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Vivienne Conway
Edith Cowan University

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Website accessibility in Western Australian public libraries

VIVIENNE CONWAY

The World Wide Web Consortium (W3C) has established international standards for website accessibility which attempt to ensure that everyone has the same opportunities to use materials published on the World Wide Web (Web). This article provides a summation of the research conducted into the accessibility of public library websites in Western Australia. A discussion is provided of the website audit methods used and results obtained. The research demonstrates the level of compliance with Australian and International standards as well as results of surveys used to determine the perceived willingness to comply with those standards, barriers to compliance and benefits of an accessible website.

Implications for best practice

- Websites need to be regularly checked for accessibility due to the changing nature of website information.
- Use a combination of methods to check a website, do not rely on a single automated tool.
- Look at compliant websites for ideas on how to best meet the guidelines. One example: http://www.visionaustralia.org/info.aspx?page=1985
- Ensure staff who add material to the website use a checklist and sign it to ensure that standards are maintained.
- The Australian Government's National Transition Strategy (NTS) can be found on the Web at: http://www.finance.gov.au/publications/wcag-2-implementation/docs/wcag-transition-strategy.pdf
- Refer to the Australian Human Rights Advisory Notes for guidelines that apply to all Australian websites. Refer particularly to Section 4.2 at: http://www.hreoc.gov.au/disability_rights/standards/www_3/www_3.html

Introduction

The World Wide Web Consortium (W3C) has established international standards for website accessibility which attempt to ensure that everyone has the same opportunities to use materials published on the World Wide Web (Web). The Director of W3C, Tim Berners-Lee, acknowledged as the inventor of the Web, states: 'The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect' (Henry & McGee 2010). The most recent version of the

Guidelines published by the W3C Web Accessibility Initiative is known as *Web Content Accessibility Guidelines Version 2.0 (WCAG 2.0)*

In Australia, all government agencies must now comply with the WCAG guidelines. The website '*Australia.gov.au*', is now compliant to Level A of the WCAG 2.0 standard (Australian Government, 2010). It is striving towards compliance at levels AA and in some cases AAA. The highest level attainable under the *Guidelines* is AAA. Other organisations affirming the need to follow the WCAG include the Australian Human Rights Commission, which enforces Section 67(1)(k) of the *Disability Discrimination Act 1992 (DDA)*, the State Library of Western Australia, the National Library of Australia, Vision Australia and other disability advocates, and the Australian Library and Information Association (ALIA).

In Australia, any web page published by either an individual or an organisation must adhere to the recognised standard. In the case of a government or government-funded agency, these standards are covered under the *National Transition Strategy* (Australian Government Information Management Office (AGIMO) 2010). The Australian Human Rights Commission publishes advisory notes advising current standards that apply to all Australian websites. These advisory notes have recently been upgraded to suggest that WCAG 2.0 to Priority A is the minimum acceptable standard, and suggest a timeline to bring websites into compliance. Compliance with this level is necessary to avoid a complaint under the *Discrimination Act 1992* (Australian Human Rights Commission 2010).

The Australian Government currently estimates that about 20% of Australians experience a long term impairment which in turn equates to about 15% of the population under the age of 65. Of the people with a disability, 86% of these report a core limitation which restricts their mobility, communication, schooling or employment (Australian Government Information Management Office (AGIMO) 2009). This means that approximately one in five of the patrons of the local library experiences a significant disability.

Purpose of the research

The purpose of this study is to determine the level of adherence to the W3C standards within public libraries in Western Australia. Ascertaining the current state of accessibility within this sphere is crucial to determining whether the needs of people within Western Australia who have accessibility-related impairments are being met by publicly-funded libraries. While it is acknowledged that there are many different impairment categories, this study was limited to those individuals with a visual impairment, and specifically their ability to access web-based services in Western Australian public libraries. Additionally, the study looked at the barriers to conforming to the standards and what areas need to be addressed to assist public libraries in meeting this goal. The study also looked at the perceived benefits of incorporating website accessibility principles into a website design. In light of the endorsement of WCAG 2.0 by both the Australian Government and the Australian

Human Rights Commission, compliance with both WCAG versions 1.0 and 2.0 was assessed.

The findings of this study inform libraries within the State of the collective level of adherence to the standards, as well as highlighting the barriers which may be preventing a fuller compliance.

Background

The Australian Library and Information Association (ALIA) is the professional body responsible for the Australian library and information sector. ALIA supports the aims of website accessibility through the Association's *Guidelines on library standards for people with disabilities*:

> The aim of these guidelines is to provide benchmarks for an acceptable minimal level of service which can be used by all libraries in analysing the current level of service, in facilitating forward-planning and in developing strategies for more-effective services. It is recommended that these standards be regarded as minimum requirements and that, given the rapid developments in technology in this area, they be reviewed every two to three years (Australian Library and Information Association 2005).

It asserts the principles of inclusive services for patrons with disabilities. These guidelines affirm that a person with a disability should be treated with equal dignity, consistency and consideration in respect to library services and that the onus is on the library, its staff and governing body to show why any limitation exists rather than upon the patrons to prove their right to such a service. It also refers to the *Disability Services Act 1986*, the *Equal Opportunity Act 1995* and the *Disability Discrimination Act 1992* for the fundamental principles outlined therein.

The Western Australian Municipal Association has produced guidelines for all local governments within the State. It articulates clearly that information designed for the public must be made available in easily understood formats. In particular reference to information on websites, the guidelines state:

> Information provided on the Internet website and for e-commerce activities should be designed to comply with the W3C Web Content Accessibility Guidelines to Level 1; and preferably to Level 2 compliance (Western Australian Municipal Association 2001).

Public libraries in Western Australia are operated by local government councils. Resources typically have been purchased through a cooperative agreement between the councils and the State Library, with State Library-owned items rotating on a monthly basis. Each council chooses its own Web interface, and some small local libraries may not have a website at all for remote access to the catalogue. Councils with more than one branch library typically utilise a shared catalogue system between their branches.

The importance of having a website that provides accessibility to a greater audience has been demonstrated by the case of the 2000 Olympic Games in Sydney. In this instance, Bruce Maguire, a visually impaired individual, sued the Sydney Organising Committee for the Olympic Games (SOCOG) over the fact that he was unable to access the Website for the Sydney Olympics. The Federal Court found in favour of the claimant and he was awarded substantial damages (Pedlow 2002).

Website accessibility compliance with the WCAG guidelines is a legal necessity and binding under Australian law. There appears to be a significant gap between Australian Government requirements for all government websites and the level of adherence to the guidelines in Western Australian public libraries. The guidelines have been endorsed by all levels of government in Australia, from Federal to State and Local governments. In addition, they are reinforced by agencies such as ALIA and the various advocacy groups. The new *National Transition Strategy* (Australian Government Information Management Office (AGIMO) 2010a) will have significant impact upon libraries.

Internationally, due to the recognition of the *WCAG Version 2.0*, courts are imposing strong sanctions against government departments and companies who fail to incorporate critical aspects of website accessibility. In December 2010, the Canadian Government was found by the High Court to have failed in its stated intention to comply with accessibility guidelines. In addition to a substantial court costs fine, the Canadian Government was given fifteen months to bring their 146 websites into compliance with current requirements.

Ball provides a very relevant reason for the inclusion of accessibility in a website:

> The increasing pervasiveness of ICT into the realm of the library and information professional offers an opportunity for increased engagement with a wider variety of users. In some instances the characteristics of these users are known and can be directly catered for, but in most cases the user audience is not known. The range of potential characteristics and needs across this largely unknown audience is therefore as great as within the general populace, and on-line resources must be designed and created with this factor very much in mind (Ball 2008, 25).

The standards for web design, which aim to ensure accessibility for all individuals, have been developed by the World Wide Web Consortium (W3C). The Vision of the W3C is 'to lead the World Wide Web to its full potential by developing protocols and guidelines that ensure the long-term growth of the Web' (World Wide Web Consortium (W3C) 2009). The W3C has developed a *Web Accessibility Initiative*, the most recent version of which is known as *Web Content Accessibility Guidelines 2.0* (WCAG 2.0). These guidelines now form the international basis for accessibility of web content. The guidelines allow for three levels of compliance A, AA, AAA, where AAA is the highest level attainable for a website. Priority Level A is considered the minimum standard acceptable. The following is taken from the Introduction to these standards on the W3C Accessibility Standards page:

> The Web is fundamentally designed to work for all people, whatever their hardware, software, language, culture, location, or physical or mental ability. When the Web meets this goal, it is accessible to people with a diverse range of hearing, movement, sight, and cognitive ability. (Henry & McGee 2010)

On October 8, 2010, President Obama signed into law the *21st Century Communications and Video Accessibility Act* which enhances the provision of the Section 508 legislation currently used in the United States to ensure website accessibility. This new law extends the coverage of the previous legislation which has been contested by numerous lawsuits in the United States under the grounds that it did not cover Internet usage. This new law not only confirms the need for website accessibility on the Internet, but extends it to cover mobile devices, emergency broadcast information, television and streaming of television available through the Internet. The purpose of the new legislation is to make sure that communications technology does not disadvantage people with vision or hearing loss.

Research methods and design

The principal research question was: 'What is the level of adherence in public libraries in Western Australia to the W3C Web Content Accessibility Guidelines, Version 1.0 and 2.0?'

In order to capture the data required for this project, a hybrid approach was adopted which included auditing the websites, completing on-line surveys and interviewing selected willing public library administrators and librarians. The purpose of the research was to discover the level of compliance with the WCAG 1.0 and 2.0 within public libraries in Western Australia, to determine their accessibility. In discussing website accessibility evaluation, Sloan states:

> The immediate aim of a website accessibility evaluation should be to uncover all *true* [emphasis in original] instances of where a disabled person may have difficulty using or be unable to use the site for its intended purpose and to avoid reporting instances of barriers that do not actually adversely affect accessibility (Sloan 2008, 73).

The research took a multi-faceted approach to data collection. The research incorporated quantitative techniques such as on-line website accessibility checking tools which provide a report identifying the percentage of pages and images that meet accessibility guidelines. Qualitative data supporting these findings were obtained from surveys and interviews.

Initially a list of public libraries within the State was obtained and libraries with on-line websites and catalogues were identified. The libraries with on-line websites and catalogues were sent an email as well as a letter requesting their participation in the study. They were asked to complete an on-line survey which presented a series of questions regarding their awareness of website accessibility issues. Where there was a group of libraries operating under a parent organisation, the individual librarians in charge of the branch were also surveyed to determine their awareness

of the accessibility issues. The survey also asked whether the library or group of libraries would be willing to participate in an interview to explore the issues and barriers relating to website accessibility. An interview was conducted with willing participants. The information obtained from the surveys and interviews provided much of the qualitative data required to answer the supporting questions.

In order to obtain the answer to the principal research question, an accessibility audit of the websites was conducted. This utilized on-line website accessibility tools, the W3C site for code validation, screen-reading software, and a manual checklist. These data were analysed to determine the website's compliance to the WCAG 1.0 and 2.0 standards.

Libraries without current websites and catalogues were sent a survey to determine their awareness of web accessibility issues, This was designed to elicit further information for the supporting questions, to discover the prevailing attitudes and perceptions regarding the issue of website accessibility and its importance.

Initially, research through the Australian Libraries Gateway (National Library of Australia) determined that there were 232 public libraries in Western Australia. Further analysis showed that 80 libraries are linked to websites with online catalogues. As a number of these libraries form consortiums, principally through local government shire/city councils, there were 29 different websites with on-line catalogues, other than through the State Library. The scope of this research allowed the auditing of all of the 29 websites, as well as surveying all of the public libraries where email addresses could be located.

Research results

Website audit
In the website audit, two automated tools were used – SortSite from Powermapper, (Powermapper software 2010) a commercial website checking tool, and Functional Accessibility Evaluator (FAE), a freeware application from the University of Illinois (University of Illinois 2005). SortSite checks a website's compliance with both WCAG 1.0 and 2.0. A summary of the results from SortSite is provided in Figure 1. FAE checks the website to WCAG 1.0, although this tool is currently being configured to WCAG 2.0. Using the two separate automated tools enables the auditor to cross-check the results.

Figure 1. Western Australian Public Libraries' Compliance with W3C Web Content Accessibility Guidelines

| | Percentage of pages with errors for 28* Western Australian public libraries' web sites | | | | | | |
	Overall	Errors	Accessibility	Compatibility	Compliance	Search	Standards	Usability
Average	20.72	10.78	10.29	3.93	3.11	5.97	9.59	8.80
Median	18.78	5.29	8.47	2.19	1.00	4.38	8.59	7.94
Min	8.05	0.94	0.43	0.46	0	0.12	0.12	0.08
Max	50.51	33.43	27.27	16.04	16.00	23.00	33.33	25.25

*data not available for 1 site

The research also included HTML and CSS code validation through the official W3C site. This further enabled validation of auditing tools as both SortSite and FAE check the coding standards. A manual 18-point checklist (Figure 2) was compiled from best-practice guidelines shown in the background literature for compiled for this research. This checklist included library-specific items such as the ease of locating membership and library location information, as well as accessibility and usability items such as the location and provision of text re-sizing options. The final item in the audit involved checking a selection of the websites using the JAWS screen-reading software available from Freedom Scientific (Freedom Scientific 2011). Three websites were selected for this evaluation, being the top, middle and lowest–scoring websites across all of the previous tools.

Figure 2. Manual Evaluation Checklist

Library Website Checklist

Library Group Name:

Description	Yes	No	n/a
1. Accessibility features are easy to find			
2. Prominent 'contact us' link with details			
3. Clear text resizing controls at top of the page			
4. Clearly marked home link on every page			
5. Homepage lists key tasks			
6. It is easy to find shire and community information			
7. It is easy to find general library information			
8. It is easy to find out how to join the library			
9. It is easy to find a catalogue link			
10. It is easy to order an item			
11. There is a simple site map			
12. There is prominent search feature			
13. The search feature is easy to use			
14. Search results are simple to interpret and useful			
15. Low bandwidth version of the page is available			
16. Language translation link is available			
17. ALT tags are present for all images			
18. Presentation – well laid out and inviting			
Score /18			

The websites were checked to Priority Level A for both WCA 1.0 and 2.0. A website that fails at this most basic level is considered to have pages that disabled patrons would find it impossible to use. The highest level for WCAG is Priority AAA. The level that both the Australian Government and Australian Human Rights Commission consider most appropriate is Priority AA.

None of the 29 websites audited met even the most basic criteria of WCAG 1.0 or 2.0, Priority Level A. Some of the errors (such as mark-up language errors) occurred in all of the websites. The other most common errors were lack of appropriate descriptive text for images, sites where numerous pages have the same title, incorrectly nested headings, and lack of a language attribute that informs the screen-reader what language was used to create the website. These errors are critical as they relate to the methods used by screen-reading assistive technology to negotiate a web page. For example, most users of screen-reading software use headings to skip navigational items and quickly move through a website. If the developer has used a heading style to format regular text as a styling short-cut (for example bold and underline), the software would incorrectly identify this text as a heading which would not make sense to the listener.

In the manual checklist, only one library achieved a grade of 18 out of 18, with the lowest score being 4. The significance of a score of 4 is that the website would be virtually impossible for a visually-disabled patron to navigate. The library website that achieved the best score was for a large metropolitan shire with a number of branches, while the library with the lowest score was not located in the metropolitan area and had a single branch. As a whole, however, the size of the library or library population did not correlate with the accessibility of the website.

The result of the JAWS evaluation was that for the highest-scoring website, it was possible to perform the required task. The task required the user to locate a book by a particular author in the catalogue, recording the elapsed time and number of keystrokes. For the best-performing website, it took approximately twice the time and number of keystrokes as it did to perform the task manually. For the middle-scoring website, the task was abandoned after eight attempts as there was a 'click here' link embedded in the online catalogue link which JAWS read as a long series of numbers with no description. For the lowest-ranking website, it was not possible to locate the item using JAWS alone as the links displayed did not contain useful descriptions, and there was no alternative text assigned to the 'library catalogue' button.

Surveys
In order to answer the supporting questions regarding willingness, barriers and conformance to website accessibility guidelines, two surveys were posted online – one for libraries that currently have their own website with links to an online catalogue, and one for libraries that do not currently have this type of website. It was presumed that libraries that do not yet have a website would eventually head in this direction; therefore, in order to assist in answering the supporting questions of the research, it was considered beneficial to gain an understanding of the perceptions of website accessibility of this group.

The surveys included demographic information to enable comparison between library size, population served etc. with the emphasis placed on the website-specific issues. Items assessed included the website's perceived importance, usage, accessibility and council support. The survey was designed to answer the supporting questions of willingness to conform to the guidelines, barriers faced in implementing accessibility, perceived benefits of an accessible website. Questions were also included to determine the knowledge of accessibility issues, legal requirements and tools available.

Willingness
The findings support the proposal that while libraries are generally supportive of the need for website accessibility, they are largely unaware of the legal and moral necessity to implement the features. There is a demonstrated lack of awareness of the guidelines, the need to adhere to these guidelines, and tools available to assist with compliance among the public library websites in Western Australia. Respondents appear mostly unaware of the tools available to check their websites as well as being unaware of the necessity to do so. Libraries are generally unsure as to who has the responsibility to check and implement the accessibility features. This finding is strongly supported by the qualitative comments provided in the survey questions by both groups

Barriers
Time and cost were clearly identified as the most commonly perceived barriers to conforming to the guidelines. Libraries surveyed indicated little understanding as to whether:

- their websites comply with the guidelines
- libraries are required to comply
- how they would check for compliance
- what tools are available to assist with complying with the guidelines

One could assume that as websites evolve, they become progressively more accessible; Leuthold, Bargas-Avila, & Opwis (2007), however, point out this is not the case, and that studies have found that the reverse is true:

> … websites became progressively inaccessible, whereas their complexity increased over the years. These results suggest that missing knowledge is not the main reason for the lack of development of accessible websites. One problem area could be financial aspects.

The findings of this research regarding the perceived barriers (chiefly cost and time) demonstrate the need to increase awareness of the issues and importance of striving toward website accessibility. The anecdotal comments in the surveys highlight the need for council (and administration staff) awareness of the issues and legislation regarding website accessibility. This research has highlighted the need for a greater understanding of the issues and importance, including communication between those libraries who currently operate websites and those who do not yet have a website with an on-line catalogue.

Benefits
The respondents clearly indicated that they perceived that the main benefits to website accessibility were assisting the disabled community members, and general user satisfaction with the website.

According to Kuzma (2010):

> Having a site that meets accessibility requirements will open the
> market to a wider range of customers and will provide people with

disabilities a more positive experience and increase the value of the site.

The survey results demonstrate that very few libraries understood the improvements in overall user experience that occur when a website meets accessibility requirements. The literature indicated that a strong business case can be made for ensuring accessibility, which includes overall user satisfaction, reducing the risk of litigation and improvement in the return rate from search engines for the websites. Local government councils are working toward promoting their area to potential residents, thus the need to understand how the council website may appear higher in the search engine return should be understood. The considerable legal cost associated with a complaint to the Australian Human Rights Commission should also not be overlooked when assessing the cost of bringing a website up to accessibility guideline compliance.

The results of the survey indicate that there is a general understanding that websites should be accessible, and that it benefits people with disabilities. However, the results show a direct connection to understanding the specific issues relating to website accessibility compliance and understanding the barriers and benefits of that compliance.

Accessibility Guideline Conformance
The website audits conducted were designed to answer the principal question as to the level of adherence in public libraries in Western Australia to the W3C Web Content Accessibility Guidelines, Version 1.0 and 2.0. The W3C, the acknowledged experts in the field, providing the internationally accepted guidelines, state:

> A preliminary review combines some manual checking of representative pages on a Web site, along with the use of several semi-automatic accessibility evaluation tools… **…** experienced users of screen readers may substitute a screen reader for a voice or text browser, but if blind, may need a sighted partner to compare information available visually; if sighted, listen to it with eyes closed, then open eyes and confirm whether the information is equivalent. (Abou-Zahra 2006)

Kane, Shulman, Shockley and Ladner (2007) validate the necessity to employ more than automated testing tools for website audits:

> These tools may assist developers in the creation of accessible web sites, but may not be able to identify all accessibility issues. For this reason, automated tools are often used in combination with some type of manual evaluation or checklist...Recognizing the limitations of automated tools, some researchers have combined multiple methods to achieve more robust accessibility measurements. Researchers have combined the results of multiple automated tools and have compared automated tools to human evaluators.

The answer to the principal research question is that at present, none of the public libraries in Western Australia that have websites with on-line catalogues (other than those linking to the State Library of W.A.), conforms to any level of the *Web Content*

Accessibility Guidelines, either Version 1.0 or 2.0. This has been confirmed by the website auditing tools mentioned previously including the W3C's own validation tools. The audit results of the individual libraries differ, with some of the websites being much closer to conformance than others. The research also looked at issues of 'usability' in conjunction with the 'accessibility', as mentioned in the literature survey, having a website that ticks all the validation boxes does not necessarily make a user-friendly website. However websites that do not pass the necessary validation will present problems to disabled users, particularly those using assistive technology.

Conclusion

The purpose of having a website that meets accessibility guidelines is to enable as many people as possible to use it easily and effectively. According to Lilly (2000), 'An effective public library Web site requires a presentation and organization that allows users to know all that the library has to offer electronically.' This is confirmed by Sadeh (2007):

> One of the main challenges in offering any kind of scholarly search interface is to make it as familiar and intuitive as the one used by web search engines and other internet tools but to guarantee that it yields better results.

From the literature studied, it is clear there is a need to achieve website accessibility compliance, particularly in relation to recent legislative changes, demonstrated by the Web Accessibility National Transition Strategy (Australian Government Information Management Office (AGIMO) 2010b).

This research aimed to investigate questions relating to the level of adherence to the WCAG 1.0 and 2.0 guidelines, as well as determining awareness, and perceived barriers and benefits of website accessibility in Western Australian public libraries. The audit used a variety of quantitative methods of evaluation including a number of different automated website checking instruments. Qualitative methods used include a manual checklist, and an evaluation of a selection of the website with the JAWs screen-reading software.

The research found that there is a large degree of uncertainty expressed by the respondents of the state of their website compliance, and how to improve it. Most respondents indicated that they support the need for further study of the issue of website accessibility, which may be the result of future research.

The principal research question was addressed by the website audits which demonstrated resoundingly that there is no compliance presently in Western Australian public libraries with WCAG 1.0 or 2.0 and that there is much work to be done to achieve this compliance. This finding supports those of the various studies cited in the background literature. While great steps have been taken to endorse the guidelines, there is a great deal of work to be done to achieve compliance. Leuthold et al (2007) reaffirm the need for websites to adhere to the guidelines, 'Application of

these guidelines ensures that HTML code is readable by screenreader software like JAWS, supporting handicapped users to access the website.'

Libraries will undoubtedly find themselves in a state of great change over the next few years as they begin to address the National Transition Strategy. Brophy (2007) states:

> In a public access setting, such as a library, it is also essential that staff are fully trained in the use of assistive technologies provided on the open access computers. Staff must feel confident in providing assistance as well as be aware of the particular difficulties faced by visually impaired people.

It is expected that both the barriers and benefits of website accessibility will become clearer as this happens. Library staff may find themselves requiring even more skills as they embrace the issue of website accessibility and may require further training to cope with additional responsibilities.

> ...if libraries manage to create a more satisfying user experience, they may very well regain their leadership as providers of scholarly information, because they enjoy several important advantages over the internet tools (Sadeh 2007)

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Vivienne Conway is a Ph.D. student in the School of Computer and Security Science at Edith Cowan University, Perth, Western Australia. She has recently completed an Honours Degree and her current research deals with the intricacies of web accessibility and usability in the context of national conformance to the WCAG 2.0 standard. Vivienne's research assesses the effectiveness of the Australian Government's Web Accessibility National Transition Strategy over the period of its implementation and will contribute to a new framework to assist other organisations in their efforts to build more accessible websites.

This article contains research that formed the basis of a thesis in Website Accessibility in Western Australian Public Libraries. Vivienne is the recipient of the Twila Ann Janssen Herr Award for Disability Services from ALIA for her research into website accessibility in public libraries. She has been using this assistance to disseminate the research results from her thesis, making presentations to local government representatives in Western Australia. Anyone with an interest in website accessibility is welcome to contact her at vconway@our.ecu.edu.au. She has also been awarded an Australian Research Award to assist in her Ph.D. studies.