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The usability of academic library website indexes: an investigation

Ilana Kingsley

There have been many research studies on the usability of websites, but few on the usability of website indexes. This paper discusses the methodology and findings of a usability study of academic library website indexes. The findings described in this paper are supportive of the utility of website indexes, but also demonstrate that website indexes are infrequently used. This paper also discusses exploratory research on how to get users to utilize a site index as their first choice when navigating web pages.

Introduction

Professional indexers have long understood that a well-crafted index is helpful for finding information in books. This understanding has been transferred to the electronic realm. From e-books to websites, indexes are an important component of effective information search and retrieval. At least, indexers think so – but what do end-users think of web indexes? The purpose of this study is to investigate the use, or non-use, of back-of-the-book style indexes for websites. The goals of the study are to:

- investigate empirically whether end-users utilize back-of-the-book style website indexes;
- examine the speed and accuracy of finding information on a website using an index compared with other finding tools such as search and browse; and
- assess end-user perceptions of web indexes.

Understanding the usability of website indexes is an important area of exploration in the field of web usability, web architecture, and indexing. Web usability is a vast area of study, ranging from large-scale corporate sites to small do-it-yourself sites. As a starting point in examining website index usability, this study focuses on library websites at academic institutions.

Terminology

The audience for this paper includes indexers, technical writers, and web designers, thus it is prudent to briefly define the terms used. In this study, there are important differences between website indexes, tables of contents, navigation menus, site maps, search, and other navigation aids. While there can be some ambiguity and overlap among these information finding tools, a quality website index is distinguishable in several ways.

- First, quality website indexes consist of more than just links to page titles or headings,[1] as are frequently found in site maps or table of contents.
- Second, quality website indexes use some type of vocabulary control system. This system can be in the form of traditional *see* and *see also* cross-references, or it can simply include synonyms for appropriate terms (Maislin, 1999; WebAIM, 2007).
- Third, website indexes, when possible, use anchor tags to link to 'precise points within a web page' (Hedden, 2005). Linking directly from the indexed term to the precise content eliminates the need for users to scroll or search for information on the retrieved page. When anchor tags are not an option, index terms link to the top of the page or a section of the page where the indexed content resides.
- Fourth, quality website indexes are created with human input. As Broccoli and Van Ravenswaay (1999) note, web indexes are superior to search engines because 'the text has been analyzed by a trained, human indexer,' who has 'made sure that the user will only be led only to useful information.'

When selecting indexes for this study, it appeared that website designers often used the terms *site map* and *site index* interchangeably. In many sites, the *site index* turned out to be a *site map*. According to WebAIM (2007), a site map, or a 'structural topical site index,' displays the major content areas of the site by topic. The organization of the site map, rather like a traditional table of contents, is closely related to the navigational structure of the website (WebAIM, 2007). Site maps usually enable end-users to visualize the site's contents on a single page. The structure of a site map is different from that of a site index, in that:

- Site maps are organized topically or graphically; site indexes, like traditional back-of-the-book indexes, are generally organized alphabetically (though being searchable means the alphabetical approach is not the only means of accessing them).
- Site maps do not use vocabulary control, whereas site indexes do.
- Site maps are often computer generated.[2] Site indexes can be computer generated; however, a quality site index has human input.

Review of the literature

There has been much research in the area of web usability (for example, design, navigation, architecture, automatic indexing, and search) but research on the topic of website indexes is less common. The following are among the sources that I consulted.

Carol Barnum and colleagues' (2004) comparison study on the usability and performance of indexes versus search in electronic books, specifically PDF books, is an important contribution to the field of indexing. Similar to the findings presented in this study, Barnum and colleagues discovered that users found more correct information when using the index and found information faster when using the index. Nevertheless, her users preferred using the search feature over the index.

Carol Hert and colleagues' (2000) exploratory study on usability of the A–Z index of the FedStats website is one of the first empirical studies that examined the usability of website indexes. Hert's research focused on the index as a starting point for website information retrieval. Participants were instructed to find information on a website using the site index but not to use other navigational aids of the website, such as searching or browsing. The study compared four different structures/styles of a web index in an attempt to determine which worked best for website indexing.

In one of the few articles and book chapters on web usability that mention web indexes, Shelly Gullikson and colleagues (1999) recommended that an alphabetical index is useful when 'search engines and categorical menus fail.' Rosenfeld and Morville (2002) briefly mention that a website index can be more precise than simply using the search function, and that indexes work well for users 'who know what they are looking for.' Nielson and colleagues (2002), in their study of commercial websites, concluded that users have a difficult time using website indexes.

Usability studies of indexes based on printed material include Olason (2002), as well as Jörgensen and Liddy (1996). Like Hert's research, these studies examined index usability based on the structure and style of index. Nelsen and Henselmeier's (2000) 'Usability testing at Macmillan USA' article focused on how to set up usability tests for printed material, specifically computer books.

Methodology

Overview of study

Two related studies were conducted, one in 2005 and one in 2006. Each study was similar in scope, but used variant methodologies. For each study, volunteers completed several finding tasks using two library websites. Subjects were told they were participating in a study on how users find information on websites and that their mouse clicks and voice would be recorded. They were instructed to complete a short online demographic survey and then began the actual study. Subjects were told they had up to three minutes to answer a question; after three minutes, if they hadn't found an answer they would be instructed to proceed to another question. After the study, open-ended and closed-ended questions were asked. These questions addressed what was happening during the finding tasks, the subjects' perspective on their success in finding the answer, and their perspective on website indexes.

Website index selection

The criterion for selecting the web indexes for this study was based on Brown and Jermey's (2004) application of Nielson's usability heuristics. Using these heuristics (found in Appendix I) 25 academic library websites were carefully analyzed, and two were selected for the study. An index is only one part of a website, so the entire website was taken into consideration when selecting sites. It's important to note that finding exemplary indexes was in itself a difficult process. The websites selected for this study were chosen for their exemplary indexes.

Sample

The sample included voluntary students, staff, and faculty from the University of Alaska Fairbanks, and was intended to represent people who would use an academic library website for their personal work or research. The 2005 study had 20 participants and the 2006 study had 35 participants. Participants were recruited by asking for volunteers via campus mailing lists and by verbally asking for volunteers at faculty and student centers on campus. Participants were not rewarded for their participation.

Data collection

Data were captured using Camtasia Studio. This software records a computer's screen, mouse movements, and audio. The audio recording included instructions given to participants, anything they said during the search sessions, and post-search questions and answers. All sessions were administered by the researcher.

The first study (2005)

For the first website presented, subjects were told they could use any method of navigation to find the answers to several questions; for the second site, they were instructed to only use the index. For each site, the same three questions (see Appendix II) were asked, with the easiest question first and the most difficult question last (following Norlin, 2002). After completing the finding-task part of the study, subjects were asked several follow-up questions (see Appendix II).

This task-analysis study used a modified within-subjects method. Generally, in a within-subjects method, half of the users receive the test in one order and the other half receive the test in the reverse order (Zhu et al, 2005). In this study the websites were presented in alternating order (user no. 1 tested site A then site B, user no. 2 tested site B then site A, and so on). However, since one of the research questions was to determine whether users selected the index as a navigational method, it was deemed inappropriate to tell participants to use the index first. Consequently, a limitation of the study was a possible order-based learning effect (Nielson, 1993) in that since the index task was always second, it's possible that subjects learned something about the questions while viewing the first website, and thus performed better on the second.

The second study (2006)

In an attempt to lessen the learning effect of the 2005 study, the 2006 study used a variant methodology. The methodology for this study was also a within-subjects method, but a 'more complex task/user approach' as described in Barnum et al (2004).

In this study, as in the 2005 study, for the first website participants were told they could use any method of navigation; for the second site they were instructed to use the index only. For each site participants were asked three questions (Appendix II) in random order; however unlike the 2005 study the questions were not repeated for each site. For example, user no. 1 tested site A with questions 1, 3, 5 and site B with questions 2, 4, 6; user no. 2 tested site B with questions 2, 3, 6 and site A with questions 1, 4, 5, and so on.

After completing the finding-task part of the study, subjects were asked several follow-up questions (Appendix II).

Another difference between the 2005 and 2006 studies was that the latter included presentation and analysis of two mock-up sites. The 2005 study results indicated that subjects did not optionally use the index, but when instructed to use the index they found the information faster than when using other navigation methods; the 2006 study included exploratory research on how to get users to select and use a website index when looking for information on a website.

For the mock-up sites, participants were asked the same task-finding questions, but their starting page was modified to include a prominent hyperlinked image/search box that directed users to the index. The focus of the mock-up study was to see whether prominent placement of the site index would encourage participants to use the index as their first choice of navigation.

The mock-up sites

Before creating mock-up sites for this study, two live sites with differing designs were pre-tested (see Figures 1 and 2). While pre-testing these sites participants did not use the index as their first, or any, method of navigation. Since the pre-tests did not result in users utilizing the index, two mock-up sites were created with the notion that the most important content or design element be placed in a prominent position (Krug, 2005; Nielson and Loranger, 2006). Sandford et al (2005) discuss prominent placement of the subject index on the World Trade Organization's (WTO) Repertory page. This is an attempt to wean the in-house lawyers away from their traditional dependence on the very comprehensive table of contents. The design approach of including an index as the first and only method of navigation,[3] as in the Repertory site, was not deemed appropriate for this study because the target audience of this study (university students, faculty, and staff) is most familiar with browsing and searching.

Staying with traditional features of a home page, where the page provides users with the ability to browse the site's main content areas and offers a search mechanism (Nielsen and Loranger, 2006), two mock-up pages were tested.
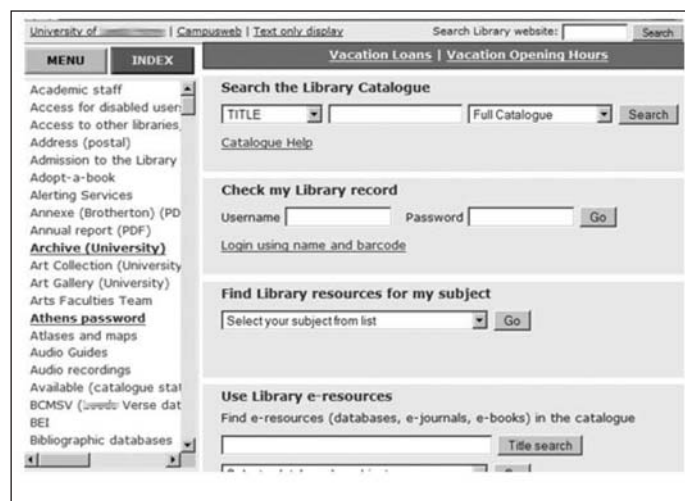

Figure 1 Live test site 1

Figure 2 Live test site 2

Mock-up no. 1 (see Figure 3) included a hyperlinked image[4] which when clicked would go to the index. After testing this page on several participants we observed that the image was not clicked, so mock-up no. 2 (Figure 4) was created.

Mock-up no. 2 included the 'Find it Fast!' logo prominently placed on the page with a search box. The words 'Find it with the Index' were displayed in the box. When a participant typed a term and clicked 'Go!' they were taken to the section of the index where the term would appear. For example, if they typed the word 'hours' they were taken to the word hours within the index. If the word didn't exist in the index, they were taken to the corresponding first letter of the word, in this case, 'H.'

Data analysis

The Camtasia recordings were analyzed for relevant data points. Quantitative and qualitative data were extracted.

Quantitative analysis included:

- **Success or failure in finding the correct answer.** Success was defined by finding the correct answer within the allotted three minutes. Failure was defined by any of: a) not finding the answer within the allotted time; b) deciding to not answer the question; or c) a wrong answer.
- **Time on overall task.** Time was calculated from the moment the last word in the question was asked, until the moment the participant indicated they found the answer by either a) moving the mouse over the answer; b) clicking the answer; or c) verbally stating the answer.
- **Number of clicks to find the correct answer.** The number of mouse clicks included following links that directed the participant to another page. The browser back button and inline anchor links were not counted as clicks.
- **User-selected navigation.** The method of navigation (browse, search, site map, or index) the participant selected when looking for the answer.
- **User perception of success versus actual method:** that is, the method of navigation in which participants thought they were most successful compared with the actual method of the navigation in which they were most successful.

Qualitative analysis included:

- **User opinions of website indexes**: participant comments on using website indexes during this study, and in their everyday web use outside of the study.
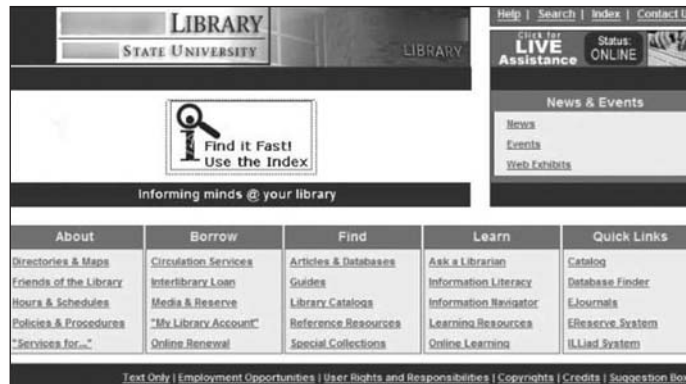
- **Promotion and use of website indexes**: user feedback on how to best promote website indexes and how to get end-users to utilize a website index.

Results and analysis of the 2005 study

Quantitative findings

An important finding was that when viewing the first website none of the participants optionally selected the index. The preferred method of finding information was to browse. Several participants used the site search capability, and only one of the participants used the site map as their first method of navigation.

Most participants were successful in finding answers to the questions regardless of their navigation method, but the success rate for finding the correct answer was higher when the index was used (recall that participants were forced to the index for the second website). With index users there was a 98 percent success rate for finding the correct answer, compared with an 86 percent success rate for users who were instructed to use 'any method of navigation' (see Table 1).

Table 1 Success by condition

Condition	Success No	Yes	Total
Start with any method	7	44 (86%)	51
Start with index	1	50 (98%)	51

Index users were quicker to find the answer than their 'any method of navigation' counterparts. The average time to success when instructed to start with an index was 20.5 seconds, compared with 32 seconds for the 'any method' approach (see Table 2).

Table 2 Time by condition (when finding correct answers)

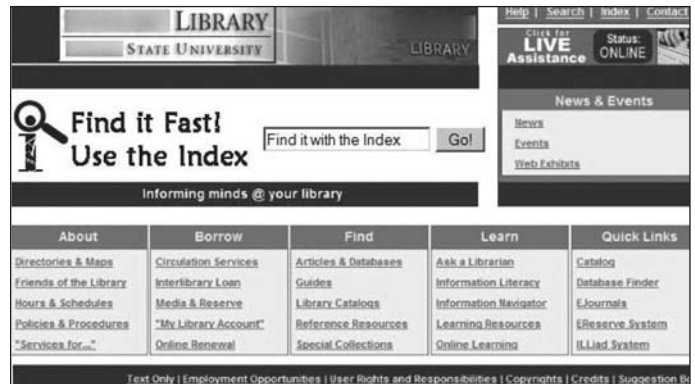| Condition	Mean (in seconds)	Number of questions (answered correctly)
Start with any method	32.13	44
Start with index	20.55	50

Figure 3 Mock-up site 1

Figure 4 Mock-up site 2

Index users found the answer to the question in fewer clicks than their 'any method of navigation' counterparts. The average number of clicks when starting with the index was 1.30, compared with 2.41 for the 'any method' approach (see Table 3).

Table 3 Average clicks (when finding correct answers)

Condition	Mean (# of clicks)	Number of questions (answered correctly)
Start with any method	2.41	44
Start with index	1.30	50

An interesting result was perception of success compared with objectively measured success, where success is defined by speed of finding the correct answer. When asked, 'With which method of navigation do you think you were most successful?' 70 percent of the participants' preferred method of navigation was the same as the method in which they were fastest in finding the answers. 24 percent of the participants thought they were most successful in finding the answers using one method of navigation, but their timed results indicated another method of navigation was faster. The remaining 6 percent were unable to answer the question.

The quantitative findings from the 2005 study cast a positive light on the use of web indexes. When using the index participants were able to find information faster than using search, browse, or site map methods of navigation.

Qualitative findings

Based on an analysis of participants' responses to qualitative questions, as well as their comments during the search tasks, findings from the 2005 study show that:

- participants may confuse indexes with site maps and other navigational structures
- participants were cognizant that the indexes used in this study were excellent indexes.

When participants were asked, 'Have you ever used an online index before, similar to the one you just used in this study? If so can you think of an example?' most participants stated that they had used an online index before. However, their examples were of site maps or directories. For example, one participant said, 'Yes. Yahoo is an example.' Another said, 'Yes, but, more like a site map.'

When participants were asked, 'With which method of navigation do you think you were most successful?' besides answering the question, many elaborated on their answer. Most of the participants indicated they were most successful with the index, and several of these participants clarified that they were successful with the index because it was a good index compared with most online indexes, which are not as comprehensive. Several participants said the index in this study was good because it contained synonyms; as one participant stated, 'the index had all of the terms I would think of – but most web indexes aren't like this' (implying

other indexes aren't as inclusive and don't contain many synonyms). This finding corresponds with Barnum and colleagues' (2004) electronic book study. Barnum found that users preferred to have many synonyms in an index and that synonyms helped shape the users' thought process over where to look for information. (This is easy to do in an online index where space constraints are unlikely to be a factor. Options include double posting or (perhaps better) links from the alternative terms to the term chosen by the indexer.)

Results and analysis of the 2006 study

Quantitative findings

As in the 2005 study, the 2006 study showed that most participants were successful at finding answers to the questions regardless of their navigation method, and the success rate for finding the correct answer was higher when the index was used. With index users there was a 97 per cent success rate for finding the correct answer, compared with an 85 per cent success rate for users who were instructed to use any method of navigation (see Table 4).

Table 4 Success by condition

Condition	Success No	Yes	Total
Start with any method	14	79 (85%)	93
Start with index	2	72 (97%)	74

As in the 2005 study, none of the participants optionally used the index, but when forced to use the index they found the answer faster than the 'any method of navigation' counterpart. The average time to successfully find an answer when instructed to start with an index was 26 seconds, compared with 40 seconds for users who used the 'any method' approach (see Table 5).

Table 5 Time by condition

Condition	Mean (in seconds)	Number of questions (answered correctly)
Start with any method	40.12	79
Start with index	26.05	72

Index users found the answer to the question in fewer clicks than their 'any method of navigation' counterparts. The average number of clicks when starting with the index was 1.00, compared with 2.00 for the 'any method' approach (see Table 6).

Table 6 Average clicks (when finding correct answers)

Condition	Mean (# of clicks)	Number of questions (answered correctly)
Start with any method	2.00	79
Start with index	1.00	72

Perception of success compared with objectively measured success was similar to the 2005 study. When asked, 'With which method of navigation do you think you were most successful?' 76 per cent of the participants' preferred method of navigation was the same as the method in which they were fastest in finding the answers. 12 per cent of the participants thought they were most successful in finding the answers using one method of navigation, but their timed results indicated another method of navigation was faster. The remaining 12 per cent were unable to answer the question.

In regard to the mock-up sites, the linked image in mock-up no. 1 received zero hits. Mock-up no. 2 received several hits as a starting navigation point; however, participants immediately backed out of the index because they were expecting to see Google-like search results. As one participant put it, 'What is this trickery? I was expecting a search.' Another said, 'I clicked on it and got to index, so, search doesn't work – it gave me an alphabetical list of topics.'

The results of the exploratory 'mock-up' part of the study are inconclusive; additional research of how to inspire users to utilize the index is needed. In the mock-up study, users who clicked on 'Find it Fast' were expecting a search function and not an index. Additional usability testing could include a click-based comparison using different labels, such as 'Site index' or 'A–Z index' in a prominently placed area of the home page. 'A–Z' is probably not a good label to use, for as Mack and colleagues (2004) note in their study of scholars using an academic library website, none of her participants used the site index labeled 'A–Z,' possibly because the label did not 'accurately describe the navigation tool.'

Conclusion

> 'I will use an index when I have empirical proof that they're better than search engines.'
>
> Participant from the 2005 study

The conclusions of this study are promising, yet disheartening at the same time. It is quite evident that participants were more successful (speed-wise, click-wise, and information accuracy-wise) when using the site index; however they never considered using the index as an option for finding information.

Bad web indexes and mislabeled site-maps give indexes a bad name

Most participants were aware of website indexes. However, when asked why they didn't use indexes they said things such as, 'I just wouldn't think of using an index on a website' and 'I just Google it.' Other participants said they had used site indexes, but when asked to describe the index their description resembled site-maps. Still other participants commented that the indexes they had used on the web weren't good indexes, and were savvy enough to point out that terminology plays a role in a good versus bad index. For example, one participant said, 'The problem with indexes is just because I use one word doesn't mean you use the same word.' Another said, an 'Index depends on what someone else thought was important to index. Our department site had an index, got rid of it, and we now use search and it works much better.'

These thoughts and perceptions about website indexes show that indexes, when thought of, are not thought of highly. Bad experiences, mislabeled site-maps, and poorly created indexes enforce the end users' notion of why they shouldn't use indexes.

The motivation for this work was the observation that relatively few websites had indexes. Since exemplary indexes were demonstrated as valuable finding aids for the websites investigated, it seems wise that more efforts should be made to implement them. These efforts include:

- Educating web designers and developers about the importance of a quality site index, and offering training sessions on how to create site indexes, or encouraging designers and developers to hire professional website indexers.
- Educating end-users to utilize website indexes. In an academic library setting, education could be accomplished during bibliographic instruction classes.

This study has demonstrated that quality website indexes on academic library sites are assets as navigational tools. Additional research needs to be conducted on how to get users to utilize an index, when one is available. Perhaps indexers need to accept the fact that depending upon the audience of the website, even though information may be found faster with a quality index, some users won't utilize an index unless they fail at searching or browsing – and even after failure, they still may not think to use an index.

The ability to easily find information is an important byproduct of the information age. Because a growing proportion of this information is in websites and other electronic forms, it is valuable to know what methods for enhancing the abilities of information seekers are most worthy of additional attention. In the studies described here, evidence was gathered for the value of indexes to websites as finding aids.

While further research is needed to more fully understand the scope and applicability of the findings (for example, for websites of different sizes and themes, as well as for different audiences), there seems little reason to delay with these activities:

1. Identify what makes a good website index.
2. Provide quality website indexes more frequently.
3. Engage in outreach and training so that end users are able to identify and benefit from website indexes.
4. Provide training and education opportunities for indexers and website designers in how to create effective web indexes.

In terms of end users' ability to more rapidly and accurately find information from academic library websites, the utility of website indexes has been demonstrated in this study. Further research is needed to understand how different types of websites, end users, and information needs could also benefit from website indexes.

Notes

1. In html markup, page titles are created by using <title><title /> tags and heading tags are created by using <Hx></Hx> tags

(where x is a number). Automated indexes often use algorithms that create indexes using title or header tags, with little or no human guidance.

2. Google Webmaster Tools provides an easy-to-use site map generator at `https://www.google.com/webmasters/tools/docs/en/sitemap-generator.html`.

3. The Repertory page does include a small search box; however it's not clear to users whether search is limited to the Repertory pages or searches the entire WTO site. After testing the search, it appears that it searches the entire WTO site and is not limited to what is covered in the Repertory indexes.

4. Note, the use of the American Society of Indexers Logo and the words 'Find it Fast!' was suggested by someone in the audience of my 2005 ASI presentation. If that person is reading this, or you know who she is, please let me know so I can give her credit for her idea.

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Appendix 1

Website index selection criteria based on Browne and Jermey's (2004) application of Nielson's usability heuristics

- Visibility: Where on the website is the link to the index? Does the user have to scroll down? Is the link prominent? Is the link to the index found on all pages of the site?
- Label: What is the link called (e.g. Index, A-Z Index, Site Index, About the Library A-Z, Library Website Index)?
- User control: Does the home page include various navigational choices (e.g. search, index, browse)?
- Consistency/standards: Is the index consistent in treatment of topics?
- Flexibility: Is the index easily navigable? Are large indexes are broken up so users don't have to scroll?
- Aesthetics/minimalist: Is the format of the index aesthetically pleasing?
- Help/documentation: Is there documentation on what the index is and how it should be used?

Appendix 2 Questions used in the studies

Finding-task questions for 2005 study

- Does the library have any job openings?
- For how long can an undergraduate keep a book checked out?
- Who would you contact if you wanted to give books or money to the library?

Follow-up questions for 2005 study

- Have you ever used an online index, such as the index used in this study?
- With which method of finding information do you think you were most successful?
- Did you know what an index was before this study?
- After this study, are you more likely to use an online index? If so, in what situations would you use the index?

Finding-task questions for 2006 study

- Does the library have any job openings?
- For how long can an undergraduate keep a book checked out?
- Who would you contact if you wanted to give books or money to the library?
- Is there a charge for overdue books?
- Is there any information about evaluating resources?
- What time does the library open?

Follow-up questions for 2006 study

- With which method of finding information do you think you were most successful?
- What is your preferred method when navigating a website?
- What did you think of the 'Find it Fast' logo? (only for users who participated in the mock-up study).

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