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Web Accessibility Status of Leading Universities in USA

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Abstract

Web accessibility has been prominent issues in public websites that need to legally abide by Section 508 guidelines of the Rehabilitation Act. A study from WebAIM (2018) indicated that only 3% of university websites in USA comply with the current web accessibility content guidelines. A dataset consisted of 95 universities in the US and Canada. Only two universities are from Canada and the rest of them are from U.S.A. 69 universities are public and 26 institutions are private. The study found the need for more advocacy and education about the barriers to website accessibility and ways to make websites more accessible as an issue of social justice. In addition to promoting social justice, website accessibility also conforms to national laws. Accessibility can also help social work programs and human service agencies reach more diverse students by assuring that information about their programs is available to all.

Keywords: Web accessibility, Universal Design for Learning (UDL), Accessibility Checker, Web Content Accessibility Guideline (WCAG)

Introduction

In 2016, the United States Department of Justice started investigation against the University of California at Berkeley (UC Berkeley) for the violation of Title II of the Americans with Disabilities Act (ADA) due to inaccessible video content for students with visual or hearing impairments. In similar cases, Harvard and MIT were also sued by disability activists for not providing video caption on their websites. From an issue of 2017, the Chronicle of Higher Education highlighted a story about Marcie Lipsitt, a veteran disability-rights activist from Franklin, Michigan. She actively involved in finding university websites and asked the Education Department's Office for Civil Rights to investigate those colleges and universities for online violations of the Americans With Disabilities Act, which prevent discriminatory practices, and the Rehabilitation Act, which requires equal access to the websites. According to the story, Ms. Lipsitt regards virtually all web pages of higher education institutions inaccessible to people who are blind or deaf, or who have motor or cognitive disabilities.

Due to the advancement of communication technology, online learning has been embedding in the everyday higher education classroom including full online, hybrid, and course management system (CMS) used for both online and face-to-face setting. At the same time, the number of university students with disabilities has increased dramatically. Although colleges and universities are aware of web accessibility issues, gaining access to online content and web-based resources is increasingly complicated for students with disabilities. EDUCAUSE surveys higher education institutions to determine key issues in postsecondary teaching and learning. In 2018, Universal Design for Learning (UDL) and web accessibility were ranked at No. 2 key issues in teaching and learning (EDUCAUSE, 2018).

Web accessibility has been prominent issues in public websites that need to legally abide by Section 508 guidelines of the Rehabilitation Act. A study from WebAIM (2018) indicated that only 3% of university websites in USA comply with the current web accessibility content guidelines. The purpose of this study is to assess web accessibility of the leading universities in USA with the use of automatic accessibility checker tools.

Web Accessibility and Universal Design for Learning

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Web accessibility can be defined as the practice of making web content accessible to everyone regardless of their physical and mental status. The primary goal of UDL and web accessibility is to increase learning access and to reduce barriers for those students and others. Thus, if university websites are designed for accessibility, academic success will be facilitated for students with disabilities. Many universities provide some enhanced solutions for students who experience issues with accessibility to the web content. However, faculty members who teach online courses are concerned about web accessibility issues particularly their own lack of knowledge to meet accessibility standards. The content they create is often not compatible with web content accessibility guidelines.

Although the focus of this paper concerns the design of Web sites for students with disabilities, all users can get benefits with a design strategy. In particular, design for web accessibility is one of the best practical examples of universal design for learning (UDL). Universal Design has been adapted to education through a number of models: Universal Design for Learning (UDL), (Hitchcock, Meyer, Rose and Jackson, 2002), Universal Design for Instruction (UDI), (Scott, McGuire & Shaw, 2003) and Universal Instructional Design (UID)(Silver, Bourke & Strehorn, 1998). In terms of learning, universal design means the design of instructional materials and activities that make the learning goals achievable by individuals with wide differences in their abilities to see, hear, speak, move, read, write, understand English, attend, organize, engage, and remember" (CEC, Pg. 2). Ronald Mace was an architect professor at North Carolina university. His concept of universal design gains a lot of attention in architecture engineering field. One good example of universal design is Curbs cuts or sidewalks ramps for people in wheelchairs. David Ross, director at center for applied special technology at Harvard applies the principle of universal design to an education field. He names it as universal design for learning. The goal of UDL is to try to create learning materials and environment that are barrier free on the web to meet the needs of all users. Rose and his collaborator said, "Students in the margins must be served, and the technology is here now to serve them effectively." (Rose & Meyer, 2002, p.14)

Multiple means of engagement mean providing options to connect the content to the learners, and engage them in the learning process. Multiple means of representation require using multimodal ways to present materials such as text, charts, eBooks, graphs, images and videos. Flexible means of expression enables faculty to create a learning environment that fosters participation by all students as they demonstrate their learning in ways that make them feel successful. These could include writing, oral reports, multimedia or demonstration. Captioned videos on the web are a good example of how Universal design for learning works. By captioning videos, students with deaf or hard of hearing can be accessible to the videos. This is also useful for English language learners, and students can learn better through reading. It is one of the many examples that web accessibility and universal design for learning can work together within the framework of inclusive education.

Web Content Accessibility Guidelines

The main objective of web content accessibility guidelines is to increase the awareness of web content accessibility. In 1999, Research and Development Center at the University of Wisconsin at Madison produced the Unified Web Site Accessibility Guidelines. These guidelines were transferred to the Web Accessibility Initiative (WAI), a project by the World Wide Web Consortium (W3C) and used to produce the Web Content Accessibility Guideline 1.0 (Bray, Flowers, and Gibson, 2003). The second version of WCAG was published on December, 2008. WCAG 2.1 became an official recommendation on June, 2018. (WCAG 2.1)

According to W3C, "Following these guidelines will make content more accessible to a wider range of people with disabilities, including accommodations for blindness and low vision, deafness and hearing loss, limited movement, speech disabilities, photosensitivity, and combinations of these, and some accommodation for learning disabilities and cognitive limitations; but will not address every user need for people with these disabilities." Most federal and state agencies adopt WCAG as policy to achieve accessibility.

The WCAG 2.1 is based on four foundation principles: Perceivable, Operable, Understandable, and Robust. The best way to remember four principles is to use four acronyms. Perceivable refers to the way people perceive content through reading or hearing. Operable means the way people use computer by using a key board, mouse, or their own voices. Understandable means people can read content with understandable and accessible languages. Robust is related to assistive technology. The main purpose of this guideline is for anyone who develop website to work with website developers who are familiar with Web Content Accessibility Guidelines. A summary of the guidelines is as follows:

Perceivable

a. Provide text alternatives for non-text content
b. Provide captions and alternatives for audio and video content
c. Make content adaptable; and make it available to assistive technologies
d. Use sufficient contrast to make things easy to see and hear.

Operable

a. Make all functionality keyboard accessible.
b. Give users enough time to read and use content.
c. Do not use content that causes seizures
d. Help users navigate and find content

Understandable

a. Make text readable and understandable.
b. Make content appear and operate in predictable ways.
c. Help users avoid and correct mistakes.

Robust

a. Maximize compatibility with current and future technologies

Section 508 of the United State Rehabilitation Act 1973 also mentioned the issue of federal government and agency websites and technology. This act emphasized that all the federal agency such as higher education institutions should provide equal opportunity for people with disability to access websites and web content, electronic documents such as pdfs and other documents. (WebAIM, 2013)

Web Accessibility Evaluation Tools

Web accessibility evaluation tools are software program or online services that assist any reviewers to checks whether web sites meet the web content accessibility guidelines. These tools provide a quick and objective way to evaluate the accessibility of any websites and find recognizing patterns of errors that humans can miss. Moreover, these tools are compatible with the current web content accessibility guidelines and standards. Thus, the evaluation results are reliable and relevant.

The most popular evaluation tool for the web accessibility was Bobby. Bobby was developed by the guidelines of WCAG and Section 508 and has been used to conduct web accessibility evaluation research (O' Grady & Harrison, 2003; Loiacono, McCoy & Chin, 2005; Williams &Rattray, 2005; Shi, 2006). However, this tool is discontinued and is not available. At present, there are other web accessibility evaluation tools such as AChecker, eXaminator, TAW, Total Validator, and WAVE (WCAG 2.1).

WAVE from WebAIM was used to conduct this study. WebAIM is a non-profit organization from Utah State University's Center for Persons with Disabilities. The center provides comprehensive Web accessibility solutions throughout the United States. WAVE is one of free tools that was developed by the organization in 2001. It is plug-in application on web browser to generate a color-coded summary of the site's accessibility features (Hashey & Stahl, 2014).

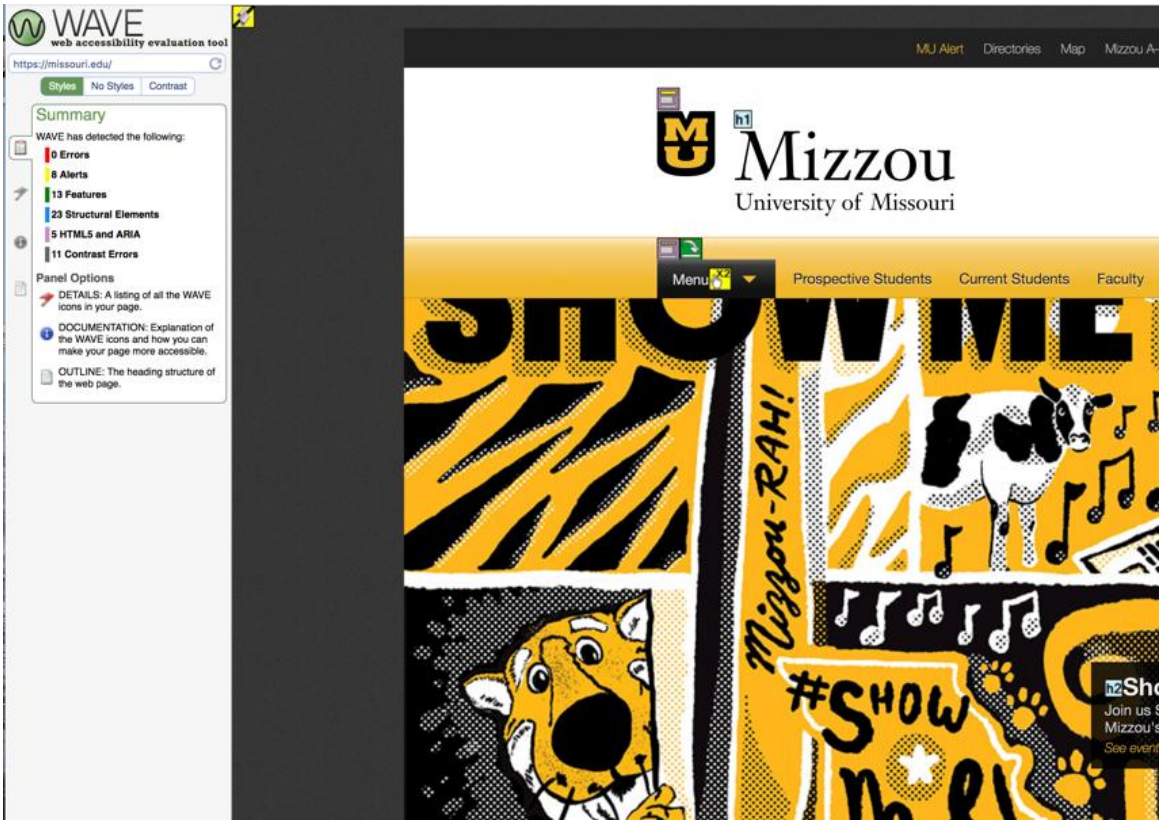
Table 1: Most Popular Automated Accessibility Tools and Applicable Standards Accessibility guidelines adapted

Tool	WCAG 1.0	WCAG 2.0	Section 508
Accessibility Valet	Yes	No	Yes
AChecker	Yes	Yes	Yes
Cynthia Says	Yes	No	Yes
EvalAccess	Yes	No	No
FAE	No	No	No
MAGENTA	Yes	No	No
OCAWA	Yes	No	No
TAW	Yes	Yes	No
WAVE	Yes	Yes	Yes
Web Acc Checker	Yes	Yes	Yes

Note. Adapted from http://usabilitygeek.com/10-free-web-based-web-site-accessibility-evaluation-tools

WAVE detects HTML 5 and Accessible Rich Internet Applications (ARIA) features, such as header, footer, ARIA landmarks and roles, and so on. Besides WAVE also provides an API that allows automated and remote accessibility analysis of web pages using the WAVE processing engine. Wave allows user to enter the web address of a current site as shown in figure 1and produce a number of icons to user's page that allows users to check potentially accessibility issues. Red icons indicate accessibility errors, the yellow ones indicate alerts; while the green icons indicates accessibility features; and all light blue indicate structural, semantic, or navigational elements.

Figure 1: A Screenshot of WAVE Evaluation Tool



Review of University Accessibility Studies

To conduct the literature review, major database search engines such as ERIC were used with keywords such as accessibility, web accessibility, virtual face, and homepage etc. (Meyer, 2008; Wilson & Meyer, 2009). Peer-reviewed journals published after 2007 were selected because after 2007 web design technique became very sophisticated to meet various types of screen platform, having a huge impact on web design techniques. Mainly two techniques were used to evaluate web sites: Manual web experts review and Automatic checker tool. Thompson, Burgstahler, and Comden's study (2003) was one of the few examples that used both methods. This study had a sample of a total of 1013 sites from 102 institutions. The particular sample for the study was public universities grouped under the "Doctoral/Research Universities-Extensive" (Carnegie Foundation, 2002). A five-point rubric was used to access the site's functionality by web accessibility experts. The study found some of the best practice from the homepages of the University of Texas at Austin, The University of Washington, The University of Kansas, North Carolina State University, and Kent University. Also they found that both methods generated similar results and showed higher correlations.

However, they found few websites accessible. Thompson, Burgstahler, and Comden (2003) indicated that "continued effort is needed in order to educate administrators, faculty, and web designers about the need for web accessibility and the techniques for implementing it."

Longitudinal study of web accessibility in higher education can be found in Zap and Montgomerie's study (2013) in Canada. They conducted web site accessibility issue from 2001 to 2003 out of 357 post-secondary web sites. Homepage of each website using TAW3 evaluation tool to meet WCAG 1.0 compliance standards. They concluded although there was some improvement over the 10 years, 73% of Canadian universities and colleges still have significant web accessibility errors among the post-secondary institutions. Similarly, Curl and Browsers (2009) examined web site accessibility over a five year period between 2003 and 2008.They examined 45 universities to compare the result of the different time periods and found that web site accessibility was improved after five years in general and yet, 75.6% of the web sites had errors and did not meet web content accessibility guidelines.

Kurt (2011) and Shawar (2015) focused on delving into their own countries' web accessibility issues. Kurt (2011) examined the website accessibility of university for people with visually impaired in Turkey. With the data set from Turkish Higher Education Council (THEC), 10 universities were randomly selected out of entire 77 universities. Each home pages were evaluated by three different automated checker tools. They found that none of the Turkish university home pages were accessible enough to pass the test. Additionally, Shawar (2015) conducted a cross-countries study for the blind people. A total of 12 universities, 6 from Jourdan and 6 from England and Arab were selected. With WAVE checker tool, they examined the home page of these 12 universities and found that web accessibility in England and Arab was higher than universities in Jourdan. In case of USA, Ravonne and Julia (2009) evaluated the library information system web sites of top 12 universities to check the status of accessibility using WebXACT. They found that only two websites (16.6%) have complied with the web content accessibility guidelines and web design. In the mean time, Ringlaben, Bray, and Packared (2014) examined the accessibility of 51 postsecondary department of Special Education home pages. Out of 51 home pages, they could analyze 44 home pages with Bobby and AChecker tools that showed simple yes or no regarding whether the page met accessibility standards. They reported that AChecker detected at least one error from 97% of the home pages.

Sampling

A list of URLs from Association of American Universities and flagship universities were selected. A dataset consisted of 95 universities in the US and Canada. Only two universities are from Canada and the rest of them are from U.S.A. 69 universities are public and 26 institutions are private.

Methodology and Findings

In order to find web accessibility, 5 phases were applied to answer the following questions:

1. What is the current accessibility status for the homepage of university websites?
2. What are the most common errors in web pages that affect accessibility?
3. How does accessibility rate differ with the institution's accreditation type?

Phase 1: Define the evaluation scope
Phase 2: Explore the target website
Phase 3: Select a sample

Phase 4: Audit sample
Phase 5: Record results.

Table 2: Number of Universities and Accessibility Errors

The number of errors	Number of universities	Percentage (%)
Zero	35	36.8
One to Three	33	34.7
Four to Six	12	12.6
Seven and Above	15	15.9

Table 2 shows a number of universities and accessibility errors. 95 universities were divided into four groups by the number of errors: Zero, One to Three, Four to Six, and Seven and Above. 35 universities had zero accessibility errors which comprise of 36.8%. Errors with one to three are considered as the minimum error. Four to six errors are identified as the moderate. More than seven errors are considered as significant accessibility issues that were found in the literatures. Among 95 universities, a total of 60 universities (63%) was identified by WAVE as having at least one significant accessibility error. 33 universities have at least more than one errors and less than three. 12 Universities have four to six errors and 15 universities have more than seven errors.

Alternative text for the images is the most common errors detected in the home page. It is considered as the easily fixable errors. In fact, the majority of the accessibility errors was rated moderate or easy to fix. The home page of 35 universities (36.8%) was identified as non-errors, which is the way higher than the national average. This result shows that leading universities in USA are aware of the issues and are trying to incorporate the accessibility evaluation process in their web site creation process.

Conclusion

The main purpose of this study was to increase the awareness of web accessibility and to check the current status of accessible websites of leading universities in USA. The home pages of each university were evaluated through the automated evaluation checker tool. The data were collected and analyzed to find the patterns. The results of this study indicated that one third of the higher education institutions has accessible web site. However, this number does not mean that the web sites are accessible to all as we did not conduct manual users testing with people with special needs. In order to understand the deeper level of accessibility of the universities, manual tests for people with special needs should be conducted as well.

Regarding the two third of the universities, it apparently showed that the digital gap do exist even in the prestigious universities. The desirable results of this study are two folds. First, related stakeholders such as the faculty members, web designers, and instructional designers have a different perspective and approach on the issue. Second, this data set can be used to guide higher education institutions to have more accessible web sites for students with special needs on their campuses.

This study indicates the need for more advocacy and education about the barriers to website accessibility and ways to make websites more accessible as an issue of social justice. In addition to promoting social justice, website accessibility also conforms to national laws. Accessibility can also help social work programs and human service agencies reach more diverse students by assuring that information about their programs is available to all.

The result from this study is not completely pessimistic. The data did reveal that one third of leading universities has accessible websites. Apparently, these leading universities are aware of the critical issues of web accessibility. There are other optimistic signs as well. A majority of universities in USA is adding a position for accessibility coordinators in order to update their web accessibility policies. A new generation of content creators and web designers recognizes the need of accessible design. These encouraging signs do not mean that we can resolve the issues of web accessibilities anytime soon. Rather, we have a long way to go to guarantee equal access for all as new cutting technologies always get in the way of accessible designs. Constant attention and special efforts are needed to improve the situation better.

Creating an accessible web site can be difficult and time-consuming. It requires knowledge, skills, and experience with the topic. Therefore, technical expertise is required for designing accessible Web sites. From the quality level of the university homepage designs observed in this study, it seems that some of the universities are missing web designing expertise. Still having technical expertise may not be sufficient for creating accessible Web sites. University web designers should be provided with genuine support and leadership and adequate resources. The topic of web accessibility has been the focus of many studies. As stated earlier, there is an increasing awareness regarding web accessibility, and yet accessibility levels are still surprisingly low. This suggests that barriers to accessibility exist. Many studies examine the accessibility levels of web pages, yet little research has been done to establish why accessibility levels are low. Further study is needed to examine this issue.

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