such as books, peer-reviewed papers, abstracts, and reports (Google Scholar, n.d.). As noted before, PsycInfo is a database for scholarly research in psychology and related disciplines. Two related sources used for searching were PsycNet and Psychology and Behavioral Sciences Collection. PsycNet is a platform designed for
searching APA databases (American Psychological Association, n.d.-b). Psychology and Behavioral Sciences Collection is an EBSCO database that includes full-text scholarly journal articles of psychology and behavioral sciences related subject areas, such as psychiatry and psychology, anthropology, and behavioral and mental process (Psychology and Behavioral Sciences Collection, n.d).

Table 1

<table>
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<tr>
<th>Search Behavior Characteristics (N=39)</th>
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<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Number of sources used</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Full-text found</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Advanced search feature used</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

Importantly, 19 of the 39 screen recordings displayed a webpage with a full-text research article, which suggested that 19 students found a full-text research article. On the other hand, 20 recordings displayed no webpage with a full-text scholarly article, which suggested the 20 students “thought” they found a full-text scholarly article or at least they reported that they found one on the worksheet.

With respect to the search strategies, all the 39 screen recordings showed that typing a search phrase in a search box was used for conducting searches. In addition to typing a search phrase in a search box, thirteen of the 39 recordings (33.3%) showed that advanced search features were applied, while 26 of participants (66.7%) did not use advanced search features. More discussion of advanced search strategy data is given below.

The above results provide an overview of our general themes. When we looked further, more on search behavior patterns emerged, and the following sections present more detail. In addition, it will be seen that some similarities and differences in search behavior patterns emerged between students who found a full-text article and those did not.

**Advanced search features**

Results showed that among the 13 people who used advanced search features, 11 students used one advanced search feature to conduct a single search, and two students
used two features. The advanced search features used included the Boolean operators AND, OR, and NOT (46.7%), special characters such as asterisk mark for truncation (46.7%), and search filters (6.7%). The search filters used were one or more of the following to limit the search results: 1) full-text, 2) scholarly journals, 3) academic journals, and 4) language English.

Table 2

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<tr>
<th>Advanced Search Feature Used and Full-Text Found (N=39)</th>
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<tbody>
<tr>
<td>Full-text found</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
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<tr>
<td>Total</td>
</tr>
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</table>

A number of patterns emerged on the relation between advanced search feature use and whether or not a full-text article was found. For example, among the 13 students who used advanced search features, eight (61.5%) did not find a full-text article, and five found it (38.5%). On the other hand, among the 26 students who did not apply advanced search features, 14 (53.8%) found a full-text article, and 12 did not find it (46.2%). Interesting patterns were also seen in the use of search filters used and finding full-text scholarly articles. Among the eight students (8) who used advanced search filters but did not find a full-text article, six students used Boolean (AND), and one (1) used search filters, and one (1) student used/tried both Boolean logic and search filters. Moreover, among the five participants who applied advanced search features and found a full-text article, four students tried search filters and one student used both search filters and special search characters. Although using advanced search features properly to conduct an effective search seems important, the results suggested that using advanced search features does not necessarily lead to finding a full-text article.

Search strategy

As mentioned above, the use of search phrases in the search box search box was the strategy applied by all the participants. However, different behavior patterns emerged from the way that search phrases were keyed in the search box. Discrete behavior patterns showed how students use keyword searches for searching academic full-text articles. As we viewed and analyzed screen recordings, we found and used four coding patterns of search phrases:

1) Typing in the whole sentence in one search box,
2) Typing multiple keywords in one search box,
3) Typing multiple keywords in multiple search boxes, and
4) Typing single keyword in one search box.

Typing in the whole sentence in one search box, the first category, is considered a relatively inefficient search strategy when using academic databases. Next, typing
multiple keywords in one search box to search for scholarly full-text articles is regarded slightly better but similar to the first category. People who apply this type of search strategy may indicate not knowing how to use advanced search strategies. Typing multiple keywords in multiple search columns generally leads to more precise search results when using academic databases.

The coded data (see Table 3) showed that during the searching process, typing multiple keywords in one search box was the most common search method (34.6%), followed by typing a sentence in one search box (32.7%), typing multiple keywords in multiple search columns (28.8%), and typing a single keyword in one search box (3.8%).

Table 3

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<thead>
<tr>
<th>Search Strategy Used in the Whole Search Process</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole sentence in one box</td>
<td>17</td>
<td>32.7</td>
</tr>
<tr>
<td>Multiple keywords in multiple boxes</td>
<td>18</td>
<td>34.6</td>
</tr>
<tr>
<td>Multiple keywords in one box</td>
<td>15</td>
<td>28.8</td>
</tr>
<tr>
<td>Single keyword in one box</td>
<td>2</td>
<td>3.8</td>
</tr>
</tbody>
</table>

When we further analyzed the search strategy that the 39 participants used on their first attempt (see Table 4), we noticed that typing multiple keywords in one search box (14 students), and typing a sentence in one search box (14 students) were the two common methods students applied to begin their search. Nine of the 39 students typed multiple keywords in multiple search box and two students used a single keyword. The results suggested that most participants conducted searches with inefficient strategies.

Table 4

<table>
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<tr>
<th>Search Strategy Used at the First Search Attempt (N=39)</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole sentence in one box</td>
<td>14</td>
<td>35.9</td>
</tr>
<tr>
<td>Multiple keywords in multiple boxes</td>
<td>14</td>
<td>35.9</td>
</tr>
<tr>
<td>Multiple keywords in one box</td>
<td>9</td>
<td>23.1</td>
</tr>
<tr>
<td>Single keyword in one box</td>
<td>2</td>
<td>5.1</td>
</tr>
</tbody>
</table>

Some other interesting patterns were seen as we compared the time spent on search behavior completion for students who found a full-text research article and for those who did not. Results showed among students who did not find a full-text article, the average time they spent on the task was 2 minutes 27 seconds, the range of time from 24 seconds to 6 minutes 26 seconds. In comparison, the average time for students who found a full-text article was 2 minutes 54 seconds. The maximum time spent searching was 7 minutes 27 seconds, and the minimum time spending was 36 seconds.
Discussion

The purpose of our research was to qualitatively explore the online searching steps used by undergraduate students when they need to find full-text scholarly articles for research assignments. We wanted to get a sense of student knowledge of (and skill set for using) library sources and tools before delivery of this particular in-class library instruction for a writing intensive course in psychology.

Although time consuming, analyzing screen recordings provided valuable information and potentially useful insights regarding undergraduate students' knowledge and abilities for conducting scholarly article searches for course assignments and research projects.

The coding themes that emerged gave us a picture of participants’ search behaviors. Those results were helpful for addressing our intended goal for of this hands-on activity. Interestingly, the university library’s search tool, DKS, was used by most of students to conduct their scholarly article search. This is interesting; most of these students in a psychology research writing class, who had other psychology course instruction, who were asked to find a psychology research article, did not use PsycInfo. One likely explanation for that result is the convenience of accessing DKS. The university library’s homepage is the default setting for all the web browser software installed in the library’s computers, and DKS is prominently located on the library's homepage. Future studies should consider altering the default setting of web browser from university library’s homepage to other webpage to reduce potential bias. At the same time, as librarians we perhaps should not assume that students are inclined or able to use PsycInfo on topics in psychology, even after one or two courses in psychology.

In addition to initial search resource choices, other search patterns allowed us to see what students know, and where understanding of strategies for effective database searches might be improved. For example, we found that most students (28 students) typed the whole search topic given to them or almost the whole topic in one search box. Two possible explanations for our results are: 1) these students do not know how to pick keywords for their search, and 2) some students may not know how to conduct efficient search with multiple search boxes (Boolean logic) as found in the EBSCO advanced search interface for PsycInfo.

We also were interested in what students might do after not finding anything or after not being satisfied with their search result. Our results showed after the first attempt fails, five of 14 students who use multiple keywords in one search box changed their strategies to multiple terms in several search boxes. They did move some of the keywords into other search boxes. More research is needed to learn more about students’ thinking process or decision making when conducting an internet search for scholarly articles.

In addition to ineffective search strategies, an interesting finding deals with full text. More than half of the 39 students (20) did not end on a web page displaying a full-text scholarly article during the process of search activity, even though they considered
themselves to have completed the search successfully. One possible explanation is that students do not know what full-text scholarly articles look like. Additionally, our results showed students who use the advanced search features might not find a scholarly full-text article.

Another possible reason that of students did not find a full-text scholarly article is that students did not care about the correctness of search results. This could be one of the limitations of the current study since, of course, participating in the library instruction session and, specifically, taking part in the hands-on search activity is voluntary. Students did not receive an incentive (i.e., course credit or grade) for participation or a consequence for not participating seriously. Or it may be possible that students are not interested in the given topic of search activity, so they picked the keywords cursorily to complete the hands-on activity without careful consideration.

In summary, the above results for undergraduates suggests a lack of knowledge and library skills related to searching for academic research. For example, what full text scholarly articles are, what it means to conduct searches for academic research, and how to use searching resources to find academic sources.

Although, as noted above, we gained insights that are suggestive for planning of instruction, a limitation of this paper is that the screen-recording results analyzed only include students’ in-class searching performance before the library instruction session began. Future screen recording research should examine and compare the student’s scholarly article searching behavior before and after the library instruction session.

**Conclusion**

As librarians we prepare and develop our instruction each semester, and we hear positive feedback. However, we hoped to see about making improvements to library instruction based on data, instead of guessing what students should or do in fact know. Our qualitative assessment of student search behaviors in a writing intensive course in psychology gave us data to support our planning and development of library instruction. Focusing on what we learned from screen recordings of student searches, our assessment of the data indicated that many undergraduates (even in their second year in a major) did not have searching routines that involve choosing key searching terms from a research topic and then using basic Boolean search strategies effectively with search interfaces such as EBSCO’s advanced searching. It also seemed that we should not assume that second year students would be inclined to use a discipline’s database for finding research articles. We also saw that many students did not know what a full text research article is. We will be sharing our findings with colleagues as we collaborate with them to develop instruction that incorporates relevant and effective teaching strategies.

**References**


