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## ARTICLES

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# Promise Fulfilled? An EBSCO Discovery Service Usability Study

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*Discovery tools are the next phase of library search systems. Illinois State University's Milner Library implemented EBSCO Discovery Service in August 2010. The authors conducted usability studies on the system in the fall of 2010. The aims of the study were twofold: first, to determine how Milner users set about using the system in order to better inform customization choices, which in turn would create better search experiences, and second, to find out whether discovery tools fix the problems of federated search. With federated search technology, users often felt frustrated by the search experience. Some reasons for the frustration included a desire for better ways to determine the relevancy of search results and for more information about the material included in the records. The authors determined that while many federated search problems were solved, some issues persisted. Overall, the move to EBSCO Discovery Service at Milner Library has been a positive experience for its users.*

**KEYWORDS** *resource discovery tools, usability study, user experience, database searching, discovery layers, information seeking behaviors, academic libraries*

The majority of Web-scale discovery tools search a single index of metadata from article databases, library catalogs, local digital collections, and more. These tools, henceforth shortened to “discovery tools” and “discovery,” are frequently described as the next generation of federated search engines. Greg

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Notess wrote, "Discovery is the new metasearch (at least for libraries) that aims to replace federated searching with something faster and more comprehensive, which promises a better overall experience for users" (2011, 45). Jeff Wisniewski (2010), a strong advocate for federated search, has started promoting discovery tools as another step toward a true, single search box for libraries. Perhaps discovery tools will fulfill the promise of a single search box, since federated search engines have met this expectation with mixed success.

Recognizing the potential of discovery tools, Illinois State University's Milner Library decided to upgrade to discovery instead of relying solely on federated search. In August 2010, Milner Library implemented EBSCO Discovery Service and EBSCOhost Integrated Search (EBSCOhost's federated search product) and promoted the system as a new and improved "Search It," which had been the local name of Milner Library's previous federated search system.

The authors were eager to gather user feedback on this new technology and designed this study with two purposes in mind. First, the authors wanted to determine *how easy Search It was for students to use*, with *particular focus on what additional enhancements or customizations could improve the user experience*. Second, the authors wanted to compare the results of this study to findings from federated search usability tests to determine if the new system overcame issues identified in federated search studies.

## LITERATURE REVIEW

The discovery tool literature is limited, since the products are fairly new. Most articles are short news items announcing a new product, feature, partnership, or customer. Some describe discovery tools (Vaughan 2011) or compare various discovery tool products (Rowe 2010; Yang and Wagner 2010).

Results from discovery tool usability studies are beginning to be available as well. At Internet Librarian 2010, Lyle Ford presented the results of Summon (<http://www.serialssolutions.com/summon/>) usability testing at the University of Manitoba Libraries. His study revealed students expected to be able to search for books and articles simultaneously, and most students did not notice Summon's limiters unless prompted. Martin Philip's (2010) master's thesis, which discussed whether students want a one-stop shop for research, included a usability study of Summon. The study's main conclusions were that students thought Summon was an excellent tool that could be a benchmark for a one-stop shop, although instruction would still be helpful.

Since the EBSCO Discovery Service interface is based on the established EBSCOhost interface, articles describing EBSCOhost usability studies (Fagan 2006; Oulanov 2008) and EBSCOhost interface design (Gorrell 2008) are

also pertinent. Michael Gorrell (2008) described how EBSCO gathered input from users, considered the designs and features of popular Web sites, and implemented new technologies to create the simple but robust EBSCOhost interface. He specifically mentioned the addition of a dynamic date slider, article preview hovers, and expandable features for various facets, such as subject and publication.

Numerous federated search usability studies have been published. Emily Alling and Rachael Naismith (2007) compiled the common findings from the earliest studies. The following review provides an updated compilation of findings, especially as they relate to this study.

Users expected to be able to distinguish between types of information (e.g., book, scholarly article, newspaper article) in the results, but some result displays did not provide sufficient or clear information (Alling and Naismith 2007; Ponsford and vanDuinkerken 2007). For example, a student in Laura Wrubel and Kari Schmidt's 2007 study said, "I would have to search through every single one of these to find which one is a scholarly article and which one is just a newspaper article" (302).

Users wanted ample information, especially abstracts, in the results to help determine relevancy, but that information was not always easily available (Randall 2006; Wrubel and Schmidt 2007). Seikyung Jung et al. reported, "There also were comments about knowing enough about the returned results to judge relevancy; this argues for longer descriptive summaries or abstracts" (2008, 384). Users expected relevant results and wanted them ranked by relevancy, but many systems did not provide relevancy ranking by default (Cervone 2005; Randall 2006; Tallent 2004). Wrubel and Schmidt noted, "While students usually realized that Research Port was sorting results by date, they expressed the desire to have relevance ranking" (2007, 302).

Users were often frustrated by the steps required before searching (Cervone 2005; Randall 2006; Tallent 2004). Alling and Naismith reported, "One subject in particular consistently forgot to choose a collection before clicking the search button, finally complaining, 'This is not helping me!'" (2007, 203). While many users had little interest in advanced searching techniques or search refinements (Tallent 2004), some users, especially faculty and graduate students, wanted advanced search options and more limiters (Alling and Naismith 2007; Ochoa et al. 2007). In Bennett Ponsford and Wyoma vanDuinkerken's study, limiter suggestions included "the ability to limit by format (books, articles, etc.), by publication year, and to scholarly articles" (2007, 176–177).

Users relied heavily on the browser back button, which sometimes caused problems (Alling and Naismith 2007; Wrubel and Schmidt 2007). Carol George reported most participants "relied on the browser Back button for navigation. Because the browser Back apparently was intentionally disabled in this software, participants had considerable difficulty navigating the search results occasionally leading to failure" (2008, 16). Also, users were

frequently frustrated by the slow response time (Jung et al. 2008). Alling and Naismith noted, "All of the subjects commented on the slow response time of the system" (2007, 204).

Users needed or requested instruction to effectively use federated search engines (Ochoa et al. 2007). In focus groups, Sarah Williams, Angela Bonnell, and Bruce Stoffel discovered "the lack of instruction or documentation was another cause of dissatisfaction" (2009, 135). Users were also not always certain what they were searching (Jung et al. 2008). Of the eighteen participants in Wrubel and Schmidt's study, only twelve (67 percent) perceived that Quick Search searched multiple databases simultaneously (2007, 297).

A sense of discovery or broadening horizons was often mentioned by users as a benefit of federated search engines (Jung et al. 2008; Ponsford and vanDuinkerken 2007; Tallent 2004). In a focus group study, Williams et al. noted, "When the participants were asked what they like about Search It, the most common response was that Search It broadened their horizons" (2009, 135).

## METHODOLOGY

The goals of this study were to determine how easy Search It (Milner Library's implementation of EBSCO Discovery Service and EBSCOhost Integrated Search) is for students to use and to compare the results to the findings in published federated search usability tests. **Informal usability testing was selected as the most effective method to meet those goals.** The book *Rocket Surgery Made Easy* (Krug 2010) and the article "Planning and Implementing a Federated Search System" (Avery, Ward, and Hinchliffe 2007) were both helpful guides for developing and conducting informal usability testing.

Susan Avery, David Ward, and Lisa Hinchliffe (2007) suggested three categories of questions to consider: **pre-test, task-oriented, and post-test.** Usability testing focuses on task-oriented questions that test the actual system interface. Based on their public service experience, the authors created five research scenarios (see Appendix 1) that are comparable to tasks students commonly do. Each scenario was also intended to test particular aspects of Search It (see Table 1).

As defined by Avery et al. (2007), pre-test questions gather demographic information about the participant and determine previous library and research experience. Post-test questions review the participant's overall experience with the system during the usability session. To streamline the process for this study, the pre-test and post-test questions were combined into one questionnaire (see Appendix 2) that was completed after the research scenarios. Selected library staff and student workers pre-tested the research scenarios and the questionnaire before the usability sessions were conducted.

Since informal usability testing prescribes a small number of participants (Avery et al. 2007), this study was limited to undergraduate and graduate

**TABLE 1** Intent of Five Scenarios Used

Scenario	Task description	User experience tested	Feature/functionality tested
1	Find and e-mail the records for a book and a peer-reviewed journal article.	Effectiveness of Search It's distinctions between types of information.	E-mail results
2	Open a full-text article published since 2005.	Ease of finding a full text article via Search It.	Date limiter
3	Determine if the library had an available copy of a poem published in a book.	Ease of finding a book in the library's collection via Search It.	Local library collection limiter
4	Find an article on a complex topic and decide how to share it with a group.	Ease of searching a complex topic in Search It.	Methods for sharing results
5	Identify a relevant citation from a specific database in the Additional Results.	Visibility and effectiveness of Search It's federated search component.	Additional Results component

students. Potential participants were recruited through a variety of methods: announcements were made on the university's portal and the library's Web site, Facebook page, and digital signs; and print volunteer forms were available at the library's reference desk and outside the library's classrooms. Recruitment materials briefly described the study's purpose and what participants could expect at a usability session. Participants received a \$15 Amazon gift card and a library T-shirt for their time.

After receiving approval from the university's Institutional Review Board, recruitment began in early October 2010. Within one week, seven usability sessions were scheduled. One participant was unable to attend her session, so six usability sessions were conducted from mid-October to early November 2010.

Each usability session involved one participant and both authors. One author served as the facilitator for all of the sessions, while the other author served as the observer. The computer screen was projected on a larger screen for the observer, and TechSmith's Camtasia software (<http://www.techsmith.com/camtasia>) was used to record on-screen activity and comments to supplement written notes.

At the beginning of the sessions, the participants heard an introductory script and were asked to read and sign a consent form. The participants then spent two to three minutes exploring Search It on their own and providing a narrative, comparable to the "home page tour" suggested by Steve Krug (2010, 75). The participants were asked to say what they thought Search It was, what it did, and what type of information they were finding. Then, the participants worked through the five research scenarios using Search It while they spoke their thoughts aloud and the authors observed their activities.

After finishing the five scenarios, the participants completed the brief written questionnaire. Once the questionnaire was completed, the authors asked the participants follow-up questions about their experiences during the scenarios and their responses to the questionnaire.

## RESULTS

### Participant Demographics

In the six usability sessions conducted, all participants were either upper-classmen or graduate students. Their areas of study varied, but no participant was majoring in the natural sciences. Half of the participants reported they had used Milner Library's previous federated search version of Search It. The participants said they used Google, the library online catalog, and EBSCO-host Research Databases at least once a month for their academic research or coursework.

### Searching and Display of Results

None of the scenario questions directed the participants to use a specific type of search. **The basic search was used most often, with three participants using the basic search only.** Advanced search was used frequently as well; two participants used it almost exclusively. One participant used the basic search for most of the scenarios, but switched to the advanced search at one point. The visual search option was not chosen by any participant.

When the participants performed the scenario searches and the results were retrieved, the authors noted some interesting behaviors. One distinctive aspect of discovery tools is the increased amount of metadata available in their indexes. The depth of material leads to large results sets. **However, none of the participants commented on the number of results retrieved by their searches.** The number of records per page can be set by the library's Search It system administrator; for Milner Library, it is set at 30 records per page. **No study participant looked at records past the first page.** Another intriguing behavior was that participants often selected records with images, especially when the image was a photograph. In Scenario 1, the records chosen to satisfy the scenario included photographs, and the same ones were chosen by nearly all the participants. One participant verbalized this preference by saying, "I like the pictures of cool cars" while choosing an article to fulfill one part of the scenario. This last behavior may merit further study.

### Pre-Search and Post-Search Use of Limiters and Refinements

Participants started from the basic search screen on each scenario. In addition to a search box, the screen also included a number of search options (see

The screenshot displays the EBSCO Discovery Service search interface. At the top, there is a navigation bar with links for 'New Search', 'Multimedia', and 'Databases by Subject'. A search bar is prominently featured with the text 'Enter any words to find books, journals and more' and a 'Search' button. Below the search bar, there are radio buttons for 'Keyword', 'Title', and 'Author'. A 'Search Options' panel is open, showing various search modes and limiters. The 'Search modes' section includes 'Boolean/Phrase', 'Find all my search terms', 'Find any of my search terms', and 'SmartText Searching'. The 'Limit your results' section includes checkboxes for 'Full Text (Online)', 'Milner Catalog Only', and 'Scholarly (Peer Reviewed) Journals'. There are also input fields for 'Source', 'Publication Date', 'Author', and 'Title'. A dropdown menu for 'Location' is open, showing options like 'Electronic Resources', 'Federal Government Resources', and 'Illinois State University Archives'. An 'Image Quick View' section is also visible with checkboxes for different image types.

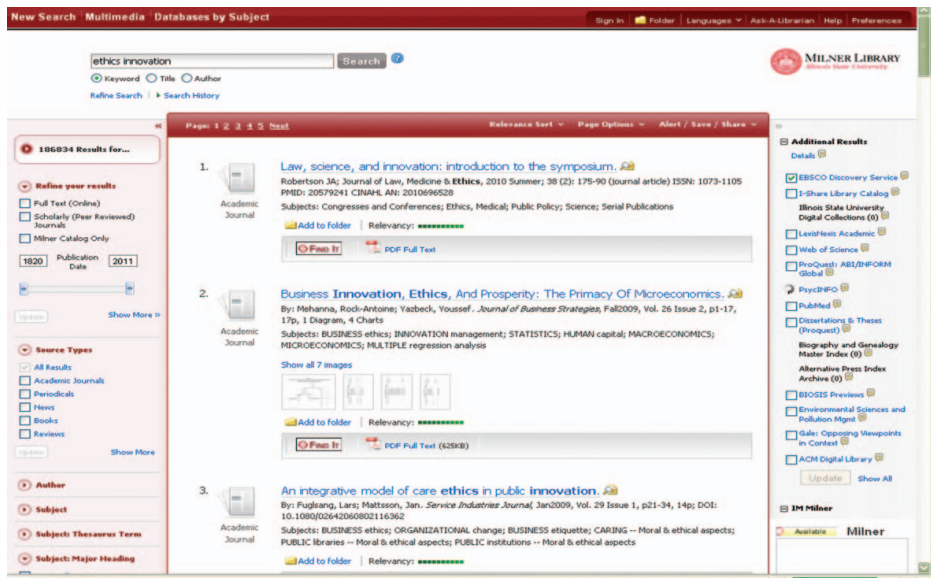
**FIGURE 1** Original basic search display. (Color figure available online.)

Figure 1). Among them were search modes (e.g., Boolean/phrase, “Find all my search terms”) and limiting options. Included in the limiters were check boxes for full text, peer-reviewed journals, and the library catalog. Also included were three known-item search boxes: source, title, and author. These search boxes are used in conjunction with terms in the primary search box when some item information is already known. Participants took advantage of the limiters without prompting, especially before starting a search. The scholarly (peer-reviewed) journals limiter was a popular pre-search choice.

A number of post-search refinement options—including source type, subject, publication, location, and content provider—are located on the left side of EBSCO Discovery Service’s results screen (see Figure 2). Which facets appear is dependent on the search results. Source type, subject, publication, and content provider always appear, but geography, gender, and others appear only when certain types of records contain the option.

Participants did use the refinement options on the results pages. The most frequently used options were in what EBSCO calls the “breadbox,” which includes check boxes for full text, peer-reviewed journals, and the library catalog. Three participants used the source-type facet, but most participants explored the facets only if they were struggling to identify a record





**FIGURE 2** Search results. (Color figure available online.)

relevant to the scenario. All but one participant used some type of post-search refinement. Table 2 includes the limiters and refinement options used.

### Format

All participants generally understood that different material formats were available in Search It. For example, one participant said, “You want the academic journals because they’ve been peer reviewed and they’re legitimate.” Another participant talked about the distinction between academic journals and periodicals.

**TABLE 2** Pre- and Post-Search Limiters/Refinements Used

Chosen limiter/refinement	Times used	Number of participants ( $n = 6$ )
Peer-Reviewed	9	5
Source Type	7	3
Location	6	3
Publication Date	5	4
Milner Catalog	5	4
Full Text	4	4
Available in Library Collection	4	2
Apply Related Words	3	1
Search Mode—Boolean	2	1
Search Mode—Smart Text	1	1

On Search It results pages, the retrieved item's format is indicated visually by an icon to help users determine the type of material described by a record. Despite these icons, the participants relied heavily on the limiters and refinement options to distinguish between types of materials. In Scenario 1, every participant split the search into two parts. First, they searched for an appropriate book. When they found one, they restarted the search and limited it to scholarly (peer-reviewed) journals to find an article on the topic. All participants used "hybrid cars" as their search terms; in the first ten results of an unmodified search for these terms, five records were for academic journals, two for books, and three for periodicals.

While participants generally understood the difference between books, academic/peer-reviewed journals, and periodicals, the distinctions between other formats were not as clear. One participant chose reviews to limit a search to peer-reviewed articles, not realizing that reviews are a specific type of article or publication. Another participant chose electronic resources as a pre-search limiter, not realizing it applied only to library-owned materials and was a location indicator, not a format indicator.

### Use of Special Features

As with EBSCOhost Research Databases, EBSCO Discovery Service provides a large suite of features for end users intended to enhance their search experience. Many features, such as setting up alerts and saving searches between sessions, are common among all database providers. EBSCOhost and EBSCO Discovery Service also include a note-taking feature for users to annotate records for their own purposes. Many scenarios used in the usability sessions tested participants' awareness of these extra features.

Two scenarios asked participants to share retrieved information either with themselves or with study group members. EBSCO Discovery Service has at least four ways to share records and full text. All participants chose to e-mail relevant records in both scenarios. One participant mentioned the texting feature of another library resource and said she would find that useful. EBSCOhost and EBSCO Discovery Service provide a "folder" function, which allows users to collect records and then e-mail, print, save, or export them all at one time. In Scenario 1, two participants used the folder function, but no one used it in other scenarios. The brief results screen contains a link labeled "Alert/Save/Share," but no participant used it. When the link is clicked, users can add the results or the search itself to folders, create two types of alerts (e-mail and RSS feeds), copy and paste a permalink, or share to more than 300 social networking sites, such as Facebook, StumbleUpon, and Thinkfinity. The same options are available when viewing full records.

Milner Library includes EBSCOhost's Integrated Search system as a custom widget within EBSCO Discovery Service. Every search performed in

EBSCO Discovery Service is also conducted via database search connectors set up in EBSCOhost Integrated Search. The widget is labeled “Additional Results” and is located in the right-hand column on results pages. Although these results were displayed throughout all scenarios, Scenario 5 specifically tested participant awareness of the possible relevant records retrieved through EBSCOhost Integrated Search. During the exploration time, one participant noticed these results and even mentioned a database listed directly above the one used in Scenario 5. However, the participant did not return to these results, without prompting, when performing the tasks for this scenario.

### Unsuccessful Scenarios

In general, participants successfully completed most scenarios. However, Scenario 3 presented some difficulties. The scenario required the participants to identify an available book that contained the poem “I Sing the Body Electric” by Walt Whitman. Participants were given the poem name and the title of the book in which it appeared (*Leaves of Grass*). While two participants quickly found the required materials by using the Milner Catalog-only limiter, four participants did not succeed, although one came close. Participants appeared to have difficulties differentiating between the poem’s title and the book’s title. This difference was not always discernable from information in the retrieved records. Although all participants used search strategies that retrieved relevant results, identification of a correct record was difficult. The unsuccessful participants tended not to notice availability status messages in the item records. An additional complication for the participants was that “I Sing the Body Electric” is also a short story by Ray Bradbury, and participants did not always recognize the differences in the authors of the two publications.

Scenario 5, involving EBSCOhost Integrated Search, was intended to test participants’ awareness of the availability of Additional Results. Additional Results links to records in databases that are not included in the EBSCO Discovery Service Index but are part of EBSCOhost Integrated Search. The list of additional databases also includes EBSCO Discovery Service. Many participants struggled and required additional prompting from the authors to complete the scenario, which involved retrieving a record from a specific database via a link that would take them outside of Search It. The participants’ biggest problem was a lack of recognition of the Additional Results listing. Users can include results from the databases in Additional Results in two ways. First, a user can click on the database name, which retrieves the results from that database only. In the other method, the user can select multiple databases by checking boxes next to the database names and retrieving the records after clicking on an “Update” button. By default, the EBSCO Discovery Service resource, which includes all the records retrieved from the original search, is checked and is presented first in the list of Additional

Results. To exclude that set from further display, the user has to manually deselect EBSCO Discovery Service, but no participants did that before making their choice. Including EBSCO Discovery Service in records retrieved from the Additional Results choices can make it appear as if nothing has changed in the results pane on the screen. Some participants were able to bypass this functionality by clicking on the resource name's link, which retrieved the records found in that resource only. However, it was not clear to participants what would happen when only a link was chosen.

In addition to generally not finding the Additional Results widget, participants were often unsure of what to do with the Additional Results content when it was displayed within Search It. No one commented that the amount of information in records retrieved from Additional Results was different from records retrieved in earlier searches. Usually, records from databases searched via EBSCOhost Integrated Search contained much less information than those retrieved with EBSCO Discovery Service. Part of the participants' confusion can be attributed to the labels used by EBSCO Discovery Service: the link to the native database in the records was different depending on whether full text existed in that database. In addition, there was no indication in the record that more information was available in the native database.

## Questionnaire Responses

Following the scenarios, participants completed a questionnaire asking them about their experiences with Search It and searching in general. When asked about Search It, most said they easily found relevant results and liked its interface. All felt that instruction on using Search It would be useful. The questionnaire also asked participants if they would use Search It again and if they would recommend it to friends; results are shown in Table 3. When asked if they felt Search It was a useful tool for actual research or coursework, all participants said it would be.

## DISCUSSION

While the authors assumed students would usually enter search terms and scan the results, the participants frequently used limiters and refinements,

**TABLE 3** Questionnaire Responses ( $n = 6$ )

	Very likely	Likely	Neutral	Unlikely	Very unlikely
Will you use Search It again?	5	1	0	0	0
Will you recommend Search It to a friend?	2	4	0	0	0

especially for peer-reviewed journals, source types, and locations. When asked to find a specific type of publication (e.g., book, peer-reviewed article), the participants seemed to rely more heavily on the limiters and refinements than on the format icons on the results page. It would be interesting to study if one of these identification methods is more effective for users.

The participants chose pre-search limiters more often than post-search limiters, which indicated they understand the value of limiting their searches beforehand. Granted, the participants did start each scenario on the main search page, which included several search options, rather than with the basic search box as presented on the library's home page. Nevertheless, all but one participant used some post-search limiter or refinement, so even if users started at a basic search box, they might still be likely to limit their search on the results page. One participant said, "I like the source types. You can actually limit them without going back and doing a whole new search." Not surprisingly, the most frequently used post-search limiters and refinements were those displayed most prominently (i.e., at the top of the left column, expanded by default). The less prominent ones were explored only when participants struggled. There is a wealth of post-search refinement options in EBSCO Discovery Service. Users can limit searches by source type (academic journals, books, reviews, etc.), three different subject types, publication title, location, and more. What facets appear in result sets are determined by the results themselves. For example, "Subject: Major Heading" only appears when results from CAB Abstracts, CINAHL, MEDLine, PsycARTICLES, PsycBOOKS, or PsycCRITIQUES are retrieved. It is possible to set which facets open by default. During this study, only the source-type facet was set to open. Although having all facets open seemed unwieldy, the Search It system administrator decided to open two additional facets—subject and subject: major heading—by default to make them more prominent.

Most participants used the limiters and refinements effectively. Some limiters and refinements were very self-explanatory, such as the full text, peer-reviewed, and publication date refinements. Others were more confusing, either because of their description or their placement. One participant tried to use an option in the location box on the main search page to limit results to books, not realizing the options were not format limiters, so the results still contained many journal and magazine articles. To help clarify this limiter, the box label was changed to "Location in Milner" (see Figure 3). While thoroughly scanning the main search page to complete Scenario 3, another participant said, "I wonder if there's a title search." During the follow-up questions at the session's end, this participant said she assumed that the source, author, and title search boxes on the main page were related to the scholarly (peer-reviewed) journals checkbox above them. Another participant did not realize that search terms were still required in the primary search box even when terms were entered in these source, author, and title search boxes. Because of this confusion, all three boxes were removed from

The screenshot displays the EBSCO Discovery Service search page. At the top, there is a navigation bar with links: "New Search", "Multimedia", "Databases by Subject", "Sign In", "Folder", "Languages", "Ask-A-Librarian", "Help", and "Preferences". Below this is a "SEARCH IT" logo with the text "powered by EBSCO". To the right of the logo is a search input field with the placeholder text "Enter any words to find books, journals and more" and a "Search" button. Below the input field are three radio buttons: "Keyword" (selected), "Title", and "Author". To the right of these are links: "Search Options", "Basic Search", "Advanced Search", "Visual Search", and "Search History".

The main section is titled "Search Options" and contains several filters and checkboxes. On the left, under "Search modes", there are four radio buttons: "Boolean/Phrase", "Find all my search terms" (selected), "Find any of my search terms", and "SmartText Searching" with a "Hint" link. To the right of these is a checkbox for "Apply related words" and another for "Also search within the full text of the articles" which is checked. Below this is a "Limit your results" section. It includes checkboxes for "Full Text (Online)" and "Milner Catalog Only". Under "Location in Milner", there is a dropdown menu showing "All", "Electronic Resources", "Federal Government Resources", and "Illinois State University Archives". To the right, under "Scholarly (Peer Reviewed) Journals", there is a checkbox and a "Publication Date" section with two "Month" and "Year" dropdown menus separated by "to". Below this is a "Language" section with a dropdown menu showing "All", "English", "Arabic", and "Catalan". A "Reset" button is located in the top right corner of the "Search Options" section. A "Search" button is at the bottom left of the section.

**FIGURE 3** Basic search screen following modifications. (Color figure available online.)

the “Limit your results” section of the search page (see Figure 3). After this study was completed, EBSCO added keyword, title, and author radio buttons under the basic search box, which might have resolved some of these problems. Since the limiters and refinements were used so frequently, it is important that their purpose is clear so that they are used correctly.

Few participants used the special features available. Many of these features are common across all EBSCOhost Research Databases, such as the magnifying glass by the title on the brief results page and the bookmark option on the detailed record page, but the library catalog holdings information on the brief results page is unique to EBSCO Discovery Service. Only one participant commented on this feature and only after she had already clicked on the book title. She seemed thrilled by it: “Oh, you can see everything right there [on the brief results page]: it’s available, the call number, and everything.” Special features need to be more apparent so users will know they are available. For example, additional information is displayed in a pop-up window when users hover over a magnifying glass icon on the brief results page; this same functionality could be added when hovering over a title. On the detailed record page, perhaps the bookmark label could be changed to “share/bookmark” to make the available functionality more apparent to users.

The EBSCOhost Integrated Search component was available for all scenarios, but participants did not use it until it was necessary or required (i.e., in Scenario 5). Even the participants who noticed it during the exploration time did not pay attention to it again until Scenario 5. If students are mainly relying on the initial results of a discovery tool, institutions may wonder if it is worth the time, money, and effort to also implement a federated search component within a discovery tool. Perhaps students would use a federated search component more if they were spending more time finding and evaluating sources for an actual assignment or project rather than a usability scenario. This would be an interesting issue to study further.

One broad goal of this study was to determine how easy it was for students to perform searches in Search It. The responses to the post-test questionnaire indicated participants found Search It easy to use. The majority agreed or strongly agreed that they were able to easily find relevant results with Search It and that they liked the interface. Furthermore, all participants indicated they would be likely or very likely to use Search It again and recommend it to friends for their research.

Interestingly, all participants agreed or strongly agreed that instruction would be helpful for Search It. The post-test questionnaire included an open-ended question about what the participants disliked or found frustrating with Search It. One participant wrote, "There are so many controls that I don't know about, so I'm sure things would go smoother if I knew about them." Another participant wrote, "I wish it had a pop-up box or similar feature with search instructions." The post-test questionnaire also included an open-ended question for other comments. One participant wrote, "I think the search options on the main page should have instructions, but all in all, it's a great resource." Another participant wrote, "I like a simple FAQ or quick tutorial being available online. Even better, maybe a one-page quick reference sheet." A future study could address the instruction aspects of discovery tools in more detail. Perhaps users feel comfortable with the basic functionality of discovery tools but would like instruction related to the more advanced features.

### Comparison to Federated Search Studies

Since numerous federated search usability studies have been published, a goal of this study was to compare this usability test's results with the common findings of federated search usability tests. Based on this study, Milner Library's implementation of EBSCO Discovery Service seems to have overcome many of the most common complaints about federated search engines, but in a few cases, the comparison revealed similar or inconclusive results.

Some federated search result displays did not provide clear or sufficient information for users to distinguish between types of information (e.g., book, scholarly article, newspaper article). The participants seemed to have

no difficulty distinguishing between information types. Scenario 1, which asked participants to identify a book and a peer-reviewed journal article, was generally completed without significant difficulty. After using the pre-search limiter for scholarly (peer-reviewed) journals, one participant even noted the academic journal icons on the results page and said, "On the left side, I can see that all these ones that have come up are peer reviewed."

Relevance was another major cause for concern with federated search engines. Users expected relevant results, wanted results ranked by relevancy by default, and wanted enough information in the results to help determine relevancy. On a detailed record page, one participant commented it was "nice to be able to read the abstract before you get to the actual article." By default, EBSCO Discovery Service sorts results by relevancy. In the questionnaire, a majority of the participants agreed or strongly agreed that they were able to easily find relevant results with Search It. In response to the post-test open-ended question about what participants liked about Search It, one participant wrote, "I felt that the results [were] more relevant than when I used other search engines on Milner's Web site."

With federated search engines, users were often frustrated by the steps required before searching (Alling and Naismith 2007; Cervone 2005; Randall 2006; Tallent 2004). This was not a problem with Search It. Participants often used pre-search limiters, but they were not required, so the participants could just enter their search terms and proceed without doing anything else.

A few federated search studies (Alling and Naismith 2007; Ochoa et al. 2007; Ponsford and vanDuinkerken 2007) reported that users, especially faculty and graduate students, wanted advanced search options and more limiters. In this study, the limiters and refinements were frequently used, and none of the participants expressed a desire for additional options. In fact, some positive questionnaire responses were related to limiters and options. One participant wrote that she liked having "many options that I can click to make searching easier and more relevant." Another participant wrote, "It didn't take much to find source[s] and also limit them." Notably, Lyle Ford's (2010) usability study of Summon found most students did not notice Summon's limiters unless prompted. Different discovery tool implementations could certainly have different outcomes related to the use of and satisfaction with limiters.

Two other common problems with federated search engines were related to navigation, especially with the browser's Back button, and response time. When using Search It, participants made no comments related to either of these issues. The authors did make two notable observations. First, after pushing the Enter key to start a search, participants often clicked the search button, not realizing that the search was already in progress. Second, when on a PDF display page, participants occasionally paused to determine if they could start a new search from that page. Overall, though, response time and navigation were not a problem with Search It.



When using the Additional Results component within Search It, response time caused some problems for at least one participant. While the single index of a discovery tool has overcome slow response time, the federated search component, which still relies on connections to other databases, can be problematic. This may be something for institutions to consider when deciding to purchase or implement a discovery tool, federated search engine, or both.

Some federated search studies (Ochoa et al. 2007; Williams et al. 2009) found users needed or requested instruction to search more effectively. Based on this study, instruction and documentation continue to be an issue with discovery tools. All participants agreed or strongly agreed that instruction would be helpful for Search It, and several responses to the post-test questionnaire were related to instruction or documentation, even though none of the open-ended questions mentioned instruction specifically. Notably, in Martin Philip's 2010 Summon usability study, two of his four main points were related to instruction: "The participants felt they needed some instruction when making use of the additional features, such as the refining facets," and "It was suggested that more advanced users would require specific instruction as well, to best make use of the additional features" (56).

One commonly touted improvement of discovery tools over federated search engines is that discovery tools combine catalog and database content better than federated search (Notess 2011; Wisniewski 2010). In addition, Jason Vaughan (2011) noted discovery tools will be extremely helpful with the perennial problem of users trying to find article titles in the library catalog. While this is likely true, some participants' experience with Scenario 3 demonstrates that users still must understand differences in titles and in the systems used to search them. Four participants did not succeed with Scenario 3, and one reason was that participants struggled to differentiate between a poem title and a book title. Addressing this difficulty was outside the scope of this project, but it may be another indicator that instruction would be helpful with discovery tools.

With federated search engines, users were not always certain what they were searching. Based on this study, it is difficult to determine if the situation has improved with discovery tools. The authors had hoped the exploration time at the beginning of the usability sessions would help determine this, but the participants did not offer much commentary related to the suggestions mentioned during the introductory script (i.e., "Tell us what you think Search It is, what it does, and what type of information you are finding"). Perhaps the participants were still getting accustomed to thinking aloud, or perhaps the suggestions were not concrete enough. During the exploration time, one participant did comment, "It looks like an online site to find journals, books and more, as it says [within the search box]." In the post-test questionnaire, that same participant wrote, "I like that you can search multiple databases from one place."

On a related note, some users certainly did understand what they were searching with federated search engines, and in at least a few usability studies (Jung et al. 2008; Ponsford and vanDuinkerken 2007; Tallent 2004), a sense of discovery or broadening horizons was often mentioned by users as a benefit of federated search engines. Except for one participant's statement that it is "nice that there is a wide range of information," this benefit was never really mentioned in this discovery tool study. Perhaps that is because with discovery tools the results are returned cohesively, and it is less apparent that the results originated from individual databases or resources. It would be interesting to see if users would note a sense of discovery if they did a search in a database familiar to them and then did the same search in a discovery tool.

## CONCLUSION

Discovery tools are beginning to fulfill the promise of federated search systems. Ease of use, relevancy of results, and speed of search response have improved dramatically. End users respond positively and readily adapt to using them. While many issues that plagued federated searching seem to have been addressed with the new discovery tools, not all have been solved. In the usability study, the authors found users still want instruction on how to use the system. Navigation issues still exist but have been reduced.

As with any new technology, new issues exist in discovery tools. Since the technology is still evolving, features and content change often. The wealth of features for users, especially topical facets, is underused. Incorporating local data (e.g., library catalogs, digital collections) can be difficult. Discovery tool vendors are working with publishers and other content providers, but there are still gaps in what content is included in the single index. Also, depending on research interests and subjects, academic faculty will continue to need functionality that is available only in native database interfaces. The gaps in content and other local user needs mean there is still a place for federated search systems and standalone subject databases.

The experience with EBSCO Discovery Service at Milner Library has been a positive one. The authors look forward to future discovery tool research, especially the importance of instruction and continuation of federated search products, as well as the evolution of discovery technology itself.

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## APPENDIX 1: SEARCH IT USABILITY SCENARIOS

### Scenario 1: Click the Search It logo to begin a new search

You are writing a short research paper about hybrid cars. Your professor requires you to have one book and one peer-reviewed journal article for your paper. Identify one of each and e-mail the citations to yourself.

### Scenario 2: Click the Search It logo to begin a new search

You have to give a presentation on bullying in high school, and your sources must be published since 2005. Your presentation is tomorrow, so find an article that you can read online. Open the full text of the article on the screen.

### Scenario 3: Click the Search It logo to begin a new search

You need to read the "I Sing the Body Electric" poem by Walt Whitman, published in *Leaves of Grass*, for your English class. Is there a copy available in Milner Library?

### Scenario 4: Click the Search It logo to begin a new search

You are a member of a group working on a presentation about the effect social networking (e.g., Facebook, MySpace) has had on relationships of teenagers. Identify an appropriate article from a peer-reviewed journal and decide how to share it with your group members.

### Scenario 5: Click the Search It logo to begin a new search

You are researching a project about the economic factors that affect businesses in Indonesia. Your professor said that useful information could be found in the ABI/Inform database. Perform a search on this topic and identify a relevant citation from ABI/Inform. Retrieve the full record from ABI/Inform.

## APPENDIX 2: SEARCH IT USABILITY POST-TEST QUESTIONNAIRE

## Demographic Information

Class Level: freshman    sophomore    junior    senior    grad student

Department: \_\_\_\_\_

Gender:        Male        Female

How frequently do you use the following for your academic research or coursework?

	Weekly	Monthly	Few times per semester	Never	Unsure
Google					
Library Catalog					
EBSCO Library Databases (e.g., Academic Search Complete, Business Source Premier)					
Non-EBSCO Library Databases (e.g., Web of Science, PsycINFO)					
Search It					

Did you use the previous version of Search It (before August 2010)?

Yes        No        Unsure

Please rate your experiences/thoughts of Search It.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I was able to easily find relevant results.					
I like the Search It interface.					
Instruction would be helpful for Search It.					

What did you like about Search It?

What did you dislike or find frustrating about Search It?

How likely are you to use Search It again?

Very Likely        Likely        Neutral        Unlikely        Very Unlikely

How likely are you to recommend Search It to a friend for their research?

Very Likely        Likely        Neutral        Unlikely        Very Unlikely

Would Search It be a useful tool for your actual research assignments or coursework?

Yes        No        Unsure

What other comments do you have about your experience with Search It?