

# A Design Analysis of Indiana Public Library Homepages

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## **Abstract**

This paper describes the results of an analysis of 430 Indiana public library homepages. The authors examined each homepage for 129 total elements, such as navigation, search, content, and

Web 2.0 features. Our findings reveal common trends in public library homepage design, including 21 elements that appear on at least half the surveyed homepages. The results of this study provide a profile of public library homepage design in Indiana. Additionally, this study blends two pre-existing library content checklists in order to provide a replicable methodology for additional libraries to apply to their homepages or websites.

### **Keywords**

World Wide Web, web site design, public libraries, homepage design, library websites, design elements, social media, Indiana libraries, Web 2.0

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## **Introduction**

Libraries are at a significant interesting juncture in their evolution: Services and products are increasingly offered online or in digital format, but libraries grapple with decreasing or stagnant budgets. While the need for technological literacy skills continues to grow, non-profit organizations such as libraries are continuously asked to provide additional services with the same or fewer resources. In an effort to convince taxpayers or funding bodies of the import of their value to their communities, libraries need to identify effective ways to communicate their value to their stakeholders. One such way libraries can achieve this goal is through their “digital door”: the library website.

The library homepage serves as information desk, marketing billboard, and access gateway to online library resources. This applies to websites for all types of libraries, including academic, special, and public. Academic library websites have been frequently studied, both in terms of redesign case studies (Becker and Yannotta 2013; Tidal 2012) and aggregate analyses of a variety of library populations (Aharoney 2012; Detlor and Lewis 2006). Several studies have also assessed the accessibility, usability, and design elements of special library websites (Schmetzke and Comeaux 2009; Manzari and Trinidad-Christensen 2006; Dowell 2008; Michalec 2006). Public library websites, on the other hand, have been studied less frequently. For example, fewer aggregate analyses of public library populations have been conducted in comparison with those of academic libraries. In an age in which web technologies quickly change, there is limited current data indicating how public libraries are choosing to design their websites. As Scott L. Jones and Kirsten Leonard (2011) indicated, though, adopting a wisdom-of-crowds approach to library homepage design and reviewing content elements for a large group of websites can be very worthwhile.

The present study focused on the homepage design practices of Indiana public libraries. Few analyses have been conducted of entire public library populations within individual states, and no previous in-depth study has specifically evaluated the design of Indiana public library homepages. This study describes the current web design practices of this library population and provides valuable data regarding the content elements and features used by this group of libraries. The subsequent data analysis will present recommendations to help guide web design decisions and enhancements for libraries of all types but particularly public libraries. Findings may also be used for comparison purposes with similar studies conducted for groups of academic libraries or, ideally, public library populations in other states.

### **Literature review**

A variety of methodologies may be used to analyze library websites. These include investigations into the adoption of specific technologies among certain library populations (Anttiroiko and Savolainen 2011; Boateng and Liu 2014), usability tests of library websites (Teague-Rector, Ballard, and Pauley 2011; VandeCreek 2005), case studies of library website redesigns (Felker and Chung 2005; Garber and Hooper 2009; Mellone and Williams 2010), and examinations of the features that appear on the websites of groups of libraries (Aharony 2012; Mestre 2011; Chu 2013). Because great discrepancy may exist among the design practices for similar libraries within a geographic region (Solomon, 2004 or 2009. See bib ref.), analyzing an entire library population may be useful in determining prevalent features among members in the group. Prevalent features identified through empirical studies have been used to develop guidelines or checklists for web design. Guidelines have presented both general and narrow recommendations, such as remembering the dynamic nature of websites, conducting user-

oriented evaluations, including speech functions so that text may be read aloud, and using alternative text tags with images for screen readers (Clausen 1999, 85; Charbonneau 2014, 126). Empirical studies of library groups have also produced checklists. Clyde (1996) offered a list of potentially-useful website features, including a sensible page title and graphics and photographs, after analyzing first Icelandic, then Nordic, and then a broader group of 13 international public and school libraries (556). Raward (2001) began with a usability checklist based on Keevil's Web Usability Index Checklist, pilot-tested it with a small set of academic library websites, and then made modifications to the checklist so that it was more useful for libraries (127-128). Libraries and other institutions have published additional web design guidelines and checklists not necessarily based on empirical studies but grounded in design best practices. Among these are Nielsen's (2002) guidelines for homepage usability, W3C's (Caldwell, Cooper, Reid, and Vanderheiden 2008) Web Content Accessibility Guidelines, Leggett's (2009) quick usability checklist, and the Association of Research Libraries' (n.d.) toolkit for accessibility standards and best practices.

The extent to which each website within a population of libraries is reviewed often depends on the research question in mind. Studies that aim to present the current state of library web design within a particular group tend to make comprehensive examinations, meaning that the entire website is reviewed for content features, either specific or general (Tolpannen, Miller, and Wooden 2000; Detlor and Lewis 2006; Qutab and Mahmood 2009). However, there are potentially many different purposes a library website may serve, such as marketing library events, providing stakeholders with publicly-accessible statistics on library usage, or connecting users with online library resources. Since the interior content of a website may vary depending on these purposes and other factors, including library resources, the homepage, an institution's

face to the world and company receptionist, is often a logical starting point for comparisons between library website features (Nielsen and Tahir 2002, 1). Clyde (1996) recommended reviewing the homepages of similar libraries in order to gain insight into what works and does not work, what is interesting and uninteresting, and what features make websites easy and pleasant to use (557). Homepage analyses have been used to identify typical homepage layout trends among ARL (Association of Research Libraries) institutions, compare website purposes and functionalities between research university and two-year college libraries, and investigate the frequency with which specific content elements appear on small, Bachelor of Arts institutions (King 1998; Cohen and Still 1999; Jones and Leonard 2011).

As has been noted, the majority of the literature comprises analyses of academic library websites; public libraries are underrepresented. Some studies have compared website features between public and academic libraries. Chow, Bridges, and Commander (2014) surveyed websites from both library types in order to identify shared design features and shortcomings, and Oud (2012) evaluated the accessibility of academic and public library websites in Ontario, Canada. Rubin, Gavin, and Kamal (2011) inspected the online technologies and public documents present on 160 public and academic North American libraries; they hoped to determine what the term “innovation” meant to libraries (401). Other comparable studies of multiple library types, though, are difficult to locate, if existent.

Despite being less prevalent, however, public libraries have also acknowledged the need to analyze their web content. A common theme, perhaps based on the diversity of public library users, is the assessment of the accessibility of public library homepages (Lilly and Van Fleet 2000; Brobst 2009; Ingle, Green, and Huprich 2009; Hill 2011). Other studies have analyzed public library websites for content targeted to specific audiences. Kanazawa, Maruyama, and

Motoki (2011 See my bib note.) and Prendergast (2013) both focused on web content for children: The former looked at the types of content on web pages for children, including the OPAC, on 123 Japanese public library websites; and the latter evaluated 20 Canadian public library websites for contents focusing upon early literacy. A handful of studies have broadly explored the contents of public library websites using checklists. These include Solomon's (n.d.) analysis of 211 Ohio public library websites; Persichini, Samuelson, and Zeiter's (2008) inspection of Idaho public library sites; and Powers' (2011) review of 306 Pennsylvania public library websites.

The current study is aligned with this latter category of public library website analyses, as we applied a checklist of criteria to Indiana public library homepages. It is the first wide-scale examination of the contents of Indiana public library websites, and it is the first study to assess the adoption of discovery services by a population of public libraries. In addition, our study innovates the practice of public library website evaluations by analyzing a large population of websites for a vast assortment of content and design elements. This study blends two pre-existing content checklists – one from academic libraries and another from public libraries – in order to create an extensive checklist of web elements, which public libraries may use in order to assess the contents of their own websites. Much of the value in this study, then, is to not only report the status of web design among public libraries in Indiana, thereby adding to the literature regarding the contents of public library websites, but also to provide a replicable methodology additional libraries may apply to their websites.

## **Methodology**

This study combined two website evaluation methods in order to evaluate a new population of libraries. These evaluations reflected studies performed for both public and academic library populations (Powers 2011; Jones and Thorpe 2014). Website evaluations may take a variety of forms, including usability testing, surveys, and analysis of web analytics data. The benefit of our methodology is that we were able to review actual, live web design practices for an entire population of libraries. By evaluating an entire population, we eliminated the potential for inaccuracies that could arise due to partial samples, low response rates, and incomplete usage data. The authors sought to identify the frequency with which specific design and content elements were included on Indiana public library homepages. The study population was drawn from the Institute of Museum and Library Services Fiscal Year 2011 Public Libraries Survey. The survey results were limited to Indiana libraries characterized as either a Central Library or Branch Library. This yielded a population of 430 libraries. We chose this population because it comprises libraries from our home state of Indiana, and, as a group of public libraries, it is understudied. We excluded from our study those Indiana libraries characterized as either Library Systems, Bookmobiles, or Books-by-Mail, as these libraries tended to be extensions of Central or Branch libraries.

The coding scheme largely comprised two methodologies, one developed by Bonnie Powers (2011) and a second formed by Scott L. Jones and Angie Thorpe (2014). Powers' (2011) methodology consisted of a pairing of basic web presence criteria identified by the Idaho Commission for Libraries and additional, desirable web presence criteria proposed by Brian Mathews (26-27). Jones and Thorpe's (2014) methodology was primarily drawn from a combination of 37 studies and other published sources, although modifications were made in order to reflect technological and design changes, such as the emergence of library discovery



services and new social media outlets (5-6). The methodology for the current study drew upon both of these previous studies by evaluating Indiana public library homepages for basic web presence criteria, beyond basic web presence criteria, design and navigation elements, content elements, search elements, and multimedia and social elements. Additional modifications were made to the evaluation criteria, primarily in response to different content element expectations for public libraries versus the academic libraries Jones and Thorpe studied. The modifications were identified by the authors during discussions regarding the elements users may expect to see on a public library web page. The modifications were:

- Basic level of web presence: We mapped Powers' (2011) criterion "link to statewide collaborative services" to the Indiana digital library known as INSPIRE. INSPIRE comprises a variety of online databases which are licensed and paid for by the Indiana State Library for the use of all Indiana residents.
- Content items: We added elements for links or information relating to local history/genealogy, library friends involvement, library annual reports, library programming, suggesting/recommending titles, local authority body or local laws, and challenge/complaint submissions.
- Elimination of academic library-specific elements: We removed items sought by Jones and Thorpe that were oriented toward academic libraries. These included the navigation feature of a university template, as well as content links to the university homepage and course reserves.

A key difference between the authors' study of Indiana public libraries and Powers' study of Pennsylvania public libraries is the authors' initial assessment of the existence of a library's web presence. Since the authors' dataset included central and branch libraries, the first step in the

website analysis was to determine whether a named library appeared to maintain its own website or had an alternate web presence, such as a branch library who only used the website of its central library or a library whose only discernible web presence was on a social networking website. To assess the web presence status of a library, the authors searched for the library using a commercial search engine, occasionally adding other search terms – such as “Indiana” or the town name – in order to refine results. If a library’s only web presence was a directory or map listing on a third party website, the authors marked the library as not having an observed web presence.

The public library homepages were reviewed and marked for content elements from June 10 to August 22, 2013. Each author coded half of the libraries within the study sample. It was not expedient for each author to code all of the library homepages, due to the fluid nature of individual websites and web design practices in general. The authors’ schedules also prevented them from reviewing each website at the same time. If the authors viewed a web page at different times, the possibility would exist that they had viewed different versions of the same page, which could result in interrater reliability issues. In lieu of each author reviewing each website, the authors promoted rating consistency by first reviewing 10 libraries in common and then calibrating coding techniques. Throughout the review period, the authors discussed unexpected situations in order to account for a variety of website presentations. Additionally, after completing the initial review of all websites in the population, the authors analyzed the data for differences in reported data for each author. This methodology allowed the authors to minimize error and uphold consistency in coding results. The authors found very few errors or differences in coding when the results were reviewed. Those differences that were found were most likely the result of web design changes over time, rather than actual coding errors.

For the review process, the authors used the Internet browser Google Chrome for all evaluations because this was the most commonly used browser when the study began in June 2013 (W3Schools 2014). Pages were viewed using a resolution of 1280 x 1024 because, as of January 2014, W3Schools (2014) reported that the vast majority of web visitors use a screen resolution greater than 1024 x 768. The resolution of 1280 x 1024 is greater than 1024 x 768 without being too high, which is important because some public libraries may deliberately choose not to offer users the highest possible resolution, as lower resolutions may be easier to read for people with reduced visibility. To measure the number of screens in length the homepage was, the authors first measured the entire length of the homepage in centimeters, scrolling whenever it was necessary. The total page length was then divided by the number of centimeters equivalent to the length of one displayed screen length without any scrolling. Any total less than one screen length was counted as one page.

During the review process, an element was marked as present if it was clearly noticeable on the library homepage or if it was accessible within one click of the homepage. For example, if an element was linked from a drop-down menu on the homepage, it was counted as present. The authors did not click on every link on every homepage; they inferred the meaning of links based on the presented names. Therefore, it is possible that a library's website may have contained more elements than were recorded for that library.

Finally, because this study examined a whole population and not a sample of a population, no inferential statistical tests were needed.

## **Results**

### *Existence of Library Web Presence*

We looked for a web presence for each Indiana public library identified in the IMLS dataset. As shown in Table 1, 223 libraries (51.9 percent) had their own website. Many libraries in the dataset made use of partner library sites: 175 branch libraries (40.7 percent) used their main library's website; and one library (0.2 percent) used a consortium or affiliate website. A small number of libraries utilized Web 2.0 technologies for their web presences: seven libraries (1.6 percent) used Facebook alone for their web presence; and one library (0.2 percent) used Google+. It is noteworthy that no web presence was detected for 23, or 5.3 percent, of the evaluated libraries. The subsequent results pertain only to those libraries that were identified as having their own websites.

PLACE TABLE 1 HERE

### *Design and Navigation Elements*

Table 2 shows that the mean length of the homepage was 1.9 screen lengths, with a standard deviation of 1.2. Interactive links – those links that appear as a result of user interaction, such as drop-down menus, accordion menus, or hover-over menus – were observed on 41.7 percent of library homepages.

PLACE TABLE 2 HERE

Table 3 reports the frequency of layout and navigation features. The most common layout was columnar, with 57.4 percent of libraries primarily arranging their content in this format. Other layout and navigation features were used infrequently. Layouts without a standard format

were used on fewer than one in five (18.4 percent) library homepages, and layouts that arranged content into a combination of columns and sections were used on approximately one in six (16.6 percent) homepages. Navigation features such as site maps and site indexes were not common, although site maps appeared far more often (21.1 percent) than did site indexes (0.9 percent). Accessibility features also did not appear on many homepages: Links to accessible, alternate versions of websites and links to text-only web pages appeared on one library homepage (0.4 percent) apiece. These results do not, however, preclude the possibility that some websites may have been designed with accessibility standards in mind, thereby negating the need for alternate site versions; the sites did not specifically highlight any such features, though 4.5 percent of the homepages included foreign language links. (That figure can be compared with the 8.2% of all Indiana population who speak a language other than English at home) Although this figure is not high, it is higher than the frequency with which other navigation features appeared. This may suggest that public libraries place a greater importance on translating their web content into other languages for increasingly diverse populations.

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Table 4 presents the frequency with which different navigation bars appeared on websites. The top horizontal bar was used most often, appearing on 68.6 percent of homepages. Note that these statistics do not total 100 percent because a library could use more than one type of navigation bar.

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*Content Elements*

Library homepages were evaluated for a variety of content elements, including basic and beyond basic web presences, plus general elements a user might expect to find on a library website. Table 5 presents the frequency with which basic level web elements appeared. Six basic elements occurred on at least 80 percent of Indiana public library homepages: Library name (99.1 percent); link to online catalog (94.2 percent); library phone number (86.5 percent); hours of operation (86.1 percent); library physical address (86.1 percent); and library mailing address (85.7 percent). An additional two basic level web elements appeared on between 50 to 79 percent of library homepages: Online contact format, such as an e-mail address or online form (67.3 percent); and link to statewide collaborative services, such as the Indiana State Library or INSPIRE databases (50.2 percent).

PLACE TABLE 5 HERE

Four elements (Table 6) comprised content features that indicated a web presence beyond basic. Two elements appeared on nearly all homepages: Mixture of text and images (100 percent); and no spelling or grammar errors (97.3 percent). The remaining two beyond basic elements appeared on less than one-third of all homepages.

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Finally, our study evaluated homepages for content elements that a user may expect to appear on a library website. Only one element – a News/events/what’s new/newsletter section or link (87.4 percent) – appeared on at least 80 percent of homepages. Six elements appeared on between 50 to 79 percent of websites: Link to e-books, Overdrive, Kindle, or Nook (74.4 percent); “About” section or link (65.9 percent); policies link (64.1 percent); contact us (unspecified) link (58.3 percent); gifts, donations, or Friends link (51.6 percent); and local history/genealogy section or link (50.7 percent). Of the remaining 26 content elements evaluated, 21 appeared on fewer than 25 percent of library homepages (Table 7).

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### *Search Elements*

Our research study also examined library homepages for a variety of elements involving search functions. One of the newest library search tools is the discovery service. For the purposes of this study, we used Jason Vaughan’s (2012) definition of a discovery service; that is, a discovery service is a single, searchable index that both searches across a vast repository of content, including locally and remotely-hosted content, and offers an accessible, intuitive interface (32). In order to be marked as a discovery service, a library search tool needed to provide results that included, at a minimum, both electronic journal articles and catalog items, such as books or DVDs. As Table 8 reports, less than 5 percent of the homepages in our study featured a discovery service. Of the libraries that offered discovery services, half provided context to explain the tool. The discovery service that appeared most frequently was Encore (<http://www.iii.com/products/encore>) from Innovative Interfaces (62.5 percent). To provide

access to the discovery service, the majority (62.5 percent) of libraries placed the service in its own search box on the homepage, and the remaining libraries (37.5 percent) offered a link to the product. Half of the libraries did not supply any branding for the discovery service, whereas 37.5 percent used the established brand name, and 12.5 percent used an original name.

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Looking more broadly at search options, 22.4 percent of library homepages provided one or more search functions within a tabbed box. As shown in Table 9, 80.7 percent of libraries supplied a link to search their OPAC, but only 26.0 percent provided a search box directly on their homepage (pages could have both elements). Note that the OPAC search link was evaluated differently than the basic web presence element of Link to the online catalog. A link to the catalog may or may not have led directly to an OPAC search box, but the OPAC search link definitely provided this connection. Other search links and boxes appeared infrequently, with cross-database search links the next most frequent link (22.0 percent) and library website search boxes the next most frequent search box (23.8 percent). The cross-database search links were typically links to the Indiana State Library's INSPIRE federated search product. Our study found few library homepages with links or search boxes to commercial search engines such as Google, Yahoo!, or Bing.

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*Multimedia and Social Media Elements*



Multimedia elements were seldom observed on Indiana public library homepages (see Table 10). Rotating images appeared most frequently (32.7 percent), but all other elements were found on fewer than 10 percent of library homepages.

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The vast majority (86.5 percent) of public library homepages included at least one social media or Web 2.0 element. Table 11 shows that Facebook (71.3 percent) is the most frequently used social media element. Other elements were noticeably less common, with the next most frequent element being interactive directions (37.2 percent).

Ari-Veikko Anttiroiko and Reijo Savolainen (2011) identified four main purposes for which public libraries have adopted Web 2.0 technologies: Communication; content sharing; social networking; and crowdsourcing (87). Our study shows that, of these purposes, Indiana public libraries have primarily only taken advantage of the social networking piece.

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## **Discussion**

The purpose of this research study was to apply a combined set of criteria to a specific library population and evaluate how the homepages of Indiana public libraries compare with those of Pennsylvania public libraries and medium-sized U.S. academic libraries. The results reveal many differences in web design between library populations, some of which may be attributable to the passage of time, as Powers (2011) reviewed Pennsylvania public library

websites in 2010 (28) and Jones and Thorpe (2014) analyzed medium-sized academic library homepages in 2012 (5). The ever-changing nature of technology may be a factor in the design of Indiana library homepages. Several other factors could also account for the differences in result sets. For instance, Powers (2011) evaluated a random sample of Pennsylvania central and branch library websites (27), whereas our study evaluated the entire population of Indiana central and branch library homepages. Additionally, Powers reviewed entire library websites and the authors of the current study only examined library homepages. In terms of result set differences between public and academic library websites, academic libraries serve a more defined audience, so their websites may have different content requirements than do public library sites.

Of the 223 library homepages we reviewed, less than 1 percent (2 out of 223) met all 11 criteria for a basic level of web presence. This figure is less than the 5 percent of Pennsylvania public libraries that Powers (2011) identified as having a basic level of web presence (28). It should be noted that our basic criteria comprised 11 items, whereas Powers' criteria comprised 10 items, because the authors of the current study separated the library address into two items: library address – physical; and library address – mailing. Powers (2011) treated these items as one criterion for her study (26). The results indicate that there is much opportunity for the majority of Indiana public libraries to enhance their homepages with simple content additions. Priority should be given to the five least used basic web elements, listed below in order of decreasing frequency of appearance on library homepages:

1. Online contact format, such as e-mail address or online form
2. Link to statewide collaborative services, such as the Indiana State Library or INSPIRE
3. Board member names
4. Descriptions of library services available to users

5. Current site content indicated by date of last review or update

None of the Indiana public library homepages reviewed in our study contained all 15 basic and beyond basic web elements. One library (0.45 percent) included 14 of the 15 elements on its homepage. All evaluated homepages used a mixture of text and images. This demonstrates awareness of the fact that different types of content appeal to different users, which is an important consideration for public libraries who may serve diverse populations. The results indicate that the largest area for improvement for Indiana public libraries as a whole is to provide places on their websites for users to provide feedback. For libraries that lack experienced web developers or programmers, a simple solution to provide a feedback option is to create an e-mail address designated for feedback and then link to the e-mail address on the homepage, perhaps with a lead-in such as, “Do you have feedback for us? Please tell us!”

The average screen length observed in the current study was slightly higher than the figure Jones and Thorpe (2014) found in medium-sized academic libraries. Indiana public libraries averaged nearly two screen lengths on the homepage, which means users may need to scroll in order to see nearly half of the homepage content. Although the notion that all web page content must be located above the fold (that is, above the point at which a user must start to scroll in order to continue reading content) has somewhat faded, web usability expert Jakob Nielsen (2010) still recommends minding the fold because long pages may lose users’ attention, and content above the fold is still more useful for attracting and keeping users’ interest.

Indiana public library homepages averaged slightly fewer initially visible and initially invisible links in comparison with medium-sized academic libraries. Public libraries had a greater range of initially visible links, though, and a smaller range of initially invisible links: 3 to 196 initially visible links for public libraries versus 5 to 147 for medium-sized academic libraries

(Jones and Thorpe 2014, 7); and 1 to 115 initially invisible links for public libraries versus 5 to 139 for medium-sized academic libraries (Jones and Thorpe 2014, 7). These facts may complement one another: If a public library includes more initially visible links on its homepage, it may see less of a need to include initially invisible links. A public library may generally have fewer links on its homepage than might an academic library because it may have fewer diverse resources or services to promote. For example, an academic library may provide separate links to circulation services for students, circulation services for faculty, and reserves services for faculty, but a public library may provide a single link to circulation services. It is also possible that public libraries do not experience the same need – or the desire – to place as much content on the homepage as do academic libraries. Public libraries may deliberately choose to limit the content on their homepages, or they may lack the technological skills or resources to build out additional links and pages on their websites. This is not necessarily a bad thing; as Jones and Thorpe (2014) pointed out, a greater number of links is likely to require more cognitive work for users to process (13). All libraries, then, should be mindful of whether links – visible or invisible – are encouraging deeper site engagement or merely cluttering the page.

A greater disparity between Indiana public library and medium-sized academic library homepage design emerges when comparing the frequency with which different content elements appeared. Only 7 of the 33 (21.2 percent) reviewed content elements appeared on at least 50 percent of public library homepages. In contrast, 15 of the 29 (51.7 percent) reviewed content elements appeared on at least 50 percent of medium-sized academic library homepages (Jones and Thorpe 2014, 9). While there were slight differences in the amount and type of content elements reviewed in both studies, 12 of the 15 elements that occurred on at least 50 percent of academic library homepages were also included in the public library study. Of these 12, five

(41.7 percent) appeared on at least 50 percent of public library homepages. These results suggest that a greater standardization of content elements exists on academic library homepages than it does for public library homepages. One potential reason for this may be that academic library websites have been analyzed in more detail, and over a longer period of time, than have public library websites. Web designers at academic libraries, therefore, have a larger volume of resources to which they can refer when planning and building their websites. Additionally, the content elements may be easier to identify for academic libraries since their audience and services are more narrowly defined. That is, academic libraries know they serve their institution's faculty, staff, students, and, potentially, non-affiliated walk-in users; and their collections support the institution's curriculum. Public libraries, on the other hand, serve their town's residents, who may span all ages, from toddler to twilight years, and all interests, from *Thomas the Train* to *The Twilight Zone*. With such potential for diversity among users, it follows that the content elements on public library websites are also diverse.

At least one type of search function appeared on 215 (96.4 percent) Indiana public library homepages. This figure greatly exceeds the quantity of Pennsylvania public library websites that included search boxes, as Powers (2011) observed search boxes – a specific type of search box was not identified – on fewer than 100 (less than 33 percent) websites (31). The most common search element was a link to the OPAC, which appeared on Indiana public libraries with approximately the same frequency – 80.7 percent – as OPAC search links appeared on medium-sized academic library homepages – 80.1 percent (Jones and Thorpe 2014, 10). However, OPAC search boxes were used less frequently among Indiana public libraries than among medium-sized academic libraries: OPAC search boxes were observed on 58 (26.0 percent) Indiana library homepages but appeared on 178 (57.0 percent) of medium-sized library homepages (Jones and

Thorpe 2014, 10). The difference between uses of OPAC links over search boxes may stem from the fact that many Indiana libraries are members of Evergreen Indiana. Evergreen Indiana, funded by the Indiana State Library, is a consortium of libraries that share an integrated library system, including the OPAC, and may borrow materials from other member libraries (Indiana State Library 2013). Since Evergreen Indiana provides a shared OPAC, participating libraries may choose to conserve resources by linking to their Evergreen catalogs rather than developing their own search boxes. Libraries may choose links over search boxes for other reasons, as well. For example, links usually require less real estate on web pages, are easily included in organized lists, and require fewer web programming or development skills. In total, 208 (93.3 percent) Indiana public library homepages featured either an OPAC search link, search box, or both. Despite being one of the more heavily used elements on public library homepages, though, questions remain as to why 6.7 percent of libraries lack OPAC search elements on their homepages. Opportunity remains to investigate whether these elements are embedded more deeply on library websites, have not been properly configured on library websites, or are missing entirely due to resource constraints. For libraries falling into the latter category, Evergreen Indiana may be an attractive solution.

With the exception of the OPAC, the authors observed very few libraries offering other search options. Both commercial search engines and library search tools, including WorldCat and discovery services, appeared infrequently on Indiana public library homepages. Library search tools were included far less often on public library homepages than on medium-sized academic library homepages. Discovery services have not experienced the same adoption rate among public libraries as they have among academic libraries. Only eight public libraries (3.6 percent) appeared to be using a discovery service whereas 124 academic libraries (39.6 percent)

utilized a discovery product (Jones and Thorpe 2014, 10). High price points, inclusion of primarily scholarly content, and lack of user need may all be contributing factors as to why public libraries have not acquired discovery services. Another library search tool – the e-journal search link – experienced an even greater disproportion of implementation among public and academic libraries, however. The e-journal search link was used on only seven (3.1 percent) public library homepages but appeared on 207 (66.1 percent) academic library homepages (Jones and Thorpe 2014, 10). Academic libraries may feature e-journal search elements more frequently because their users experience higher demands for scholarly journal content. However, public libraries are acquiring subscriptions to databases containing both popular periodicals, such as MasterFILE Premier and McClatchy-Tribune Collection from EBSCOhost, and research materials, such as HeritageQuestOnline from ProQuest and Health & Wellness Resource Center from Gale Cengage Learning. One emerging trend to watch is public library adoption of user-friendly, e-journal browsing tools such as Zinio (<http://www.zinio.com/>) and BrowZine (<http://thirdiron.com/browzine/>; currently only available for academic journals but could still be of value to some public libraries). As public and academic libraries alike build their e-periodical collections, user needs may warrant a change in direction from providing e-journal search elements to e-journal browse elements.

Multimedia elements were also seldom used by Indiana public libraries. Approximately one-third of the reviewed libraries (73, or 32.7 percent) featured rotating images on their homepages, which is similar to the percentage (32.3 percent) of academic libraries Jones and Thorpe (2014) identified as having this feature (11). Libraries may opt to use this multimedia element on their homepages because it allows them to show different types of content to different sets of users. For example, a rotating image slideshow may contain announcements of

new resources, reminders about programming events, and promotion of library services, such as eReader check-outs. Rotating images were by far the most commonly used multimedia element among public libraries, though. Four multimedia elements – podcasts, embedded audio that plays when clicked, embedded audio that automatically plays, and embedded video that automatically plays – were not found on any of the reviewed public library homepages. The lack of adoption of these technologies is likely reflective of changes in technology and community needs. For instance, smaller libraries may not have the technological resources or user demand to justify creating virtual tours of their libraries. Additionally, web design technologies that were popular in the late 1990s or early 2000s – such as animations and scrolling images – may have been replaced by rotating images and social media links on library homepages.

Technological changes and community needs are likely also impacting public library implementations of social media or Web 2.0 elements, as 193 (86.5 percent) library homepages featured at least one such element. This figure is only slightly lower than the 87.5 percent figure Jones and Thorpe (2014) found for medium-sized academic libraries (14). The proximity of these two figures suggests that libraries of all types understand and are trying to capture the potential of Web 2.0 technologies in order to engage with their users. The most common social media element among both sets of libraries is Facebook, with 71.3 percent of public libraries using the social networking site and 62.9 percent of academic libraries using it (Jones and Thorpe 2014, 12). After Facebook, however, no other social media elements appeared on at least 50 percent of public or academic library homepages. Twitter was the third most popular element among both sets of libraries, and blogs ranked in the top five elements for both library populations. Public libraries used interactive directions and programming schedules more often than did academic libraries, though, which may be attributable to a greater user need. It is not always obvious, for



instance, where a public library is located within a town, especially in larger cities or cities with multiple branch libraries; hence, interactive directions become more critical to guide users where to go. Academic libraries, on the other hand, serve a more defined audience, and the library is often one of the stops on a campus tour for new students; hence, there is less need for libraries to provide directions to the library. Similarly, programming drives much of a public library's community outreach and engagement. Providing interactive calendars with which users can engage (e.g. filter for specific programs or copy events to their personal calendars) allows libraries to promote and recruit attendees to their programs. In most academic libraries, the "programming" comprises information literacy sessions which are not open to the general student population but are instead tailored to specific courses. While it may be helpful for academic libraries to post when their classrooms are in use, students likely will not engage with an interactive schedule in the same way that public library users do. Web 2.0 technologies may seem to be just the latest craze, and libraries may be tempted to bypass these fads in favor of tried and true outreach approaches, such as mailers and e-mail blasts. However, after analyzing 120 public and academic library websites, Chua and Goh (2010) found that the inclusion of Web 2.0 elements on library websites positively affected the overall quality of the websites. This is not to say that including Web 2.0 elements will automatically improve the design of a library website; rather, users may perceive an enhanced sense of quality and connection when they visit a library website that utilizes Web 2.0 elements. Chua and Goh (2010) also advocate for the "aggregated deployment" of Web 2.0 elements (210). In other words, libraries should be thoughtful in their selection of Web 2.0 technologies because complementary techniques will likely increase the level of user engagement and thus deepen the connection between user and library.

The results of the current study can be used to inform web design decisions among public libraries, as well as other types of libraries. A review of the design elements that appeared on a majority of Indiana public library homepages presents a composite list of elements that should be given priority for inclusion on library homepages. Tolppanen et al. (2005) defined a core component of a website as any item that appeared on at least 50 percent of sampled sites; their study yielded 42 such elements (16). Jones and Thorpe (2014) applied the same standard and found 21 core components in their analysis of medium-sized academic library homepages (15). Using this definition for our study, we also identified 21 core components, listed below in order of decreasing frequency:

1. Mixture of text and images
2. Library name
3. Site is free of spelling and/or grammatical errors
4. Link to online catalog
5. News/events/what's new/newsletter section or link
6. Library phone number
7. Hours of operation
8. Library address – physical
9. Library address – mailing
10. OPAC search link
11. E-books, Overdrive, Kindle, etc. link
12. Facebook link
13. Top horizontal navigation bar
14. Online contact format (e-mail address or online form)

15. “About” section or link
16. Policies link
17. Contact us (unspecified) link
18. Primary layout: Content arranged in columns
19. Gifts/donations/friends link
20. Local history/genealogy section or link
21. Link to statewide collaborative services (e.g. Indiana State Library, INSPIRE)

Since these elements all appeared on at least 50 percent of Indiana public library homepages, a wisdom-of-crowds approach indicates that there is community value in including such elements on library homepages. Web designers, therefore, should take note of these elements for inclusion on their library websites, if they are not already present.

It is also helpful to review the list of elements that appeared least frequently. The following 28 elements occurred on between 0.1 to 2 percent of Indiana public library homepages (in order of decreasing frequency):

1. Delicious link
2. Other library OPAC search box
3. Texting link
4. Tumblr link
5. Bing search link
6. Chat with librarian
7. LinkedIn link
8. Other external search engine search box
9. StumbleUpon link

10. WorldCat search box
11. Interactive library map
12. Library site search link
13. QR codes
14. Site Index
15. User comments displayed
16. Video tutorials or link to them
17. Virtual tour
18. Wikipedia link
19. Wikis
20. Yahoo! search box
21. Accessibility link
22. Audio link (not podcast)
23. Challenge/complaint submission link
24. Digg link
25. Discussion forum(s)
26. Polls
27. Text only link
28. Video, not tutorial, link

An additional 11 elements were not observed on any of the evaluated homepages:

1. Audio, embedded, automatically plays
2. Audio, embedded, plays only when clicked
3. Bing search box

4. Databases (search across multiple ) search box
5. E-Journals search box
6. Google Scholar search box/link
7. Instant message
8. Myspace link
9. Podcasts
10. Primary layout: Content arranged in four equally divided sections
11. Video, not tutorial, embedded, automatically plays

Web designers deliberating on using these elements on their homepages should use these lists as a guide: Although these elements may not appear with high frequencies, certain items may prove beneficial for specific audiences. All libraries, however, should be mindful of the accessibility elements, such as text only links and site indexes. The diversity of both library web content and the populations for which the content is created should motivate libraries to ensure their curated web pages are available to all current and potential users.

These lists reveal that underutilized elements tend to fall into three main categories: 1) Search; 2) Multimedia; and 3) Web 2.0/Social Media. All three of these categories are more susceptible to technological changes than are general content elements such as policies or news announcements. Some elements, therefore, may be less commonly used on library websites because they are already ubiquitous (e.g. Bing search link and Yahoo! search box), and so users do not require the library's assistance in facilitating access to these websites. Other elements – such as Tumblr, StumbleUpon, and video elements – are still considered emerging technologies that libraries may have yet to embrace, perhaps for lack of implementation know-how, perhaps for lack of funds to pay for programming the innovation into the electronic personality of the

library. Although some of the elements on these lists may be infrequently used for good reasons (e.g. no e-journal search function, use of static vs. interactive library map), they also show that there are a variety of directions libraries can take in order to interact and engage with their communities. Libraries should consider whether videos, audio clips, and/or social media profiles may help staff connect with underserved community groups. The benefits of adding any new elements, of course, must be carefully balanced with user needs and library resources.

Overall, the fact that there are only 21 (16.3 percent) core components from a list of 129 web design elements suggests a fair amount of divergence still exists among public library homepage design. One factor behind this degree of dissimilarity is likely the vast range of library sizes in our survey population. Reviewees spanned from township libraries serving less than 3,000 residents to metropolitan city libraries serving upwards of 800,000 residents (U.S. Census Bureau 2013). Such varied user populations imply a need for different resources, including different library website designs. While a complex site design with hover menus may work well for one library's users, it may introduce unnecessary barriers for another library's users. With that said, it remains surprising that less than 100 percent of Indiana public libraries feature a link to an OPAC on their homepage, and fewer still specify their physical location. Since our study only evaluated the content elements that appear on library homepages, it is possible these elements appear on pages located deeper within library websites. However, since the ultimate goal of the website is to efficiently and easily provide users with content, web designers should consider the impact of relocating elements from subpages to the homepage.

Our study comprised an entire library population and thus does not draw conclusions based upon a small sample size. However, a limitation of the study is the lack of involvement among actual library users. Usability is a key consideration for web design, as user-centered web

development calls for users to be included in the web design process (Lazar 2001, Chapter 1). User-centered design principles emphasize the ease of use and usefulness of websites. Although our study did not include usability testing among a group of library users, we may still extrapolate from the findings using a wisdom-of-crowds logic: If the majority of the surveyed sites included a content element, it is likely that users perceive value and utility in the inclusion of that element on the website.

Ultimately, this study identifies some significant differences between Indiana public library and medium-sized academic library web pages while showing less diversity between Indiana and Pennsylvania public library websites. The differences between public and academic library missions help explain this diversity. In reviewing Indiana public library homepages, or the lack thereof, this study illustrates a trend in that public libraries with more complete and full-featured web presences tend to serve larger communities. Several factors may contribute to this finding, including:

- Smaller libraries are more likely to have fewer employees, which increases the likelihood that creating and maintaining a website is not a high priority. It is not uncommon for an Indiana public library to employ only one person and be open for only a few hours each week.
- Some branch libraries may be constrained to a central library or city government web design template and therefore may not have design freedom to add or modify content elements.
- Smaller or rural library populations may have less or slower access to technology resources, and libraries that serve these users may recognize these limitations and thus provide alternate, non web-based points of contact to engage their users.

- The technical skills required to develop a website or web pages or to add or modify elements to a web page may be beyond the skills of the current library employee(s).

While there are – and should be, due to varying institutional missions – noticeable differences between public and medium-sized academic library homepages, it is important to note that any library website needs more than just certain elements in order to prove effective and useful for library users. Intuitive and uncomplicated navigation and content elements will allow users to find and access the details they seek. Libraries should consider these recommendations in conjunction with local needs in order to develop or refine their own “digital doors” and thereby meet the needs of a new and evolving type of library user.

## **Conclusion**

With primary and secondary schools moving to iPad distributions for all students, e-textbooks for course readings, and class assignments that require the use of mobile apps (“Noblesville Schools Gets \$100K Grant”; Miller 2014), a savvy group of technology users with growing expectations for readily-available and accessible digital content is emerging. In a burgeoning population that is more technologically adept, more familiar with beginning a search for information on the device of their preference, and more exacting regarding digital offerings, it will be essential for public libraries to meet their users at their digital doors. For many, the library’s homepage will be that front door. To accommodate as many unique visitors as possible, this entrance should greet the user with a variety of content. This study provides practical recommendations regarding the web elements that librarians should consider during the development or improvement of a public library website homepage. These results may be



combined with specific library population needs and existing library digital resources in order to connect users with the content they need and want.

This analysis of Indiana public library homepages will act as a basis for further study of public library websites. As one of only a handful of broad investigations into public library websites within a specific state, and the first study to report the prevalence of discovery services among public libraries, there is opportunity for other states to replicate this study in order to fill in gaps of the larger question of the status of U.S. public library homepage design. Additionally, having formed a list of suggested elements for library web pages, another area for future research is web usability testing so as to determine whether users can find, use, and understand the content elements that appear on public library websites.

The importance of the homepage as a gateway to library services and collections means that public libraries may need to consider web programming skills as a qualification when new personnel are hired. Customer service and critical thinking skills have traditionally been sought in library employee applicants, but as library users and collections change, so must the skill sets of the personnel who help users and curate collections. Expanding the list of qualifications for desired library employees would create additional opportunities for libraries. For example, by seeking employees with web design skills, libraries may be able to develop their web presences and improve outreach to their users, thereby maintaining community relevance even as their user populations change. During this transitional period, state libraries or library associations may increase their import, as well, by developing web mentoring programs to help libraries without web presences begin to adapt to a new future. Cultivating the library's web identity will not only help the library's specific user population in its information needs but will also help to communicate the value and role of the library to its stakeholders everywhere.



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