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Testing the Design of a Library Information Gateway

W. Bede Mitchell, Laura Davidson, Rebecca Ziegler, and Ann Viles

In autumn of 1999, librarians at Appalachian State University and Georgia Southern University had decided to revise their Web sites. Each institution's site had been in place for more than a year, and experience with library users had shown that there were certain aspects of the sites' designs that were confusing. Previous efforts to improve these library sites had involved the pooling of criticisms from the librarians and users, and then a small group of library faculty and staff would attempt to create new designs that avoided the weaknesses of the old designs.

However, this time the librarians decided to adopt the intriguing approach reported at the 1999 ACRL Conference (Dickstein, Loomis & Veldof). Librarians at three universities had employed a methodology for improving their Web sites called User-Centered Usability Testing. They had asked student participants to find specified information by searching prototype Web interfaces. The students were to express their thought processes orally, and their comments were recorded along with the selections they made at the computer. Based on the results of this kind of testing,

librarians at the University of Arizona modified their library Web site to eliminate confusing terminology, make greater use of color and icons, and reorganize the placement of information, graphics, and selections. The result was a dramatic change from the librarians' original design and conception of a successful library Web site.

In order to determine whether the features that worked well for the University of Arizona students would work equally well for the students at Appalachian State University and Georgia Southern University, our user-centered usability study employed sixteen Georgia Southern freshmen and sixteen Appalachian freshmen to test the Arizona, Georgia Southern, and Appalachian sites, using all but two of the same questions that the University of Arizona librarians had used in their Web site development. The two questions that were not used addressed search capabilities that were not applicable to the Georgia Southern and Appalachian sites. Half of the students from both Georgia Southern and Appalachian tested the Arizona site, while the other half of the Georgia Southern students tested Appalachian's

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site and the remaining Appalachian students tested Georgia Southern's. This approach was selected to eliminate possible bias inherent in using an already familiar Web design. Student responses to each of the information requests were recorded and scored according to their effectiveness and efficiency as search options, and whether the students found a correct answer. The results obtained from the students were analyzed statistically, the null hypothesis being that Georgia Southern and Appalachian students using the Arizona design would not produce a significantly greater percentage of correct answers to the Arizona questions than the students using the Appalachian State and Georgia Southern sites.

The statistical analyses showed that users of the University of Arizona site were significantly more likely than were the users of the other two sites to find the site option that would lead to a correct answer (effectiveness), to actually find a correct answer, and to find the correct answer without false starts and having to begin again (efficiency). The chi square tests were significant at the .01 levels. Further, an examination of individual site scores for effective, efficient, and correct answers shows that the Arizona site yielded the best score on 22 out of 33 possibilities.

In analyzing the results and the comments the students made while testing the sites, a number of design considerations were identified. These will be discussed as we examine each search the student volunteers were asked to perform.

1. "How would you find a book about affirmative action?"

All three sites performed well in this question since each had easily identifiable links to their online catalogs. Arizona had a prominent icon which featured a book, while Appalachian's option stated "Books and more." Georgia Southern's option was worded "Library Catalog" and yet still led to more correct responses by the testers than did the other two sites. While the term "catalog" may be library jargon, apparently it is well understood by freshmen.

2. "Find a journal or magazine article about the management trends in a business."

The Arizona site's icon clearly represented magazines and newspapers with the word "articles" prominently displayed, making it easy for the students to find the best search option. The Appalachian and Georgia Southern sites fared less well. Appalachian's site had no icons and used the term "periodical" which did not equate to "magazine" for many freshmen. Georgia Southern's site referred to "databases" without referring to magazines, periodicals, or articles, which

also did not suggest to many students that this was where to find articles.

3. "Can you find out whether the library owns Sports Illustrated, the magazine?"

Students found this search problematic regardless of which site they were testing. Many selected the same option they were supposed to choose for finding indexes to periodical articles. In this case, Arizona's usually effective icons may have contributed somewhat to the confusion since the students were drawn to the images of the newspaper and magazine instead of to the disk, book, and video images that identified the correct selection "Catalogs of Books & More." Appalachian also used the description "Library Catalog - Books and more" which was no more effective a guide without an icon, while Georgia Southern's "Library Catalog" was the most succinct description of all. A common mistake at the Appalachian and Georgia Southern sites was to select "Special Collections." This term did not convey to the freshmen anything other than that this was where catalogs of materials besides books might be found. The "Special Collections" option was also chosen in desperation for other searches as well, indicating that this is not a good term to use on an opening library Web site screen if it is not sufficiently defined.

4. "How would you find what your teacher has put on reserve for your class?"

In this case the Arizona site did not have an icon associated with the word "Reserves," which appeared in a column of other icon-less options called "Quick Links," located to the left of the prominent icons. Nevertheless, the Arizona site was more successful than the Appalachian or Georgia Southern sites with this question. "Reserves" did not appear on the Appalachian site. Users were required to select either "Library Catalog - Books and More" or a drop-down box that had a different background color and was located to the right of most of the options. The Appalachian drop-down box was almost never selected or investigated by students for any of the searches. This finding, along with the clearly negative results of the "Special Collections" link noted above, led the Appalachian Web Team to replace "Special Collections" with a "Reserves" link shortly after the usability testing was completed. Although the word "Reserves" was an explicit option on the Georgia Southern site's opening page, it was in a different font size with a different color background and to the far left of the section where most of the options were listed. The students treated "Reserves" and all the other options on the left as if they were a filigree

design in the frame of a painting. It became clear that the students assumed that the content in the middle of the page was what mattered, and they rarely explored anything else, especially if it was in a different font, script, or color. In the case of the Arizona site, what may have mitigated the perimeter location problem was that the Quick Links were in close proximity to the icons, with the same color background, and underlined clearly as links in a font similar to that of the icons.

5. "Find a Web site about the Yaqui Indians."
The Arizona site did far better on this search request since the site contained an icon clearly labeled "Web Search." By contrast, neither the Georgia Southern nor the Appalachian sites offered a means of connecting directly to a Web search engine from the opening screen. In Appalachian's case, students could choose "Search Engines" from the drop-down box but as noted above, almost no one examined the options in the drop-down box. A further source of confusion was the button labeled "Search." Students optimistically chose this but in fact the option was for searching the Appalachian site, not the Web as a whole. Georgia Southern's site did not offer any option for jumping to a Web search engine. Students were required to do what a few did regardless of the site they were testing: leave the library site without selecting anything and clicking on the "Search" option in Netscape or Explorer.

6. "How would you find a newspaper article about gun control?"
The newspaper in the icon for "Indexes to ARTICLES & More" made it very easy for testers of the Arizona site to find the best search option for this question. Users of the Georgia Southern and Appalachian sites encountered similar problems to those they had with question 2, such as misinterpreting "Special Collections" and not understanding that newspaper indexes would be found in "Databases and Periodical Article Indexes." If the precise term, such as "newspaper," "magazine," or "video" did not appear in the description of an option, many students thought it was probably not to be found there. What made the Arizona icons so effective was that although they were not completely exhaustive in representing what could be found in each option, they came much closer to being so than the more traditional labels at the Appalachian and Georgia Southern sites.

7. "If you need to check to see if you have any overdue books or any library fine, what would you do?"
The Appalachian and Georgia Southern sites required the user to select "Library Catalog." This is not intuitive to the typical freshman. The Arizona site did not have an icon for "Your Borrower Info," but it was among the same "Quick Links" as was "Reserves." After the usability testing results were known, Appalachian added an option, "View Your Library Record," to the drop-down box.

8. "How would you look to see if the library owns a video about Shakespeare?"
Users of the Arizona site were helped by the video image prominently featured in the icon for "What We Own: Catalogs of Books & More." The Appalachian and Georgia Southern users did not usually get to the online catalogs. They tended to choose other options such as "Special Collections" in the expectation that videos, as a non-book medium, would not be listed in the online catalogs, which they took to be for books only.

9. "How would you find articles in an encyclopedia that is online?"
This was especially easy for the Arizona site testers since the "Online Reference" icon included a book labeled "ENCY." Users of the Appalachian and Georgia Southern sites had to know or deduce that an online encyclopedia would be found among the electronic databases.

10. "Can you find the spring schedule of classes for the university?"
All three sites used similar buttons linking to their respective university main pages; the superior score for the Arizona site might be attributable to the fact that its site was less cluttered than the Georgia Southern site and had a color background that was more prominent than Appalachian's.

11. "Assume you are taking a class in a subject completely new to you: business, psychology, or communications. When the professor assigns a paper to you, how would you find out about information resources in that subject area?"
In this case the Georgia Southern site yielded the highest scores since the links for various subject resources were toward the top of the list of choices. The Arizona icon "Research by Subject" had confused some users in earlier questions because they thought it would enable them to enter a subject search term in a search box. Since it did not, some students had already written it off as a selection of little interest, and they did not discover that it was specifically

designed to lead them to Web sites and electronic pathfinders organized by subject. Appalachian's site had no cue for research guides on the opening screen, and students had trouble identifying "Help Desk" as the best choice.

In short:
- Graphics attract students, and well-designed icons really work.
- Most students do not read long descriptive or explanatory text. One sentence is often their limit.
- Most students take icons literally. If an icon shows several items, they take it as an exhaustive list rather than a sample of items accessible at the site.
- Most students are drawn to color and to the center of the screen. Even links with colored backgrounds are less likely to be selected if located on the perimeter of the screen.
- Many terms whose meanings seem self-evident to us are actually library jargon which students do not always understand. Examples include "special collections," "reserve," and "articles."
- The student testers never used the help/tips options on any of the sites.
- Many students have difficulty finding information if the terms they seek are not on the Web site's opening screen.
- Many students do not fully understand the relationship of "articles" to "journals/periodicals/magazines/newspapers" or to "databases."
- Most students do not understand the need to select an electronic index, or know how to do so. They want to see a search box immediately. A long list of databases and database descriptions confuses them.
- The more complex and multilayered the site, the more it confuses students. They prefer the typically simple (albeit inexact) Web search engine.
- Drop-down menus are frequently ignored if the default text does not describe what the menus will display.

- If the Web page is too large to fit on one screen, most students do not scroll down to see what more is there.
- Caveats: None of this applies to all students, and we used only freshmen in this study.

The finding that came out most forcefully was that students want a white box into which they can type their search terms. If students have to go beyond two screens to find such a box, they become frustrated and impatient. One of the student testers' most common complaints was the difficulty in finding search boxes. This is in sharp contrast to their experience using Google and other Internet search engines.
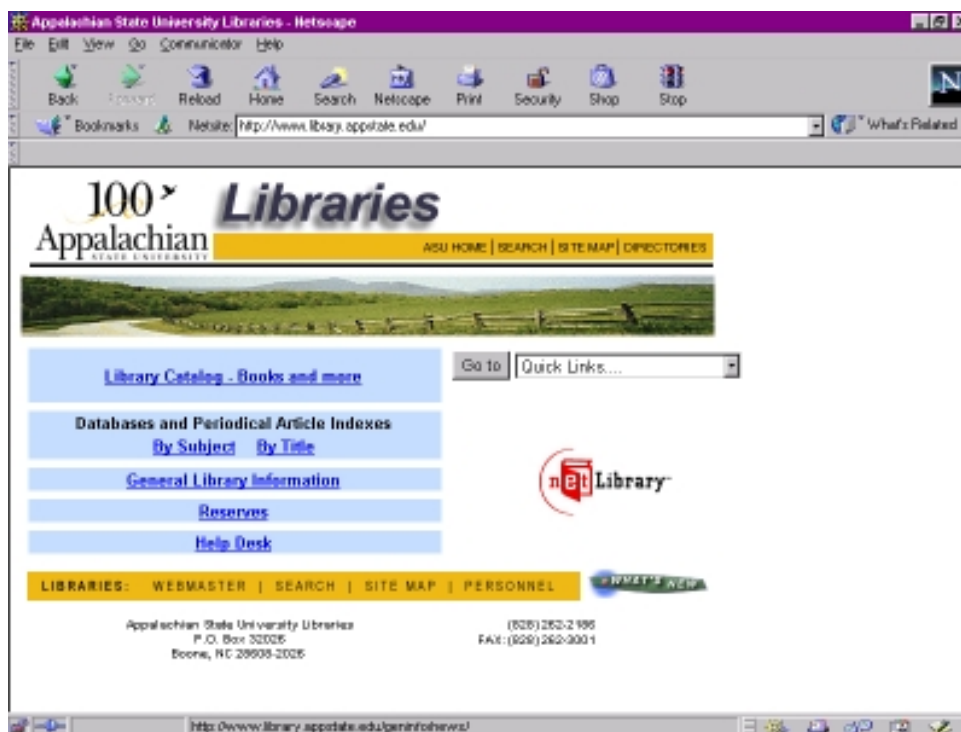
Obviously much in usability tests depends on how the questions are worded. For example, if number 2 had asked students to find an article in a *periodical*, the term used at the Georgia Southern and Appalachian sites, rather than *journal or magazine*, as was used by Arizona, the comparative results might have been different. However, this does not undermine the lesson to be learned about the confusion that arises in Web sites, online catalogs, or user brochures by the use of jargon which is imprecisely understood by many of our patrons.

The results of the study were extremely useful to Appalachian and Georgia Southern as we worked to improve our Web site designs. We intend to conduct usability studies as a continuous improvement process, and we recommend that others do the same and report their findings. The fact that the University of Arizona's design made it easier for Appalachian and Georgia Southern students to find information suggests that they have identified effective features which academic librarians would be wise to utilize.

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Appendix
The Tested Web Sites