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By Amy E. Smith

Introduction

For over 20 years, libraries have been moving information resources to the Web. When a patron visits a library Web site, they will most likely be able to find information about the library, the online catalog, research databases, tutorials, reference services, and so much more. The movement of print resources to electronic format benefits many people who have disabilities that limit their use of print materials. Because of the many obstacles faced by individuals with disabilities, the U.S. Congress has enacted several pieces of legislation to help provide equal access to Web sites, also known as Web accessibility.

"Web accessibility is the degree to which a Web-based resource is widely usable" (*Encyclopedia of Special Education*, 2007, para.1). Web accessibility is often directly associated with people with disabilities, but in fact, it benefits many users without disabilities. The Web Accessibility Initiative (WAI), is a subgroup of the World Wide Web Consortium (W3C), which looks at different situations in order to develop ideas and guidelines to make Web accessibility possible for people with disabilities, as well as the aging population that experience different barriers. Two main standards have been developed and are used as guidelines for creating Web sites that are accessible. These regulations and guidelines have prompted the development of many different accessibility "checkers," which automatically check Web site content against accessibility standards. Many other tools, including Web 2.0 and tutorials, have introduced different and better ways to offer information in a variety of formats that meet the needs of all individuals.

In 1990, the U.S. Congress enacted the Americans with Disabilities Act (ADA). This was an important piece of civil rights legislation that prohibits discrimination against persons with disabilities in regards to access to housing, employment, public entities, and education. Prior to ADA, Section 504 of the Rehabilitation Act of 1973 was enforced to assure that any entity receiving Federal financial assistance could not discriminate against people with disabilities. It also mandated equal education for all students. In 1998, the legislation was renamed the Workforce Investment Act and was made stronger by the addition of Section 508 which defined some of the first standards for electronic access. Section 508 forced federal agencies as well as agencies receiving federal funding to ensure that developing technology was accessible for people with disabilities ("Tip Sheet", 2010).

According to the U.S. Census Bureau, as cited by Brault (2012), 56.7 million non-institutionalized people (18.7%) had a disability in 2010. The risk of having a disability increased in older age groups. "About 17.4 percent of males and 19.8 percent of females had a disability in 2010" (p.7). People with disabilities are divided into three different domains: seeing, hearing, and speaking limitations; upper and lower body limitations; and cognitive, emotional, and mental functioning. "Of the 51.5 million adults with disabilities, 30.3 million had a disability or disabilities in only one domain; 15.8 million people experienced disabilities in two domains, and 4.0 million had a disability in all three domains" (p.9).

According to 2009 Disability Data for Alabama, 18.3 percent of the population over the age of 5 has a disability (PASCenter, n.d.). The chart indicated that 3.4 percent reported a visual disability, 4.8 percent reported a hearing disability, 10.7 percent reported an ambulatory disability, 7.3 percent reported a cognitive disability, 4.1 percent reported a self-care disability, and 7.9 percent reported an independent living disability (Disability data for Alabama, PASCenter, n.d.).

Purpose of the Study

The purpose of this study is to analyze and compare Alabama's academic library Web sites to determine how accessible they are for persons with disabilities and what kind of useful links such as tutorials and Web 2.0 applications can be found on the home pages.

Statement of the Problem

The focus of this study is to analyze Alabama's academic library home pages to determine and compare degree of accessibility, complexity, and readability, as well as find out what types of links are offered for online tutorials and Web 2.0 links from the home page.

Research Questions

R1. How accessible are Alabama's academic library home pages for people with disabilities, based on online accessibility software?

R2. How do public academic library home pages compare to private academic library home pages in accessibility?

R3. How does the complexity and readability of public academic libraries compare to private academic library home pages?

R4. What types of Web 2.0 links were located on the home pages of libraries examined in this study?

R5. What types of online tutorials were found on the home pages of the libraries in this study?

Definitions

Americans with Disabilities Act
The Americans with Disabilities Act (ADA) was enacted by the U.S. Congress in 1990 to help ensure and protect the civil rights of individuals with disabilities. Library services, architecture, and design have been impacted greatly by ADA. (Reitz, J.M., 2007, ADA. *ODLIS*).

Flesch-Kincaid Grade Level
An algorithm, similar to the Gunning-Fog Index, which gives a rough measurement of the amount of schooling needed to understand the content. Numbers greater than twelve are reported as twelve,

and negative numbers are reported as zero ("Flesch-Kincaid Grade Level", 2012, para.1).

Flesch Reading Ease
An algorithm used to rate the text of a Web site for understanding. A 100-point scale is utilized, and authors are encouraged to score a value of 60 to 70; the higher the score the easier the document is to understand ("Flesch Reading Ease", 2012, para.1).

Gunning-Fog Index
An algorithm used to determine the approximate number of years of schooling needed to understand the content presented: the lower the number the more understandable the content. Any results over 17 are considered post-graduate level ("Gunning-Fog Index", 2012, para.1).

Web 2.0
Web 2.0 refers to blogs, wikis, and forums that offer an interactive experience over the Web ("Web 2.0", n.d., *Collins English Dictionary*).

Web Accessibility Initiative (WAI)
The Web Accessibility Initiative is a program sponsored by the World Wide Web Consortium (W3C), "that is designed to make the Web more accessible to people with limited vision, hearing, or dexterity" ("WAI", 2003, *Webster's New World Computer Dictionary*).

Web Content Accessibility Guidelines 2.0 (WCAG 2.0)
Web Content Accessibility Guidelines provide an outline to help authors implement successful techniques to make information accessible to all users. The guidelines are first laid out with four principals for Web accessibility: perceivable, operable, understandable, and robust. Twelve guidelines are further broken down under the four principles to help authors implement and better understand how to create a successful Web site (WCAG 2.0, 2008).

World Wide Web Consortium (W3C)
The World Wide Web Consortium is a nonprofit organization that works with its members as well as the public to develop Web standards that make Web sites accessible to all (Reitz, J.M., 2007, W3C. *ODLIS*).

Limitations of the Study
This study was limited to library Web pages of four year, bachelor degree granting colleges and universities in Alabama. The study included only the home page for each library and the information that could be found on the library's home page. Colleges or universities that did not have their own library Web page were excluded.

Assumptions
It is assumed that the list of bachelor degree granting colleges and universities in Alabama are current and up to date based on CollegeSource Online database. It is also assumed that the library Web pages in this study are an accurate reflection of the libraries' resources and services and that the accessibility checking software used in this study is accurate.

Importance of the Study
The importance of this study is to determine the accessibility and readability of academic library Web site home pages based off of the current WCAG 2.0 guidelines, as well as the availability of Web 2.0 tools and tutorials on library home pages. By studying the results of the Web site accessibility software, college and university libraries will be able to better accommodate and serve all students. Looking at the results for the Web 2.0 tools and tutorials will give an overall idea of the advancements and changes academic library Web sites are making to bring more information, in a variety of ways to their students.

Literature Review
Standards and Guidelines
Libraries today have many of their main resources located on the Web; this makes it even more important that they conform with Section 508 guidelines to create Web pages that are accessible to all individuals. Section 508 of the 1973 Rehabilitation Act (RA) was changed in 1998 and 2000 to include the federal government's standards addressing accessible information technology (Vandenbark, 2010). Providenti and Zai (2007) state that Section 508 is based off of the WCAG 1.0, which mandates accessibility for federal Web sites only. Section 508 directly impacts accessibility of federal Web sites, Section 504 of the RA calls for "effective communication," which is ample for mandating Web accessibility guidelines for higher education

institutions in the United States. In addition to the laws above, ADA became effective in 1990 and requires that places that accommodate the public must be accessible. Web accessibility for academic institutions has been required for many years for persons with disabilities (p.479).

According to Vandenbark (2010), the W3C creates international standards for Web accessibility standards. They created a specific subgroup known as the WAI to fill the mission of creating accessibility standards, supporting materials needed to both help and understand Web accessibility, and collaborating with international bodies. The first set of guidelines published by W3C was the WCAG 1.0. WCAG 1.0 (1999) was made up of 14 guidelines and then divided into 65 checkpoints. The checkpoints are assigned a priority level which ranks them for level of importance.
- Priority 1 is basic checkpoints that *must* be satisfied by developers.
- Priority 2 is items that *should* be satisfied by developers to remove significant barriers.
- Priority 3 is items that developers *may* satisfy to improve overall access to Web documents ("Priorities", para.1).

The checkpoints are then given a conformance level as follows:
- Conformance Level "A": all Priority 1 checkpoints are satisfied
- Conformance Level "Double-A": all Priority 1 and 2 checkpoints are satisfied
- Conformance Level "Triple-A": all Priority 1, 2, and 3 checkpoints are satisfied ("Conformance", para.1).

According to Reid and Snow-Weaver (2008) the WCAG 1.0 guidelines were initially created to make HTML Web sites accessible for people with disabilities. As the Web continued to change, the WCAG 1.0 guidelines quickly became obsolete, and W3C created a team to develop WCAG 2.0.

WCAG 2.0 was introduced in 2008 and is applicable to all W3C or non-W3C technologies. This set of guidelines can be used to check HTML, XHTML, CSS, SMIL, SVG, XML, PDF, and Flash (Reid & Snow-

Weaver, 2008). WCAG 2.0 guidelines are easiest remembered by using the acronym P.O.U.R. which stands for Perceivable, Operable, Understandable, and Robust (Vandenbark, 2010). WCAG 2.0 (2008) is made up of 12 guidelines, and the requirements are divided into three levels instead of ranking by priority. The WCAG 2.0 Guidelines are as follows:

Perceivable
1.1 Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language.
1.2 Provide alternatives for time-based media.
1.3 Create content that can be presented in different ways (for example simpler layout) without losing information or structure.
1.4 Make it easier for users to see and hear content including separating foreground from background ("Principle 1", para.1).

Operable
2.1 Make all functionality available from a keyboard.
2.2 Provide users enough time to read and use content.
2.3 Do not design content in a way that is known to cause seizures.
2.4 Provide ways to help users navigate, find content, and determine where they are ("Principle 2", para.1).

Understandable
3.1 Make text content readable and understandable.
3.2 Make Web pages appear and operate in predictable ways.
3.3 Help users avoid and correct mistakes ("Principle 3", para.1).

Robust
4.1 Maximize compatibility with current and future user agents, including assistive technologies ("Principle 4", para.1).

When a Web page is tested for accessibility, it is assigned a level based on several different factors. The levels are simply labeled as A, AA, and AAA. Level A satisfies all of the Level A criteria. Level AA satisfies both Level A and AA criteria. Level AAA satisfies Levels A, AA, and AAA criteria. AAA conformance is not required due to the inability for entire sites to meet all requirements with some content (Reid & Snow-Weaver, 2008).

Web Accessibility
A Web site that is accessible is designed so different people and different Web browsers can easily access, navigate, and use the site (Miller, 2006). A solid design concept makes information obtainable and accessible for a broad range of people with and without disabilities. Accessibility reaches far beyond individuals with profound disabilities, it also affects those who lack current technology, speak English as a second language, or suffer from a common condition like arthritis. Early research by Spindler (2002) makes note of the changes many academic institutions put in place for people with physical disabilities. Ramps, assistive technology labs, and institutions offering services to individuals with disabilities have become the norm across the country. Accessibility for those with physical limitations was only the beginning, as the Web became more of an information standard; developers began to create standards and guidelines to increase equal access to all individuals wanting to retrieve information via the Web.

Several studies have been completed that look at Web accessibility in academic libraries. Lilly and Van Fleet (1999) identified colleges and universities using Yahoo!'s "100 Most Wired Colleges" and tested accessibility using Bobby 3.0. The results indicated that 40 percent of the institutions passed Priority 1 checkpoints. Spindler (2002) carried out a similar study that examined library Web sites from 190 institutions that had a population between five-thousand and ten-thousand students. The institutions were a combination of both public and private located in the United States. Bobby 3.2 was used to analyze the home page of the library Web site, which checks parameters based on the WAI guidelines. The results of this study concluded that 58 percent of library Web pages failed, but many only by a small margin of error. Providenti and Zai (2007) tested for compliance in Bachelor degree granting academic libraries in Kentucky. This study was a continuation and comparison of an earlier study conducted in 2003. Watchfire's WebXACT accessibility tester was used as well as W3C's HTML validator. Results showed no difference in the

number of institutions that passed the Section 508 compliance between 2003 and 2007. Priority 1 checkpoint compliance increased from 23 percent to 37 percent between 2003 and 2007.

In 2008, WCAG 2.0 guidelines were finalized. The prior studies were all based on WCAG 1.0 compliance. Very few studies have been conducted using the new WCAG 2.0 guidelines (Oud, 2012). Oud's study is recent, and one of the only retrieved, that checks for WCAG 2.0 compliance. The study checks for compliance amongst university, college, and public library Web sites in Ontario. Sixty-four Web sites were evaluated and the results indicated that an average of 14.75 accessibility errors was found.

Web 2.0
Web communications at universities have continued to grow at an astronomical rate. Students are expected to use the Web for everything now including registration, paying bills, purchasing books, completing class assignments, and accessing grades. With the growing rate of the use of the Web in higher education for both traditional and online classes, it is more important than ever for universities to make sure that Web sites are accessible to all groups of people (Bradbard, Peters, & Caneva, 2010). A major problem faced with Web page creation, is that they are created based on looks, not accessibility. The lack of concern for those with disabilities when creating Web pages creates continuous barriers for these students.

Web 2.0 technologies have a big impact on users with disabilities. Fairweather and Trewin (2010) looked at the impact these technologies had on users with cognitive impairments. Unfortunately, Web 2.0 technologies can actually degrade the user experience for this group of individuals. Many new technologies like mashups, social networking, user-created content, and dynamic page updates require users to have certain perceptual abilities in additional to basic auditory and visual. The article clarifies many different problems associated with Web 2.0, and also offers many solutions and suggestions for developers to consider when creating these programs that will help make them more accessible. Brown, Jay, Chen, and Harper (2012) investigated the impact Web 2.0

technologies have on visually impaired users. The authors note that accessibility is always changing because technology is always changing, and the Web is always evolving. The main challenge is keeping assistive technologies up to date enough to handle the continuous changes. The authors performed research to get a better understanding of the evolution of the Web, as well as the use of technologies that deal with dynamic updates for disabled users. Current and historical Web sites were evaluated to determine trends on popular Web sites. Assistive technologies were analyzed to determine which tools were the most helpful for visually impaired users.

Content Analysis Methodology
Similar methodology has been used in many studies over the past decade to determine Web accessibility. Still (2001) conducted a content analysis of library Web sites in English speaking countries. Spindler (2002) analyzed the accessibility of Web pages for mid-sized college and university libraries. Clyde (2004) conducted a content analysis on the trends of school library Web sites between 1996 and 2002. Comeaux and Schmetzke (2007) evaluated the Web content and trends within ALA-accredited library schools and their campus libraries. Providenti and Zai (2007) gathered information regarding content and Web accessibility of Kentucky's academic libraries. Oud (2012) analyzed Ontario library Web sites to find out if they were meeting the new accessibility standards and guidelines mandated for all organizations employing more than one person.

Still (2001) conducted a content analysis comparing and contrasting the content and design of library Web sites in English speaking countries. Australia, Canada, the UK and the United States were the four countries selected for the study. To provide the most diversity, universities with enrollment over 10,000 were chosen. At least one school was selected from each state, province, or region. No branch or satellite campus libraries were used in the study, only main libraries. A checklist was created to identify items most commonly found on U.S. library Web sites. All Web sites were evaluated during a one month period of time so that very little changes or updates would happen to skew the results. The results indicated that library Web sites, in the four countries identified,

are very similar with a few cultural differences. In the U.S., two big areas of interest indicated on Web sites were library instruction and remote access to materials. The author found that library Web sites in Australia, Canada, and the UK provided links on their main page to exam papers and for-profit bookstores. These are links that were rarely or never found on U.S. library Web sites.

In Spindler's (2002) study, the author wanted to have a better understanding of the state of accessibility among college library Web sites. A record published by USnews.com was used to produce a list of 188 schools meeting the search criteria. After a list of schools and Web sites was obtained, Bobby 3.2 was used to analyze the library Web sites. The accessibility tool automatically checked for alternate text for images, alternate text for image map hotspots, titles for each frame, and alternate text for applets. Some elements were not able to be checked automatically and required manual checks. Results of both the automatic and manual tests revealed "that a significant number of mid-sized colleges have problems with accessibility on their library Web sites." Of the sites tested, only 79 (42%) were given a passing grade. The three major problems causing Web sites to fail the accessibility checker included a lack of alternative text for images, Web sites with image map shots failed to provide alternate text, and Web sites using frames failed to provide titles. Although the results seem staggeringly high on failure rate, the author notes that of the sites that failed the test, fifty-five had five or fewer accessibility errors. These were generally errors that were easily fixed with proper coding.

Clyde's (2004) study was a content analysis of 50 school library Web sites between 1999 and 2002 to find out how "state of the art" they are. A previous study was conducted between 1996 and 1999 to look the library Web sites to find out what was offered and how they were changing. A new study was conducted in 2002 to analyze and compare how the Web sites have evolved and changed over the past six years. Data were collected and analyzed based on the country the library was located in, the type of school, and the visible changes. The changes were comparison's made from the previous research to what was currently available on each Web page. The

Web pages were ranked by how sophisticated they had become, if there were few changes, the site had actually declined in sophistication, or if the site no longer existed. The results of the study indicated that more than half of the Web sites became more sophisticated between 1996 and 1999. The study done between 1999 and 2002 indicated slower development. The major development noticed in 2002 was the increased quality of resources available through the library Web pages, for example the movement from card catalogs to the OPAC, as well as many other informational services.

Comeaux and Schmetzke (2007) performed a Web site analysis to determine the accessibility of libraries located on ALA-accredited library school campuses. This study is a follow-up to a previous study by Schmetzke (2003), which analyzed the entire Web sites of ALA-accredited schools, to find out if accessibility has improved or not. A total of 56 campus libraries that offer a Library and Information Science (LIS) program were located, 49 in the United Stated and seven in Canada (Schmetzke, 2007). The exact same library Web sites were used that Schmetzke (2003) used in his study. Bobby 3.1.1 was used to check for accessibility on library home pages as well as subsidiary pages directly linked to them. Only the information that could be obtained automatically from Bobby was used in the study. Information that had to be manually tested for was not checked. The results of the study indicate a rather positive improvement of accessibility with LIS Web pages as well as library Web pages. Accessibility increased from 33 percent to 44 percent on top layer Web pages at LIS schools. Library Web sites increased from 51 percent to 55 percent, and barriers declined from 4.5 to 3.6. Canadian LIS schools outperformed both Canadian library sites and U.S. LIS schools in accessibility with only 1.1 barriers per page. Although barriers are declining, many LIS schools and library Web sites are inaccessible and need continued changes to better serve all patrons.

Providenti and Zai (2007) conducted a study on the accessibility of Kentucky's academic library Web pages. In Kentucky, one in four people have reported having some sort of disability. Six and a half percent of college students in Kentucky between the ages of 18 to 24 report having a disability. A previous study

was conducted in 2003, which was being compared with the recent 2007 study to determine if any changes had taken place. The data collected were used to determine if institutions in Kentucky are creating Web pages that are more accessible, or if they are just creating pages that pass online accessibility testers. The authors used CollegeSource Online database to determine Bachelor degree granting institutions in Kentucky. The search yielded 33 institutions meeting the criteria. Each institutions library home page was evaluated using Watchfire's WebXACT accessibility tester and W3C's HTML validator. The accessibility tester checked Web pages against the WCAG 1.0 automated checkpoints and Section 508 automated checkpoints. The data indicated no changes between 2003 and 2007 in the number of institutions that passed Section 508 automated checkpoints. Compliance with WCAG Priority 1 checkpoints grew 14 percent between 2003 and 2007. WCAG Priority 2 and Priority 3 checkpoint compliance remained unchanged. Fifty percent of the Web pages automatically tested had fewer than five errors, but manual checkpoints are more concerning offering very little compliance. These data led the author to conclude that many Web developers create pages that rate well against automated accessibility testers, but fail to matchup and meet the full accessibility guidelines created (Providenti & Zai, 2007).

Oud's (2012) was one of the first researchers that evaluated Web accessibility using WCAG 2.0. Changes to standards written in the Accessibility for Ontarians with Disabilities Act (AODA) contain an Information and Communication section that requires the information be available in accessible formats. International standards for Web accessibility will have to be met my all libraries in Ontario by 2021. With the new standards passed into law, it is the hope that people with disabilities will have the same accessibility to information as a person without a disability. This study evaluated a total of 64 Web sites that included university, college, and public libraries. The author tested several different automated Web accessibility checkers for accuracy, and found that Total Validator performed the best with the lowest number of false positive errors. Each site had a total number of 30 pages checked; if a site contained fewer than 30 pages,

then all of the pages were checked. In addition to using Total Validator, a WCAG Contrast Checker was also used to check for color contrast on pages. Overall, a total of 1,860 pages were checked, and all of them had errors. These data indicated that there were no Web pages in compliance with the WCAG 2.0 guidelines. With a combination of Markup errors, Contrast errors, and other WCAG 2.0 errors, college libraries had an average of 15.99 errors per page, public libraries had an average of 14.38 errors per page, and university libraries had a total of 13.99 errors per page. The most common error found was incorrect html/xhtml. These types of errors create accessibility problems for screen readers. Poor contrast between text and background colors was the second most common error. The results from this study yield very different results when compared with Comeaux and Schmetzke's 2007 study. The primary difference comes from the change in WCAG 1.0 guidelines versus WCAG 2.0 guidelines and the use of a contrast checker in Oud's study. The study found that Ontario libraries have a lot of work ahead of them to become WCAG 2.0 compliant. It is important also to remember that only automated testing was completed, and further more in depth manual checking will also have to be completed to check for other elements of compliance (Oud, 2012).

Methodology
A Web site analysis was completed to determine if the private and public college and university libraries in Alabama were accessible for people with disabilities. CollegeSource Online database (CollegeSource, 2012) was used to create a list of public and private colleges and universities in Alabama. To come up with a list of public institutions, a "Criteria Search" was set to locate institutions matching "Bachelor's degree" and "Public" and "Alabama." Sixteen public institutions were found. To come up with a list of private institutions, a "Criteria Search" was set to locate institutions matching "Bachelor's degree" and "Private", "Private nonprofit (no-religious affiliation)", and "Private nonprofit" and "Alabama." The search for private institutions yielded twenty-one results. Library home pages were located by browsing the institution's home page or by using Google when necessary. Libraries that did not have their own home page were excluded from the study as well as

branch campus libraries that used the same home page. Only the main library home page for each university was evaluated for campuses with multiple libraries. After searching for each library home page, it was determined that there were four private universities that did not have a library home page; therefore, those institutions were eliminated from the results.

Vision Australia (2012) offers a Web Accessibility Toolbar for IE – 2012 that was used to test the accessibility of each library home page to check for compliance with the WCAG 2.0. The Web Accessibility Toolbar assists in evaluating Web pages by identifying the components of a Web site that are not compliant with WCAG 2.0 standards, so that all of the work does not have to be done manually. The software allows the user to run a report to identify specific problems and also gives information on how to fix the problems to meet WCAG 2.0 standards. The testing was completed over a one week time period in April of 2013 to ensure that limited changes were made to any of the Web pages during the research. The results were compiled in an Excel spreadsheet showing the five main categories: Navigation and Orientation, Text Equivalents, Scripting, Styling, and HTML Standards. Each category was assigned a status of Web sites completeness, which included a percent pass, percent warn, and percent fail for each category. Juicy Studio Readability Test (Juicy Studio, 2012) was used to test the readability of each home page. The software examined the content of each page including navigation links. The inclusion of navigation links in the analyses can slightly skew the results. The Implementation amongst the pages and Styling ranked in the middle with most of Web pages having this area with an "almost complete" status. The graph below shows the percentage of completeness, based on a one hundred point scale, for each of the five main categories.

results from each Web page were compiled in a chart to show the Gunning Fog Index value, the Flesch Reading Ease value, and the Flesch-Kincaid Grade. These values helped to determine the readability of each library Web sites home page. The software was unable to properly load and read one of the private library home pages, so it was eliminated from that portion of the study.

A checklist was created in Excel to compile the results of the Web 2.0 applications that were visible on each library's home page. The applications that were examined were the following: photo streams, blogs, wikis, podcasts, social media, and virtual reference chats. Data were also collected and evaluated to determine which home pages offer links to Web tutorials and in what format the tutorials were offered. This portion of the research was also concluded within a one week time frame to give a more concise reflection of all of the Web sites at one time.
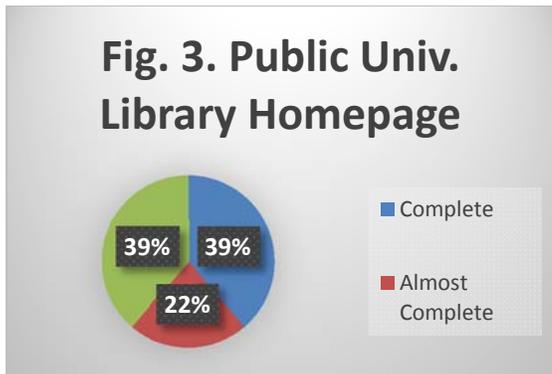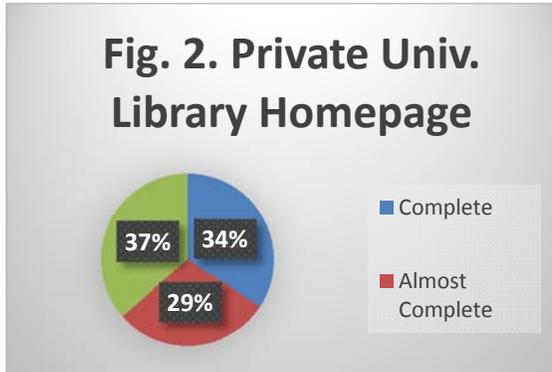
Findings

R1. How accessible are Alabama's academic library home pages for people with disabilities, based on online accessibility software?

After the research was completed, a total of thirty-three library home pages were evaluated by using the Vision Australia Web Accessibility Toolbar. Based on the five main categories that broke down the accessibility of each Web sites home page, HTML Standards and Scripting ranked the highest for "completeness" amongst the pages. Navigation and Text Equivalents both ranked the lowest for "partial
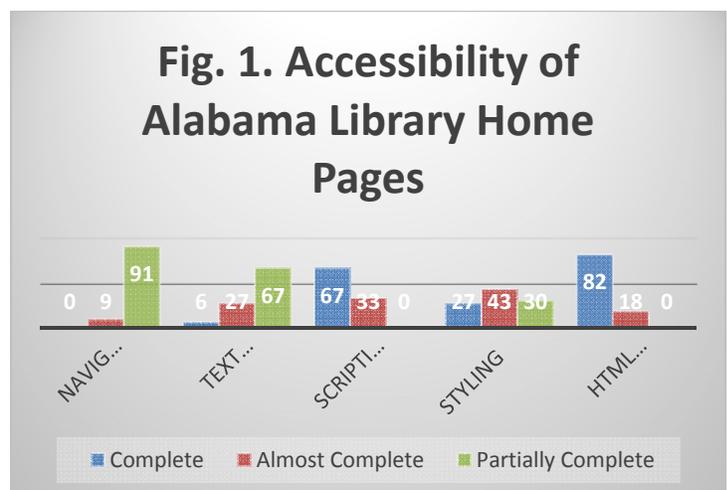
Fig. 1. Accessibility of Alabama Library Home Pages

R2. How do public academic library home pages compare to private academic library home pages in accessibility?

Among the five categories, public university library home pages had a score that was five percent higher than private university library home pages on completeness (Figures 2 and 3).

Fig. 2. Private Univ. Library Homepage

- 34% Complete
- 29% Almost Complete
- 37%

Fig. 3. Public Univ. Library Homepage

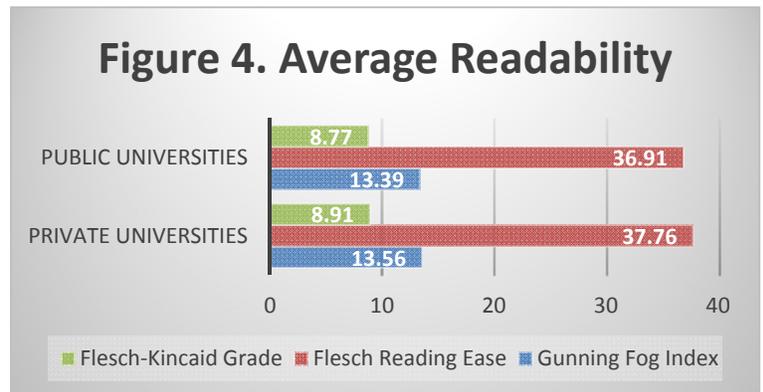- 39% Complete
- 22% Almost Complete
- 39%

Private university library home pages had a score that was seven percent higher than public university library home pages in the area of almost complete. Public university library home pages also had a higher number of home pages that were only partially implemented. Overall, the numbers for both public and private universities in Alabama are very close and comparable. If one takes only the numbers based on 100 percent completeness, public university library home pages come out as slightly more accessible, but if one combines the overall completeness and almost complete categories, the private university home pages become slightly more accessible.

R3. How does the complexity and readability of public academic libraries compare to private academic library home pages?

On an average comparison, the complexity and readability of public university and private university library home pages is comparable (Figure 4). The averages of each category indicate less than one point dividing each of the three categories.

Figure 4. Average Readability

	Flesch-Kincaid Grade	Flesch Reading Ease	Gunning Fog Index
PUBLIC UNIVERSITIES	8.77	36.91	13.39
PRIVATE UNIVERSITIES	8.91	37.76	13.56

Breaking down the results by individual universities within both the private and public sector shows a larger difference in scores. The Gunning Fog Index scores for public university library home pages ranged from 10.74 to 17, with an average readability of 13.39 (Figure 5). The Gunning Fog Index score for private university home pages ranged from 10.13 to 17 with an average understandability of 13.56 (Figure 6). A score of seventeen or higher is considered a post-graduate reading level. The lower the numbers are in this category, the more understandable the content.

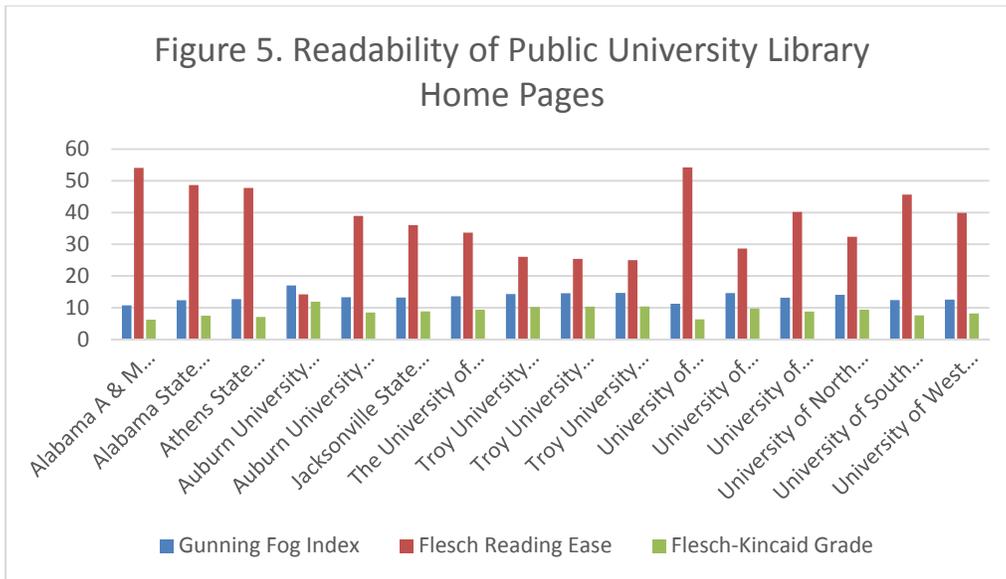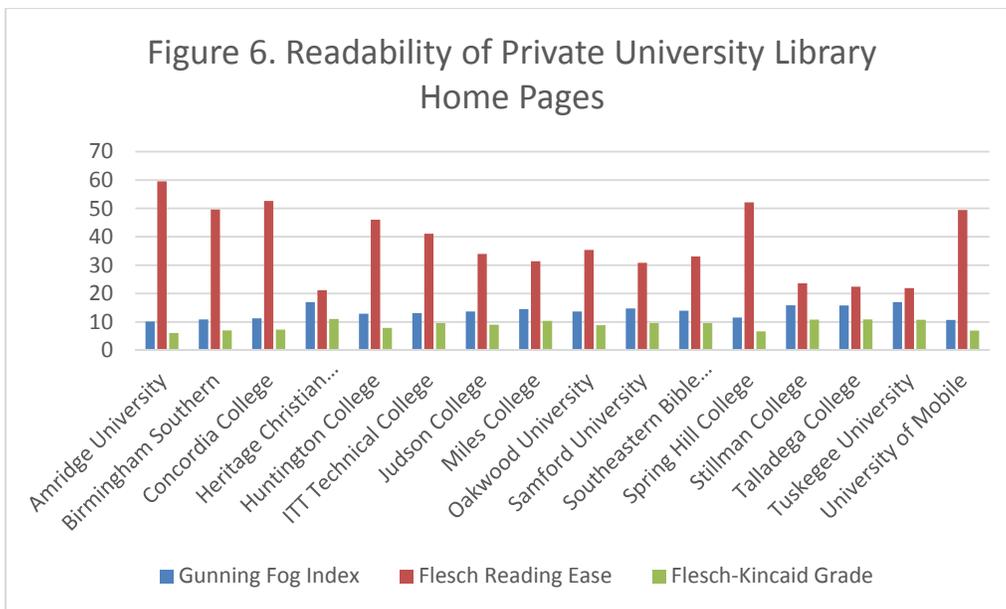Figure 5. Readability of Public University Library Home Pages

Figure 6. Readability of Private University Library Home Pages

Flesh Reading Ease scores for public university library home pages ranged from 14.18 to 54.25, with an overall average of 36.91. Private university library home pages had a range from 21.19 to 59.52, with an overall average of 37.76. The Flesch Reading Ease scores are traditional aimed to be between 60 and 70 on a 100-point scale. None of the public or private university library home pages scored a sixty or higher. The higher the score in this category, the easier the document is to understand. After analyzing the scores for both the public and private universities, there were only five institutions that scored above a fifty in this area. That leaves a total of twenty-seven schools with scores less than fifty, which makes those sites potentially harder to understand.

Flesh-Kincaid Grade Level numbers measure the approximate amount of school needed to understand the information presented. The lower the numbers, the easier the content is to read and understand. Public university library Web sites had an average score of 8.77, and private university library Web sites had an average score of 8.91. The majority of the results gathered scored between an 8 and 10 in this area, with a few scores on the low end and a few on the high end. Overall, the average person with at least eight to nine years of schooling should be able to easily read the pages.

Figure 7. Web 2.0 Applications by Library Type
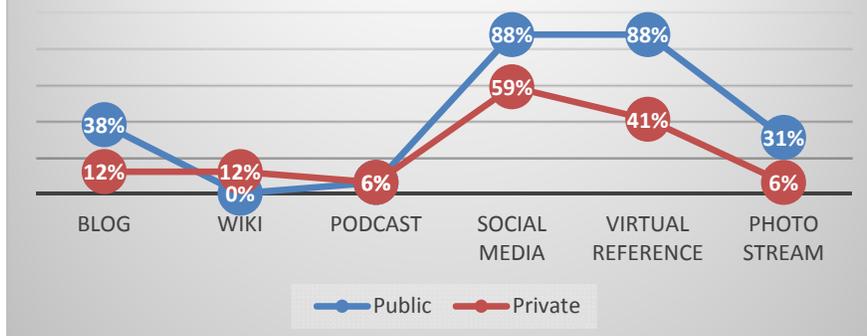
	BLOG	WIKI	PODCAST	SOCIAL MEDIA	VIRTUAL REFERENCE	PHOTO STREAM
Public	38%	0%	6%	88%	88%	31%
Private	12%	12%	6%	59%	41%	6%

R4. What types of Web 2.0 links were located on the home pages of libraries examined in this study?
Each library home page was evaluated for Web 2.0 tools, which included photo streams, blogs, wikis, podcasts, social media links, and links for virtual reference services. Figure 7 shows the Web 2.0 tools located on the home pages of public and private university library Web sites. Social media links and links for virtual reference were found on more than eighty-five percent of public university library home pages, those numbers decreased on private university library Web sites, with social media links appearing on approximately sixty percent of the Web sites, and virtual reference links were found on a little over forty percent of the Web sites. With the exception of wikis and podcasts, the percentage for Web 2.0 usage was greater for public academic library home pages than private academic library home pages.

R5. What types of online tutorials were found on the home pages of the libraries in this study?
Online tutorials of many formats were located on library home pages. Library tutorials were broken up into four different formats: PowerPoint, Video, LibGuides, and Web Guides. Ninety-four percent of public university libraries offered some type of online tutorial from their home page (Figure 8). The results were significantly different with only forty-seven percent of private universities offering some format of an online tutorial (Figure 9).

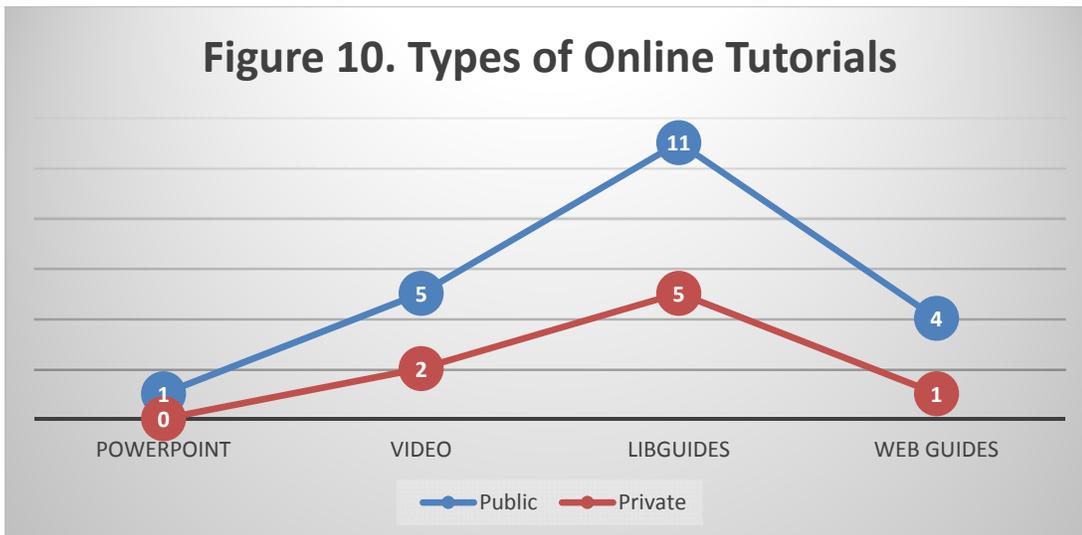**Figure 8. Public University Tutorials**

Guide 94% / No Guide 6%
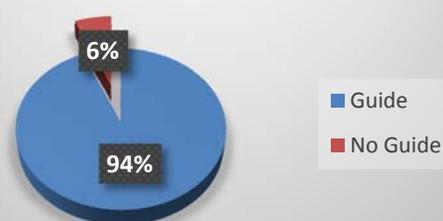
Figure 9. Private University Tutorials

Guide 47% / No Guide 53%

The most popular type of online tutorial being used by both public and private university libraries are LibGuides. Eleven of the fifteen public university libraries that offer online tutorials use LibGuides, five out of the eight private university libraries that offer online tutorials use LibGuides. Video tutorials ranked second as a method for online tutorials for both private and public libraries. PowerPoint and Web Guides were the least used by both types of university libraries (Figure 10).

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Figure 10. Types of Online Tutorials

Figure 10. Types of Online Tutorials

Legend: Public (blue), Private (red). POWERPOINT: Public 1, Private 0; VIDEO: Public 5, Private 2; LIBGUIDES: Public 11, Private 5; WEB GUIDES: Public 4, Private 1.

Conclusion

Vision Australia's Web Accessibility Toolbar for IE – 2012 was utilized for this research. The software scans specific Web pages for potential problems, many which are easily fixed by Web administrators. Reid and Snow-Weaver (2008) explained the importance WCAG 2.0 standards as well as the changes that made the guidelines more objective for testing purposes.

In this study, the home pages from both public and private university libraries were analyzed to find out how accessible the Web sites really were. Overall, the results were fairly positive for both public and private university libraries. All of the pages were assigned a degree of completeness, and for any areas that received a failing grade, sub-categories broke down the specific problem areas needing attention. The problem areas that showed failing grades for public universities, also existed in private universities. The end results showed that both private and public university library home pages ranked within percentage points of each other on accessibility. The results of this study fall in line with many of the results in Oud's (2012) study that indicated that none of the Web sites tested were fully compliant with WCAG 2.0 standards, and that manual evaluations should also be completed for more specific results. Although no Web site fully met WCAG 2.0 standards, there is evidence that changes are occurring to create better Web standards and Web accessibility. The results also show that there are some very specific areas that can easily be improved to make accessibility even better.

The Juicy Studio Readability Test indicates the understandability and readability of a Web page. The software is great at providing an overall look at the age and reading level the Web site. The numbers for all three of the categories analyzed show comparable overall numbers. The average Gunning Fog Index scores indicated that most of the Web sites required at least a high school reading level to fully understand. The Flesh Reading Ease scores indicated that none of the university Web pages met the traditional goal area of a score between 60 and 70. Lower scores in this area mean that the content may not be easily understandable. The Flesh-Kincaid numbers calculated show that the persons who would most easily be able to read and understand the content provided would need to have at least eight years of schooling.

Web 2.0 tools have become more popular and more relied upon by students and librarians. The results of this study indicate both the importance and the need for Web 2.0 technologies on university Web pages (Bradbard, Peters, & Caneva, 2010). Public university library home pages yield links to blogs, social media, virtual reference, and broadcast important information through the use of photo streaming on their home pages. Private university library home pages on the other hand had a much smaller showing of Web 2.0 technologies on their home pages. Many

private university library home pages that had links for social media were for the school as a whole, and not library specific, where as a majority of public university library home pages had social media links that were created and specific to the library itself. The comparison between public and private university library home pages that offer online tutorials also show considerable differences between the two types of institutions. Once again, public university library home pages dominated this area. Only one public university library home page lacked having a link to some kind of online tutorial. Out of the seventeen private university library home pages, eight had links to online tutorials, and nine did not. LibGuides did rank the same for both groups, being the most popular format for offering online tutorials. Over sixty percent of both public and private university library home pages that offered online tutorials used LibGuides. The results for Web 2.0 technologies appear to be pretty clear cut between public and private institutions.

This study could be conducted on a more in depth level by using both the accessibility checker and a manual check of each Web page. As with any software, there is the potential for glitches that may only be known about by manually investigating the problem areas. The Juicy Studio Readability results must also be closely looked at beyond the scope of the software. Because of the way the software works, results can be easily skewed based on the amount of content on the page, as well as the number of navigation links. As a brief overall look, these tools are both very helpful and give a general idea of both accessibility and readability.

Accessible Web sites are a requirement for many businesses and schools. Many factors must be considered when creating a Web page, especially the home page of a Web site that offers navigation to several different areas. Many helpful tools are available for free on the Web to analyze Web page content to find out what problems may potentially exist for persons with disabilities. Continued studies in this area will help boost the care and attention brought forth to creating accessible Web pages.

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