ARL Library Catalog Department Web Sites

An Evaluative Study

Kavita Mundle, Harvey Huie, and Nirmala S. Bangalore

User-friendly and content-rich Web sites are indispensable for any knowledge-based organization. Web site evaluation studies point to ways to improve the efficiency and usability of Web sites. Library catalog or technical services department Web sites have proliferated in the past few years, but there is no systematic and accepted method that evaluates the performance of these Web sites. An earlier study by Mundle, Zhao, and Bangalore evaluated catalog department Web sites within the consortium of the Committee on Institutional Cooperation (CIC) libraries, proposed a model to assess these Web sites, and recommended desirable features for them. The present study was undertaken to test the model further and to assess the recommended features. The study evaluated the catalog department Web sites of Association of Research Libraries members. It validated the model proposed, and confirmed the use of the performance index (PI) as an objective measure to assess the usability or workability of a catalog department Web site. The model advocates using a PI of 1.5 as the benchmark for catalog department Web site evaluation by employing the study tool and scoring method suggested in this paper.

No library could function in today's information society without well-designed and well-maintained Web sites. Individual departments within the library also need adequate Web presence. Clientele for departmental library Web sites is different from the general library Web sites. For catalogers, their department Web site should provide access to sources for cataloging and classification, local policies and procedures, a departmental staff directory, and other useful and relevant information from within and outside the unit.

Background

Although many catalog departments or technical services operations have developed their Web sites, the published literature reporting their existence, development, or design remains scanty. Catalog department Web sites act as a gateway to important local and external cataloging-related resources in an organized way. Catalogers use these Web sites to get information about their department and its local policies and procedures, find out about recent changes to rules, and educate themselves about emerging standards, new trends, and other developments happening in the field. Cataloging is a dynamic and constantly evolving field; thus, catalog department Web sites must undergo periodic assessments or evaluations to determine if updates or revisions are necessary. Although a few attempts were made in the past at evaluating general library Web pages,

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assessment of departmental Web pages, particularly those of technical services, catalog departments, or both, have been missing. The authors sought to bridge this gap with an earlier pilot study that evaluated the catalog department Web pages of thirteen member libraries of the Committee on Institutional Cooperation (CIC).[1] Their study proposed a model to evaluate the performance of a catalog department Web page and recommended desirable features for such Web sites. To assess their recommendations, and to test their model, authors of this paper studied a larger group of research libraries—members of the Association for Research Libraries (ARL), which includes the thirteen CIC libraries. The specific objectives of the current study were to:

- test the model devised previously by expanding the study to 123 ARL member institution libraries (including all CIC libraries); and
- assess whether recommendations made in the earlier study enhance the performance and workability of the catalog department Web sites.

ARL is a not-for-profit membership organization comprising most of the leading research libraries in North America. In the world of library and information sciences, ARL member libraries are leaders and early adopters as well as adapters of cutting-edge technology. Member libraries investigate, implement, and disseminate best practices; assess services; and monitor trends in the library world. Developments seen among ARL libraries often spread to other institutions. Although the individual member libraries differ in size and makeup, overall they share the same traditions of service, commitment of staff to lifelong learning, and broadening access to materials. These characteristics make ARL libraries a suitable study group for this study.

Literature Review

Designing, creating, and maintaining catalog department Web sites is not an easy task. Among other things, frequently changing cataloging rules, paradigm shifts in the profession and the specialization, changing curricula, realignment of institutional priorities, and lack of monetary and human resources pose challenges. Literature addressing academic library Web sites has focused mainly on design and appearance, content, organization, and usability studies. Evaluative studies in the past have used investigator or end user perspectives while evaluating library Web sites.

Investigator Perspectives

Many studies have highlighted the design aspects of Web sites. King scrutinized 120 ARL library main Web sites to compare design similarities and differences.[2] His study concentrated on page background, document headers and footers, graphics, hypertext links, and page length. He found that the typical ARL site had 22 links on the main page. Stover and Zink reviewed 40 higher education library Web pages to assess the quality of design with respect to their trends, patterns, and anomalies.[3] In an interview with CNN reporter Kristie Lu Stout, Web page design guru Nielsen stated that the biggest mistake in Web design is not telling people what the site is about and what they can do on the site, being very indirect, and putting information in hypertalk.[4] He advised designers not to design the site for themselves, but for the average person. Johnson assessed 32 acquisitions department Web sites of academic libraries for page design, eye appeal, originality, and usefulness.[5] Concluding that many of these sites were conceived and mounted hastily, he argued for more thoughtfully designed Web sites and provided a useful checklist for developing a new site or evaluating and redesigning an existing site. Cottrell and Eisenberg studied the design of Web pages that facilitate information seeking and problem solving, and urged designers to agree on a basic set of objectives, such as "minimizing download time, avoiding flashing text or insufficient color contrast, keeping content near the top . . . [concentrating] on meeting the needs of their users."[6]

Cohen and Still examined Web sites of 50 universities and 50 two-year colleges for their content and functionality.[7] They hypothesized that sites should serve as tools for information, reference, research, and instruction. They discovered a core common content, regardless of the type of institution; however, the scope and scale differed. The results showed that the Web sites of two-year colleges offer fewer resources compared to the resources offered by larger libraries, where users select from a vast number and variety of materials. Sweet provided directions for novice Web masters in developing and designing Web pages.[8] He advised them to look at other pages for ideas and remember that Web pages are primarily designed to distribute information to people.

End Users Perspectives

Testing library Web sites for usability by involving users and their experiences is another area that is receiving considerable attention in the evaluation of library Web sites. Norlin and Winters provided suggestions for organizing testing groups and methods for testing and retesting of library Web sites.[9] They provided basic steps in designing and administering usability testing from beginning to end. McGillis and Toms tested the usability of the Memorial University of Newfoundland Libraries Web site with 36 participants who performed 6 tasks.[10] Results of their study showed that users found the information on the site not very intuitive; they

did not know where to begin, and they interacted poorly with the site. The authors concluded that libraries must take a systematic user-centered approach in developing their Web sites. An article by Benjes and Brown described a library Web site usability study at the University of Southern California, Norris Medical Library.[11] The authors tested the existing Web site and then tested the redesigned library Web site. The initial test results, with 7 participants, showed that users had difficulty in understanding the terminology, the navigation, and the color scheme of the library Web site. After testing the redesigned site, the researchers found that users learned more as they navigated through the site and the problems with the terminology lessened but were not completely eliminated. Another usability study by Travis and Norlin examined students' use of two electronic research library Web sites, Questia and Blackboard, and then compared it with two large university library Web sites—University of Arizona and California State University, Long Beach.[12] The major finding of the study was that the design of the site affected the success of students doing research. Students rated the University of Arizona as the best site, followed by Questia. The sites' overall design, navigation, and ease of finding specific information increased their usability. The study also showed that students often did not read the entire page, and instead looked for keyword, hyperlinks, or search boxes; they did not understand such terminology as "items" and "resources." Further, Wyman, Beachboard, and McClure studied federal library Web sites to learn which federal Web sites meet the needs of their users.[13] Their study developed evaluation tools that were based on user feedback and some technical criteria. The usability studies summarized above underscore the importance of designing user-centered Web sites, and showed that usability studies assist Web designers in developing intuitive and user-friendly Web sites.

Technical Services Web Sites Evaluation

Published research on technical services and catalog department Web sites remains relatively uncommon. Two studies have reported the creation and the development of such sites. Council, Lang, and Scott described their experiences in building Web sites for their technical services departments at Fayetteville State University and University of Cincinnati respectively.[14] They covered the questions to be asked before developing a site, information to be collected, and responsibilities of creating and maintaining content. A study conducted by Harizan and Khoon outlined the process of creating a cataloging Web site at Nanyang Technological University in Singapore.[15] An article by Scheschy pointed to a wealth of information available on the Web that could be of interest to technical services librarians.[16] Scheschy provided a good overview of resources related to acquisitions, cataloging, and serials, and also recommended that technical services staff create a home page to combine local information with access to remote sites.

Chressanthis and Wesley surveyed the technical services Web sites of National Association of State Universities and Land Grant Colleges members.[17] They tested accessibility, presence of hot links, webmasters' roles, and design details. They found that only 67 percent of members had technical services Web sites, and concluded that these pages serve as public relations tools and as content-rich information resources. A study by Wang and Gao examined 60 randomly selected academic library Web sites from June to July 2003 and found that only 12 had technical services Web sites.[18] They concluded that larger research institution libraries are more likely to have a technical services Web presence than other libraries. A study by Mundle, Zhao, and Bangalore proposed an objective measure called the performance index to measure the effectiveness of a catalog department Web site.[19] The study applied the index to 13 CIC Web sites and recommended features that would enhance the workability of a catalog department Web site.

To test the validity of the evaluation model proposed by Mundle, Zhao, and Bangalore, and to verify their recommended features for a catalog department Web site, the present authors undertook a larger study of 123 ARL libraries. This study takes into account the investigators' evaluation perspectives, which in this case are the authors of this study.

Method

To test the validity of the evaluation model, the present study evaluated the catalog department Web sites of ARL member institution libraries. The study tool consists of four parameters: accessibility, design and structure, internal documentation, and external resources. The individual queries were designed to gather well-rounded information about each parameter. Accessibility assessed multiple links to and from the catalog department Web pages. Subsequently, design and structure evaluated the esthetics, such as graphics. While internal documentation elucidated information regarding catalog department operations and its internal resources, external resources parameter emphasized the availability of information for the professional enrichment of catalogers.

Study Design

A template (see appendix) was used to gather data from all ARL member institution Web sites. The current study instrument used the same template developed for the pilot study, with minor modifications, and added one question to

the accessibility parameter—whether a catalog department Web page was linked from the library's Web page. Further in the same parameter, the option "Tech services only" was added to the original question ("Is the page linked to Technical Services Web page?") Additionally, for the question "When was it [Web page] last updated," the responses were grouped into three categories of "0–3 months ago," "3–6 months ago," and "over 6 months." Further, in the internal documentation parameter, the word "resources" was added to the question, "Does it provide links to the cataloging tool such as?" For clarity purposes, individual questions in each parameter were numbered.

The template was in the form of a questionnaire. Of 32 questions, 24 questions were either answered "yes" or "no"; 2 "yes," "no," or "somewhat"; 1 question had "yes," "no," or "technical services only" response; and 5 had nominal answers. Each of the three investigators examined the Web sites from November 1 through December 16, 2004, and independently rated the same Web sites on the same day. In addition, each Web site was reviewed only once, and any updates made to any Web site after being evaluated were not taken into consideration. The investigators compared their findings and determined the final ratings. In a few instances, the technical services or catalog department heads were contacted to obtain access to the catalog department pages that could not be located through a library site search or a Web engine search. The Web sites of 25 institutions could not be accessed because these sites were on their intranet, and access was denied due to institutional policies and password restrictions. Additionally, 2 of the other Web sites also could not be accessed because one had a broken link and the other site was under construction. Thus, no further analysis was possible beyond evaluating user accessibility in these 27 Web sites. Six institutions had no Web sites for their catalog departments or technical services units, and 3 institutions did not respond to inquiries. As a result, 36 Web sites were not studied, other than to be assessed for outside user access. Four of the 87 Web sites were undergoing revision at the time of testing. In cases of institutions with multiple campuses, only the main campus library Web site with corresponding catalog department or technical services Web sites were taken into consideration. For institutions that did not have a separate or a dedicated Web page for the catalog department, cataloging-related information was evaluated from their technical services Web sites. Because these technical services Web sites were organized either by sections or by function, it was easy to ascertain which links provided cataloging related information.

Scoring Study Responses

A rating scale was used to score individual responses. In the 24 "yes" or "no" questions, a rating of "yes" was scored as 2 and "no" as 1. In the case of the design and structure parameter, for the two questions that had a rating "somewhat" (that is between "yes" and "no"), a score of 1.5 was assigned. Additionally, while scoring the question, "Is the page linked to Technical services Web page?" under the accessibility parameter, for a "Tech services only" response, a score of 1.5 was used and only cataloging-related information was evaluated. For the few publicly accessible Web sites that consisted of only a single page, uniformity in the design could not be fully addressed. In these cases, a score of "0" (zero) was used for the following questions, "Does each page have the same header and footer?" and "Does each page have the same background color?" Moreover, many catalog department Web sites exhibited a mix of direct as well as indirect links to external resources. Direct links connect to the actual resource (reference tools, professional journals and literature, professional organizations) via a single link and were scored as 2. Indirect links require multiple clicks, often via an initial link to an outside resource or portal, such as, "Internet library for Librarians" or "Catalogers' toolbox," and were scored as 1.5. A percentage of institutions under each scoring category for every question (by individual study parameter) was determined and plotted.

Special consideration was given while scoring the five nominal questions. For the question "Who designed the Web page?" (design and structure parameter), the responses were grouped into one of these four categories: Catalog Department, Library Systems, Outside Agency, or Can't decide. Then a percentage response was calculated for each specific category. In the case of the question, "When was the page last updated?" (design and structure parameter), all responses were sorted by their date and grouped as "within three months," "between three to six months," or "over six months," and respective percentages were calculated for each. While scoring a question under internal documentation, "Does it include contact information?" (e-mail, phone number, fax number, and mailing address for a given Web site), the presence of all forms of contact was scored as "yes," absence of all forms of contact information was scored as "no," and the presence of one to three forms of contact information was scored as "incomplete." Then for each Web site, the percentage of each category was determined (for example, scores, 2, 1, 1.5). Local policies and procedures information was organized either alphabetically, by format, or by subject. For every Web site, a percentage response was calculated for each method of organization in order to obtain an answer to the nominal question, "How are they [policies and procedures] organized?" For the question, "Does it [Web page] provide links to cataloging resources or tools?" a percentage response was calculated for each cataloging resource, such as Online Computer Library Center (OCLC), Library of Congress (LC), Machine-Readable Cataloging (MARC), Cooperative Online Serials Program

(CONSER), Name Authority Component (NACO), Monographic Bibliographic Record Component (BIBCO), Subject Authority Component (SACO), and others. Links to these resources not only provide cataloging-related information, but also act as tools to help with cataloging.

Statistical Analysis

Statistical data analysis was performed to assess the validity of the study tool, ascertain if any interrelationships among individual study parameters exist, and rate the performance of individual Web sites. A "*P* value" of <0.05 was considered significant in all the statistical applications.

- **Determination of the Performance Index (PI).** For each institution, a mean score for a specific study parameter (accessibility, design and structure, internal documentation, external resources) was calculated based on the scores of individual questions under that study parameter. Subsequently, the performance index (PI) was determined as the mean of scores of all four study parameters for every individual institution.
- **Determining interrelationships among study parameters.** Spearman's correlation coefficient test was used to determine the interrelationships among the four study parameters for the entire group of 87 institutions. Further, to determine the relative impact of individual study parameters on the PI, again using Spearman's correlation coefficient test, correlation between every study parameter and PI was assessed.
- **Categorization of institutions into low, average, and high performers.** The mean PI and its standard deviation (SD) were calculated for the entire group of 87 institutions. Subsequently, values for mean – SD and mean + SD were determined as the lower and the upper limit of the range of average PI. The institutions with PI falling in the range (mean ± SD) were thus grouped as average performers. Those with PI less than the range (< mean – SD) were grouped as low performers, while those with PI more than the average range (> mean + SD) were grouped as high performers.
- **Comparing high, low, and average performers.** The mean scores of individual study parameters in all three groups—high, low, and average performers—were compared. An independent sample student's "*t*" test was utilized to see if the mean scores in the individual study parameters in all three groups differ significantly.
- **Identification of the highest and the lowest performers.** To identify the highest and lowest performing Web sites within their respective groups, the performance index of individual institutions in both the groups was compared with the average PI of the entire group of 87 institutions using a paired sample "*t*" test.

Results

The 36 Web sites that could not be accessed were rated only on the accessibility parameter, but were excluded from the final analysis. To normalize the relative proportion of responses in individual parameters for all institutions, percentage responses were plotted.

Analysis of Individual Study Parameters

Accessibility

As seen in figure 1, 70.7 percent (87 of 123) of all Web pages in the study provided access to outside users. Henceforth, percentages are determined using the 87 libraries that provide access. Of the catalog department Web pages, 89.6 percent (78 of 87) had a link to their main library Web page. Only 73.6 percent (64 of 87) of the Web pages were linked from their main library's Web page (i.e., the first library page visible to the public). The links either led directly to catalog department Web pages or to technical services Web pages. Moreover, 18.4 percent (16 of 87) of the libraries opted to have a centralized page for technical services rather than having a separate page for the catalog department. Interestingly, 63.2 percent (55 of 87) of the catalog department Web pages were not linked to their technical services Web pages and 71.3 percent (62 of 87) of the Web pages provided a link to their institution or university Web page.

Design and Structure

Predominantly, the Web pages of individual libraries were uniformly designed with the same header and footer (67.8 percent; 59 of 87) and background color (69 percent; 60 of 87) throughout, as seen in figure 2. Eighty-six percent of the Web pages showed good navigational features. A majority (59.8 percent; 52 of 87) had a search function capability that helped in easy navigation of the site. Only 35.6 percent (31 of 87) of the Web pages had interactive forms for reporting cataloging errors, requesting a rush cataloging, or other forms, such as for requesting a purchase of a book or a journal. One of the striking features observed is the absence of graphics on all ARL Web pages studied. A significant 96.5 percent (84 of 87) did not have any graphics that might (or might not) enhance the visual appeal of the Web page. Very often, the choice of font type and background color is governed by the institutional Web page development standards. The researchers found that in 29.9 percent (26 of 87) of

the cases, fonts and background color added to the overall appeal of the pages. They rated 56.3 percent (49 of 87) of the Web pages moderately or reasonably appealing with respect to their fonts and background color. Catalog department personnel designed 43.7 percent (38 of 87) of the Web pages, library systems unit staff designed 12.6 percent (11 of 87), and an outside agency designed 5.7 percent (5 of 87) of the Web pages. A majority of the Web pages, 57.5 percent (50 of 87), were updated within three months of the study, 16.1 percent (14 of 87) were updated between three to six months before the study, and 17.2 percent (15 of 87) were updated more than six months before the study was conducted. Of the 8 remaining Web sites, 2 sites were updated in 2004, but had no specific date mentioned, and 6 of the Web sites did not mention when they were updated.

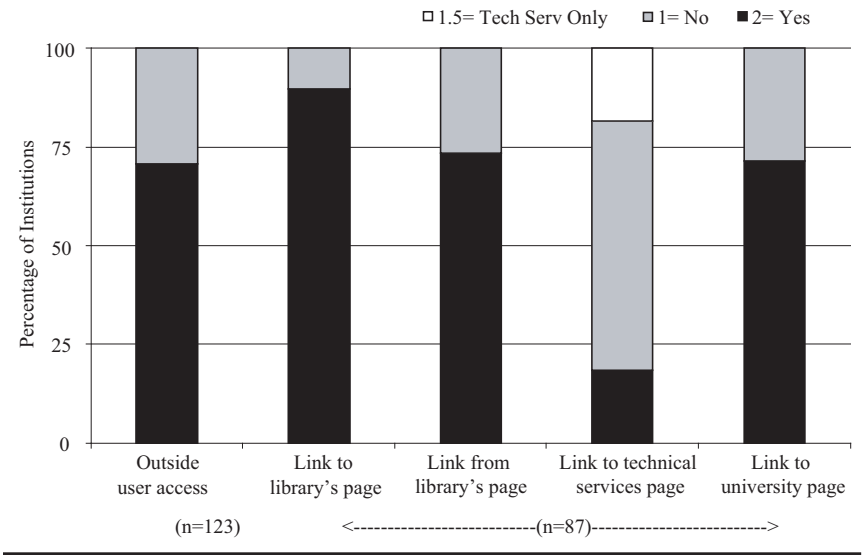

Figure 1. Accessibility

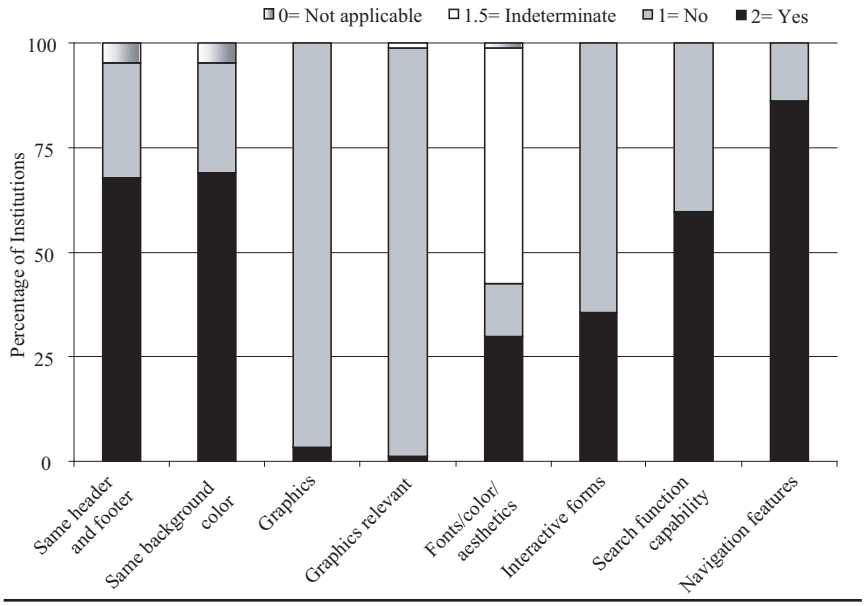

Figure 2. Design and structure

Internal Documentation

As seen in figure 3, 83.9 percent (73 of 87) of the Web pages described the mission of the catalog or technical services department. A significant majority (95.4 percent; 83 of 87) of Web sites had some form of contact information. In 81.6 percent (71 of 87) of the Web pages, the information on local policies and procedures was presented in great detail. These policies and procedures were arranged either alphabetically by subject or by format. Since this nominal question was not scored, the data was not plotted in figure 3. Links to various cataloging tools for catalogers' consultation were seen in 83.9 percent (73 out of 87) of the Web sites. Only 9.1 percent (8 of 87) of the Web sites had cataloging cheat sheets. Annual reports or statistical information about the department were provided in 34.5 percent (30 of 87) of the Web sites, and only 21.1 percent (19 out of 87) offered links to various meeting minutes. Moreover, only 11.5 percent (10 of 87) pages provided links to a "Department Newsletter." Information about on-going departmental projects was available on 20.7 percent (18 of 87) of the Web sites. Only 17.2 percent (15 of 87) of the sites posted a training or trainer's manual online.

External Resources

Many catalog department Web sites displayed a mix of direct as well as indirect links to external resources. Overall, 26.4 percent (23 of 87) of Web sites exhibited no links to any of the external resources mentioned in the study tool, 3 of the Web sites provided only indirect links to the external resources, 6.9 percent (6 of 87) showed direct links to all external resource categories, and 63.2 percent (55 of 87) Web sites displayed a mix of direct, indirect, or no links to the various external resources categories.

Figure 4 illustrates the percentages of direct, indirect, or no links in each category in greater detail. As shown in figure 4, 70.1 percent (61 of 87) of the Web pages provided links to reference sources, such as language dictionaries or encyclopedias; 38 provided direct access, and 23 provided indirect access. Links to outside technical services or catalog department Web pages were present in 66.6 percent (58 of 87) of the Web pages; 41 provided direct access, and 17 provided indirect access. Another 66.6 percent of the pages provided links to professional journals and literature. About 65 percent of the sites linked to helpful electronic discussions lists, like AUTOCAT, SERIALST, and others (32 percent direct and 33 percent indirect). Further, 65 percent of the Web sites provided links to professional organizations (e.g. American Library Association (ALA), Medical Library Association (MLA), and North American Serials Interest Group (NASIG) (direct, 34 percent, and indirect, 31 percent).

Assessment of Interrelationships between Individual Study Parameters and Performance Index

A relative proportion of responses for every parameter for every institution was determined by calculating percentages. To illustrate, 78 of 87 catalog department Web pages linked to the library's Web page, for a percentage of 89.7. Then, an average score for a specific parameter was calculated for every institution. For example, if an institution had scored 2 for every question on the accessibility parameter, then the average score for accessibility of that institution is 2. Finally, the performance index was determined as the mean of scores for all four study parameters in individual institutions (n=87). For example, if an institution had a score of 2 for accessibility, 1.7 for design and structure, 1.7 for internal documentation, and 2 for external resources, the performance index (the mean score of all four parameters) would be 1.85, which would be rounded off to 1.9 to avoid robustness of data for the scope of this study. In all subsequent statistical analyses, however, the calculations are used up to two decimal points. Subsequently, the interrelationships among all 4 study parameters and the performance index of every institution were assessed using Spearman's correlation coefficient test. A positive correlation was observed between the internal documentation and

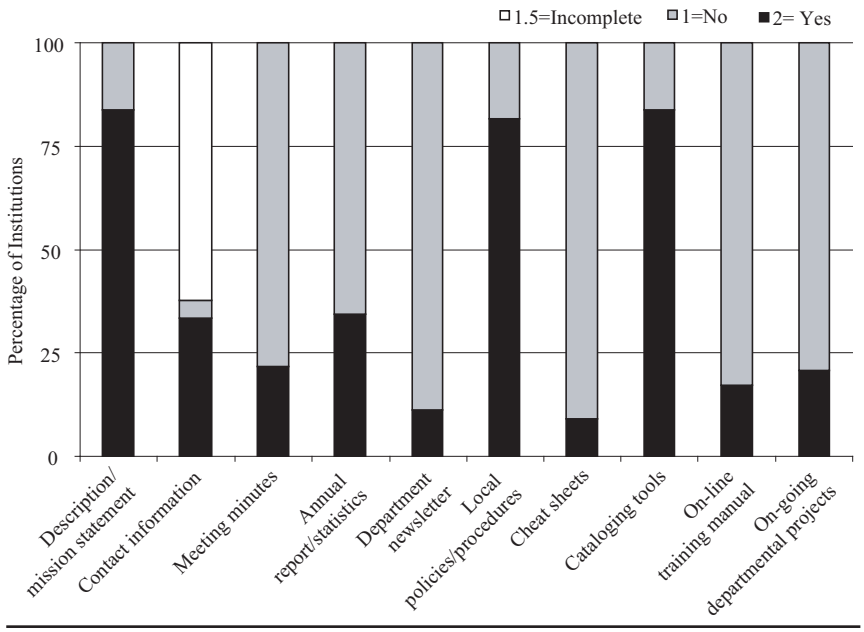

Figure 3. Internal documentation

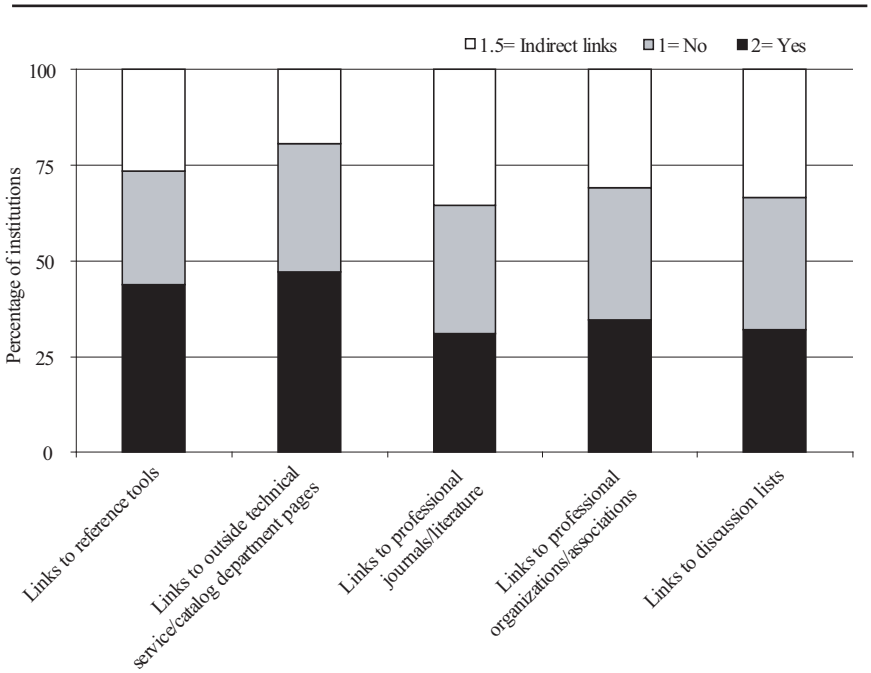

Figure 4. External resources

external resources study parameters (correlation coefficient "r"= 0.209, p = 0.05). This observation parallels the authors' earlier finding.[20] Moreover, the performance index was significantly correlated with all four study parameters: accessibility ("r"= 0.43, p<0.001); design and structure ("r"=0.46, p<0.001); internal documentation ("r"=0.49, p<0.001), and external resources ("r"=0.70, p<0.001). This finding indicates that all parameters significantly influence the value of performance index, which in turn determines the workability of a Web page. Of all the parameters, access to external resources showed the highest correlation coefficient indicating most cogent relationship with the PI.

Determination of Mean Performance Index and Categorization of Study Subgroups

The performance index of the 87 institutions studied ranges from 1.2 to 1.9. In order to rank the performance of individual Web pages, first the mean performance index for the entire group was determined. It was found to be 1.54, which is in line with the earlier study.[21] Further, to subgroup the institutions on the basis of PI, the range for average performance was calculated as mean PI ± standard deviation of the mean (1.54 ± 0.13). Accordingly, the institutions with PI between 1.41 and 1.67 were grouped as the average PI group (i.e., PI=1.5 and 1.6; n=50). The institutions with PI < 1.41 were regarded as the low PI group (i.e., PI=1.2, 1.3, and 1.4; n=16) and those with PI > 1.67 were categorized as the high PI group (i.e., PI=1.7, 1.8, and 1.9; n=21).

Comparison of Different Study Subgroups

The mean PI of individual study parameters differed significantly in the three groups. Further, individual study parameters in low and high PI groups were compared with the average PI group using independent sample student's *t*-test. As shown in table 1, mean scores for all four study parameters were found to be significantly different in the three groups. This again substantiates the observation that each of the four parameters has a significant bearing on the PI and hence on the workability of a Web page. The mean scores for accessibility, design and structure, and internal documentation in the three groups showed a pattern of steady difference from low to average to high PI groups (see figure 5). The mean of external resources manifested a noticeably pronounced difference in the three groups. Whereas 75 percent (12 of 16) institutions in the low PI group did not show links to any external resources, all institutions in the high PI group consistently showed links to various external resources, with more than 75 percent institutions scoring extremely high on the study tool.

Testing the Recommendations of the Previous Study

The authors' earlier study on evaluating catalog department Web sites of CIC libraries recommended that a catalog department Web site should have:

- access through the library Web site, when permitted;
- intuitive navigational features;
- relevant and updated content through internal documentation (including contact information and local policies and procedures, cataloging tools); and
- links to external resources (including links to professional literature, professional organizations).

They also suggested that the following features would enhance the usability and appeal of a Web page:

- search function capability;
- interactive reporting of cataloging errors; and
- uniformity in design and appearance of Web pages within the site.[22]

The present study tested these recommendations against all 87 Web sites of ARL institution libraries in the present study; the results are presented in table 2. Of all the recommendations, contact information was the best addressed feature. Contact information was based on Web sites having at least one of the features (e-mail, phone number, fax, and mailing address). Preference was given to e-mail (92 percent; 80 of 87), phone number (90.8 percent; 79 of 87), and

Table 1. Comparative profile of mean scores for four parameters and PI in three study groups

Study groups	Accessibility	Design and structure	Internal documentation	External resources	Performance index
Low PI (n=16)	1.61± 0.05 (p=0.027)	1.29 ±0.06 (p=0.002)	1.34 ±0.05 (p=0.038)	1.11±0.06 (p<0.001)	1.33 ±0.02 (p<0.001)
Average PI (n=50)	1.72 ±0.02	1.47 ±0.02	1.44 ±0.02	1.53 ±0.05	1.55 ±0.01
High PI (n=21)	1.83 ±0.03 (p=0.005)	1.58 ±0.04 (p=0.028)	1.59 ±0.03 (p=0.001)	1.82 ±0.03 (p<0.001)	1.72 ±0.01 (p<0.001)

Note: Values expressed as Mean± Std. Error of mean; P value as compared to corresponding values in Average PI Group.

mailing address (70.1 percent; 61 of 87). Similarly, links to cataloging resources or tools were based on the number of Web sites that had at least one related link. The most attention was given to tools like OCLC (78.2 percent, 68 of 87), LC (77 percent, 67 of 87), and MARC (65.5 percent, 57 of 87), CONSER (32.2 percent, 28 of 87), NACO (29.9 percent, 26 of 87), SACO (23 percent, 20 of 87), and BIBCO (20.7 percent, 18 of 87). Only two pages had links to the National Library of Medicine (NLM) and Medical Subject Headings (MeSH) and none had a link to the Dewey Decimal Classification (DDC) system. With regard to the enhanced features, 69 percent (60 of 87) of the Web pages appear to be uniformly designed with respect to their headers and footers and background color information.

Identification of the Highest and the Lowest Performing Institutions

Among the low and high PI groups, the PI of individual institutions was compared with the mean PI of the entire group of 87 institutions. A paired sample "*t*" test showed significantly high PI for three institutions (p=0.018, p=0.024, p=0.015, respectively) and significantly low PI for two institutions (p=0.029 and p=0.046, respectively). The absence of graphics, and the absence of "Department Newsletter" were the only two negative points noted in all three highest performers and in the two lowest performers. Graphics take a longer time to load—for this reason, some institutions may not have them on their Web pages. The highest and lowest performers were compared against the recommendations made in the authors' earlier study. The three high performers scored meritoriously on all recommended and also on enhanced features (see table 3). The two low-performing institutions scored weakly on all recommended features. Although the two low performers had detailed local policies and procedures information, lack of a search function capability, contact information, and links to external resources lowered their performance. One of the lowest performing sites was not fully developed as it had just been mounted, which may have affected its overall performance.

Table 2: Percentage of ARL library web sites showing recommended and enhanced features (n=87)

Features	Percentage of sites
A) Recommended	
Access from library Web page	73.56
Intuitive navigational features	86.21
Contact information	95.40
Local policies/procedures	81.61
Links to cataloging tools	85.06
Links to professional organizations	65.52
Links to professional journals/literature	66.67
(B) Enhanced features	
Search function	59.77
Interactive reporting of cataloging errors, rush cataloging request forms	35.63
Uniform header and footer	67.82
Uniform background color	68.97

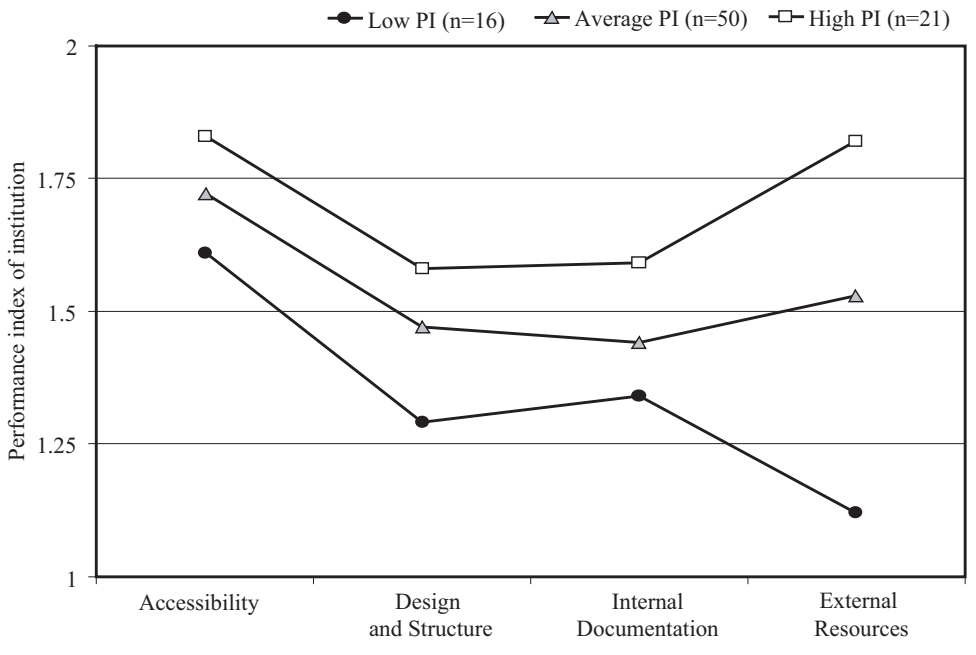

Figure 5. Mean PI of high, average, and low ranked institutions

Discussion

This study validated the model previously proposed by the authors, and also confirmed PI as an objective measure of a Web site's usability or workability. A PI of 1.5 has emerged as an average score. This report suggests that a PI of 1.5 could be used as a benchmark when a Web site's performance is analyzed by using the study tool and the scoring system suggested in this paper.

The need for standardizing Web page design and content is emphasized in the library literature. Balas pointed out that "standards [may] stifle innovation and creativity, and . . . that a rigid standard that cannot be extended to include new technologies has no place in our increasingly digital world. However, in order to have all the pieces of our world of digital information work together smoothly and seamlessly, we need well-developed, extendable standards."[23] Thus, in the light of Balas's comment, the study tool and the PI provide a framework for standardization that allows flexibility to meet local needs and serve as a useful guide to catalog librarians in developing Web sites for catalog departments.

The efficiency, effectiveness, and user-friendliness of any Web site are the key factors that determine its success or performance. Most Web evaluation studies focus on evaluating Web site usability by measuring its design, organization of content, navigational features, graphics, user-friendliness, and links relevant to the intended users.[24] All these features are well-represented in the study tool in the form of four parameters—accessibility, design and structure, internal documentation, and external resources. The PI, which is the mean of scores of all study parameters, not only determines the usability or workability of the Web page, but also determines the degree to which a catalog department Web site meets the needs of that department.

Considerable effort is required to maintain and update Web sites. To keep Web sites active and dynamic, Ryan proposed that a library should develop and follow a regular schedule of maintenance and update procedures.[25] She also asserted that, although many pages will be updated on an as-needed basis, all departmental and informational pages should be verified at least once a semester. The present study showed that a majority of the Web sites, 57.5 percent (50 of 87) were updated within the last three months of study. Thus, a use of PI for periodic evaluation of a catalog department Web site could easily fulfill Ryan's recommendations.

Of all parameters, the external resources showed the highest correlation ('r"=0.70) with PI. Statistically speaking, the higher the score of external resources parameter, the higher the PI score. Of 87 Web sites studied, 23 Web sites showed no links to external resources. This skews the correlation of the external resources parameter on the PI values for those Web sites, but the study tool still would validly assess how catalog departments performed on the external resources parameter by scoring "1" (indicating "no" response) on the external resources parameter.

Another interesting finding—how institutions differ in the number of links they provide to various external resources and whether they link directly or indirectly—deserves special mention. The differences in their practices could be attributed to a variety of reasons. Institutions may design Web sites specifically for support staff, professionals, or both; they may cater to a specific audience, which may affect the types of materials they catalog; they may have concerns

Table 3: Comparison of recommended and enhanced features in highest and lowest performers

Features	Number of institutions showing the presence of a feature	
(A) Recommended	**Highest Performers (n=3)**	**Lowest Performers (n=2)**
Access from library Web page	3	0
Intuitive navigational features	3	1
Contact information	3	0
Local policies/procedures	3	2
Links to cataloging tools	3	0
Links to professional organizations	2	0
Links to professional journals/literature	3	0
(B) Enhanced		
Search function	3	0
Interactive reporting of cataloging errors, rush cataloging request, etc.	3	0
Uniform header and footer	2	2
Uniform background color	3	2

about the time spent in updating the external resources links due to staff shortage and shrinking budgets; and they may not want to duplicate the effort, as other comprehensive sites already exist for ready reference. These factors do influence the overall scoring of the external resources parameter and thereby affect the value of the performance index.

A positive correlation observed between internal documentation and external resources study parameters corroborates the observation in the authors' previous study.[26] These two parameters serve different purposes and complement each other. Information contained within internal documentation helps catalogers increase their job efficiency or functionality and their awareness about the department. At the same time, external resources provide diverse information that helps catalogers in their professional growth and development, and emphasizes institutional attention to the professional development of the catalogers. The study tool comprehensively and effectively assesses internal documentation and external resources.

The validity of any evaluative study tool is based on two factors: (a) if each question in the tool can elicit a unique clear answer, and (b) if each question affects the final outcome for which the study tool is intended. With respect to the study tool, the final outcome is the PI that measures the workability of a Web site. While evaluating all 87 ARL Web sites, each individual question received a unique answer that could be scored directly. A statistically significant positive correlation of each study parameter with the PI thus offered comprehensive validation of the study tool developed by the authors.

Among all 87 institutions (see table 2), contact information was the most prevalent of the recommended features. Similarly, with the enhanced features, 68 percent of the pages showed uniformity in the overall design of Web pages with respect to their enhanced features. Further, the three highest performers (see table 3) fulfilled almost all the recommendations (except one site, which had indirect links to professional organizations) and exhibited almost all of the enhanced features (except one site, which lacked uniformity in the header and footer design) and thus ranked higher among all 87 institutions. Conversely, although the two low performers had detailed local policies and procedures, showed uniformity in the overall design aspect of the Web sites, and one of the Web sites had good navigational features, both lacked in the other recommended features. Thus, these observations further support the authors' recommendations about "recommended" and "enhanced features" for a catalog department Web site. Furthermore, these findings illustrate the effectiveness and the usefulness of the study tool and substantiate the model proposed for the evaluation of catalog department Web sites.

Conclusion

The present study validates the model proposed by the authors in their pilot study for the evaluation of a catalog department Web site. The study also confirms the use of PI, which is the mean of scores of all study parameters, as an objective measure of usability and workability of a Web site. The proposed model serves as a useful guide to catalog librarians in developing and maintaining Web sites for catalog departments that have standard features. The model advocates using the study tool described, determining the PI based on the scoring system suggested, and then comparing the PI of a Web page with the average PI of 1.5 to ascertain the performance of an individual Web site. All the study parameters included in the study tool (accessibility, design and structure, internal documentation, and external resources) greatly affect the performance index of a catalog department Web site. Moreover, each question in the study tool seeks a unique answer that in turn affects the value of the performance index and thus underscores the study tool's comprehensiveness and efficacy.

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Appendix: Template for Evaluating Catalog Department Web Pages

Accessibility

1. Can outside users access the Web page? ❑ Yes ❑ No
2. Is the page linked to library's Web page? ❑ Yes ❑ No
3. Is the page linked from library's Web page? ❑ Yes ❑ No
4. Is the page linked to Technical Services Web page? ❑ Yes ❑ No ❑ Tech Services only
5. Is the page linked to university Web page? ❑ Yes ❑ No

Design and Structure

6. Is the page uniformly designed:
   Does each page have the same header and footer? ❑ Yes ❑ No
   Does each page have the same background color? ❑ Yes ❑ No
7. Does it have any graphics? ❑ Yes ❑ No
   Are the graphics adding any relevancy to the page? ❑ Yes ❑ Somewhat ❑ No
8. Do fonts, background color add aesthetics to the overall design of the page? ❑ Yes ❑ Somewhat ❑ No
9. Who designed the Web page? ❑ Cat ❑ Dept. ❑ Lib ❑ Syst. ❑ Outside Agency ❑ Can't Decide
10. When was it last updated? ❑ 0–3 months ago ❑ 3–6 months ago ❑ more than 6 months ago
11. Does the page have any interactive form for reporting cataloging errors, requesting rush cataloging, or other queries? ❑ Yes ❑ No
12. Does it have a search function capability? ❑ Yes No
13. Are there any navigation features present? ❑ Yes ❑ No

Internal Documentation

Does it include:

14. Description/Mission statement of the department? ❑ Yes ❑ No
15. Contact information (e-mail, phone, fax, mailing address)? ❑ Yes ❑ No
16. Meeting minutes? ❑ Yes ❑ No
17. Annual Reports/Statistics? ❑ Yes ❑ No
18. Department newsletter? ❑ Yes ❑ No
19. Does the page have local policies and procedures? ❑ Yes ❑ No

    If yes, proceed further:
    Are the policies detailed? ❑ Yes ❑ No
    How are they organized? ❑ Format ❑ Subject ❑ Alphabetical
20. Are there any cheat sheets provided? ❑ Yes ❑ No
21. Does it provide links to the cataloging resources or tools such as OCLC, LC, NLM, MeSH, DDC or any others? ❑ Yes ❑ No
22. Does it have training/trainer's manual online? ❑ Yes ❑ No
23. Are ongoing projects in the department listed? ❑ Yes ❑ No

External Resources

24. Are there any reference tools listed? ❑ Yes ❑ No
25. Any links to outside technical services or catalog departments' home pages? ❑ Yes ❑ No
26. Links to professional journals/literature? ❑ Yes ❑ No
27. Links to professional organizations/associations? ❑ Yes ❑ No
28. Links to electronic discussion lists? ❑ Yes ❑ No