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KICKING THE TIRES: A USABILITY STUDY OF PRIMO DISCOVERY TOOL

KEYWORDS: usability; Web-scale discovery tool; user experience; testing; Primo; next generation catalogs; library 2.0

ABSTRACT

Discovery tools offer users a powerful way of searching library holdings, as well as external databases and indexes. They are becoming an increasingly common part of the library user experience, and research on the usability of such tools is expanding. In 2012, a mid-sized academic research library implemented Primo Discovery and Delivery by Ex Libris and conducted a diagnostic usability test to investigate how the tool is used without instruction, to discover patterns in searching behavior, and to uncover how compatible Primo is with user search behavior. This paper will describe the design and implementation of the usability study. Despite some design flaws, users adapt to the tool over time and can perform effective searches. This paper also provides recommendations for future usability studies in specific targeted areas where problems were detected.

Introduction

The adoption of resource discovery tools is a growing trend across academic libraries in the United States. Resource discovery tools enable users to simultaneously search local library holdings, electronic cloud-based collections, and external indexes. A mid-sized academic research institution, referred to as the Libraries, sought out a discovery tool to enhance the discoverability of diverse library resources, provide a more convenient yet robust search

interface, and integrate a wide variety of internal and external resources to augment research.

According to Jody Fagan, Meris Mandernach, Carl Nelson, Jonathan Paulo, and Grover Saunders (2012), a resource discovery tool can be defined as software that searches journal article and library catalog metadata in a unified index and presents search results in a single interface.

The Libraries consist of a central academic library and a small medical library. Primo Discovery and Delivery by Ex Libris was selected since it can be hosted on local servers, thus offering more control over Primo's look and feel, as well as its functionality. Primo can be customized in significant ways such as boosting search results and manipulating the placement and labeling of search facets. Factors that made Primo an attractive option for the Libraries included the ability to conduct known-item searches using a left-anchored search box and the quantity and quality of the resources indexed and made more discoverable. Moreover, Ex Libris is the producer of the link resolver SFX, which the Libraries had adopted as its new link resolver about a year before adopting Primo.

In addition to local hosting, customization, design, and integration with SFX, Primo offers a large, unified index of resources called the Primo Central Index that is designed to supplement local library holdings and indexes. The Primo Central Index harvests millions of scholarly electronic resources from aggregators, primary and secondary publishers, and open-source repositories, thus enhancing the user's ability to discover resources beyond the reach of a library's immediate collections. Information harvested from Primo Central is discovered and accessed through Primo Discovery and Delivery, providing users with a vast collection of research.

Primo can be accessed from the Libraries' home page through a link or a simple search box, located on the upper right-hand corner of the homepage. Both the search widget and the

Primo search interface offer users several search “scopes,” including a combined search of the entire Primo Central Index, all of the library collections, and most of the Libraries electronic subscriptions; or a narrower scope that searches all of the library collections, excluding the Primo Central Index and library electronic subscriptions; or one of several library collection subsopes including the Library Catalog search scope, a digital repository subscope, and subsopes for individual library digital collections. Within the Primo search interface, users can choose between the default basic search interface, which offers a single search box and a choice of search scopes in a drop-down menu, or the Advanced Search interface, which offers four search boxes and a variety of search limiters.

Research Questions

In order to discover which aspects of Primo our users—or, in this instance, our test participants—find difficult or intuitive, the authors explored several specific research questions. These research questions focused testing on what the authors considered to be key aspects of Primo’s design, functionality, and layout. These research questions were:

1. Will new users be able to find relevant and appropriate content using the Primo search interface?
2. Will users be able to interpret results lists and records?
3. Will users discover and use search limiters and facets?
4. Will users be able to find and use Primo tools such as e-mail, e-Shelf, and the full-text button?
5. Will users discover and use the search scopes? If they do use the search scopes will they choose the appropriate scope for their research?

Literature Review

Literature reviewed for this study focuses on usability studies of the Primo resource discovery tool as well as studies that were used to model the design of this study. Only three published studies have specifically analyzed the usability of Primo Discovery and Delivery. Tamar Sadeh (2008) administered two usability tests of the beta version of Primo. Usability studies by David Comeaux (2012) and Kylie Jarrett (2012) conducted usability testing on Primo with Primo Central Index. Rice Majors (2012) conducted a study that compared user experiences with a variety of competing resource discovery tools, including Primo.

The researchers also reviewed usability studies on the EBSCO Discovery Service by Fagan et al. (2012) and Sarah Williams and Anita Foster (2011), as well as studies on World Cat Local by Sue Fahey, Shannon Gordon, and Crystal Rose (2011), Jennifer Ward, Steve Shadle, and Pam Mofield (2008), and Bob Thomas and Stefanie Buck (2010). These articles provide additional information on the design of usability tests and track trends in user behavior with discovery tools. While not the only usability studies on discovery tools, the authors found these studies to be the most useful for gauging the state of resource discovery tool usability in academic libraries. These studies focused on user interactions with discovery tools and tracked trends in user successes, failures, frustrations, and ability to adapt. These studies recommended solutions, through customizations or alternative avenues, to some of the problems that were uncovered by these studies. The authors also reviewed sources including Usability.gov and Jakob Nielsen's writing (2000), to support the development of this usability study's methods.

The researchers of the present study were interested in how other usability tests of Primo were designed and conducted. Sadeh (2008) at the University of Minnesota conducted two usability tests of Primo, which was a Primo development partner at the time of testing. Sadeh's studies did not test the Primo Central Index in conjunction with the Primo interface because it was not available at that time. The first study tested an alpha version of Primo, and the second study tested a beta version. Both of Sadeh's usability studies used a task-based test on student and faculty test subjects. For both Sadeh's studies, subjects found the interface friendly, easy to learn, and reported that faceted browsing was useful for narrowing long result lists. The researchers found usability problems with terminology, icon design, the need for additional links, and the display of services. These problems were reportedly rectified by Ex Libris.

Comeaux (2012) at Tulane University included eleven undergraduates, four graduate students, and five faculty members from a variety of majors and disciplines in his usability study. Subjects were asked to perform a series of five tasks designed to test key features of the discovery tool such as facets, accessibility of full text, and requesting items. A post-test questionnaire gathered subjects' ratings of Primo's usability and effectiveness in searching, information retrieval, and interpretation. Comeaux recorded the test sessions with Silverback screen recording software (<http://silverbackapp.com/>), but it is unclear how extensively he used the recordings to analyze and compare participant performance. Comeaux's participants found location labels confusing, had difficulty making interlibrary loan requests, and were confused by hold and recall features. However, Comeaux states that users have had the problems with their traditional catalog and database interfaces. Comeaux found the aggregation of resource types into a single results list was a point of confusion for undergraduate and faculty test subjects. Undergraduate subjects in particular were slow to use the facets with would have aided in

narrowing search results lists. Despite these problems, subjects rated Primo favorably in the exit questionnaire for perceived usability and quality of search results.

At Flinders University in Australia, Jarrett (2012) employed a controlled usability test and an online survey of Primo that was open to all Flinders users. The usability test consisted of sixteen tasks with six undergraduates participating in three rounds of testing. Jarrett also recorded test subjects using screen recording software and carefully reviewed the recordings for detailed analysis. Jarrett's subjects mostly had positive experiences with Primo in terms of ease of use, effectiveness, and search result relevancy. As usability tasks progressed and became more complex, subjects made greater use of the refinement facets. Some problems uncovered by the usability study include participants having difficulty interpreting records and confusion with choosing "Journals" material type with searching for articles.

Majors (2012) conducted a usability study on several resource discovery tools at the University of Colorado Libraries. Primo, EBSCO Discovery Service, Encore Synergy, Summon, and WorldCat Local were tested by undergraduates with a controlled task-based usability test. Majors compared the various products and hoped to discover which, if any, stood out from the others. Majors used 5-6 undergraduate students as test subjects for each resource discovery tool and used screen recording and analysis software to record screen activity, facial expressions, and voice.

Interestingly, Comeaux, Jarrett, and Majors gave strikingly similar recommendations. Each author thought that Primo usability could improve through a combination of customizations to remedy problems with interpreting records and make the interface more intuitive, as well as incorporating Primo training into the library instruction program.

Some interesting studies have taken place with other resource discovery tools, notably EBSCO Discovery Service and WorldCat Local. Fagan et al. (2012) conducted a usability study of EBSCO Discovery Service (EDS) at James Madison University (JMU). Fagan et al. reported that subjects were generally able to navigate the EDS interface, complete tasks successfully, and made use of facets to refine searches. Participants had difficulty selecting appropriate limiters and distinguishing source types. The usability team at JMU recommended future research for instructing users how to work with large numbers of results and research to determine the ideal design to make limiters and source types intuitive to users. While the researchers made some interface-specific discoveries that led to interface customizations (by both JMU and EBSCO), they believe that librarians need to focus on how resource discovery tools will be presented to users in library instruction and services.

Williams and Foster (2011) ran a task-based usability study of the EBSCO Discovery Service with six undergraduate test subjects at Illinois State University. Williams and Foster found that subjects made frequent and effective use of research limiters and facets for refining search results. Some search limiters labels such as “peer-reviewed” were intuitive to users while some of the more ambiguous labels such as “location” confused test subjects. Special functions such as “bookmarking” and “Additional Results” were overlooked by subjects. In a post-test survey most subjects indicated that they liked the search interface, found relevant results easy to find, and would recommend EDS to a friend.

Sue Fahey, Shannon Gordon, and Crystal Rose (2011) described two usability studies of WorldCat Local where test subjects had difficulty interpreting holdings information, locating call numbers and locations, and distinguishing between books and other item types such as periodicals and journal articles. Jennifer Ward, Steve Shadle, and Pam Mofield (2008) ran a task-

based usability test of WCL at the University of Washington. They found that test subjects were able to complete the tasks but that the detailed item records made it difficult to distinguish between various formats and editions. Thomas and Buck (2010) found serious usability issues with WCL at Western Washington University. The task-based usability study revealed that the blend of multiple formats in a single result list confused test subjects and that subjects had difficulty with known-item searches.

Methodology

Through a diagnostic usability evaluation, the researchers hoped to gauge Primo's usability for users who had little to no exposure to the product; investigate whether users might use the many facets and limiters available in Primo; discover patterns in user search behavior; and draw connections regarding how that behavior is compatible with Primo's design. These discoveries could then be used as the foundation for future research that would enable the Libraries to make informed changes to the highly customizable Primo search interface. A diagnostic evaluation is a user-based evaluation of a working system, such as a Web site or resource discovery layer, where the principal objective is to identify usability issues. This type of evaluation helps researchers identify major usability problems, understand why users might have difficulties with the system, and measure user attitudes towards the system (Usabilitynet.org, 2006).

The usability study was conducted with nine test subjects from representative backgrounds within the university community. The number of subjects slightly exceeded the six to-eight test subjects prescribed by Usability.gov and the five test subjects recommended by Nielsen (2000). Both Usability.gov and Nielsen found that testing a field of subjects within these recommend ranges is sufficient to uncover the major problems in a product and that differences

between subjects diminishes when there are more than five subjects. Three of the subjects in this usability study were juniors, three were seniors, one was a post-baccalaureate student, one was a post-doctoral fellow, and there was one faculty member. Six of the subjects were female and three were male. Four of the participants were from the College of Arts and Sciences, one from Continuing Education, one from the College of Engineering and Mathematical Sciences, one from the College of Agriculture and Life Sciences, one from the School of Environment and Natural Resources, and one from the College of Nursing and Health Sciences. Seven of the participants indicated that they were comfortable using online library resources, and two participants indicated that they were not comfortable using online resources. The identity of all test subjects was kept anonymous to promote a low-pressure test experience for the subjects and to comply with Institutional Review Board (IRB) standards. The study protocol and final test instrument were reviewed and granted exempt status by the IRB.

Participants were recruited in front of the central research library, medical library, and campus center in the fall semester of 2012. The researchers set up a sign on an easel that advertised a \$25 gift card in exchange for participation in the study. The researchers felt that monetary incentive was necessary to recruit subjects because a time commitment was involved; some tests took up to 45 minutes to complete. Researchers stood by the sign and asked students and faculty members if they would participate in the study as they walked by. Participants scheduled a test-taking time and date with the researchers upon initial recruitment.

The test was administered by a team of three: a facilitator, a note-taker, and the principal investigator (PI), and was conducted in either a classroom or conference room to maintain privacy and confidentiality, and to help subjects focus on the test. The test was conducted on a MacBook Pro laptop using Silverback screen capture software.

The researchers thought that Silverback was the best option for recording subject activity because of its ability to record faces, screen activity, and voice simultaneously and for the relatively low cost of licensing the product. . Researchers also felt that with a high Mac user population at the university and very similar Web browsing experience, a Mac would not significantly skew subject performance.

The usability test consisted of six primary tasks and several entry and exit questions. The task scenarios were developed to answer the research questions described in the Research Questions section of this article; the entry questions were designed to gather participant demographic data; and the exit questions were designed to gauge participant attitudes towards their experience with Primo. The researchers created realistic task scenarios, as recommended by Jeffrey Rubin (2008, 8.8.1), that were modeled after common questions encountered by users at the reference desk. The tasks progressed from several known-item search questions to a research-level question. The test was designed to proceed from easier to more difficult questions to give subjects an opportunity to become familiar with the interface before encountering the more difficult research-level task. The researchers also wanted to discover whether users would be able to learn how to use the Primo search interface and Primo functions through trial and error. The usability study was designed, as recommended by Dumas and Redish (1993), to test the research questions several times throughout the usability test in order to test this.

After the tests had been administered, one of the researchers created a mash-up video, using iMovie, organized by usability task to compare subject performance side-by-side. The mash-up video enabled researchers to easily gather, review, and analyze data. An analysis team of three reviewed the recordings (two members who administered the usability tests and a third who did not participate in the administration of the usability tests). Using the scoring sheet

(Appendix B) each reviewer scored participants on criteria that included time to complete task, completion of task, and confusion or frustration. Researchers also analyzed screen activity, subjects' verbal comments and expressions, and visual expressions from subjects' facial recordings to judge their performance and experience using Primo. The analysis team discussed the performance of each participant before scoring. Notes from the test were used to supplement the recordings and inform the scoring sheet.

Results

Research Questions 1 and 2

The first major question was whether users would be able to find relevant and appropriate content using Primo. Of all the research questions, this one was the broadest and the most simple: Will users be able to find the information they need using Primo? The second research question was closely related to the first. It asked whether users will be able to interpret the results lists and records they retrieve from a Primo search. Throughout the usability test participants were required to identify and interpret their search results in order to indicate whether or not they found the information they were asked to retrieve. In some cases the researchers had to simultaneously determine whether participants were able to find and identify the information they sought. The authors present the results of these two research questions together due to this close relationship.

Several of the test questions served to provide us with information supporting answers to Research Question 1 and Research Question 2. When participants were given tasks where the records they were required to find were displayed at the top of the results list and the information they were required to interpret was displayed prominently in the brief record, most participants

could easily find and identify that information. For example, the first task, a known-item search for a book, primarily addressed Research Question 1; six of the nine participants were able to complete the task easily (See Figure 1). The three remaining participants did not complete the task. One of these participants spelled the author's name wrong and researchers noted that Primo did not offer to correct the spelling in this case. The other two participants who did not complete the task had trouble interpreting their search results correctly. Although their search results displayed the correct item record, they both chose the wrong title for their answers.

[Insert Figure 1]

Participants became increasingly successful finding and interpreting records with known-item searches as the test progressed when the records appeared at the top of the results list and the information was prominently displayed in the brief record. Participants were asked to find a specific online journal article, and they were given the exact title and author. Eight of the nine subjects succeeded in finding and identifying the record for the article in Primo (See Figure 1).

Test subjects were also asked to find an image that researchers knew was part of a specialized digital collection within the libraries. Participants chose a variety of approaches to finding the requested image, and all were eventually successful—seven succeeded easily, and two with more difficulty (See Figure 1).

In one task the participants were asked to find any performance of Shakespeare's *Hamlet*. There are numerous performances of this play on both videotape and DVD in the libraries. Seven participants were able to find a recording owned by the libraries quite easily. One participant was successful, but only after substantial difficulty. One participant failed to find a performance of *Hamlet* (See Figure 1). When asked where the performance of *Hamlet* could be found, all eight

participants who were able to complete the known-item media search were also able to answer the media location question easily (See Figure 1).

Participants had difficulty retrieving and interpreting records when they needed to sort through results lists to find relevant records and when they had to use tabs within the brief record to find information. For example, participants were asked if the library has online access to current issues of the journal *Nature*, and another task asked them to tell us how much of the journal can be accessed online. The authors chose *Nature* in part because it is a widely cited journal, and in part because its title is not a unique word, and would likely call up large results lists, unless participants performed a highly limited search. This task proved difficult. Of the nine participants, only two completed the known-item journal task with ease, two completed it with difficulty, and five could not complete it (see Figure 1). It seems safe to say that over half the participants could not find relevant content using the Primo interface (Research Question 1), nor could they readily interpret results lists and records (Research Question 2.) In fact, if the participant failed to use limiters and/or facets, the results lists were rather overwhelming to them.

A follow up question for those who succeeded in finding a book record was specifically aimed at addressing Research Question 2. The follow up task asked participants to then find the call number for the book. All participants succeeded with this task relatively easily, because the call number could be seen in the brief record in the results list (see Figure 1). By contrast, the follow up question about how many copies of the book the library owns, and if any copies were checked out, was met with difficulty by participants. To access the information participants had to open a tab labeled “Locations” within the brief record. Only three participants found this information easily, one with difficulty, and four participants could not find the information (see Figure 1). Half of the test subjects expressed frustration trying to complete the task (see Figure

2). The same problem was observed in the media availability task when only four of eight participants were able to determine whether the copy of *Hamlet* they found was checked out (see Figure 1).

[Insert Figure 2]

To replicate a typical research assignment participants were asked to find three full-text, peer-reviewed articles published within the last two years that addressed the topics of agricultural practices and dairy policy. This proved to be a challenging exercise for the participants. Ultimately, three participants completed the task easily, three with difficulty, and three did not complete the task (see Figure 1). Those who finished the task easily started out with the simplest searches combined with astute use of refinement facets or search limiters. Those who created the most complex searches seemed to have the most trouble completing the task. Of those who did not complete the task, one participant formed two poor search strategies before giving up, another participant could not interpret or sort through her results list, and the last participant searched for articles in the Libraries search scope, which does not yield journal articles in search results.

Participants were often misled by the brief records displayed after a search, in some cases they believed that each record in the list represented a single copy held by the Libraries and therefore ignored fuller information found in the hyperlinked tabs located below each brief record. The researchers believe the information provided in these tabs is not easily accessible, although some participants learned how the tabs functioned as they gained experience using Primo. The researchers also observed that participants struggled with the long results lists unless they made effective use of the search limiters and refinement facets.

Research Question 3

The third research question addressed was whether users would discover and use the search limiters and facet refinement features of Primo. One problem identified in prior usability studies was difficulty sorting through long results lists. For example, Comeaux (2013) observed that the long results list, with an intermixture of resource types, was confusing for new users. Refinement features and limiters are designed to help users cope with this large quantity of information. If users can easily identify and use refinement features, the large results lists may be more manageable.

Several test questions gave participants an opportunity to use search limiters or facets. When participants were asked to find a known-item book, most participants finished this task with ease; however, only one participant out of nine used a facet and no participants used limiters (see Figure 3). In this case, use of facets and limiters was not necessary as the correct record displayed at the top of the results list. Similarly, when participants were asked to find a journal article with Primo, eight of the nine participants completed this task easily and did not use the search limiters or facets (see Figure 3). The article came up at the top of the results list and was easy to find.

[Insert Figure 3]

The journal location task challenged participants to find the online version of the journal *Nature*. *Nature* was chosen by the usability team because it is a term with multiple meanings that produces a variety of results, and might prompt participants to use either search limiters or refinement facets. Only two participants made use of the facets (see Figure 3). Participants generally had trouble reading and interpreting the brief record and tended to look at only the first few results on the list. Use of the facets would have helped participants narrow their results list

down significantly, but at this stage of the usability most participants seemed to either miss or ignore them.

As the usability test progressed, participants began using the limiters and facets with greater frequency. The media task required participants to find a performance of *Hamlet*. Three subjects used refinement facets and two used limiters (see Figure 3). The digital collection image task asked participants to find an image through Primo. Eight of the nine participants used either limiters (4) or facets (4) to complete the task.

The authors thought the research question task would give participants a good opportunity to use limiters or facets because the question requires participants to find articles on a specific topic, within a narrow date range, and in full-text electronic format. All of the participants made use of the facets and limiters to complete the task. Of the nine participants, six used the facets and three used limiters (see Figure 3). Subjects who used the refinement facets and simple search terms completed the task faster and with greater ease than those who formed complex searches and used the search limiters. All of the participants who finished the task with difficulty struggled because they limited the Resource Type to “journals” rather than “articles,” which did not produce the results they expected.

These observations suggest that with time and practice, users should be able to discover and use the search limiters and refinement facets in Primo on their own. Jarrett (2013) made similar observations, noting that use of the facets increased as the usability sessions progressed. The journal location task indicated users might become frustrated by the vast results lists if they do not apply limiters or facets. Users may also become confused by the labels used for search limiters and refinement facets, as evidenced by research question task.

Research Question 4

The fourth research question was whether users will be able to find and use functions in Primo such as e-mailing a citation, the e-Shelf, or a button in the brief record to open a journal article in a new window. These functions are designed to help users organize their research, view online sources, and share their search results and lists. A trend found from the literature review was that users have difficulty finding and using these Primo functions. For example, Majors (2012) found users had difficulty finding the e-mail function within Primo, and Comeaux (2013) found users had difficulty connecting to library services, such as Interlibrary Loan, through Primo. For this study, three usability tasks were developed to give participants an opportunity to find and use Primo functions.

Participants were asked to use the Primo e-mail function to e-mail a book citation. This question was designed to determine the degree of difficulty participants had finding and using this function. Of the eight subjects participating in this task, two completed it easily, three completed it with difficulty, and three did not complete the task (see Figure 1). Six of the eight participants expressed frustration while performing the task and two asked for clarification (see Figure 2). Most of the participants seemed surprised that Primo has an e-mail function. Participants who did not complete the task could not find the “Send to” menu and those who completed it with difficulty struggled to find it. Six of the eight participants noted that they found the text messaging function called “Text it!” as they searched for the e-mail function. Subject 5, who had a hard time finding the e-mail function, suggested that it should be located in a list of links near the “Text it!” function. After some searching Subject 9, Subject 6, and Subject 5 all mentioned that they would simply copy and paste the record into their personal e-mails.

Participants were asked to add the article they found in the article location task to Primo's e-Shelf function. The e-Shelf allows users to save lists of records and search queries for ongoing and future research. The purpose of this task was to test how challenging finding and using a tool such as e-Shelf would be for participants. One participant did not complete the article location task and therefore did not participate in this follow up task. Of the eight participants, five did not complete the task, one completed it with difficulty, and only two completed the task easily (see Figure 1). Seven of the eight participants expressed frustration during the task (see Figure 2).

Most of the participants did not know what the e-Shelf is or what it does. Subject 1 commented, "I don't know what an e-Shelf is but I will try." Even Subject 2 and Subject 6, both of whom completed the task with ease, commented that they did not know what the e-Shelf was or did. Both of these subjects seemed to find the e-Shelf instinctively in the "Send to" menu. Given the relative speed with which they completed this, using the e-Shelf might have been learned from the e-mail citation task. None of the participants used the star icons, which are located in the brief record, to add the article to the e-Shelf. Five of the participants went into the EBSCO record for the article in an attempt to find the e-Shelf. Two participants tried to add the article from the e-Shelf link from the top of the results page but couldn't figure out how to work it. Subject 4 said, "This is frustrating. I mean I'm there but I'm not."

Participants were asked to open the article record they found in the article location task in a new window. A button located on the "Preview" tab for the brief record of an article would open an expanded record of the journal article in a new window. Researchers sought to gauge how difficult subjects would find this task. Researchers were also interested in which avenues participants would select to complete the task as there are options within Primo as well as options that are not Primo specific.

Most participants used functions outside of the Primo interface to open the article record in a new window. Three participants opened the record within the EBSCO interface, two participants clicked on the title in the brief record, and one participant used the right-click mouse-menu shortcut, which is not a Primo tool. Only one participant used the icon located in the "Preview" tab in Primo to open the article in a new window.

The difficulty participants had finding the e-mail and e-Shelf tools, as well as the difficulties they had using a Primo icon to open an article record in a new window, demonstrates that certain Primo functions are buried deep within the interface. Throughout the usability test, other useful functions such as the "Sort-by" drop-down filter were not used by participants, which lead the authors to believe some functions are buried. These hidden functions frustrate users and inhibit their ability to take full advantage of Primo's functionalities.

Research Question 5

The fifth research question investigated whether participants would discover and use appropriate search scopes while they worked through the usability tasks. The researchers recorded participant use of the search scopes throughout the usability test. A majority of participants started with the default search scope, "Primo," which was the broadest possible scope of the tool. However, most participants seemed to understand what the other scopes were and used them appropriately. Eight of the nine participants limited to the narrower scopes such as Libraries or Library Catalog, and grew more comfortable with changing scopes as they progressed through the tasks of the usability test.

Discussion

The usability study revealed several problems users experienced while searching Primo. Participants often felt confused and frustrated when searching for Primo functions and had difficulty interpreting search results when they were required to sort through long results lists. While some participants explored the various information-rich tabs in the brief records, others had difficulty finding information in the tabs. Users would benefit from basic instruction in this area. The usability results also demonstrate that some labels, such as the search limiter labeled “Journals,” confused participants. These problems highlight importance of design and functionality for discovery tools.

The usability study also revealed that with some exposure users will adapt to Primo and will make use of the limiters and facets and choose appropriate search scopes. The researchers observed that participants learned how to effectively use the tools available in Primo as they worked through each task. As the tasks progressed, participants applied search scopes and utilized refinement facets and search limiters.

The researchers found that participants who created very simple searches and narrowed their search results with facets or used simple limiters in advanced search finished tasks quickly and easily. Participants who conducted more complex and highly limited searches ran into problems by misusing limiters or using irrelevant facets.

Participant Behavior

A number of participants appeared to suffer from what might be called the “First Result Syndrome.” This occurs when participants expect the first result in a list to yield the most relevant and accurate result and do not look beyond that result. This phenomenon was most profound in digital collection image location task, when participants continually clicked on an

empty collection-level record and did not venture to records further down the list to find an image in the record. Majors made a similar observation, noting that if promising information was not retrieved within the first page of results participants would typically try a new search strategy (Majors 2012, 191). Users need to be taught to look beyond the first few results in a list and to use functions such as the refinement facets to sort through results before giving up or restarting a search.

When some participants were unable to easily perform a task, they often would click all over the screen searching for the answer, as demonstrated with high volume of mouse clicks when asked to find Primo functions, such as e-Shelf and e-mail. The authors wonder if participants were overwhelmed by the amount of information on the screen, but the evidence for this is inconclusive.

The researchers could not find a significant correlation between participant performance in the usability study and their self-reported comfort level with online library resources. Every participant struggled with at least one task in the usability test. In the entrance interview researchers asked participants to rate their comfort using online library resources with one indicating “not comfortable” and five indicating “very comfortable.” Of the two participants who rated the comfort level as low, both indicated a comfort level of two, one struggled through the tasks, and the other completed most of the tasks easily. Test results were also mixed for the two participants who rated themselves as feeling moderately comfortable with online library resources (a three on the scale); one performed well but the other struggled through the test. Of the four participants who rated themselves as being more comfortable (a four on the scale) three performed well and one struggled with all but one task. The phenomenon of inaccurate self-reporting has been observed by usability experts such as Nielsen (2001) who advocates

observing and assessing participant performance rather than taking self-reports at face value. Similarly, Jensen, Potts, and Jensen (2005) observed that participants self-reported a much higher degree of knowledge of privacy technology and vulnerabilities than testing revealed them to have.

Participant Attitudes

Participants displayed conflicting attitudes toward Primo—sometimes user behavior did not match their attitudes about Primo. In the exit interview, one participant stated that there were too many options in Primo and that the interface was confusing. However, this subject completed the more complicated tasks with ease, effectively using facets and limiters to conduct the searches. Some users felt overwhelmed by all the options, while a majority of participants learned to use the tool more effectively and efficiently as the test progressed. The researchers see this attitude as evidence that the combination of a long results list, extensive facets list, multiple tabs, search scope options, and electronic functions, presented all on one page can intimidate users. However, users can overcome their initial bewilderment and effectively conduct productive searching.

Five of the participants described the tool as “straightforward” but most were frustrated when they tried to open a new window or locate functions such as e-Shelf or e-mail. When asked how they would describe Primo to a friend, most participants responded that it was very much like a search engine. The mixed attitudes subjects had towards Primo indicates that there are aspects of Primo that, with some practice, users can figure out on their own. Most participants were able to apply basic skills such as entering search terms into the search box, selecting an appropriate search scope, and narrowing a search with facets with no instruction. Primo also

presented sources of frustration that participants could not resolve on their own. The location of electronic tools such as e-Shelf, confusing labels, and interpretation of item records proved to be frustrating for participants. Researchers believe that this reflects Sadeh's (2008) assertion that users' experience with familiar interfaces such as Google Scholar, Google, and Amazon creates an expectation of what the search experience should be like.

Technical Challenges

Two technical issues affected this study: inconsistent results due to Primo's relevancy ranking, and incorrect metadata ingested into Primo that created false results. The first issue was best exemplified in the media location task performed by Subject 3. The participant attempted to execute a highly limited advanced search that researchers believe should have yielded satisfactory results. However, the participant was not able to retrieve relevant resources. Researchers attempted to recreate the search scenario twice, once retrieving the same results as Subject 3, and another time retrieving the expected search results with local holdings. This inconsistency in results demonstrates a potential point of frustration for users, and a variable that could possibly skew research results. Understanding Primo's indexing and relevancy ranking is necessary to comprehend and interpret results.

The second issue was that collection level records from an in-house digital library were not displaying correctly through Primo, and this affected the results for the image location task. The collection-level records were pointing to item level displays, and when subjects searched for "Hiking the Long Trail," the first result was the collection of "Long Trail Photographs." This record led participants to an empty item-level record (which lack images), and confused participants. The display of collection level records has been corrected since the conclusion of

the usability study. Researchers believe that if collection level records had displayed properly, users would have easily found the images in the first record in the search result. The researchers have made a decision to thoroughly review how the tool displays and interprets the data whenever a local collection of metadata is ingested into Primo.

Future Research

The findings of this study point to several problems that require further research. Additional investigation could inform effective customizations that would make searching Primo and interpreting records more intuitive. Additional research will also help determine how to integrate Primo into reference instruction services and how to present Primo to users in a variety of research situations.

During the exit interview, Subject 2 commented that all students should be required to take an introductory Primo session during their freshman year. This presents an interesting question on how discovery tools should be integrated into the library's instructional program. Careful consideration should be made regarding the most effective uses of the discovery tool and how to best reach out to users. Based on this usability study, researchers concluded that users will need instruction on how to interpret search results and how to effectively use limiters, facets, search scopes, and Primo functions. The researchers recommend studying how to effectively provide instruction on Primo searching and results interpretation in formal classroom environments, online mediums, and in reference situations.

Instruction and education will increase the rates of success in using Primo, but many users will not get that instruction. Customizations are necessary to make the Primo interface more intuitive, results lists easier to interpret, and Primo functions easier to locate and use. A

follow-up usability study is recommended to help make informed and effective changes to these areas.

- The tasks asking participants to find an online journal demonstrated that subjects had difficulty finding and interpreting information from the brief record. A usability test that focuses on how information is presented in the brief record will be helpful in determining how to make these records easier for users to interpret.
- Limiters in the Advanced Search interface confused test subjects in the research question task. A usability study that focuses on the labels given to these limiters should be conducted. Which limiter labels confuse or mislead users? Are there alternative labels users might find more intuitive?
- Hidden Primo functions such as the e-Shelf and e-mail were very difficult for participants to find. A usability study that is aimed at making these and other Primo functions more visible is necessary. Is there a better location for these functions? Will changing the labels associated with these functions make them easier to find?
- Participants indicated that they did not understand the function of the e-Shelf. A usability test on message options, such as rollover textboxes, that explained the function of the e-Shelf, would be helpful in determining how to best describe this function.
- The “Location” tab label in the brief record was not intuitive to participants. A usability test to determine a more intuitive label for this tab is recommended.

Will users find a different label easier to interpret than the current “Locations” label? Is the order in which the tab is presented a factor in its usability?

- The media availability and book availability tasks demonstrated that participants had difficulty determining whether an item was checked out or available. The “Available at” notes in the brief record mislead several participants. A usability test is recommended to determine an alternative label.
- When asked to find a known media item, Subject 3 conducted a search that should have yielded satisfactory results but did not. The researchers tested the same search a number of times and came up with different results; some satisfactory, some unsatisfactory. A large-scale test should be conducted to determine how common this problem is. Is this a problem that can be resolved by tweaking relevancy rankings locally? Or is this a bigger problem that Ex Libris needs to resolve?

Conclusion

The researchers who conducted this usability study believe that users will be able to discover resources with Primo and will gain confidence using it over time. While some functions are hidden and difficult to navigate, this did not prevent most participants from accomplishing most tasks and finding resources. This study and the other studies discussed in the literature review demonstrate that users will encounter some difficulties while they adjust to the new search interface and learn to deal with long results lists. Enhancements to the interface and instruction are necessary to ensure that users take advantage of Primo functionalities and can

interpret records and results lists more easily. Overall, Primo is a robust and complex tool for resource discovery, and like all tools, it will be the responsibility of library personnel to understand, use, and teach it.

As discovery tools evolve and become more widely adopted in academic libraries, institutions that choose to adopt them should continue to conduct studies to uncover flaws in usability and share their findings with vendors and the academic library community. Together vendors and librarians can use research findings to make improvements to discovery tools. Equally as important, academic libraries should study how to promote the use of discovery tools, investigate the strengths and weaknesses of discovery tools in various research situations, and research best practices for teaching users of all levels how to use these tools.

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APPENDICES

Appendix A: Usability Test

Student status: Fr Soph Jr Sr Other

Library student worker OR new user

What is your major?

Thank you for your willingness to participate in the design-improvement process of the new library discovery tool. We appreciate your time. This session should take about 30 minutes. Since this is part of our design phase, there are no right or wrong answers--we are solely interested in learning about your choices in how you approach searching, navigating and finding information.

We have a \$25 gift card that will be given to you upon completion of the usability session.

PRELIMINARY QUESTIONS

Please rate your degree of comfort using the libraries' online resources, with 5 being extremely comfortable, and 1 being not at all comfortable:

1 2 3 4 5

Based on description found on the basic search screen, what do you think Primo is?

TASK 1 - Known Item Book Search

1A. Does the library have the book, *A brief history of time: from the big bang to black holes* by Stephen Hawking? Y___ N___

1B1. Can you find the call number of this book? Y___N___
If so, what is the call number?

1B2. How many copies are owned by the library? Are any checked out?

1C. How might you e-mail the citation for this book to yourself?

TASK 2 – Journal Title Search

2A. Does the library have online access to the current issues of the journal *Nature*?

2B. If so, how much of the journal can be accessed online by the library?

TASK 3 – Article Search

3A. Can you find the article *How to get our democracy back* by Lawrence Lessig?

3B. If so, can you add the article to your e-Shelf?

3C. Can you open the article in a new window?

TASK 4 – Media Search

For your theatre class, you need to watch a (any) performance of *Hamlet*.

4A. Does the library have a copy?

4B. Where is it/are they?

4C. Are any checked out?

TASK 5 – Image Search

5. Can you find an image of hiking the Long Trail?

TASK 6 – Research Question: Topical Search for Peer-reviewed Articles

6. You have a research paper on the topic of agricultural practices and dairy policy. Please find three full-text peer-reviewed articles published within the last two years.

Exit Questions/User Impressions

What is your overall impression of Primo?

What did you like best about Primo?

What did you like least about the Primo?

If you were to describe Primo to a colleague in a sentence or two, what would you say?

Do you have any other final comments or questions?

Appendix B: Scoring Sheet

Subject # _____ Scorer Initials _____ Task _____

# of mouse clicks				
Did the subject express any confusion or frustration?	Verbal		Non-Verbal	
	YES	NO	YES	NO
Did the subject need clarification of the task?	YES		NO	
Did the subject use:	Basic Search		Advanced Search	
Did the subject refine with either:	Side Facets		Top Level Facets	
Time to complete the task				

Task completed?	Completed easily	Completed with Difficulty/Needed Help	Not completed
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Notes: