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The College of St. Benedict and St. John's University Library have used WorldCat Local as a discovery tool since 2008. After four years of use and numerous anecdotes about the difficulties encountered with this product, a committee was formed to test the tool's usability and effectiveness. Seven female and six male students were asked to find appropriate materials within WorldCat Local for a mock research assignment. The students' research and thought processes were recorded and studied. The recordings were analyzed by the committee, and the search strategies as well as the materials selected by the students were evaluated and scored. Although the sample size limits generalizability, the videos provided an in-depth look into the students' research processes and their evaluation of what they found. Students generally fared well when asked to identify suitable books for their research topic, but they encountered many difficulties interpreting article records and identifying appropriate articles. Some WorldCat Local interface features appeared to be either the source of student problems or were not used effectively. Anyone wanting to replicate this study in his or her own evaluation of a discovery tool will want to be aware of the issues encountered in this evaluation of WorldCat Local.

INTRODUCTION

The College of Saint Benedict and Saint John's University are Catholic liberal arts colleges located approximately five miles apart in rural central Minnesota. The College of Saint Benedict (CSB), for women, is located in St. Joseph, and Saint John's University (SJU), for men, is located in Collegeville. Each college maintains its own campus, residence hall, athletic program, and traditions. However, the colleges offer a joint academic program and are served by a joint library with buildings on each campus. Combined enrollment for CSB/SJU is approximately 3,900 students, all of whom are undergraduates except for a small graduate theology school at SJU.

The CSB/SJU Library began offering WorldCat Local (WCL) to patrons in late 2008 in addition to the existing public catalog (MnPALS). When comparing the search interface and content to the public catalog, initial impressions from both users and library staff were positive. Anecdotally, users and staff noted the usefulness of the single search box for the basic interface, and they appreciated the expanded access to the entire OCLC catalog. Due to expanded access to materials, interlibrary loan demand grew significantly. As WCL grew to become a "discovery tool" through the addition of indexing and links to a variety of non-book literature, user satisfaction grew as well, particularly as access to journal literature continued to grow.

At the same time, library staff began hearing concerns from students. Many were having difficulty interpreting retrieved records and finding materials that met their needs. Anecdotal observations of student search techniques by librarians seemed to confirm these concerns. On the other hand, a few known-item usability tests of WCL and some of the other Web resources were executed, and results were generally positive. In order to gather additional evidence to settle this disparity, the library appointed a small committee to develop and execute a usability study on WCL. Because the anecdotal observations were in conflict with the positive results of the known-item usability tests, a different type of usability test was developed and performed. It asked students to find materials based on a research question, similar in scope and content to those used in the institution's first-year seminar courses. The intent of this study is to evaluate the usability of WCL. By foregoing a known-item study in favor of a research-based approach, we expected to get a clear understanding of features in the discovery tool that are confusing or barriers to students. The outcome is two-fold: (1) The authors identify weaknesses in the interface design and (2) present a methodology to evaluate discovery systems.

LITERATURE REVIEW

Federated searching was intended to be the next-generation search interface that melded disparate interfaces into a single search. In practice, however,

federated searching never delivered: it was slow, could not relevance-sort efficiently, and students were indifferent to the technology. Web-scale discovery systems attempt to take the promise of federated searching and implement it in a scalable way. While discovery systems are still a maturing technology, the potential of unified indexing is allowing libraries to expose more of our resources to our users while simplifying the process for those users to locate material. These systems enhance libraries' role in information discovery. A review of the literature found several articles that utilized usability studies to help decide which discovery tool to purchase (e.g., WCL, Primo, or Summon). Few articles discussed conducting a usability test after one of these tools had been purchased. Of these studies, the majority used a known-item approach. This method provides insight into how students find specific resources but does not provide any knowledge about how students actually use tools in their own research. A research scenario-based approach, if constructed to emulate the type of research students are asked to perform in class, should give a better picture of students' decision-making process as well as their evaluation skills.

Two separate studies, one by Jody Fagan and her colleagues (2012) and another by Anita K. Foster and Jean B. MacDonald (2013), gave research scenarios to participants. Both investigated two different discovery tools: EBSCO's Discovery Service and Serial Solutions' Summon. While these two studies discussed usability testing after implementing a discovery tool, neither focused on WCL.

In the spring of 2008, University of California (UC) participants at UC Berkley and UC Irvine compared WCL to their local catalog, Melvyl. The study's goals were to assess whether WCL met user expectations, gather input on a possible transition to WCL, and identify ways to improve WCL as a discovery tool (Arcolio 2008, 2). Participants provided feedback on how to improve the WCL interface: they valued the inclusion of journal article content, yet they demonstrated patterns of misunderstanding about the many links and icons associated with electronic resources. The participants also found their local catalog a "fulfillment tool; they did not regard [it] as a primary tool for discovering unknown items" (4). The researchers stated that one of the valuable features of WCL was that it allows users to view items not available in their local catalog, which is helpful to those working on extensive research projects. While this study focused on WCL, it relied on self-reported use of the tool.

The initial research questions of Sue Fahey, Shannon Gordon, and Crystal Rose (2011) were similar to those posed by Arnold Arcolio and compared WCL to their library's Sirsi/Dynix Symphony catalog. Results from this study showed that participants encountered challenges in both databases, including the interpretation of citation information, determining the availability of print journals, and understanding the item format (Fahey et al. 2011, 13). While the interface may have been easy to navigate, students

seemed to have difficulty understanding the types of sources they were accessing.

John Carlo Bertot and his colleagues did not compare WCL to their local catalog but instead explored these questions: "What are the usability and functionality requirements and experiences of users with WCL?" and "What were the user experiences with WCL as a resource location tool?" (2012, 208). The researchers determined that the students "found the WCL interface very appealing and usable" (219). Students preferred the integration of both books and journals, but they had difficulty with the relevancy ranking and the large number of search results, which often included duplicate title names (219).

While Melissa Becher and Kari Schmidt (2011) conducted their study by including participants from various constituencies, comparing local catalogs, and discussing interface changes, they did not ask their participants to look for known items. Their study was unique in that it compared two discovery layers that were implemented locally and focused on "capturing user preferences for features, content, and display based on normal searching behavior rather than completion of a list of tasks" (Becher and Schmidt 2011, 202). Results showed that freshmen and sophomores preferred WCL, while upperclassman and graduate students preferred their local catalog (210). Regardless of class status, the participants who showed a preference for WCL indicated that it was because the interface was simpler in comparison to their local catalog, and they were able to find full text articles (210). Both groups also reported the ease of using facets in WCL (211).

From observations during reference transactions, library instruction, and previous usability tests done at CSB/SJU Library, the authors of the present study knew that students had few difficulties when asked to find known items. However, it was unclear how effectively and efficiently students would fare in finding useful items on a given research topic. This study provided a pre-assigned research topic, rather than asking students to find specific known items to observe how students approached finding materials in WCL when conducting research for class assignments.

METHODOLOGY

Previously, the authors had tried a variety of non-direct observational research methods: e-mail surveys, focus groups, individual interviews, and paper prototypes. However, these methods did not fully help to answer the question, "Do students discover and locate what they need efficiently?" To answer this question, the authors used one-on-one usability testing that closely emulated actual research paper assignments to provide a more realistic picture of students' research processes and show where students were confused or struggling with WCL. The authors wanted to hear students

discuss why they chose specific items, as this would provide insight into their decision-making processes.

A call for participation was sent to all students at CSB and SJU via e-mail, and over 300 replies from interested students were received. The goal was to recruit 16 students—two females and two males from each class (i.e., first-year, sophomore, junior, and senior)—to participate in the study. The first students to reply to e-mail who fit these criteria were accepted. Two first-years, four sophomores, four juniors, and three seniors were able to participate. The students represented several majors: accounting, art, biology, communication, computer science, math, nutrition, and psychology. The average GPA of the student participants was 3.19, which is similar to the average GPA of the student population, 3.24. Our sample group is generally representative of the larger student population in terms of GPA, gender, and class standing.

Each participant received a $25 gift card to the campus bookstore for participating in the study. Upon arrival, the participants were told the researchers were not testing the participants; the study was designed to track the process they used to find sources for research papers in WCL; the study should take approximately 30–45 minutes; screen capture software would be used and audio would be recorded; and they would be left in the room alone. The equipment used for this study was a standard desktop computer running Camtasia Studio 8 with a USB microphone. Camtasia recording started before the researchers left the room. Once the researcher was notified by the student that he or she was done with the study, a researcher returned to the room to stop the Camtasia recording, saved the file, and reset the browser to the library homepage.

The students were asked to complete the mock research assignment using only the WCL interface. The participants were given a thesis statement and a list of formats they were expected to find to support the thesis (Appendix A). They were also asked to explain how they planned to use each item in their "paper." To maintain anonymity, the researchers asked the students only for their school year, major, and gender. Once the participants were ready to begin the experiment, they received an envelope with directions explaining the assignment (Appendix B), and then the researchers asked if there were any questions. The researchers also instructed the participants to explain aloud what they would do if they had any questions regarding a research assignment (e.g., ask a parent). The researchers also emphasized the importance of talking out loud as the participants went through the assignment to provide insight into their thought process. Once these instructions were given and any questions were answered, a researcher started the recording software and left the room.

After viewing sample recordings, the researchers developed a simple rubric to assign an "efficiency score" to measure how quickly and efficiently the participants identified a resource using WCL that they ultimately selected

TABLE 1 Efficiency Score Rubric

Efficiency score		
Score	Definition	Full definition
5	Most efficient	Participants made good use of WCL and did not encounter stumbling blocks in their search.
4	Efficient	Participants had a little trouble but ultimately found their items without false starts.
3	Somewhat efficient	Participants struggled in using the interface to find their items.
2	Inefficient	Participants had multiple difficulties finding their items.
1	Unsuccessful	Participants were unsuccessful locating an item and using the search tool.

for their assignment, as well as to determine if they selected the requested material type. This score is intended to be a measure of how well the discovery tool worked for them. A 5-point scale was used to rate efficiency (see Table 1). The researchers discussed this score after viewing each video segment, and the three committee members must come to consensus before the score was assigned. Thus, the score was subjective and was based on the three viewers' determination of how the student arrived at the record for the selected resource.

RESULTS

For the study's first task, students were asked to use WCL to find a book from 2004 that was relevant to the thesis statement provided. Eleven of the thirteen students scored a "5" for this task. Students used a variety of search strategies. Three students immediately limited their results to "Book" and "Year," while only one student limited to "Book." Three students began their search with "Advanced Search," using limits for books and the year 2004 on the search page. Two students did not use facets, and one student typed "2004" in the search box to limit the results.

For the second task, students were asked to find a book the CSB/SJU Library did not own. Several of the schools' First-Year Seminar courses require students to request a book or article from another library through interlibrary loan. Only four of the thirteen students were able to identify a book the library did not own, and these students received a score of "5." Two of the students who managed to identify a book the library did not own were successful only after reviewing eight to nine pages of results. Two more students selected the "Sort by" drop-down menu available in WCL, but neither of them used this as an initial strategy; they stumbled upon this menu after much frustration.

TABLE 2 Efficiency Scores for Each Student on Five Tasks

Participant	Task 1 (Book)	Task 2 (Book)	Task 3 (Article)	Task 4 (Article)	Task 5 (Encyclopedia)
1	4	1	5	4	1
2	5	2	2	3	3
3	5	5	1	2	1
4	5	1	2	2	1
5	3	5	5	1	1
6	5	3	3	3	1
7	5	2	5	5	1
8	5	3	4	5	3
9	5	1	5	5	4
10	5	5	5	5	1
11	5	3	5	1	1
12	5	5	5	3	5
13	5	3	1	2	1

The third question asked students to find a scholarly article published within the last five years. Seven of the students scored a "4" on this task. Eleven of the students used the facet to limit to "Article," three limited to specific years, and three students used "Advanced Search." One student stated during the study that she did not know what an "article" meant and chose archival material instead.

For the fourth task, students were asked to find a scholarly article written within the last ten years. Only four of the thirteen students scored a "4" or higher. Students had a mix of strategies to complete this task. Six students limited results to "Article;" three of those limited results to "Year;" and two students used "Advanced Search." One student limited the results to "Article" but chose a book chapter instead of an article.

Finally, students were asked to find an encyclopedia. Only one student received a "5" for this task. WCL has a limiter "Encyclopedia Articles," which six of the students chose. Two of the students added "encyclopedia" to their keyword search and one student went to the library's homepage to the link for Encyclopedias. Several made comments that they were trying to find the facet to limit the format to "Encyclopedias."

Looking at the efficiency scores for all the participants, one can see that no student received "5's"(most efficient) for all resources he or she found. All had a mix of efficiency scores (see Table 2). These were some of the observations found regarding WCL usability while analyzing the video recordings:

- Many students appeared to have difficulties interpreting records in WCL. If they were looking for a book, they assumed what they found were books. Several students chose articles instead of a book in questions 1 and 2.

- Without spell check, students did not realize they had incorrectly spelled a word. WCL did not offer suggestions on how to correctly spell a word unlike many other databases (e.g., EBSCO, ProQuest) and Google.
- The researchers saw extensive use of facets but only after students attempted multiple fruitless searches.
- Students struggled to identify whether or not the library owned a particular item. Several times when students were looking for an article, they dismissed it as unavailable in the CSB/SJU Library because a holding record was not found under "Find a copy in the library." The student would not select the "Find It" button to see if it was available in another database and many times ignored the listing of databases the journal could be found in.
- Many of the students appeared to be unable to interpret the type of material they found.

In sum, students struggled to interpret search results. Excessive detail and inefficient page layouts made it difficult for students to identify information details like material type and availability.

DISCUSSION

The student test group showed a wide variation in success rates of efficiently discovering materials and identifying appropriate formats in WCL. Nearly all participants in the test group were able to efficiently discover suitable books for the mock assignment. Search terms were entered appropriately, and most students were able to identify the material type designation in the brief record display. However, difficulties emerged when students chose to view a full record: many seemed overwhelmed by the amount of information provided, as they routinely skipped over the "find a copy online" section and went straight to "find a copy in the library," or overlooked the summary provided in the record. This mirrors the finding of Fahey and colleagues (2011) who stated, "Specific challenges emerged for participants in both studies: consistent interpretation of citation information, locating call numbers, identifying desired edition, determining availability of print journals, and recognizing item format" (13). As is the case with all libraries, many formats can be found in WCL. The researchers speculate that this complicates record interpretation for students.

Periodical articles seemed to be a challenge for the study's participants. Although there were a few exceptions, most of the students experienced difficulties finding articles and interpreting their records. As Bertot and colleagues noted, WCL should "consider providing clear definitions and locating those definitions in intuitive places in the design of the website" (2012, 220). Despite the existence of small graphics for "peer reviewed" and "article,"

many students found it difficult to determine that a record was indeed for an article and/or that it was scholarly in nature.

Other usability issues noted by students or observed by the researchers included the lack of a "Did you mean?" to account for spelling errors in search terms. This problem was also noted by Bertot and colleagues as an issue WCL had tried to address (2012, 209) but not in a robust enough way to aid CSB/SJU study participants. Also, the loss of selected facets when using the back browser button was not noted in any other studies but caused considerable confusion among CSB/SJU participants. The difficulty in determining if the library owns a specific article was also encountered in Fahey and colleagues' study, where users struggled with determining if an item was online or available in print (2011, 11). The "Sort By" and "Libraries to Search" menus were a mystery to nearly all encountering them. The researchers suggest that the relevance sort option be more prominently displayed.

LIMITATIONS

Although this study provided valuable information, its research design has some limitations. This study is open to bias because of its small, non-random sample size and because the study took place in the library, facilitated by library staff. Furthermore, the artificial nature of the study likely influenced student choices; students were given a thesis statement instead of formulating their own, as they normally would for an assignment. The research statement was intentionally broad so that students could approach it as they would in real life. Finally, the efficiency score was based on a simple rubric that the researchers created (see Table 1). The researchers chose not to create a more detailed rubric due to the small sample size and the perceived diminishing returns from parsing each task more granularly. However, using a simple rubric could leave the analysis open to subjective bias.

CONCLUSION

The purpose of this study was to evaluate the CSB/SJU Library's discovery tool through a usability test of CSB/SJU students. The study uncovered multiple interface issues with WCL that confused students. After presenting the results to reference librarians, a conversation started regarding whether or not CSB/SJU should continue using WCL or if it should begin the process of selecting a new discovery tool. The library chose to retain WCL for the immediate future while continuing to monitor the discovery tool landscape for major advancements. Preliminary research in this direction indicated discovery tools in general are still works-in-progress, each with their own pros and cons.

The process of using a mock research assignment to examine research behaviors yielded much information on how CSB/SJU students think and make decisions, which was of interest to the librarians as well as teaching faculty. While the results were not necessarily unique in comparison to studies using known-item searching, this method provided insight into how students approach a more holistic research project using this type of search tool. Generally accepted common knowledge is that students do not go beyond the first page. This study also found that they do not necessarily comprehend what they are reading and struggle to interpret location and availability cues in the results list and item record. None of the previous known-item studies commented on participants using relevance sort and facets, but in this mock research assignment students used these and other features regularly but with little understanding. This methodology could be employed by any institution looking for insight into how students use their institutional discovery tool, regardless of whether it is WCL or another product.

Given the difficulties of providing appropriate instruction for all students at a given institution, librarians rely on the discovery tool interface for effective relevancy ranking. The interface must be easy to interpret and clearly lead to a physical or electronic copy of the desired item. In particular, as discovery tools are integrating books and periodicals into a single result set, it must be simple for a user to determine the material type a citation represents. Additional research is needed to confirm these findings and to identify appropriate solutions, whether they be changes to the interface or user behavior, the latter being highly unlikely.

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APPENDIX A

In this scenario you're in a class where you've been assigned a research topic. The topic is genetically modified food (GMO). You've come up with this thesis statement:

Genetically modified food will positively affect developing countries.

Your professor has listed below the types of materials you are expected to find in **_WorldCat Local only_**. Please evaluate and choose relevant items that best support your thesis. Your professor has asked that you list each of the resources you need to use below and include a short explanation of why you selected the source.

Types of materials needed:

1. A book with a publication date of 2004 from the CSB/SJU Libraries.
   Which library is the book located at?
   Why did you select this item?
2. A book that CSB/SJU libraries does not own (any year):
   Why did you select this item?

3. A scholarly article written within the last five years. Does the CSB/SJU Libraries own this item?
   Why did you select this item?
4. A scholarly article written within the last ten years. Does the CSB/SJU Libraries own this item?
   Why did you select this item?
5. An encyclopedia:
   Why did you select this item?

APPENDIX B

The goal of this exercise is to study how people find sources for their research assignments within WorldCat Local. ***We are not testing you.*** We hope to better understand how WorldCat Local is being used. You will have to find several sources.

While we will have a video recorder aimed at the computer screen, please speak out loud as you are working on each question. We want to know which item you choose to select and why you choose that particular option. Don't worry if you can't find the answer every time. Remember – we aren't testing you.

If you reach a point on any question where you would normally seek assistance, write that information down.

The whole test should take less than an hour – probably about 30-45 minutes. You can stop at any time if you want.

Once finished please put your notes into the envelope and bring it to the facilitator. The facilitator will then give you a short questionnaire to fill out. If after that you have any other comments you would like to share please do so. Once done you will be given a gift card in thanks for your participation in this project.

Once the video recording is turned on,
<u>please begin by</u> stating your major, class standing, and gender out loud.