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Usability Testing for E-Resource Discovery: How Students Find and Choose E-Resources Using Library Websites

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Abstract

In early 2010, library staff at Bowling Green State University (BGSU) in Ohio designed and conducted a usability study of key parts of the library website, focusing on the web pages generated by the library's electronic resources management system (ERM) that list and describe the library's databases. The goal was to discover how users find and choose e-resources and identify ways the library could improve access to e-resources through its web site. This article outlines the usability study conducted at BGSU, presents its conclusions about how students at BGSU find and choose databases, contextualizes these findings with other current research about user behavior, and makes recommendations for increasing student use of library e-resources.

Background (BGSU, III ERM)

Bowling Green State University (BGSU) is a public university located in Northwest Ohio with approximately 18,000 students. While primarily an undergraduate institution, BGSU also has 3,000 graduate students in over 50 graduate programs. The library uses Innovative Interfaces (III) software for its catalog and has been using the III Electronic Resources Management module (ERM) since 2005 to both hold information about electronic resources and generate the public web pages patrons use to access them. These pages include an A to Z list of databases, databases-by-subject lists in 36 categories, and full resource records for approximately 300 subscription and free online resources.

In 2009, the committee responsible for the library's website decided to conduct usability testing in preparation for a site redesign. As members of this committee, the library's Reference Coordinator and Electronic Resources Coordinator collaborated to design and conduct a usability study to discover if the library web site was doing an effective job at presenting and providing access to electronic resources. The goal was to learn how the library's users discover electronic indexes and databases and use its ERM pages. The study was also designed to reveal if users were aware of the library's course and subject guides (which offer alternate subject access to e-resources), and if they used the library's electronic resources to help them with citation.

Literature Review

The International Organization for Standardization (ISO) defines usability as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."¹ It is a multi-faceted concept usually associated with attributes in five categories: learnability, efficiency, memorability, errors and satisfaction.²

The usability of a website can be gauged by conducting formal usability testing, which most often takes the form of asking users to complete common tasks while thinking aloud, which Nielsen describes as “the single most valuable usability engineering method.”³ Experts recommend thinking aloud over other usability methods,⁴ and it is also the most common method employed by libraries.⁵ According to Krug, testing can either consist of “‘get-it’ testing” (asking a user to figure out what something is) or “key task testing” (asking a user to try a typical task).⁶ Jeng includes locating known items or using databases to find articles among the key tasks for usability testing of library websites.⁷ Effectiveness of a site is usually measured by correct answers or successful task completion, efficiency can be measured by time to completion, and satisfaction can be gauged through Likert scales or open-ended questionnaires.⁸

In 2005, Jeng reviewed usability in the context of the digital library and proposed a model for digital library usability evaluation that involves effectiveness, efficiency and satisfaction as well as learnability.⁹ Alshamari and Mayhew’s 2010 article provides a review of current research in usability testing, including the attributes of various models, an assessment of the selection of tasks, an evaluation of measures and standards, and a discussion of the limitations of usability testing.¹⁰

There are many guides to conducting usability testing, both in general and specifically in libraries. Krug offers practical suggestions for designing tests, conducting them, and communicating results to colleagues.¹¹ *Making Library Web Sites Usable: A LITA Guide* discusses usability in general as well as specific testing techniques such as surveys, focus groups, paper prototyping, and card sorting.¹² An earlier LITA guide, *Usability Assessment of Library-Related Web Sites: Methods and Case Studies*, includes techniques as well as detailed case studies from eight academic, public and special libraries.¹³ *Studying Students: The Undergraduate Research Project at the University of Rochester*, edited by Foster and Gibbons, outlines the extensive usability and user behavior studies completed by library staff at the University of Rochester, offering insights both into usability testing techniques and the research habits of college students.¹⁴

Many academic libraries have conducted usability testing. Chen, Germain and Yang found that, as of 2007, 71 ARL libraries (85% of those who responded to their survey) had conducted usability testing on some part of their websites.¹⁵ However, most of this testing has centered around library homepages and catalogs¹⁶ and has not necessarily dealt with testing on electronic resources pages.

Usability studies on library websites have led some libraries to revise how they present database options on their home pages or have led to changes to database access pages. A study conducted by the University of South Florida in 1999 revealed that students there used the e-journals rather than the databases link to complete a task that asked them to “research journal or magazine articles,” so the library combined these options into one portal called “find an article.”¹⁷ The results of surveys, focus groups and task-based testing at the University of Washington in 2004 led the Libraries there to revise their databases lists and subject guides as well as their home page.¹⁸ Also in 2004, testing of eight students at Georgia Tech showed that users struggled to choose between different content silos, so the library’s site redesign focused on making navigational choices clear.¹⁹ In 2009, the University of Nevada Las Vegas found that users were

not sure of the differences between the “journals” and “articles” options on the home page and decided to combine these in a site redesign.²⁰

A few additional studies have dealt with how library users access databases. Usability testing completed at the University of Buffalo in 1999 revealed that, while users frequently used the library’s “Online Resources” page to link to databases in specific academic disciplines, they had trouble using the page to find resources to answer general queries and to find databases by title.²¹ In 2000, the University of Illinois Libraries developed and tested an expert system for database selection. Testing with 22 users revealed that most supported the tool’s use instead of or alongside the library’s existing menus of databases, but search options needed to be simplified.²² Some tasks in a usability study done with 52 users at Florida International University Libraries in 2002 were designed to see how students found databases or subject resources.²³ The University of the Pacific Library conducted testing in 2004 to “gain information about student awareness of the library’s web site and its resources,”²⁴ including accessing and searching in databases.²⁵ Most notably, Fuller et al describe three rounds of testing done in 2009 with students and faculty at the University of Connecticut that focused on how users there find and choose databases. The problems they observed users having with the databases pages, such as typing topics instead of database titles into the search box on the databases landing page and struggling to find subjects in drop-down lists arranged by discipline,²⁶ “did not stem from heuristic problems with design, but rather user expectations of function.” “Instead of providing users with a search box for articles,” they wrote, these web pages “gave them a series of difficult choices.”²⁷ They found the key to a successful redesign was to play to the expectations of users while including value-added information, such as short and long descriptions, links to tutorials, and shorter subject lists ordered by relevance, in their web pages.²⁸

By focusing their user testing on webpages that provide access to electronic resources, researchers at BGSU hoped to add to the research published about library web design and usability.

Study timeline and methodology

Planning was begun in December 2009 and the testing sessions, which took the form of one-hour meetings with individual users, were conducted in February and March 2010. Because the primary goal was to learn how students find and choose databases using the web pages generated by the library’s III Electronic Resources Management System, subjects were limited to undergraduate and graduate students. As lead investigator, the Electronic Resources Coordinator completed Human Subjects Review Board training during January 2010 and submitted the IRB (Institutional Review Board) application later that month, including recruitment materials, the testing instrument and the informed consent form. The library’s Dean’s office also agreed to provide funding for \$20 gift cards that would be given to each participant.

Participants were recruited in early February through flyers posted in the library and at a few select locations outside the building. Students were asked to contact the reference desk by phone or e mail to sign up for a time slot, and the slots filled extremely quickly. Many usability experts believe that most usability problems can be found by talking to just five users (though some researchers dispute this claim);²⁹ therefore, the researchers planned to recruit six undergraduates

and six graduate students (planning for possible no-shows). Ultimately tests were conducted with nine undergraduates and six graduate students.

Ultimately tests were conducted with nine undergraduates (five females, four males) and six graduate students (four females, two males). Among the undergraduates, there were two freshmen, six juniors and one senior. The students were enrolled in a variety of programs and majors, including business, art history, film production, and education, representing five of the six colleges on campus. Though not perfect, the sample was fairly representative of our university population as a whole.

Both librarians were present at all of the sessions. The Reference Coordinator was the session administrator, leading all activities and questions, while the Electronic Resources Coordinator observed and took notes. This gave the study consistency between sessions and ensured conclusions were not one-sided. Audio of each session was also recorded using Audacity.

The session administrator tried to establish a relaxed atmosphere in the sessions, assuring participants that the web site, not the participant, was being evaluated. She reminded participants to take their time and, though they were in a controlled environment, try to behave as they would if they were doing research on their own. The researchers also asked each participant for his or her major and the topic of a recent research paper or project in order to establish an area of interest to use during the session.

Format of the study

The study had five parts and used a combination of paper printouts, computer tasks with concurrent think-aloud, a Likert scale, and open-ended questions. Each method was selected to match up with an objective of the study.

In Part I of the study participants were given a paper copy of the library's home page and asked to highlight up to five links they had used before, writing on Post-It notes brief descriptions of where each goes or why they would follow it. On a second printout they were asked to highlight up to five links they found confusing and use Post-It notes to record where they thought each might lead. This part of the study was designed after an exercise done by the University of Rochester.³⁰ Its goal was to identify places on the library's home page where links were unclear, reveal the vocabulary BGSU students use to describe library resources, and help the library decide which links on the home page could be removed or changed.

In Part II participants were asked to complete five common tasks using the library's website:

- find a named book (each student was given a piece of paper with the book's title and the last name of its author)
- find a scholarly article on a topic in the student's major
- find another source for scholarly articles on the same topic (they were asked to assume they had not found enough articles in Task 1)
- find a named database (each was given the name of a multidisciplinary database he or she had not used in Tasks 2 or 3, usually JSTOR or Web of Science)
- find a named article (the student was given a piece of paper with a full citation in APA format)

The first task in Part II was designed to see if students could locate a book in the catalog and reveal the path they most commonly took to find it. The second was to see which databases, if any, students commonly chose when searching for scholarly articles and how they accessed them. In the third task, the researchers wanted to see if students could use the databases pages to get to another database, either one they already knew about or one they might identify based on their subject area of research. The fourth was to see how students would search for a named database they may have never used before. The fifth task was designed to see if students knew how to use the e-journals link to locate a specific article. Effectiveness was measured through successful task completion and efficiency by number of tries or searches to completion.

Part III was another print-based activity, designed to elicit open-ended feedback on the four types of web pages generated by the library's ERM and determine if students could understand the function of each. These were the "All Research Databases" landing page (which was linked from the library's home page and included A to Z links to databases, a list of subject links, and a search box where users could look up databases by title), a portion of the databases A to Z list, a portion of the Business databases-by-subject page and a full resource record for an individual database (EBSCO's Business Source Complete). These types of pages can be found on the websites of most academic libraries despite the fact that little data has been collected on their effectiveness and use. Students at BGSU were asked if each page looked familiar, to describe what it showed and how they might use it, and if they thought they would want to use it in the future. Finally, each student was asked to identify which elements of the full resource record they thought were important (by circling them), which were confusing (by putting a question mark next to them) and which were unnecessary (by crossing them out).

In Part IV, students were shown examples of three types of librarian-created guides (a course guide, a subject guide and a format guide) and asked to use a Likert scale to rate possible names for the link to these guides on the library's home page.³¹ Finally, in Part V, the researchers asked for general comments on the library's home page and also about each student's habits when citing sources.

Results

Part I

Part I of the study revealed that, when using the library's home page, students primarily used the links in the left navigation bar but found the layout of these links to be confusing.

[Insert Figure 1]

[Insert Table 1]

When identifying links they used, students most often chose Academic Search Complete (EBSCO) and the link to the OhioLINK statewide catalog. Because students used the key terms "articles" and "books" to describe where these links led, it was obvious they knew what the branded terms for these resources meant. When identifying links they found confusing, however, other branded terms in the left navigation bar were most often chosen – the Digital Resource Commons, ILLiad, WorldCat, and RefWorks. Therefore, many BGSU students had learned to

associate meaning with certain branded library tools and link to them from the library's home page.

The researchers also noticed what appeared to be a huge middle-of-the-page blindness. When looking at the library's home page, study participants typically started at the top left corner of the page, looked down the left navigation bar, and then sometimes scoured the rest of the page just to complete the exercise. Links from the middle of the page were rarely highlighted, and only three were chosen more than once: "hours" (which three students also said they frequently have trouble finding), "by course" (one of the links to the library's guides) and "jobs at the library." Many of the students only looked at the news links (located at the bottom) if they were specifically asked about that part of the page. "What's the importance of this stuff down here?" one asked, while another said, "I've never glanced at that."

Part I revealed that BGSU students are familiar with EBSCO and frequently link to Academic Search Complete from the home page. This is not surprising, as instruction efforts (tutorials and in-person library instruction) aimed at students in freshman composition courses make use of this database. While three users thought the e-journals link was confusing, none said the same about the All Research Databases link. In fact, four students associated the All Research Databases link with subject resources, scholarly research, or named databases: in their descriptions, they wrote "list of subjects for databases," "locating academic resources for papers," "list A-Z, JSTOR, ARTstor," and "JSTOR, Dissertations, LexisNexis." For these students, the word databases was not library jargon, but signified a particular type of library resource important for scholarly research, and they often identified the resources they chose from that link by name.

Part II

Part II showed that while BGSU students are mostly comfortable and successful using the library website for finding books and articles, they are less sure of how to find a particular article or unfamiliar databases. Students do not commonly associate the process of finding databases with that of finding other library materials like books and journals. If true for users beyond BGSU, this has important implications for how libraries present databases to users on their websites.

All of the students successfully completed Task 1 (find a named book). Nine out of 15 used the catalog search box found on the home page (which executes a keyword search). Twelve found the book in three tries or fewer, though two struggled, needing seven and nine tries.

[Insert Table 2]

To complete Task 2 (locate scholarly articles on your topic), 12 out of the 15 students chose to link to EBSCO's Academic Search Complete from the library's home page. Another two students used the All Research Databases page to navigate to JSTOR (one through the A-Z list and one through a subject page). Only one student was not able to figure out a place to find articles. This was another task where almost all were successful in very few tries, by turning to a known database that they had successfully used in the past.

[Insert Table 3]

When asked to find a second source for locating scholarly articles (Task 3), only six students knew how to successfully complete the task using library resources. All six did so by navigating to a resource they had previously used – five of them to databases and one to a known e-journal. Four additional students were able to figure out another resource to use, but only two of them by using the databases-by-subject lists. The results of this task showed that most students at BGSU choose to use databases whose names they recognize, and students who do not know of a named database to use have a great deal of difficulty otherwise identifying one appropriate for their search topic, even when using library-provided subject lists and descriptions. Three students specifically mentioned that they would probably just go to Google or Google Scholar. No students tried to use the library's catalog to identify a database in Task 3.

[Insert Table 4]

Eleven students successfully completed Task 4 (find a named database) while four did not: Table 5 provides details on the students' starting points and successes. While the students used a variety of paths to successfully complete this task, most began with the All Research Databases web pages and only a few tried searching for the database in the catalog. Thus, as in Task 3, most students relied on the website's navigation when looking for a database rather than trying to locate a search box in which to enter text, as they commonly did when looking for books (Task 1) and articles (Task 5).

[Insert Table 5]

Task 5 (find a named article) was designed to show if students knew how to use the Serials Solutions A-Z list to find an article in a particular journal. This task was by far the one that these students struggled most to complete, though 14 out of 15 were eventually able to find the article. Six students started with the e-journals link on the home page (which leads to the Serials Solutions A-Z list), though only two successfully used it to find the article. Four students chose to begin their search in EBSCO and all of these were successful. Two began in the catalog, two with the All Research Databases page, and one with Google. The most common search from all starting points was the article title: seven students began their search with this, despite the fact that only the journal title would have been a successful search from the e-journals page or the catalog.

[Insert Table 6]

Part III

The results of Part III show that BGSU students are generally not very familiar with the database access pages generated by the library's ERM, though how information is presented on these pages affects student understanding of the information they contain.

Six of the students said they had never seen the All Research Databases landing page before that day, but all 15 recognized that choosing the subject that most closely matched their major would allow them to search for library resources on that subject. Most also understood that the A-Z links would lead them to databases whose titles began with the selected letter.

[Insert Figure 2]

When shown a printout of the page displaying databases beginning with the letter B, many of the students were clearly confused. The library's A-Z list of databases is generated by a browse function in the catalog not optimized for displaying databases. It is text-heavy with little white space and does not always accurately render capitalization and punctuation. Most of the study participants, therefore, were not at all sure what they were looking at, how this list was generated, or how the items listed were related to one another. "I'm not sure what these are. I feel like I should know this," one user said. "I'd probably quit after I got this," said another. One student described the hyperlinked text in the list as the resource name and the other text as a brief description of the resource, even though both are the resource name. However, while most of the students were not able to explain this page or its function, many were observed using it successfully during Part II of the study when navigating to a known resource. The Part II activity was clearly centered on looking for and identifying a known title, which they were able to do without discerning the function and order of the page they were using to find it.

[Insert Figure 3]

The students felt more comfortable when viewing the printout of a databases-by-subject page. Nine were able to describe it as listing databases for business research and were able to identify it as a page that would be helpful to a business major. "If I need to find information it's the websites I could use," one said. "If I were a business major I would definitely use this page," said another. However, the researchers had also observed the students struggling to successfully use the databases-by-subject pages when completing tasks in Part II. When not looking for a known item, the subject lists overwhelmed these users, who quickly clicked away from them. While their design was clear and the structure of the database titles and descriptions usable, these lists still failed in their primary function, which was to help library users learn about and choose an appropriate database for a research topic.

[Insert Figure 4]

The students were also comfortable with the full resource record they were shown. BGSU resource records contain the following fields: a hyperlinked title that takes users into the resource, the title again (not linked), coverage dates, formats contained in the resource, short and full descriptions, notes, links to the database's help screens or tutorial, the library's contact information, the subject, a persistent url for the record, the license information, and a placeholder for the titles and coverage dates of the full-text resources included in that database (called "coverage load" for III users). These are much more detailed than many universities' database records, which are sometimes limited to titles, brief descriptions and urls. It was not known if the approach of providing a more robust resource record was worthwhile and if students would understand or use the information it contained.

[Insert Figure 5]

The students were asked to circle parts of the resource record they thought were important, cross out parts they thought shouldn't be there, and put question marks next to parts they thought were

confusing. It was not surprising to learn that the students considered coverage dates to be important (one student said, “I usually look at these first”) as well as the words “full text.” It was, however, surprising that many also circled the license information. This seems to indicate that students are aware of the importance of intellectual property rights and terms of use in the electronic environment. These explanations of allowed and prohibited uses on each of our resources are intended to fulfill our agreements with vendors, but they may also provide libraries with an avenue for teaching library users about fair use and their rights as users of information.

Many of the study’s participants also circled the subjects and descriptions: six indicated the subjects were important, while 14 out of 15 indicated that the descriptions were. Data from the 2009 OCLC report *Online Catalogs: What Users and Librarians Want* shows that users of information resources want more value-added information that will help them evaluate whether or not a resource is appropriate for their information needs. Subjects and summaries are specifically mentioned.³² BGSU students also feel this information is important and valuable.

The researchers were very surprised by how many students were confused by the phrases “mobile access” and “on campus access” in the record. Their comments showed they equated mobile with movement and not with mobile devices. The coverage load information at the bottom of the record was also marked as confusing, but this was mostly after students were specifically asked about it. “Do I do all this down here, too?” one asked. As with the news on the library’s home page, most of the participants ignored the bottom of the page.

Students were reluctant to cross out parts of the record. “I don’t pay attention to certain things, but that doesn’t mean they shouldn’t be in there,” one student said. However, the tutorials link ended up being most often identified as unnecessary. Students expect online systems to be easy to use and self-explanatory. Despite the library’s effort to provide this information, test participants’ feedback indicated it was unlikely to be used.

[Insert Table 7]

While the study participants were happy to give feedback on the information in the library’s resource records, it should also be noted that more than one commented that they usually did not read the information on these pages, but rather just clicked through to the database.

Part IV

Shortly before beginning the usability study, the library redesigned the gateway page to its guides, which include course-specific, general subject, and format-specific guides. The new gateway page collocated the three types of guides onto one page, but the library’s home page was still using three separate links for this content. Librarians agreed that it would be less confusing to use one link, but there was no consensus on what to call it. While most libraries offer locally-created course and subject guides,³³ research shows that students are usually not aware of them and seldom use them.³⁴ This appears to also be true at BGSU: while all the students in the study agreed that the guides seemed useful and appeared to contain valuable information, few had ever used any of them before. Eight of the students we spoke to specifically said they had never used any of the links into the guides from the library’s home page.

The study participants were asked to rate possible link names on how meaningful and descriptive they were of the guides' contents, but their feedback was inconclusive. The link name with the highest ranking was also the first listed. Most of the names were very similar to one another. And, while some students thought the names that contained the word "research" were most descriptive, others remarked that research was too generic a term, because everything on the library's website is related to research.

[Insert Table 8]

The researchers concluded that renaming the link would not, on its own, bring more students to the library's guides, and that the link's location, in the center of the page, also needed to be changed. During the subsequent redesign of the library's home page, the committee decided to move the link to the guides to the left-hand navigation bar, with the page's other heavily-used links, and call it merely "LibGuides." While not inherently more meaningful than some links users had commonly indicated were confusing (ILLiad, the Digital Resource Commons), the term LibGuides appears in each guide's url and is what librarians call them when demonstrating them to students and faculty. BGSU librarians hope to thus contribute to and capitalize on the growing brand recognition of this popular software.

Part V: Citing Sources

Asked specifically about what they use when formatting citations, only one student in the study, an undergraduate, said she actively uses the online bibliographic citation management program RefWorks, which is linked directly from BGSU library's home page. "Nobody knows what RefWorks is," she then said, indicating that none of her fellow undergraduate colleagues used it. Indeed, only she and four of the graduate students in this study said they had even heard of it before.

All six of the graduate students in the study indicated that they create their citations and bibliographies by hand, even though some had been taught to use RefWorks or had used it before. A doctoral student in his final year said that by the time he learned about RefWorks it was too late for him to begin using it, because he had already completed a large amount of research and had another system in place for organizing it. A first-year master's student said she had tried to use it once, but her professor told her that her references were formatted incorrectly, so she abandoned it.

By contrast, most of the undergraduate students in this study said they do use citation formatters to create their bibliographies, though often in conjunction with the style guides and websites to guide them. Three indicated that they use KnightCite from Calvin College; two others said they use EZBib, while one said he had used Son of Citation Machine. Only two undergraduate students said they create their citations solely by hand.

Eight students said they would use RefWorks had they known about it. "We all have a hard time citing," one, a freshman, said. It is important for the library to be purposeful about when and how tools like RefWorks are introduced to students. Too early, they are potentially not useful (lower-level undergrads are usually not thinking ahead about organizing research and importing citations from databases); too late, students already have a system in place.

Discussion and Recommendations

What conclusions can be drawn about how students find and choose electronic resources from what was observed in this study? How do they fit into what is known about web usability and user behavior? And, finally, what might this mean for how academic libraries present and promote databases to students?

Students stick with what they know. If students have used something successfully in the past, they will return to that resource for other research questions. When students were asked to find sources for scholarly articles in Part II of this study, the researchers watched them navigate to known resources two-thirds of the time, whether that was a specific database, a specific journal, or a specific search engine. In fact, two students actually navigated to a library home page other than BGSU to find a database that they had used prior to coming to BGSU. This conclusion is supported by other research on user behavior. In their survey of the information-seeking habits of over 2,300 students at six American colleges and universities in 2009, Head and Eisenberg found that “almost all of the respondents relied on the same few information resources – regardless of which research contexts they were trying to satisfy.”³⁵ In a 2006 study of 200 university students in the United States, Prabha, Connaway and Dickey found that users value “familiarization, convenience, currency and authority” when choosing information resources.³⁶ In a 2009 study of 34 business and economics students at UK universities, Wong et al found that students’ “decisions about which resources to use were based on their prior knowledge and experience with a resource.”³⁷ The tried-and-true resources students use tend to be convenient and nearby and include both Google and library databases.³⁸

At BGSU, students clearly know what EBSCO is, though the depth of that knowledge was not tested (and reference and instruction interactions show that many believe Academic Search Complete searches *all* EBSCO databases at once). Other resources mentioned by name were JSTOR and LexisNexis. As with the statewide catalog, OhioLINK, students can, and do, recognize branded databases and return to them.

Therefore, libraries should get specific in our promotions, capitalizing on the brand recognition students already have and marketing brands that students will remember.

While academic librarians are warned to avoid jargon, we should also remember that our students live in a world awash with brands that have acquired meaning for them through use and repetition. BGSU students were most successful navigating the library’s databases web pages when they were looking for the names of specific resources, not when they were browsing by subject. Therefore, if we want students to use a wider range of our resources, it is crucial that we teach them to recognize the resources that will be useful for them. As the brand diversity of our resources narrows, vendors and publishers merge, and vendors market more and more to end users, this strategy may become easier to adopt. One way to do this might be to connect lesser-known databases to the most popular ones (for example, Project MUSE and JSTOR, Factiva and LexisNexis, or the ISI Web of Science and EBSCO) in instruction sessions, campus communications, and web guides. Ideally, students familiar with one resource would be able to link the two databases in their minds and remember or recognize both at their point of need.

Students do what their professors tell them to do. If a professor requires students to use a particular database, they will. Otherwise, they'll use what they know with Google as their backup. Many students said specifically that they would only use the databases pages if they were required to for a class. Research indicates that students consider their professors to be the experts and that professors are a more influential part of the students' research process than librarians.³⁹ **As a result, librarians should collaborate closely with teaching faculty to develop guides, promote collections, and teach students about resources.** Many librarians are already doing this, embedding library resources in Blackboard, and developing strong liaison programs. But this recommendation also flies in the face of some libraries' efforts to reach out to students directly, through general orientations, activities, and drop-in workshops as well as through carefully structured personal service programs. We believe the most effective way to get students to use library e-resources is through specific endorsements by their professors.

"As long as you can search for anything you can search for it." This quote from one test subject, while it sounds strange, illustrates a tactic quite a few students employed to successfully complete the tasks in the study. Not sure where to find the named database JSTOR, this student clicked around the library's website typing "JSTOR" into every search box he saw until it yielded the result he was seeking. This is something the researchers saw particularly in Tasks 1 and 5. A user who was not successful finding the book in her initial search in the BGSU library catalog would choose to re-execute the same search in the statewide catalog before refining her search terms. Likewise, students who unsuccessfully searched for the article they were asked to find by the article title were more likely to navigate to a different part of the library's website and repeat this search than they were to search by journal title.

In 2006, Steve Krug said internet users were mostly looking for something clickable to click on,⁴⁰ BGSU students, by contrast, often looked for a search box to search in. When a search was unsuccessful, instead of retooling it, the student looked for a different search box and tried the same search again. The students in the study tried to change the subset of information they were searching, not the search they had already decided was the best one.

Therefore, getting to that "one search box" for all of the library's content is crucial to helping students. Several experts of user behavior on the web, both in and out of libraries, agree. Hepworth cites tools that cross-search resources as examples of "people-centered inclusive information products and services."⁴¹ He writes that "most students enter university unaware of different electronic sources," so it is beneficial to users for libraries to provide "one common interface...to search several databases reducing the knowledge the user needs to have."⁴² In her survey of library websites for user-centered design and technology innovations, Liu recommends libraries implement "an aggregated search of all library resources," including databases and digital collections.⁴³ Krug also says that searching all content at once with good relevance ranking for the results is preferable to making users decide which segment of a website to search.⁴⁴ Users, too, request this: students at the University of Washington said this when surveyed in 2004,⁴⁵ and students who participated in OCLC's 2005 *Perceptions* survey did as well.⁴⁶

We believe that discovery layers are going to be the best solution for most users.⁴⁷ Discovery layers like Serials Solution's Summon eliminate the guesswork of choosing a subset of

information to search (catalog vs. database) or the right format for that search (article vs. journal title) because they search across the range of the library's resources. Does this eliminate the need to teach users about specific databases? No, because these tools, still in their very early development, do not encompass every resource in our collections and will likely not in the near future. But, with good relevance ranking, faceted results and wide-reaching content bases, these tools are still, in the short run, likely to save the greatest amount of time for the greatest number of users.

Students generally understand the term "database." This study shows that, contrary to some perceptions, students know what the term database means on a library web site and are able to identify the role such databases play in the research process. In Part I, when students were asked to identify links that were confusing, no students chose the link to the All Research Databases page. The students' comments and descriptions of that link made it clear that Research Databases signified a particular type of library resource that was important for scholarly research.

However, these tools seem to remain isolated in students' minds from other items in the library's collections and, unlike books and journals, students do not typically find them through catalog searching. Thus common database discovery webpages, including database A-Z lists, databases-by-subject lists, and full records for databases, remain an important part of the database discovery process for students.

Subject lists are for librarians. While study participants were often able to successfully describe the contents of the library's databases-by-subject lists, they did not, during the task completion part of the study, often successfully use them. Confronted with the lists during the search process, many students quickly clicked away from them. They did not scroll down and they obviously did not read them, which caused them at times to miss desired information. Therefore, these lists, which are long (on average containing 15 resources), in alphabetical order, and divided into categories that suit the library's collections rather than students' expectations, do not work well for students.

Would relevance order ("core or more" or "best bets") make a difference? Probably, because students are used to seeing relevance ranking in their online searches, even in library catalogs and databases. University of Michigan students, when asked, said they "preferred to have recommended resources at the top of an appropriate guide."⁴⁸ When the University of Connecticut redesigned its databases-by-subject lists, its librarians decided to limit each list to only five items, ranked in relevance order by the subject specialist, with the option to link to a fuller list.⁴⁹ However, based on these researchers' examination of ARL library websites, less than a third of ARL libraries have some kind of relevance ranking in their databases lists. Many libraries simply do not have the tools to support "core and more" or "best bets" ranking in their databases lists because they are using legacy homegrown software or vendor ERM products (including III's ERM) that do not give this kind of flexibility, and scalable collection management takes precedence over refined public display.

Should we, especially as discovery layers grow in popularity and functionality, have database lists at all? Having A-Z and subject lists of databases is clearly a best practice for academic libraries: in their 2007 survey of the 99 American academic ARL libraries, Caudle and Schmitz

found that 98% had a databases A-Z list and 96% had databases-by-subject lists.⁵⁰ In addition, having multiple ways of finding online resources, including searching, linking, and cataloging, helps the greatest number of people successfully find something. Nielsen found that, in 2000, about 50% of people were searchers while the rest used a combination of search and navigation to find things online.⁵¹ Also, students seem to associate catalog searching with books but not with database names, so relying only on the search function in the catalog to link to databases would cause some users not to find them. **Lists also serve a staff purpose that cannot be discounted: even if most students do not independently use subject lists of databases, they do help librarians assist patrons looking for resources in a subject area with which the librarian may not be very familiar.**

Conclusion

As a result of this usability testing, BGSU Libraries has moved forward with a redesign of its home page that significantly revised the left navigation bar, re-branded course and subject guides, and put the spotlight on a flexible search portal that will hopefully draw some content silos closer together. Further revisions to the databases pages generated by the ERM are also planned, including investigation of an alternate format for the databases A-Z list and subject lists that would allow relevance ranking.

While the validity of this study's conclusions should not be overstated because of its small sample size and focus on users at one university, we believe that the findings at BGSU have broader implications for how all libraries present and promote their databases to their users. Well-designed pages are not enough for student access and use. Perhaps more important is these pages' promotion of certain types of information: namely, database brand names and value-added information about them like coverage dates and descriptions. Brand recognition of a resource is the most likely way for it to be used by a student; when students are asked to search for information without knowing which database to use, they are mostly unable to use database lists to choose an appropriate resource by subject. Therefore, while the design and usability of lists is important, it is more important to a) build recognition of particular databases through marketing and working with faculty and b) build brand associations among databases in order to expand students' awareness and use of library databases.

Further research should be undertaken to see if students can indeed effectively use relevance-ranked database lists for resource discovery. In addition, research on the effectiveness of brand-based marketing of library databases to specific student populations should also be undertaken, especially research to determine if pairing lesser-known databases with those that are better-known and asking professors to promote particular databases would enhance recognition and result in higher usage statistics for the products in question.

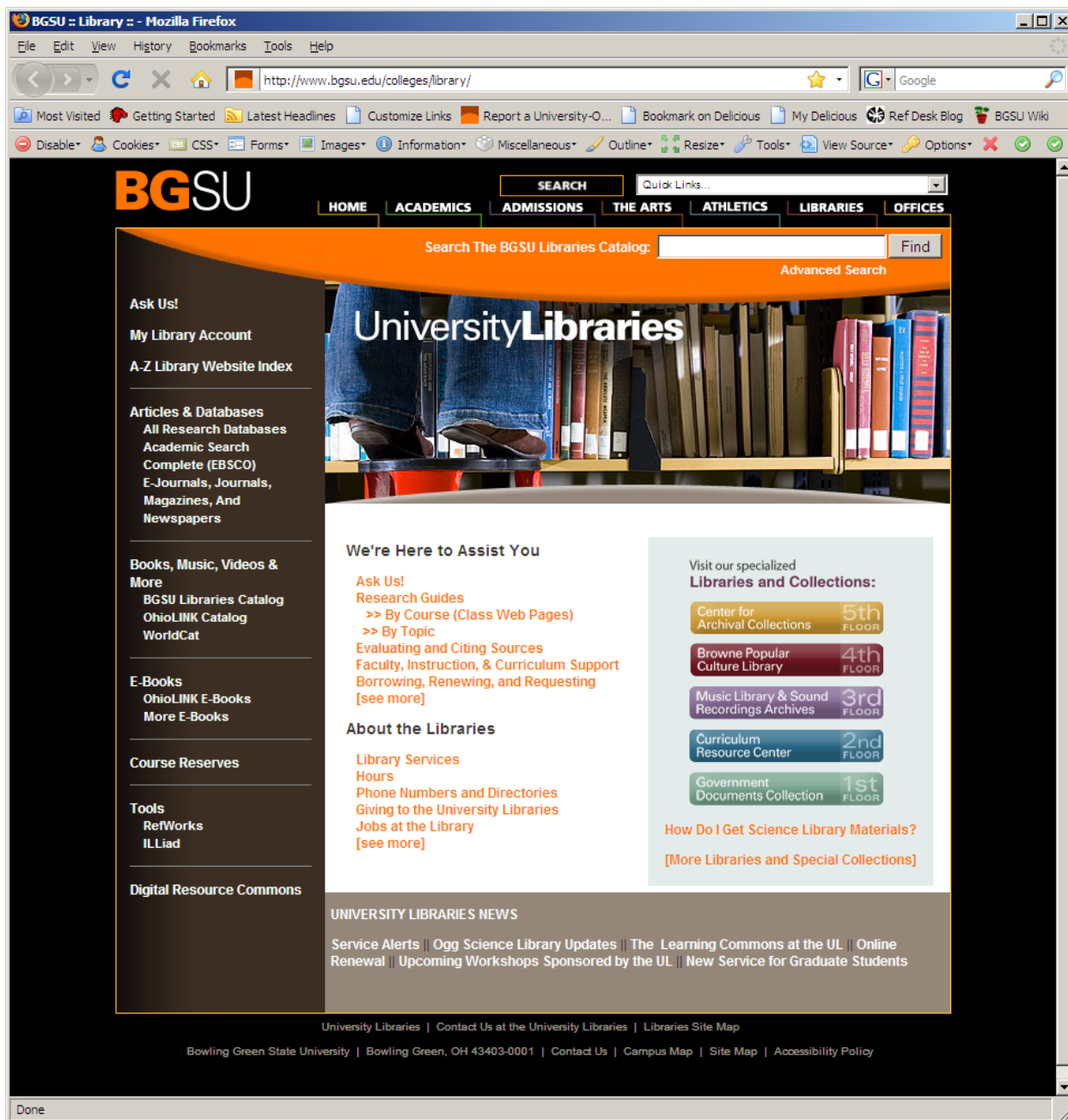


Figure 1. BGSU Libraries home page, spring 2010.

Links Students Have Used	Times Chosen	Links Students Find Confusing	Times Chosen
Academic Search Complete (EBSCO)	9	Digital Resource Commons	8
OhioLINK Catalog	9	ILLiad	8
Course Reserves	7	UL News [any]	5
My Library Account	7	WorldCat	5
All Research Databases	5	A-Z Library Website Index	4
Hours	5	RefWorks	4
BGSU Libraries Catalog	4	E-Journals, Journals, Magazines and Newspapers	3
Search box for catalog	4	Evaluating and Citing Sources	2
E-journals, Journals, Magazines and Newspapers	3	“Academic Search”	1
Research Guides >> By Course	2	“How do I get Science Library materials?”	1
Jobs at the Library	2	Ask Us!	1
Ask Us! [in left nav bar]	1	BGSU Libraries Catalog	1
Ask Us! [in the middle of the page]	1	Borrowing, Renewing and Requesting	1
A-Z Library Website Index	1	Center for Archival Collections [button]	1
Borrowing, Renewing and Requesting	1	Curriculum Resource Center [button]	1
Government Documents Collection [button]	1	E-Books [not a link]	1
Library Services	1	Faculty, Instruction, & Curriculum Support	1
Music Library & Sound Recordings Archive [button]	1	Jobs at the Library	1
OhioLINK E-Books	1	Library Services	1
Online renewal	1	OhioLINK Catalog	1
RefWorks	1	OhioLINK E-Books	1
WorldCat	1	Phone Numbers and Directories	1
		Research Guides	1
		Tools [not a link]	1

Table 1: Results of Part I

Part II, task 1: find a named book				
<i>Session</i>	<i>Starting point</i>	<i>Initial search</i>	<i>Number of tries</i>	<i>Successful</i>
1	Search box for catalog	Title	2	yes
2	Search box for catalog	Title	3	yes
3	Reserves	Title	2	yes
4	Search box for catalog	Title and author	1	yes
5	Search box for catalog	Author	4	yes
6	BGSU Libraries Catalog link	Title	9	yes
7	Search box for catalog	Title	3	yes
8	Search box for catalog	Title	7	yes
9	Search box for catalog	Title and author	2	yes
10	BGSU Libraries Catalog link	Title	1	yes
11	Advanced search link	Title	1	yes
12	Search box for catalog	Title	3	yes
13	Search box for catalog	Title	2	yes
14	A-Z Library Website Index	Title	3	yes
15	BGSU Libraries Catalog link	Author	2	yes

Table 2: Part II, Task 1: Find a Named Book

Part II, task 2: find scholarly articles on a topic			
<i>Session</i>	<i>Starting point</i>	<i>Number of tries</i>	<i>Successful</i>
1	EBSCO link on home page	1	yes
2	EBSCO link on home page	1	yes
3	E-Journals, journals, magazines and newspapers link	6	no
4	All Research Databases	1	yes
5	EBSCO link on home page	1	yes
6	EBSCO link on home page	1	yes
7	EBSCO link on home page	1	yes
8	All Research Databases	1	yes
9	EBSCO link on home page	1	yes
10	EBSCO link on home page	1	yes
11	EBSCO link on home page	1	yes
12	EBSCO link on home page	3	yes
13	EBSCO link on home page	1	yes
14	EBSCO link on home page	1	yes
15	EBSCO link on home page	1	yes

Table 3: Part II, Task 2: Find Scholarly Articles on a Topic

Find a second source for articles: Students who knew how to complete this task		
<i>Session</i>	<i>Strategy</i>	<i>Starting point</i>
2	Accessed a known database	All Research Databases landing page
4	Accessed a known database	All Research Databases landing page
9	Accessed a known database	EBSCO link on home page
11	Accessed a known database	All Research Databases landing page
12	Accessed a known e-journal	OhioLINK EJC (linked directly)
14	Accessed a known database	Library course guides

Find a second source for articles: Students who did not know how to complete this task but were successful		
<i>Session</i>	<i>Strategy</i>	<i>Starting point</i>
3	Used the subjects on the All Research Databases page and chose the first one in her subject list	All Research Databases landing page
7	Used the subjects on the All Research Databases page and chose a database she recognized	All Research Databases landing page
8	Googled her topic and the word "Springer"	Google
10	Used the E-Journals link to find a scholarly journal in his subject area	E-Journals, journals, magazines and newspapers link

Find a second source for articles: Students who could not successfully complete this task		
<i>Session</i>	<i>Strategy</i>	<i>Starting point</i>
1	Chose an inappropriate subject and resource from the All Research Databases page	E-journals
6	Chose an inappropriate subject from the All Research Databases page then became lost in the catalog	All Research Databases landing page
13	Browsed by subject under E-Journals	E-Journals
15	Chose an inappropriate resource from the All Research Databases page	E-Journals

Table 4: Part II, Task 3: Find a Second Source for Scholarly Articles

Find a named database		
<i>Starting point</i>	<i>number who started here</i>	<i>number successful</i>
Databases A-Z list	4	4
Databases-by-subject lists	5	2
Search box for catalog	2	3
E-Journals link	2	0
All Research Databases landing page	1	1
Google	0	1
A-Z library website index	1	0
Total	15	11

Table 5: Part II, Task 4

Find a named article: starting points	
<i>Starting point</i>	<i>number who started here</i>
E-Journals, etc.	6
EBSCO link from home page	4
Catalog	2
All Research Databases link	2
Google	1
Total	15

Find a named article: search type	
<i>Search</i>	<i>number used as first search</i>
Article title	7
Author	5
Journal title	3

Table 6: Part II, Task 5: Find a Named Article

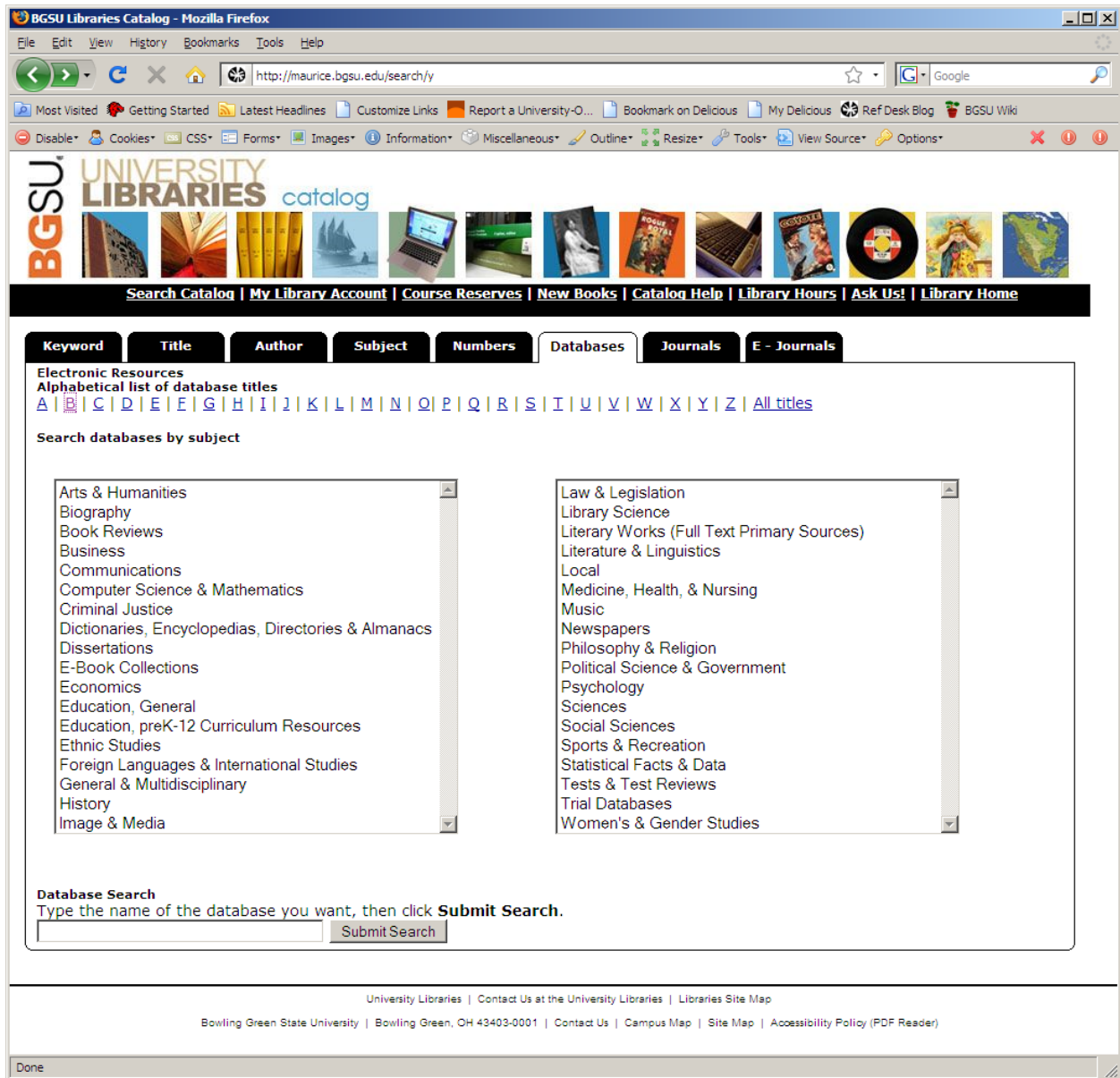


Figure 2: All Research Databases Landing Page, spring 2010

The screenshot shows a web browser window displaying the BGSU University Libraries catalog search results. The search criteria are 'b', sorted by system, with 16 entries found. The results are displayed in a table with columns for 'Num', 'Mark', 'RESOURCE NAMES (1-16 of 16)', 'Year', and 'Entries Found'.

Num	Mark	RESOURCE NAMES (1-16 of 16)	Year	Entries Found
1	<input type="checkbox"/>	Beilstein : CrossFire Abstracts (Beilstein)		1
2	<input type="checkbox"/>	Bg News Index : BG News Index; Connect		1
3	<input type="checkbox"/>	Bg News Online : BG News Online; Connect		1
4	<input type="checkbox"/>	Bgsu Centennial Memories : Centennial Memories (BGSU); Connect		1
5	<input type="checkbox"/>	Bible In English : Bible in English; Connect		1
6	<input type="checkbox"/>	Bibliography Of American Literature : Bibliography of American Literature; Connect		1
7	<input type="checkbox"/>	Bibliography Of Native North Americans : Bibliography of Native North Americans; Connect		1
8	<input type="checkbox"/>	Biography Reference Bank : Biography Reference Bank; Connect		1
9	<input type="checkbox"/>	Biography Reference Center Ebsco Trial : Biography Reference Center (EBSCO) [TRIAL]; Connect		1
10	<input type="checkbox"/>	Biological Abstracts : Biological Abstracts; Connect		1
11	<input type="checkbox"/>	Blade : ToledoBlade.com; Connect		1
12	<input type="checkbox"/>	Book Review Digest Plus : Book Review Digest Plus; Connect		1
13	<input type="checkbox"/>	Book Review Digest Retrospective : Book Review Digest Retrospective; Connect		1
14	<input type="checkbox"/>	Bowling Green State University Centennial Memories : Centennial Memories (BGSU); Connect		1
15	<input type="checkbox"/>	British Library Archival Sound Recordings : British Library Archival Sound Recordings; Connect		1
16	<input type="checkbox"/>	Business Source Complete : Business Source Complete; Connect		1

Figure 3: Databases A-Z List, portion showing databases beginning with B, spring 2010

The screenshot shows a Mozilla Firefox browser window displaying the BGSU Libraries catalog search results for the subject 'Business'. The browser's address bar shows the URL <http://maurice.bgsu.edu/search/m?SEARCH=Business>. The page header includes the BGSU Libraries logo and a navigation menu with links such as 'Search Catalog', 'My Library Account', 'Course Reserves', 'New Books', 'Catalog Help', 'Library Hours', 'Ask Us!', and 'Library Home'. Below the header, there are search controls including buttons for 'Start Over', 'Limit & Sort Search', and 'Another Search', along with a search history dropdown. The search criteria are set to 'RESOURCE SUBJECT: Business', 'System Sorted', and 'Sort'. A checkbox option 'Limit search to items available for checkout' is present. A 'Save Marked' button is also visible. The main content area is titled 'RESOURCE SUBJECTS (1-24 of 24)' and lists ten database entries for 'Business':

- 1 Business Source Complete**
Information on all topics in business, including full text scholarly journal articles, company information, and industry reports. [\(more...\)](#)
Coverage: 1886 to present
- 2 CCH Tax Research Network (IntelliConnect)**
A comprehensive federal, state, and international tax database, including laws, tools, practice aids, and more. [\(more...\)](#)
Coverage: Current information
If you encounter a browser "security certificate" error when linking to CCH, add the exception (in Firefox) or continue to the website (Internet Explorer) to resolve it.
- 3 CRSP (Center for Research in Security Prices)**
NYSE/AMEX/Nasdaq daily and monthly security prices, with data going back to 1925. [\(more...\)](#)
Coverage: 1925-present
Available in all four College of Business Administration Computer Labs. Not available in Jerome Library.
- 4 Current Index to Statistics**
Index to books and articles on statistics. [\(more...\)](#)
Coverage: 1975 to present, with selected earlier coverage
- 5 Digital Video Collection (OhioLINK)**
Over 2,300 full-length digital videos on a wide variety of subjects. [\(more...\)](#)
Coverage: 1979 to present
- 6 ebrary**
Over 10,000 full text books on topics in the fields of Business and Education. [\(more...\)](#)
Coverage: 1957 to present; most after 2000
- 7 Factiva**
Full text business news from newspapers, magazines and newswires, including the *Wall Street Journal* back to 1979. [\(more...\)](#)
Coverage: 1979 to present
Access limited to 4 users at a time.
- 8 Gale Business & Industry (Last Updated 7/2006)**
Company, product and industry information from magazines and journals, newsletters and newspapers. [\(more...\)](#)
Coverage: 1994 to 2006
- 9 Global Market Information Database**
Demographic, economic and marketing statistics for 205 countries, as well as detailed income, expenditure and lifestyle statistics. [\(more...\)](#)
Coverage: 1977 to present
- 10 Lexis-Nexis Academic**

Figure 4: Databases-by-Subject List, portion for Business, spring 2010

The screenshot shows a Mozilla Firefox browser window with the address bar displaying a search URL from maurice.bgsu.edu. The page header includes the BGSU Libraries logo and a navigation menu with links like 'Search Catalog', 'My Library Account', and 'Course Reserves'. Below the header are search controls including 'Start Over', 'Save for Export', 'Return to List', and 'Another Search' buttons, along with a search history dropdown.

The main content area displays 'Record 1 of 24' and 'Result page: < previous next >'. The title of the record is 'Business Source Complete'. Below the title is a table of metadata:

Resource Name	Business Source Complete
Coverage	1886 to present
Resource Format	Full Text Resources
Description	Index to Journal Articles Information on all topics in business, including full text scholarly journal articles, company information, and industry reports. Provides information on all topics in business, including marketing, management, MIS, accounting, finance and economics. In addition to journal and magazine articles, the non-journal content includes financial data, books, conference proceedings, case studies, investment research reports, industry reports, market research reports, country reports, company profiles, SWOT analyses and more.
Public Note	Mobile access On-campus access
User Support	The EBSCO video tutorial Basic Searching for Academic Libraries (5:25) provides an introduction to using EBSCO databases. Other training videos are also available on the EBSCO website.
Local Contact	If you have questions about using Business Source Complete or need to report a problem with the database, please contact the Research and Information Desk .
Subject	Business Economics

Below the metadata table is a 'Persistent link to this record' and a table of usage policies:

Authorized Users	BGSU Faculty, Staff, Students, and Walk-in Users
Permitted Use	Users may make one print or temporary electronic copy of a reasonable amount of data for personal use only.
Restricted Use	Systematic copying expressly prohibited. Database content may not be distributed to non-BGSU users.

At the bottom, there is a table with three columns: 'Title', 'Coverage online', and 'Click for more':

Title	Coverage online	Click for more
Ziff Davis smart business [electronic resource]	May 01, 2001- June 30, 2002	Mobile access
Ziff Davis smart business for the new economy [electronic resource]	May 01, 2000- Apr. 30, 2001	Mobile access

The page concludes with 'Record 1 of 24' and 'Result page: < previous next >'.

Figure 5: Resource Record for Business Source Complete, spring 2010

Resource record fields and text			
<i>Field/text</i>	<i>times chosen as important</i>	<i>times chosen as confusing</i>	<i>times chosen as unimportant</i>
Local contact	5	1	2
Coverage load	2	6	1
Dates	10	1	0
Description	14	0	1
Full text	7	1	0
Hyperlinked title	1	0	0
License categories	6	2	1
On-campus access	1	4	0
Persistent url	1	0	0
Resource format	2	0	0
Subjects	6	2	1
Resource name (title)	5	0	2
User support	2	2	3
Video tutorial	1	0	0
Mobile access	0	10	1
Index to journal articles	0	3	1
MIS	0	0	1
Public note	0	0	1

Table 7: Part III, Resource Record exercise

<i>Possible Link Name</i>	<i>Total points</i>	<i>Average</i>
Research guides by class & subject	66.0	4.40
Class web pages and research guides	56.0	3.73
Class web pages and subject guides	55.5	3.70
Library guides by class & subject	52.5	3.50
Guides by course & subject	48.0	3.20
BG LibGuides	28.0	1.87
LibGuides at BG	27.0	1.80
LibGuides	25.0	1.67

Table 8: Ranking of Possible Guide Names

¹ Stephen Asunka and others, "Understanding Academic Information Seeking Habits through Analysis of Web Server Log Files: The Case of the Teachers College Library Website", *Journal of Academic Librarianship* 35 (2009): p. 33, http://journals.ohiolink.edu/ejc/article.cgi?issn=00991333&issue=v35i0001&article=33_uaishtottclw (accessed November 22, 2010); Yu-Hui Chen, Carol Anne Germain and Huahai Yang, "An Exploration into the Practices of Library Web Usability in ARL Academic Libraries", *Journal of the American Society for Information Science and Technology* 60 (May 2009): p. 954, http://journals.ohiolink.edu/ejc/article.cgi?issn=15322882&issue=v60i0005&article=953_aitpowuiaal (accessed November 22, 2010); Judy Jeng, "What is Usability in the Context of the Digital Library and How Can It Be Measured?" *Information Technology and Libraries* 24 (June 2005): p. 48, <http://search.ebscohost.com/login.aspx?direct=true&db=tfh&AN=19683817&site=ehost-live&scope=site> (accessed November 22, 2010); Majed Alshamari and Pam Mayhew, "Technical Review: Current Issues of Usability Testing", *IETE Technical Review* 26 (2009): p. 402, <http://tr.ietejournals.org/text.asp?2009/26/6/402/57825> (accessed November 22, 2010).

² Jakob Nielsen, *Usability Engineering* (Boston: Academic Press, 1993), p. 193.

³ Nielsen, "Usability Engineering", p. 195.

⁴ M. J. van den Haak Van, M. D. T. de Jong and P. J. Schellens, "Employing Think-Aloud Protocols and Constructive Interaction to Test the Usability of Online Library Catalogues: A Methodological Comparison", *Interacting with Computers* 16 (2004): p. 1169,

http://journals.ohiolink.edu/ejc/article.cgi?issn=09535438&issue=v16i0006&article=1153_etpaciolcamc (accessed November 22, 2010).

⁵ Chen, Germain and Yang, "An Exploration", p. 954.

⁶ Steve Krug, "Usability Testing on 10 Cents a Day: Keeping Testing Simple So You Do Enough of It", in *Don't Make Me Think! A Common Sense Approach to Web Usability*, 1st ed. (Indianapolis, Indiana: Que, 2000), p. 141, http://sensible.com/Downloads/DMMTchapter09_for_personal_use_only.pdf (accessed June 10, 2010); Steve Krug, *Don't Make Me Think! A Common Sense Approach to Web Usability*, 2nd ed. (Berkeley, Calif: New Riders Pub., 2006), p. 133.

⁷ Jeng, "What is Usability?" p. 51.

⁸ Ibid.; Alshamari and Mayhew, "Technical Review", p. 404.

⁹ Jeng, "What is Usability?"

¹⁰ Alshamari and Mayhew, "Technical Review".

¹¹ Krug, *Don't Make Me Think!* p. 201.

¹² Tom Lehman and Terry Nikkel, *Making Library Web Sites Usable : A LITA Guide* (New York: Neal-Schuman Publishers, 2008), p. 184.

¹³ Nicole Campbell, ed., *Usability Assessment of Library-Related Web Sites: Methods and Case Studies* (Chicago: LITA, 2001).

¹⁴ Nancy Fried Foster and Susan Gibbons, *Studying Students : The Undergraduate Research Project at the University of Rochester* (Chicago: Association of College and Research Libraries, 2007), p. 90.

¹⁵ Ibid., p. 953.

¹⁶ Chen, Germain and Yang, "An Exploration", p. 959.

¹⁷ Maryellen Allen, "A Case Study of the Usability Testing of the University of South Florida's Virtual Library Interface Design", *Online Information Review* 26 (2002): pp. 40-53,

http://journals.ohiolink.edu/ejc/article.cgi?issn=14684527&issue=v26i0001&article=40_acsotusfvliid (accessed November 22, 2010).

¹⁸ Jennifer L. Ward, "Web Site Redesign: The University of Washington Libraries' Experience", *OCLC Systems & Services* 22 (2006): pp. 207-216,

http://journals.ohiolink.edu/ejc/article.cgi?issn=1065075x&issue=v22i0003&article=207_wsrtuowle (accessed November 22, 2010).

¹⁹ Heather Jeffcoat King and Catherine M. Jannik, "Redesigning for Usability: Information Architecture and Usability Testing for Georgia Tech Library's Website", *OCLC Systems & Services* 21 (2005): p. 236, http://journals.ohiolink.edu/ejc/article.cgi?issn=1065075x&issue=v21i0003&article=235_rfu (accessed November 22, 2010).

²⁰ Tom Ipri, Michael Yunkin and Jeanne M. Brown, "Usability as a Method for Assessing Discovery", *Information Technology and Libraries* 28 (December 2009): pp. 181-183, <http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=2010509566&site=ehost-live&scope=site> (accessed November 22, 2010). Many more library website usability studies are outlined in Blummer's extensive literature review (Barbara A. Blummer, "A Literature Review of Academic Library Web Page Studies", *Journal of Web Librarianship* 1 (2007): pp. 49-51, <http://search.ebscohost.com/login.aspx?direct=true&db=lih&AN=27651128&site=ehost-live&scope=site> (accessed November 22, 2010)).

²¹ Brenda Battleson, Austin Booth and Jane Weintrop, "Usability Testing of an Academic Library Web Site: A Case Study", *Journal of Academic Librarianship* 27 (2001): pp. 193-194, http://journals.ohiolink.edu/ejc/article.cgi?issn=00991333&issue=v27i0003&article=188_utoaalwsacs (accessed March 11, 2011).

²² Wei Ma and Timothy W. Cole, "Test and Evaluation of an Electronic Database Selection Expert System", in *Crossing the Divide: Proceedings of the Tenth National Conference of the Association of College and Research Libraries, March 15-18, 2001, Denver, Colorado*, ed. Hugh A. Thompson (Chicago: ACRL, 2001), pp. 282-290.

²³ Sarah J. Hammill, "Usability Testing at Florida International University Libraries: What we Learned", *E-JASL: The Electronic Journal of Academic and Special Librarianship* 4 (Winter 2003): p. 6, http://southernlibrarianship.icaap.org/content/v04n01/Hammill_s01.htm (accessed November 22, 2010).

²⁴ Janice Krueger, Ron L. Ray and Lorrie Knight, "Applying Web Usability Techniques to Assess Student Awareness of Library Web Resources", *Journal of Academic Librarianship* 30 (2004): p. 286, http://journals.ohiolink.edu/ejc/article.cgi?issn=00991333&issue=v30i0004&article=285_awuttasaolwr (accessed November 22, 2010).

²⁵ *Ibid.*, pp. 288-90.

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<http://search.ebscohost.com/login.aspx?direct=true&db=tfh&AN=37194484&site=ehost-live&scope=site> (accessed November 22, 2010).
- ²⁷ *Ibid.*, p. 295.
- ²⁸ *Ibid.*, pp. 296-97.
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