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Web Accessibility Issues with Blackboard at Edith Cowan University

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Abstract

Website accessibility is a very real and pressing issue in Australia and internationally. Tim Berners-Lee credited with founding 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). This paper is the result of research conducted into the website accessibility of Blackboard as implemented at Edith Cowan University. This well-known commercial Learning Management System is used for e-learning access and content delivery. Testing was conducted to determine the level of adherence of Blackboard to internationally-recognized best practice web accessibility guidelines. An analysis of the results of this research demonstrate that while Blackboard scores “better than average”, this still constitutes a failing grade in terms of overall usability for people with visual disabilities. Incorporation of the features of the WCAG 2.0 would ensure that Blackboard meets current best practice guidelines.

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Abstract: Website accessibility is a very real and pressing issue in Australia and internationally. Tim Berners-Lee credited with founding 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). This paper is the result of research conducted into the website accessibility of Blackboard as implemented at Edith Cowan University. This well-known commercial Learning Management System is used for e-learning access and content delivery. Testing was conducted to determine the level of adherence of Blackboard to internationally-recognized best practice web accessibility guidelines. An analysis of the results of this research demonstrate that while Blackboard scores “better than average”, this still constitutes a failing grade in terms of overall usability for people with visual disabilities. Incorporation of the features of the WCAG 2.0 would ensure that Blackboard meets current best practice guidelines.

Introduction

One of the most socially important characteristics of the World Wide Web (WWW) is its ease of access for people of all abilities, nationalities, locations and backgrounds. Tim Berners-Lee, Director of the World Wide Web Consortium (W3C), who has been credited with inventing the World Wide Web, has stated that this universality of access regardless of disability is an essential aspect of the Web (Henry & McGee, 2010).

This study examined how Blackboard, as a Learning Management System, met the various accessibility and usability guidelines which define ease of use for web users with visual disabilities.

The theme of eCulture this year is “Educating for employability: the person, the professional, the academic”. Programs in the School of Computer and Security Science at Edith Cowan University involve among other things, raising the awareness and skills in accessibility factors in order to make graduates more employable within the IT industry and elsewhere. This is especially necessary for anyone entering any level of government employment where such issues are going to apply to every aspect of their online activity within the next two to three years. This is partly due to the new Web Accessibility National Transition Strategy released by the Australian Government in June 2010.

The purpose of the study was to examine how a student with a visual impairment would fare using Blackboard and whether Blackboard was able to pass the internationally

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accepted best-practice guidelines developed by the World Wide Web Consortium (W3C) known as the Web Content Accessibility Guidelines (or WCAG).

This research was conducted in the context of Blackboard as used at Edith Cowan University (ECU), in Perth Western Australia. Within ECU, Blackboard is the central platform for delivery and management of all electronic learning materials, across a student population of more than 20000 users. How this particular install of Blackboard met web accessibility guidelines is the focus of this paper. Given available space in this paper, this research is a necessarily brief analysis which looks at the key accessibility and usability issues of the public and student homepages of Blackboard as viewed from an accessibility standpoint. The Blackboard site states that it is “committed to ensuring that our e-Education platform is usable and accessible”.

Literature Review

Literature on website accessibility is available across a number of sources, including books, journals, government publications and websites. Although websites are not typically utilized in academic research, in this particular instance they are crucial, as the internationally recognized standards are published in this and for this medium. The standards recognized by the Australian Government, Western Australian Government, local governments and agencies working as advocates for the different disability organisations have been examined. In addition, material from the United States, Canada, and Europe has been examined to determine the international recognition of standards and research conducted into adherence of those standards.

A study in 2005 in the U.K. discussed the ramifications of current legislation on e-learning situations. At that time it was determined that approximately 57% of pages of the 160 UK University websites failed to comply with the WCAG 1.0 guidelines (B. Kelly, Phipps, & Howell, 2005). It should be noted that this study looked at university websites and not necessarily the Blackboard (or other LMS) interfaces within these institutions.

A 2007 study in the United States compares web accessibility of top international university web sites. In that paper, Australian universities are among the top performers. However, the situation is still far from ideal with many accessibility and usability issues found on the websites. The authors of that study state “Inaccessible university web pages may also promote an educational divide in which people with disabilities are denied equal access to public education and other aspects of society” (Kane, Shulman, Shockley, & Ladner, 2007).

International best-practice guidelines

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”(“W3C Mission,” 2009). The W3C 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. Level A is considered the minimum standard acceptable.

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The mission of the Web Accessibility Initiative (WAI) (sic) is to lead the Web to its full potential to be accessible, enabling people with disabilities to participate equally on the Web. (Henry & McGee, 2010)

In Australia, the Australian Human Rights Commission has published *World Wide Web Access: Disability Discrimination Act 1992 (DDA) Advisory Notes Version 3.3.1*. The purpose of the DDA Guidelines is to guide developers and organisations in maximizing the accessibility of their websites, reducing the likelihood of complaints that may be made to the Australian Human Rights Commission. The DDA requires that an organisation provides equal access to information on the Web where it can be 'reasonably provided'. In Australia, this applies to any individual or organisation placing or maintaining a Web page on an Australian server. ("World Wide Web access: Disability Discrimination Act advisory notes: Version 3.3.1," 2009)

On 23 February, 2010, a statement was released from the Australian Federal Government that WCAG 2.0 standards would now be recognized in Australia as best-practice. (Tanner & Shorten, 2010)

In June 2010, the Australian Government released the *Web Accessibility National Transition Strategy (2010)* which outlines the transition from compliance with Version 1.0 of the WCAG to compliance to different levels of Version 2.0, depending on the level of government. The Transition Strategy referred to provides a three year work plan for full compliance with the guidelines.

In Australia, in 2002 the Queensland University of Technology conducted a project the report of which found numerous papers written on the need for accessible web pages, but few demonstrate how the sites were tested, and even fewer of the sources state how the sites performed or how issues were rectified. (Borchert & Conkas, 2003)

A number of accessibility surveys have been conducted in the United Kingdom in 2002 and 2004. These studies have included 1000 websites, UK university home pages, 100 leading international universities, and 300 museum library and archive websites to determine their level of compliance with the WCAG 1.0 guidelines (Brian Kelly, 2008). The results varied, and the authors attribute the low level of compliance (41.6% to WCAG 1.0 Level A and 3.4% to AA) to the usual list of lack of knowledge, implementation methods, lack of willingness etc., but also to a problem with WCAG 1.0 Guidelines. Kelly further states that the publication of the WCAG 2.0 ensures that "the guidelines are more easily understood and provide more flexibility" (Brian Kelly, 2008; Sloan, 2008). Sloan states that "81% of UK sites fail to meet a basic level of accessibility, according to a 2004 Disability Rights commission survey" (Sloan, 2008, p. 49).

The Australian Human Rights Commission has affirmed that complaints may be made by anyone who feels that they have been disadvantaged regarding access to a website hosted on an Australian server. The Sydney Olympics court case also attests to the legal standard's applicability to websites.

Australia has led the way in legislative background protecting the needs of disabled persons. Sloan (Sloan, 2008, p. 49) states that the United Kingdom based its Disability Discrimination Act on Australia's Act of the same name which was introduced in 1992. Sloan also states that at the time of publication (2008), Australia's test case of the 2000 Sydney Olympic Games was the "first-ever successful legal action taken by a disabled person against a provider of an inaccessible website" (Sloan, 2008, p. 49)

In the case of an educational institution, it should be noted that an inaccessible website may prevent students from working to their potential, realizing their educational goals, and participating in university life. "Inaccessible university web pages may also

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promote an educational divide in which people with disabilities are denied equal access to public education and other aspects of society” (Kane et al., 2007) .

A study in April 2010 of the Political Party Websites for an upcoming UK election provides valuable assessment suggestions. The websites are assessed against twenty best practice guidelines including the inclusion of site maps, 'contact us' links, consistent navigation, and clearly provided resizing and accessibility options (*Political party websites: poor communication with users: a usability study of UK party websites*, 2010).

Where access to a website for a user may be considered desirable, but not critical, issues of accessibility to web content can be irritating but not problematic. However, should a student be reliant on content coming from a LMS like Blackboard, a patent inability to easily access learning materials and participate in the learning process could prejudice that student's results and course outcomes.

Research Tools

In order to capture the required data for this website assessment, a hybrid approach has been adopted which includes assessing the Blackboard site with two different on-line accessibility checking tools, completing a manual checklist, and using Blackboard with JAWS screen reading software. The purpose of the research is to discover the level of compliance with the WCAG 1.0 and 2.0, and to determine the accessibility as well as the usability of the interface for visually disabled users. 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, p. 73)

This research is not merely intended as an exercise to examine a legalistic interpretation of compliance, but to determine how accessible the website is to a disabled person.

The literature review showed that the individual tools selected for this assessment have been in use for some time in academic studies. However, what the available literature continually stresses is the need to use a combination of tools. In order to test the validity of the automated testing tools, two of the most-respected tools were chosen and in the research analysis the close correlation of the results is demonstrated. The importance of using of a manual checklist is also emphasized in the literature, as is testing with screen-reading software that a person with visual impairment would use. The Australian Government in their publication describing the National Transition Strategy (2010), state “Agencies are reminded that automated tools provide incomplete conformance information, and human assessment is also required.”

Screen Reading Software

Jaws® Screen Reading Software ("Freedom Scientific: Products," 2010) is the program currently used by Edith Cowan University for visually impaired staff and students.

Automated Website Accessibility Tools

For the purposes of this assessment, Blackboard was tested through a number of tools in order to ensure the results were consistent. These tools include:

- Functional Accessibility Evaluation 1.0.3 (FAE) (University of Illinois, 2005). FAE is cited in a number of journal articles. They provide a free online service to check web pages either individually or for an entire website.
- SortSite commercial software from Powermapper Software. SortSite ("SortSite - Web Site Testing Tool," 2010) was also used because of its ability to check to both WCAG 1.0 and 2.0. SortSite checks accessibility against all current guidelines, compatibility with browsers, compliance with EU and US law, broken links, search engine optimization, web standards and current usability guidelines.
- CynthiaSays (HiSoftware, 2003), has been used in numerous studies shown in the Literature Review to test to WCAG Version 1.0. It is available free from HiSoftware, Internet Society Disability and Special Needs Chapter. It was used in the first evaluation, but not in the second due to the Australian Government endorsement of WCAG 2.0 compliance requirements.
- W3C HTML and CSS Validation using the W3C Validation service

Manual Checklist

A checklist of key accessibility points was prepared using key points of the W3C Guidelines and important features noted in the literature review. A summary of the results is included in an Appendix to this paper and is available

Research Analysis

Two separate evaluations were conducted using the above methods on the Blackboard site, with an emphasis on the Blackboard Login Page and the Student Home Page. The first evaluation was carried out in June 2010, and the second in October 2010, summary results of which are displayed in Table 1.

For the purposes of this research, pages examined included the initial pages that students would encounter first in an online learning situation. A checklist was developed which incorporated issues of accessibility and usability according to best practice guidelines established by the W3C. A checklist is used to provide a visual check on the usability of the website for issues such as location of accessibility guidelines and re-sizing features. In addition, it provides a method of visually checking the items highlighted in the automated testing evaluations.

A number of problems were encountered with both pages and are detailed as annotations of those interfaces and the issues that were identified. Annotated images were used in preference to tabular data as it provides a more visual demonstration of accessibility problems.

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The login page failed the checklist in three out of four criteria. Main features missing are the lack of a 'Contact Us' link, and accessibility features placed in very small print at the bottom of the page, as shown in Figure 2. Best practice guidelines state resizing options and accessibility features should be placed prominently, preferably at the top of every page. If the user were using a screen-reader, they would not encounter the link until the whole page had been read to them. There is a Help/FAQ link, but when this is accessed, there are no 'Contact' details. On the student page, there is a 'Homepage' link, but it is very small and there are no resizing or accessibility options shown anywhere on the page. There is a 'help' button, which links to the onlinelearning@ecu page which provides posts on various subjects, but again, no 'Contact Us' link is shown.

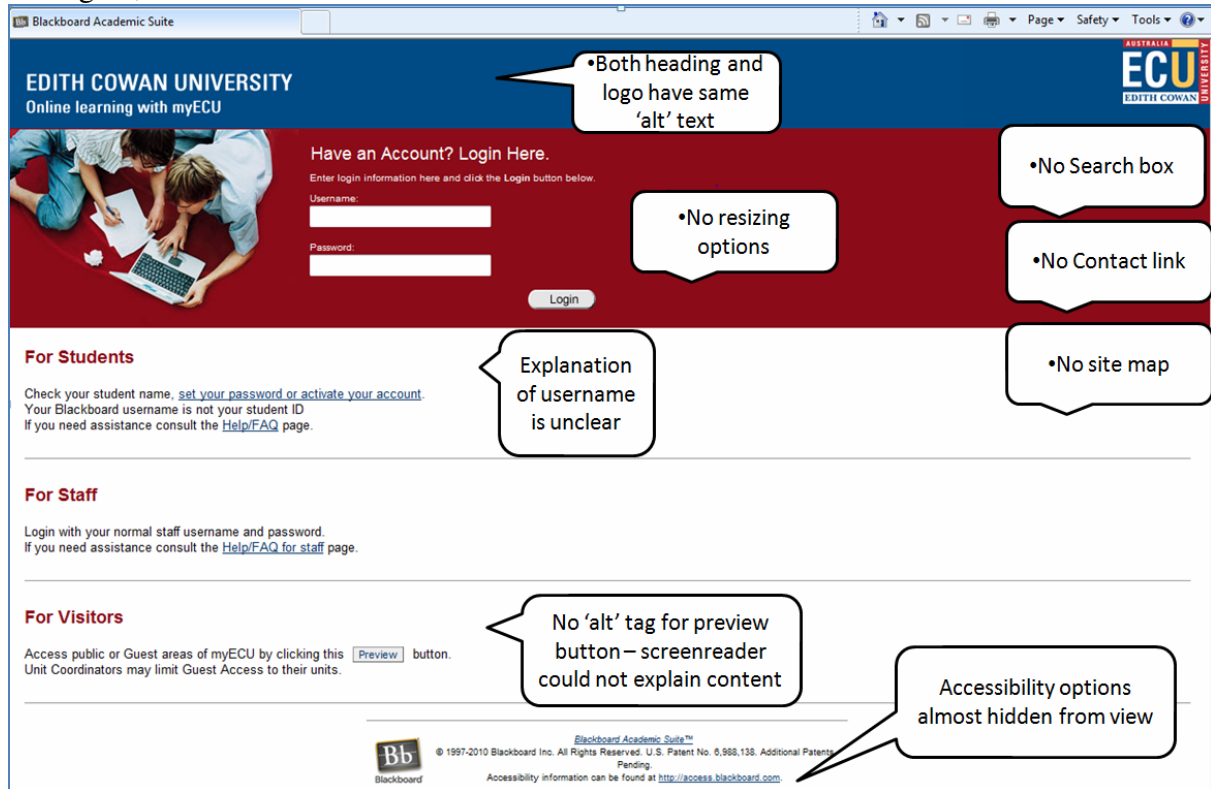


Figure 1: Blackboard login page

WCAG Guideline 13.3 and 13.4(2) stipulate that there should be a site map describing the site layout, highlighting and explaining available accessibility features. (Abou-Zahra). No site map was found on either page.

On the login page, there is no search feature, while on the student page there is a search feature which links to searching units and communities, but not staff members. There is a feature labelled 'Search LX' with no description as to how it is used as demonstrated in Figure 3. Searches conducted with this feature returned null results.

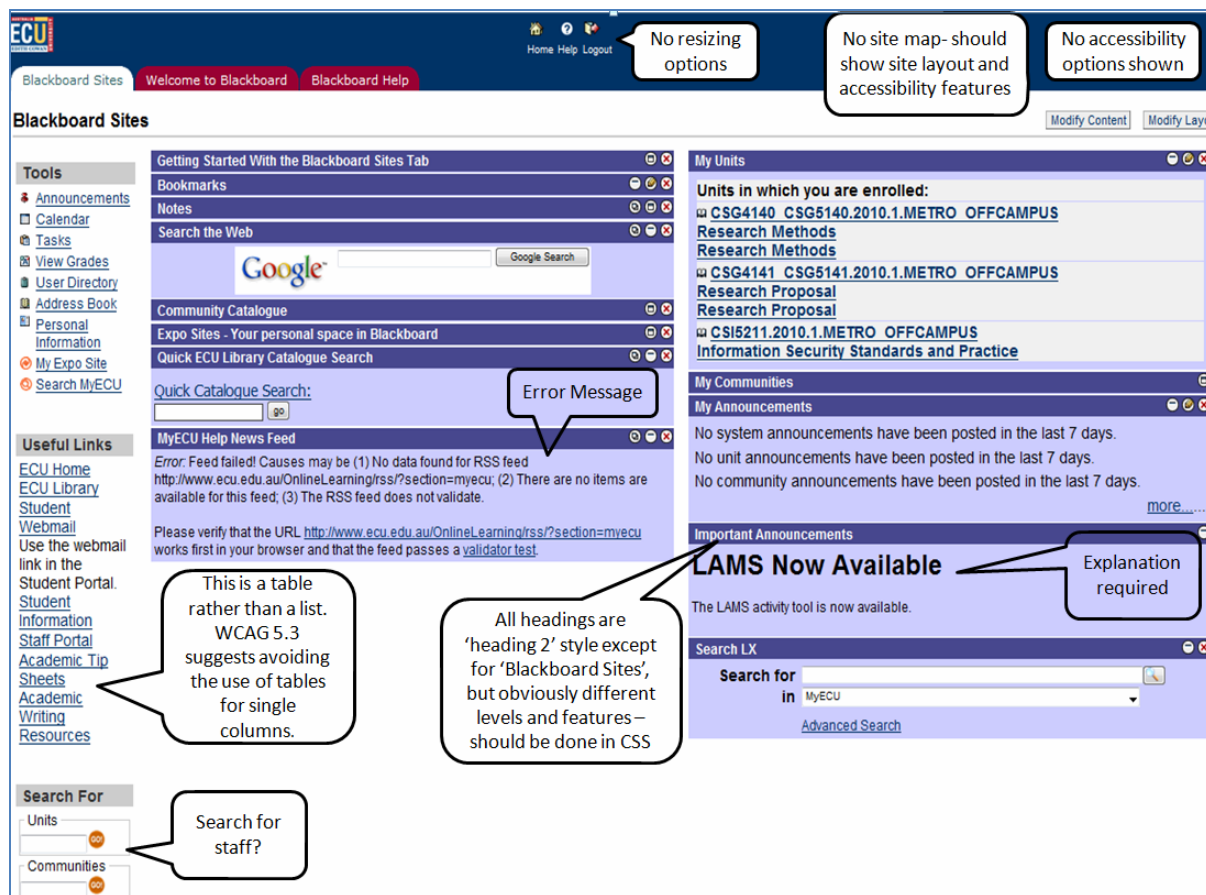


Figure 2: Blackboard student homepage

The WCAG state that the page should be able to be navigated without using a mouse. While on both pages the tab key moves through the page, it is difficult and sometimes impossible to know where you are because there is no set sequencing to the tab movements.

It is critical that the web page should be able to be ‘read’ with screen-reading software. As stated above, for this research we used the NVDA software. Both pages passed this test, however it should be noted that the author spent at least a full day learning to use NVDA before actually being able to use the software to access websites.

The use of a consistent structure is required for WCAG accessibility checks. While on the login page, the headings are simple, on the student page (as shown in Figures 3 and 4), there is a Heading 1 (an HTML style such as those found in word processing packages) which incorporates the modify button, and all other headings are shown as Heading 2, even though there are various sizes and colours used. In particular under the Important Announcements heading, there is an item shown as ‘LAMS Now Available’ which is also Heading 2, but is twice as large and in a different colour as the heading it comes under. This would be very confusing for a visually-impaired user with screen-reading software where it is assumed that the Heading type denotes structure and purpose.

Both pages failed the Functional Accessibility Evaluation (FAE) and the CynthiaSays and SortSite evaluations. The validity of these tests is borne out by the similarity of their results and their consistent use evidenced in the literature. The main reasons for the automated errors are lack of correct nesting of headings, lack of a !DOCTYPE Declaration, and use of deprecated features (features being used that are no longer a part of the current HTML standard). All styling is expected to be incorporated into Cascading Style Sheets (CSS) rather than using the limited presentation features of HTML. While there are CSS files

associated with both of these pages, additional formatting is placed in the web page. This results in the inconsistent headings mentioned above and shown in Figure 5.

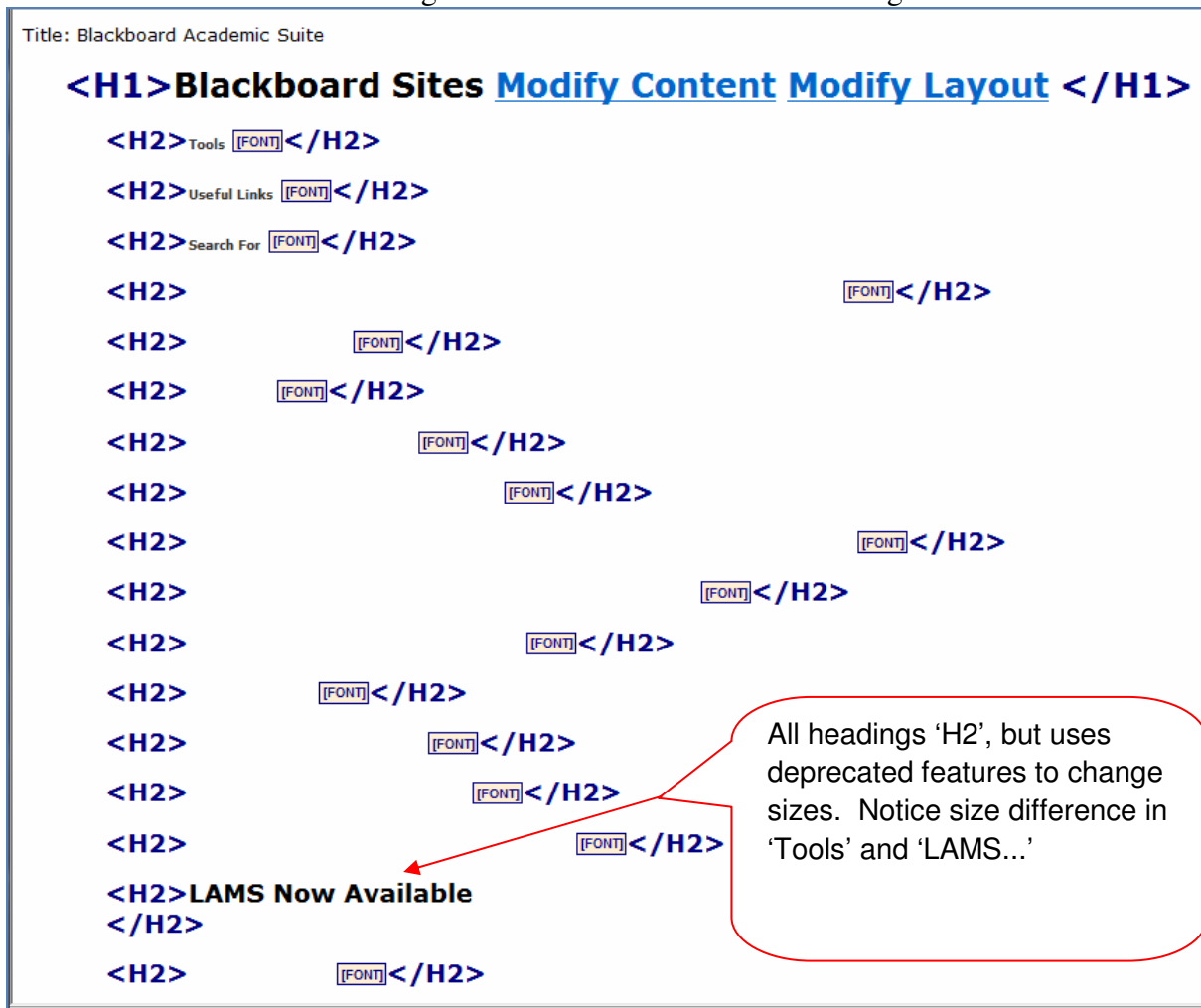


Figure 3: Blackboard student homepage heading structure

The pages also fail testing due to lack of META data elements. Using META elements is considered standard on web pages. The language attribute is also missing. As universities enrol students from around the globe, placing the language element in the heading of the page is essential for translation features. The W3C HTML Validation fails due to similar problems as above, and also some missing end tags.

Beyond just technical compliance comes the issue of actual usability. In the top right hand corner of Figure three are listed the actual units of study a student is enrolled in, which for most students would be the prime focus of their attention. Within this instance of Blackboard, the hyperlinks to the 'units' do not have any ALT tags which can be used to describe the content of the links and the My Units text is not in a Heading style but nested within table headings, which are not compatible with accessibility guidelines. Essentially, the most crucial part of the page is also the most difficult to locate for users with visual disabilities.

Tool	Date	Result
Manual checklist	14/10/10	Appendix 2 and 3 attached

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	13/06/10	Same as above
SortSite evaluation (75 pages/images checked)	13/10/10	<u>Errors</u> : 2 issues on 2 pages (broken links) <u>Accessibility</u> : 11 accessibility problems <u>Compatibility</u> : missing content or functionality for IE 6,7 & 8 <u>Search</u> : problems for Google, Bing, & Yahoo <u>Standards</u> : pages fail both W3C HTML & CSS validation and use deprecated features
Cynthiasays (checks to WCAG 1.0)	13/06/10	<u>Usability</u> : W3C – some pages hard to use Different, tool similar results
FAE evaluation	13/10/10	<u>Navigation</u> – 75% of pages pass (warnings 11%, fail 14%) <u>Text equivalents</u> – 50% of pages pass (50% warnings) <u>Scripting</u> – 75% pass (25% warnings) <u>Styling</u> – 33% pass (50% warnings, 16% fail) <u>HTML standards</u> – 50% pass (50% fail)
	13/06/10	Same results as above
W3C HTML validation	13/10/10	18 errors, 13 warnings
	13/06/10	Same as above
W3C CSS validation	13/10/10	13 errors
	13/06/10	Same as above
JAWS evaluation	13/10/10	Passed – see notes below
NVDA screen reader	13/06/10	Similar problems to above

Table 1: Blackboard Website Audit Results

Conclusion

Despite Blackboard's assertion that it is committed to "ensuring that our e-Education platform is usable and accessible" and that it has been voted "the most accessible learning system they had ever rated" by the National Federation of the Blind (NFB) in the United States, problems still exist. ("Blackboard : Resources: Accessibility," 2010). Some of these

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problems may be related to this particular instance of Blackboard, in terms of the chosen interface and layout used for this institution.

While there are a number of features that are static on Blackboard, due to its use of a Content Management System, there are ways that staff may ensure that accessibility is maximized for students. Some of the methods that may be used include: ensuring that there are a variety of access methods used for lecture materials including audio recordings of lectures accompanied by a transcript would enable individuals with both hearing and visual impairments to maximize their learning potential. Items such as PDF files are notoriously inaccessible to screen-reading software; therefore an HTML version should also be included. Descriptive content for any graphics should also be included in Alt-text format so that screen-reading software may describe the item to the user.

Many of the errors and warnings highlighted by the automated tools used could be simply remedied and may be caused by the use of the systems coding tools; items such as a missing DOCTYPE Definition, missing language attribute and inconsistent heading nesting. However, as mentioned above, this may be due to the CMS features and require change from the software supplier side.

Literature reviewed in the course of this research highlights the need to look at issues of usability, and not merely accessibility. This includes how easy the site is to use, how easy it is to get help, and how the site works with accessible technologies. It would appear that while Blackboard is cognizant of and working toward accessibility, there is more work to be done to assist all users in their interactions with Blackboard and the learning materials contained within. The study of the top international university websites mentioned in the Literature Review state that universities in Australia generally rate higher than any other universities in terms of their website accessibility. Edith Cowan University's accessibility statement says that their aim is to meet at least Level "AA" of WCAG 1.0, with no mention of Version 2.0 compliance (Edith Cowan University Library, 2010). This is a concern as all of the testing instruments demonstrated that Blackboard did not pass WCAG 1.0 Level A (the most basic level).

In light of the new Australian Government Transition Strategy (2010), now might be a suitable time to conduct a review of Edith Cowan University's website accessibility for this installation of Blackboard. We need to be aware that we are training future graduates who will be entering the workforce and expected to be fully aware of website accessibility requirements. In addition to this, Edith Cowan University's standards of equity for all users require that we provide materials that are accessible to as many students as possible.

Appendix 1 Blackboard Accessibility Audit Summary

SortSite evaluation:

Accessibility: The check of 75 pages and links found that Blackboard did not pass WCAG 1.0 Level A (most basic level), WCAG 2.0 or above

F AE evaluation:

Navigation – problems with nesting of titles and sub-headings and lack of default language on all pages

Text equivalents – all problems were associated with decorative images

Scripting – warnings associated with ‘onclick’ elements

Styling – some warnings with text styling, however 100% of layout tables fail

HTML – all failing pages relate to W3C validation faults

W3C HTML and CSS validation:

Blackboard from the home login page was tested on the W3C Markup Validation and CSS Validation page to verify above results.

Tested as HTML 4.01 Transitional

JAWS evaluation

While it is possible to use the website with JAWS, there are considerable difficulties.

Appendix 2: Manual Checklist for Blackboard Login Page

Blackboard Login Page	http://myecu.ecu.edu.au/			
Guideline				
	Pass	Fail	n/a	Comments
Site and homepage priorities				
1. Prominent 'Contact us' link		x		Help/FAQ link, but no dedicated contact link
2. Clear text resizing controls at top of the page		x		Link to accessibility features in small print at bottom of page
3. Homepage lists key tasks	x			
4. Easy to understand the purpose of the site		x		It appears that the purpose of the site is assumed
Site supports key user tasks				
5. Easy login	x			Only if the user knew their username
6. It is easy find help	x			There is a Help/FAQ key
Engagement				
7. Engaging delivery of content	x			Adequate
Navigation and orientation				(refer to Figure 1)
8. Site offers a simple site map		x		No site map
9. Site map is easy to use			x	
10. Navigation style is consistent			x	No navigation buttons

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11. Prominent 'Search' feature		x		No search feature
12. Search results are useful			x	
13. Page can be navigated without a mouse	x			With difficulty – hard to see where you are
14. Page can be 'read' with screen reading software	x			'Jaws' or equivalent – NRMA software 'reads' the links but not the instructions,
15. All images have useful alt tags		x		<i>Should make sense to the user</i> Main heading and logo have same alt text
16. Decorative images have null ALT text tags (Alt="") so that they are ignored by screen readers		x		<i>Necessary so that they are ignored by screen readers</i> Logo is decorative – should have a null alt tag
17. There are no random characters separating links				<i>e.g. vertical bars, as screen reading software 'read' this information</i>
18. There are subtitles or transcripts for audio material			x	No audio on this page
19. Forms have prompt text next to (before) each item and there are no flashing cursors	X			Prompt is above, but this still passes
20. Forms do not have flashing cursors	X			
21. Forms do not have pointless information in empty form fields	X			
22. The link text make sense		x		No 'click here' or 'more' descriptors. "preview" button is a link with no descriptor

Appendix 3 – Manual checklist for Blackboard Student Homepage

Blackboard Student Homepage				http://myecu.ecu.edu.au/webapps/portal/frameset.jsp
Guideline	Pass	Fail	n/a	Comments
Site and homepage priorities				
1. Prominent 'Contact us' link with useful details		x		There are different links in 'Useful Links', but nothing showing a contact. There is a help button which links to online learning help, but that does not have a contact either.
2. Clear text resizing controls at top of the page		x		No resizing options shown, and no link to accessibility functions such as on Login page. When you use the Search LX button for accessibility you get info on Microsoft Access
3. Clearly marked home link on every page	x			Very small with no re-sizing
4. Homepage lists key tasks that are easy to locate and understand	x			
Site supports key user tasks				
5. It is easy to find and access unit materials	x			
6. It is easy to access lecturer contact details			x	Done from individual unit pages

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7. It is easy to access assessment and unit outline details			x	As above
8. It is easy to understand the purpose and use of each section		x		e.g. under 'Important Announcements'. Very large heading "LAMS Now Available" without explanation as to what the LAMS activity tool does.
9. It is easy to find help	x			Help button at top of page, but no resizing available. The MyECU Help News Feed generates an error message.
10. Page can be customized to suit user	x			Using the 'Modify Content' and 'Modify Layout' buttons you can choose what you want shown on the user screen. However these do not have accessibility functions. You can only change the order and colours (which may assist with contrast).
Navigation and orientation				
11. Site offers a simple site map that's easy to find and use		x		No site map available
12. It is easy to know where you are within a given section.	x			
13. It is easy to get back to where you were.	x			Use of back arrow or home key. Home key doesn't take you back to login page, leaves you on same page. Logout button would take you back to Login page.
14. Navigation style is consistently applied and simple to understand.				

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15. Search is easy to find and use.		X		Tried using Search LX for a unit user is enrolled in – nil results, for a lecturer, nil result – could not find help on purpose/use for Search LX – also used search facility in portal – no results for Search LX
16. Search results are simple to interpret and useful.	x			Yes, but Search for units/communities. No for Search LX
17. Page can be 'read' successfully using screen reading software	x			Works well – e.g. says “Visited Link Announcements” or “Link Calendar”
Compliance Checkpoints				
18. All images have informative alt tags – short & succinct	x			1 image – logo which states “ECU Home”
19. Decorative images have null ALT text tags (Alt=”) so that they are ignored by screen readers			x	
20. There are no random characters separating links e.g. vertical bars, as screen reading software 'read' this information	x			

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21. There is no pointless information in empty form fields	x			
22. There are subtitles or transcripts for any audio material			x	No audio on the page
23. Forms are accessible – there is prompt text next to (before) each item and there are no flashing cursors	x			
24. All text can be resized		x		No option provided
25. Does the link text make sense? No 'click here' or 'more' descriptors.	x			
Automated Site Testing				

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