# Accessibility 2010 and 2012

## Research Questions

1. How accessible are the major library Web sites on the campuses with SLIS schools in 2010?

2. Has Web site accessibility changed over the past 4 years? Is there a discernible trend?

3. If there are changes in accessibility, are there recognizable patterns?

a. How strong was the tendency for the 2006 accessibility leaders (laggards) to remain leaders (laggards) in 2010?

b. Have there been changes with regard to the relative frequency of the various types of accessibility barriers?

4. How many library sites use "Skip Navigation" links and does their use correlate with accessibility?

5. How does the method of page layout (table-based or CSS-based) correlate with accessibility?

6. Does the use of a Content Management System (CMS) correlate with accessibility?

7. Does the use a tabbed search box on the library home page correlate with accessibility?

## Results

### How accessible are the major library Web sites on the campuses with SLIS schools in 2010?

Overall, 60.70% of the web pages tested per site were Bobby-approved. Eight of the 56 sites were 100% approved. An additional 13 sites had approval percentages above 90%. 11 more had approval percentages between 80% and 90%. On the down side, six sites had no approved pages, and seven more had percentages of less than 10%. The average number of errors per page was 2.28 for all 56 libraries studied.

### How accessible are the major library Web sites on the campuses with SLIS schools in 2012?

In 2012, 61.47% of the web pages tested per site were Bobby-approved. Seven of the 56 sites were 100% approved. An additional 23 sites had approval percentages above 90%. Seven had approval percentages between 80% and 90%. On the bottom end, five sites had no approved pages, and seven more had percentages of less than 10%. The average number of errors per page was 1.66 for all 56 libraries studied.

### Has Web site accessibility changed over the past 4 years?

The overall percentage of approved pages has been remarkably consistent since 2006. However, the average number of errors per page has decreased considerably, from 2.28 per page in 2010 down to 1.66 in 2012. When comparing the 2002 data, a clear improvement is apparent, particularly with regards to the number of barriers per page.

Table 2  
Change over time

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **2002** | **2006** | **2010** | **2012** |
|  |  |  |  |  |
| **% Approved** | 45.68% | 61.48% | 60.70% | 61.47% |
| **Errors/Page** | 4.80 | 3.56 | 2.28 | 1.66 |

### If there are changes in accessibility, are there recognizable patterns?

#### How strong was the tendency for the 2006 accessibility leaders (laggards) to remain leaders (laggards) in 2010?

To answer this question, we performed a Pearson correlation using Microsoft Excel. Pearson correlations are a statistical means of evaluating how closely two groups of numbers match. The correlation is measured on a scale from -1 to 1, with -1 indicating no correlation at all, and 1 indicating a perfect match. The value is typically denoted as *r*.

We compared the 2006 data to the 2010 data using both the percentage of approved pages and the average errors per page. We looked at the entire North American sample, and also looked the U.S. and Canadian sample separately.

For the North American sample as a whole, there were mixed results. Comparing percentage of approved pages, the *r* is .25, which is typically considered a low correlation. Comparing the errors per page, however, *r* is .76, which is usually considered high correlation.

The U.S. component reveals very similar numbers. This is not surprising, as the U.S. schools make up 87.5 per cent of the overall sample. Comparing percentage of approved pages, the r is.30, which is typically considered a low correlation. Comparing the errors per page, the r is .81, which is rather high.

The Canadian sample shows no significant correlation at all. Comparing percentage of approved pages, the r is -.08, which is usually considered no correlation. Comparing the errors per page, r is .19, which is very low correlation.

#### How strong was the tendency for the 2010 accessibility leaders (laggards) to remain leaders (laggards) in 2012?

The correlation between 2010 and 2012 was high. For the errors per page metric, the correlation was .8. For the percentage of approved home pages, it was .58. The U.S. sample was similar, at .8 for errors per page and .71. The Canadian sample showed a high variance. The errors per page correlation coefficient was .16, while the approved pages number was -.4.

#### Have there been changes with regard to the relative frequency of the various types of accessibility barriers?

There have been discernable trends in the relative frequency of errors reported. One notable trend has been the decrease in errors related to image maps. In 2002, over 22 per cent of errors reported were missing alt tags for image maps. In 2010, it dropped to 6.45%, and then rebounded slightly to 7.67% in 2012. Another notable trend has been a very significant upsurge in errors related to image buttons. Comprising less than a tenth of a per cent of errors in 2002 and 2006, image button errors comprised nearly 7.5% of total errors in 2010 and 5.17% in 2012.

Table 3  
Relative Frequency of Barriers

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 2002 | 2006 | 2010 | 2012 |
|  |  |  |  |  |
| **Alt-text images** | 75.92% | 90.56% | 85.79% | 86.82% |
| **Alt-text imaps** | 22.28% | 7.71% | 6.45% | 7.67% |
| **Alt-text buttons** | 0.05% | 1.10% | 7.49% | 5.17% |
| **Alt-text-object** | 0% | 0% | 0.15% | 0.26% |
| **Alt-text applets** | 0.03% | 0% | 0% | 0% |
| **Title each frame** | 0.30% | 0.55% | 0.12% | 0.09% |
| **Read. w/o frames** | 0.56% | 0.03% | 0% | 0% |
| **Red txt ss-imaps** | 0.86% | 0.05% | 0% | 0% |

### How many library sites use "Skip Navigation" links and does their use correlate with accessibility?

We found that, in 2010, 25 library sites (44.6 per cent) used skip navigation links. In 2012, 27 (48.2%) used Skip links. This is a very significant increase from 2006, when only 10 library sites used skip links.

As the use of skip links is associated with some significant level of awareness about accessibility, the question of whether sites using skip links have higher overall accessibility figures is an interesting one. To determine this, we looked at the percentage of approved pages and average barriers per page for the sites with and without skip links.

Of the sites with skip links in 2010, the average percentage of approved pages is 66 per cent. This compares quite favorably to the group without skip links, which average 56 per cent. The difference in average barriers per page is quite significant. Sites with skip links average only 1.65 barriers per page, compared to 2.79 barriers per page for the sites without skip links.

In 2012, the difference is starker. The percentage of approved pages for sites with skip links is 75%, compared to only 49% for sites without them. The errors per page is significantly lower, with less than 1 per page for the skip links sites compared to 2.29 for sites without them.

Table

Skip Navigation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | With Skip Links (2010) | Without Skip Links (2010) | With Skip Links (2012) | Without Skip Links (2012) |
|  |  |  |  |  |
| % Approved | 65.92% | 56.48% | 74.83% | 49.04% |
| Avg. Barriers per page | 1.65 | 2.79 | .98 | 2.29 |

### How does the method of page layout (table-based or CSS-based) correlate with accessibility?

#### Background

When web design was in its infancy, pages consisted mainly of lists of links with little structure. Soon, designers learned to manipulate HTML tables to give them some measure of design flexibility. However, tables can be tricky to use as a design mechanism, as they were never intended for this purpose. Therefore, designers often resorted to inserting precisely-sized images in table cells to force pages to display as intended. Since these images do not convey meaning, it is understandable that designers would neglect to include alt tags. However, screen readers read them and are a significant annoyance to screen reader users.

In 1996, the World Wide Web Consortium (W3C) released Cascading Style Sheets, level 1, (CSS1), as a recommendation for web designers. CSS1 enabled designers to determine the visual style of web page elements with more specificity and more efficiency than before. CSS1 caught on quickly, and soon designers largely abandoned font tags when styling web content. However, CSS1 offered no significant advancement in regards to site layout, so tables continued to be the principal means used to determine web page layout.

With the introduction of Cascading Style Sheets, level 2 (CSS2) in 1998, designers were afforded a new toolset for structuring pages. CSS2 includes a visual formatting model known as the “Box model.” Block-level elements, such as the<div>, <p> and <ul> elements, could be given properties such as height, width, and a variety of visual characteristics that made them more effective as page design elements. Block-level elements, primarily the <div> element, became an alternative means of structuring web pages. With a div-based layout, spacer images were no longer necessary to force HTML tables to bend to the will of a designer’s vision.

In the 2006 study, the lead author observed that a high percentage of errors were due to missing alt tags for “spacer” images, and suggested further study. Therefore, in this study, the question of whether div-based sites were more accessible was systematically evaluated.

#### Evaluation

In 2010, there were 14 sites (out of 56, or 16 per cent) that were judged to rely significantly on tables for page layout. The percentage of approved pages was nearly identical, at 60.21 per cent for table-layouts compared to 60.8 per cent for CSS-based sites. The difference in average errors per page, however, was pronounced. The table-based sites averaged 3.93 errors per page, compared to only 1.72 for the CSS-based sites. This number was skewed by the extraordinarily high number of errors found on two web sites: North Carolina Central (1057) and Southern Mississippi (490). Nonetheless, there is very strong evidence that table-based layouts are considerably more likely to result in accessibility errors than CSS-based layouts.

In 2012, there were 12 table-based sites. The table-based sites actually had a higher percentage of approved pages than the CSS-based sites (64 per cent compared to 60.77 per cent). But the table-based sites continue to have a higher incidence of errors per page (2.6 compared to 1.4).

Table

Table or CSS Layout

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Table-based (2010) | CSS-based (2010) | Table-based (2012) | CSS-based (2012) |
| % Approved | 60.21% | 60.86% | 64.04% | 60.77% |
| Avg. Barriers per page | 3.93 | 1.72 | 2.60 | 1.4 |

### Does the use of a Content Management System (CMS) correlate with accessibility?

#### Discussion

A Content Management System (CMS) is a web-based software application that uses a programming language to assemble web pages from content stored in a database. A CMS offers many advantages. The most often cited advantage that impacts accessibility is the use of template files to build pages. The content displayed on a page is pulled from a database, and then positioned as dictated by the template. Layout is determined with CSS2 with HTML div elements as building blocks, rather than tables. As noted in the previous section, this practice is associated with higher accessibility results. CSS is also used for visual formatting, such as applying fonts and colors. Thus a significant measure of consistency across pages is virtually ensured.

The use of a CMS has proliferated in the web design world. This appears to be true in academic libraries as well. Bundza et al. (2009) conducted a survey of web development practices in academic libraries. They found around half of responding libraries use a CMS as part of their web development process. They also found that the most popular CMS was Drupal, with 15 responses. The next most popular were systems developed in house.

That the use of a CMS can promote accessibility has been suggested in the library literature. Dunlap (2006) writes that a major reason that web sites fail to implement accessibility standards is because of a heavy reliance on "static" code. On a static site, content exists on discrete web pages encoded in HTML. Making a change to a common area such as a header involves changing every page on the site. For sites constructed this way, making changes to improve accessibility can prove excessively time-consuming.

Database-driven sites, such as those created by CMSs, promote accessibility because of their reliance on consistent templates. A change can be implemented once to a template file and be immediately implemented site-wide. In addition, the transition to a database-driven site provides an excellent opportunity to improve accessibility. As web content is prepared for loading into a database, it is an ideal time to strip the content of unnecessary and poorly-formatted code.

Likewise, Kane and Hegarty (2007) emphasized the critical role of the CMS template system in easing the process of meeting accessibility standards. Because the developers can focus on only one template file, rather than examining hundreds of individual files, the task of making that template fully accessible is vastly simplified. Also, they mention the absence of "confusing layout tables" and "excess images" (p. 281) as factors promoting accessibility.

#### Findings

In 2010, 16 sites were identified as clearly built using a CMS. The CMS sites average 68.88 per cent approved compared to 57.43 per cent for the non-CMS sites. The difference in errors per page is even more considerable. The CMS sites average just 1.16 errors per page, compared to 2.72 for the non-CMS sites.

In 2012, 19 sites were identified as clearly built using a CMS. The CMS sites averaged 72.69 per cent approved compared to 55.71 per cent for the non-CMS sites. The difference in errors per page is even more considerable. The CMS sites average just 1.12 errors per page, compared to 1.93 for the non-CMS sites.

Table

CMS or Not

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | CMS (2010) (n=16) | Not CMS(2010) (n=40) | CMS(2012) (n=19) | Not CMS(2012) (n=37) |
| % Approved | 68.88% | 57.43% | 72.69% | 55.71% |
| Avg. Barriers per page | 1.16 | 2.72 | 1.12 | 1.93 |

References Cited

<http://www.w3.org/TR/2008/REC-CSS1-20080411/>

<http://www.w3.org/TR/2008/REC-CSS2-20080411/>

Bundza, M, Vander Meer, P, & Perez-Stable, M 2009, 'Work of the Web Weavers: Web Development in Academic Libraries', Journal of Web Librarianship, 3, 3, pp. 239-262, Library, Information Science & Technology Abstracts with Full Text, EBSCOhost, viewed 10 April 2011.

David Kane, Nora Hegarty. New web site, new opportunities: Enforcing standards compliance within a content management system. Library Hi Tech, Volume 25, Number 2 (June 2007), pp. 276-287, <http://ejournals.ebsco.com/direct.asp?ArticleID=47C1B983C9641ECC1849>

Dunlap, I 2006, 'How Database-Driven Web Sites Enhance Accessibility', Library Hi Tech News, 23, 8, pp. 34-38, Library, Information Science & Technology Abstracts with Full Text, EBSCOhost, viewed 3 April 2011.

Macken, D 2008, 'Get Accessibility Right from the Start', Managing Information, October, Library, Information Science & Technology Abstracts with Full Text, EBSCOhost, viewed 3 April 2011.

Content Management Systems (CMS) <http://www.libsuccess.org/index.php?title=Content_Management_Systems_(CMS)>

[http://www.scarecrowpress.com/Catalog/SingleBook.shtml?command=Search&db=^DB/CATALOG.db&eqSKUdata=0810856921](http://www.scarecrowpress.com/Catalog/SingleBook.shtml?command=Search&db=%5eDB/CATALOG.db&eqSKUdata=0810856921)

Discussion

This series of research papers has two main aims. One is to present a longitudinal quantitative analysis of the state of web accessibility in our sample set of academic libraries. The other is to explore possible links between design methods and quantitative measures of accessibility.

With a decade's worth of data in four data sets over this timespan, it is now possible to draw some broad conclusions about trends in web accessibility. As the information discussed in the Results section indicates, there has been improvement in the quantitative accessibility metrics employed in this series of studies. In particular, the average number of barriers per page has fallen dramatically. From an average of nearly five errors per page down to just 1.66 is a significant step forward.

Unfortunately, the average percentage of errors per site has apparently plateaued at around 60 per cent. While considerably better than the 40 per cent found in studies done at the turn of 21st century, still two out of five library site pages are plagued with Priority 1 errors.

While the overall numbers of approved pages has been consistent over the last six years, there continues to inconsistency on a per site basis. The Pierson coefficient continues to indicate extreme flux. It is not uncommon for sites that have high accessibility in one dataset suddenly plunging to the bottom in the next. Luckily, it is also common for the reverse to occur; for a site with terrible numbers to suddenly achieve perfection.

To try to reach a better understanding of these numbers, the authors have endeavored to look for correlations between website design methods and website accessibility. The factors we have considered are methods of page layout; usage of a content management system, and the presence of a tabbed search interface on the library's home page.

The method of page layout refers to whether the layout of a website is based on tables or CSS. As discussed in Comeaux and Schmetzke (2007), HTML tables had been used for many years by web designers to create website layouts – to place menus, content, and features in certain areas of the page. However, tables were intended to be used to display tabular data, not as a layout mechanism. So designers often resorted to using what are commonly referred to as "spacer" images placed in table cells to help achieve the desired appearance. As Comeaux and Schmetzke noted, it appeared that many of the missing alt tags were tied to spacer images. It was then suggested that future research should be done to see if a correlation exists between use of tables for layut and poor accessibility measurements because of this problem.

As discussed in the results, the average of error-free pages was actually higher for the table-layouts. However, the number of errors per page was significantly higher for them.