Challenging design students to be ethical professionals in a changing landscape of technologies

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Despite the existence of Web accessibility guidelines since 1999, the evidence suggests a continuation of design practices that limit the accessibility of Websites for diverse audiences. This problem has been further compounded with the increasing popularity of technologies such as Flash, which have encouraged many designers to place greater emphasis on form than function. This paper examines these issues and proposes a humanistic approach to Web design; one which acknowledges the designer's responsibility to create sites that contribute to and improve the quality of life for all users. The role that design educators need to play in challenging their students to engage in design practices that will ensure the sites they develop are accessible in a changing landscape of technologies are explored in this paper, and the benefits of incorporating changes into the design curriculum that address the need for graduate designers to be aware of, and to engage in, inclusive design practices are discussed. After presenting the case for changes in the design curriculum that engage students in inclusive design practices, a case study based on the development of an undergraduate program that promotes inclusive design is presented. The strategies developed to ensure students understand the techniques required to create accessible and compliant Flash designs are discussed in some detail and in the final section of the paper, the benefits for students and the community groups with which they engage through their program of studies are discussed.

Keywords: web design, curriculum design, form and function, ethical issues, advanced web technologies, Flash design, web accessibility, universal design

Introduction

The debate concerning form and function can be traced to classical antiquity. As Krakauer (2000) explained, Plato regarded every concrete being as having form, and therefore held the view that form precedes function. In contrast, Aristotle regarded form as that which fulfils function; form is said to follow function. This debate, according to Krakauer (2000), found new expression in emergent disciplines. The maxim that "form follows function" first introduced into architectural doctrine by Lodoli in 1750, and popularised by architect Louis Sullivan in the nineteenth century, is often cited as evidence of the continuation of the functionalist philosophy in modernist architecture and design. These tensions were evident in the early debates between human computer interaction (HCI) experts and design professionals regarding the importance of style and imagery in Web design. As Laviea and Tractinsky argued in 2004, HCI researchers and practitioners traditionally emphasised objective performance and tended to overlook the role that aesthetics play in determining user satisfaction and pleasure. According to Engholm (2002), the functionalist mainstream originated in the early 1990s when the Web was primarily used to communicate textual information. This first-generation, functionalist approach to Web design can be considered a continuation of the modern design tradition originating from the Bauhaus (Laviea and Tractinsky, 2004). By the end of the decade, artists had begun to push the limits of the medium, resulting in the appearance of the first avant-garde sites in which graphics were added as an extra dimension to the content, at the extreme, drowning out the content and focusing on art for arts sake (Engholm, 2002). However, such debates proved futile and represented a lack of understanding of Sullivan's dictum "form follows function". As Frank Lloyd Wright pointed out "form and function should be one" (cited in Dunning, 2002); in other words, function and form are intricately intertwined and inseparable (Finck, 2001).

Form and function in web design

Despite the perpetuation of the debate about form versus function, it is evident from this discussion that there is nothing inherent in the definitions of the terms that suggest form and function cannot co-exist in design. Indeed, it can be argued, that it is the "spiritual union" of form and function in Web design that

will lead to enhanced user experience. The view that form and function should be in accordance in design has been expressed by numerous authors. For example, Engholm (2002) suggested that discussions of design should focus on how to combine form and function in such a manner that the aesthetic aspects are not subordinate to the functional aspects or the other way around. Similarly, Finck (2001) argued that the essence of function relies on form and Hilhorst (2004) contended that designers should recognise the coalescence and reciprocal significance of form and function in achieving the optimal outcome.

Thorlacius (2004), like Hilhorst, placed particular importance on the contribution that form makes to the functionality of a site arguing that a web site, which has as its primary aim the provision of information, should also offer users an aesthetic experiences. In more recent years there have been notable designers including Zeldman (2003), Shea and Holzschlag (2005), Meyer (2006) and others who have also promoted an integration of form and function in Web design. What makes the work of these designers distinctive is their attention to the World Wide Web Consortium's Web coding standards and accessibility guidelines. However, these guidelines only apply to W3C technologies such as standardised mark-up languages (HTML, XHTML, XML etc); popular Web design technologies such as Macromedia's Flash are not addressed by the guidelines. This creates challenges for design educators who both employ Flash in the design of their course materials, and who are faced with the task of also preparing their students, future designers, to create compliant and accessible sites.

While an XHTML web page follows a strict semantic linear language, the relationship of objects within Flash is non-linear and far more complex. XHTML enables developers to add elements to a page, such as a paragraph of text or an image. Flash also allows developers to add these same elements, and enables developers to add objects within Flash, called Movie Clips, to the main movie, creating nested Flash movies. This provides developers with greater control on grouping of elements within a Flash movie, as well as more power when controlling the accessibility properties of an object. The Flash authoring environment includes many tools to assist developers in creating accessible Flash content, such as the Accessibility Panel, which enables the developer to expose objects to screen readers such as "JAWS" and "Windows Eyes", so that the content can be read aloud to the user to assist with interpretation, interaction and navigation. However, the implementation of many of these accessibility techniques is complex and can be time consuming, and is therefore often overlooked by developers, who Clark (2000) somewhat controversially argued are "even worse than HTML designers" creating colourful, image-heavy and cutting-edge media, yet failing to understand the concepts of inclusive design, accessibility, usability and at times, aesthetics.

Given the endless possibilities of implementation within the Flash authoring environment and the non-linear structure of Flash, designers and developers have more freedom and flexibility in how the site is created, and it is therefore of importance that designers communicate with their client throughout the development lifecycle to ensure that a project's form will be suitable to its function, and yet at the same time, its function developed to ensure its form can be achieved.

Towards a humanistic perspective

It is evident from the preceding discussion that for a Web site to be effective, there needs to a balance between form and function. While user-centred design considers the usability of a Web site from the user's perspective, human-centred design is concerned about the affirmation of human dignity. Students who are preparing for a career in Web design are therefore uniquely positioned to promote the dignity of all users by ensuring their sites "remain accessible despite any physical, sensory and cognitive disabilities, work constraints or technological barriers" (Sklar, 2003, p. 55). For the purposes of this discussion, the term "accessibility" is defined in its broadest sense: Web accessibility is about ensuring that anyone, using any browser or device is able to access any content on the Web. This definition is consistent with Letourneau's (1998) position that accessibility ought to be concerned with ensuring that all users (regardless of ability) should be able to access sites using current and legacy browsers as well as emerging non-browser technologies, and gain full and complete understanding of the content of those sites.

The W3C web content accessibility guidelines

The World Wide Web Consortium's (W3C) Web Content Accessibility Guidelines version 1.0 (WCAG 1.0) and the draft version 2.0 (WCAG 2.0) guidelines provide designers with guidelines that can help them to create Websites that are accessible to a broad range of users, including those with visual impairments, hearing impairments, mobility impairments and learning disabilities. The two themes underpinning the current version of the W3C Web Content Accessibility Guidelines (WCAG 1.0) are: (1) ensuring graceful transformation and (2) making content understandable and navigable.

There are 14 WCAG 1.0 guidelines with associated checkpoints; the theme of graceful transformation is addressed in the first eleven guidelines, while the second theme, making content understandable and navigable applies to guidelines 12 to 14. These 14 guidelines are organised into one of three priority levels based on the checkpoint's impact on accessibility. The W3C Web Content Accessibility Guidelines 2.0 (WCAG 2.0), which are soon to take effect, are designed to have wider applicability to more advanced Web technologies and to provide guidelines that are more precisely testable than WCAG 1.0. According to the W3C, Web sites that conform to WCAG 1.0 should not require significant changes in order to conform to WCAG 2.0 since the fundamental issues of Web accessibility are the same, though there are some differences in the requirements between WCAG 1.0 and WCAG 2.0.

Advanced technologies exacerbate existing accessibility issues

Despite the potential for accessible design practices to "even the playing field" and "build a series of bridges across the digital divide", Dunlap lamented in 2006 that for some developers, Web accessibility is considered a "troublesome inconvenience that assists relatively few and diverts energy and resources from Web initiatives and development projects that could aid the masses". In 2005, the UK Disability Rights Commission expressed concerns about the state of accessibility of UK Web sites, citing the findings of their study in 2004 which found that 81% of the 1000 UK Web sites tested failed to satisfy basic accessibility requirements. Similarly, a recent audit of 100 leading Web sites from around the world commissioned by The United Nations Department of Social and Economic Affairs reported:

"Levels of web accessibility across the 20 countries were lower than anticipated, given the presence of disability legislation in some countries and the fact that the WCAG have been in existence for over half a decade. Apart from the three sites that achieved Single-A accessibility, there is a global failure to provide the most basic level of web accessibility for people with disabilities" (The United Nations Department of Social and Economic Affairs, 2006, p. 3). Similar findings from studies of the accessibility of Government and public Web sites are not hard to find. For example, a survey of Irish Government and political Web sites undertaken in 2006 by Red Cardinal found 34% of the 41 sites tested failed WCAG 1.0 Priority 1 guidelines and 90% failed both WCAG 1.0 and CSS/HTML validation tests, and the report concluded that "Maintaining WCAG compliance is by far the most difficult area of website accessibility, even more so given the dynamic nature of many of the sites tested" (p. 11).

The problem is further compounded when considering the usability of Web sites designed in Flash. In 2000, Macromedia Flash was considered one of the most inaccessible Web technologies (Nielsen, 2000). Version 6, labelled Flash MX, was released in 2002 and added accessibility features that could be enabled using complex ActionScript "which has turned into an opportunity for making advanced Internet features available to users with disabilities" (Nielsen, 2002). Macromedia's release of Flash MX 2004 increased accessibility support by making many Flash components automatically accessible (Macromedia, 2004a), making Flash the "first rich media player to make rich media accessible to people with disabilities" (Macromedia, 2004b). Through testing of 46 Flash applications for usability, Loranger and Nielsen (2002) found that only six of the tested applications passed with a score of 100%. Stiover and Nielsen (2002) tested Flash applications with people who use assistive technologies and found that the success rate of completing given tasks for screen magnifiers was 45% and only 26% for screen readers.

While technical accessibility is a pre-condition for usability (Leporini and Paternò, 2002), providing an accessible site does not in itself make the site usable (Powlik and Karshmer, 2002). As research undertaken by Ma and Zaphiris (2003) has shown, the correlation between accessibility and usability is low; a Web site that is usable does not mean it is also accessible and vice versa. Thus, while the W3C WCAG guidelines provide the foundations for designing an accessible site, a truly humanistic approach to Web design must go much further; designers must also consider the techniques required to ensure the sites they develop with new and emerging technologies also accommodate the needs of users and understand how users who rely on adaptive technology work with their tools (Theofanos and Redish, 2003). A humanistic model (Buchanan, 1995) then, is one that considers both aesthetics and functionality; acknowledging that functionality encompasses Web accessibility, usability and technical adequacy, and can be readily applied to a changing landscape of Web technologies

Applying the principles of humanistic design to the Web design curriculum

In the preceding section of this paper the need for graduate designers to be aware of, and to engage in, inclusive design practices is discussed. The following case study describes the development of an undergraduate design program that promotes inclusive design practice in the curricula of three courses offered within the program and outlines some of the challenges facing students in more advanced courses as they grapple with the complexities of creating accessible Flash based content. A solution developed by

the authors, which provides guidelines and templates to assist students in their application of accessibility guidelines to Flash is discussed, and in the final section, the benefits for students completing these courses and the communities with which they engage through their program of study are discussed.

The Bachelor of Media Arts (MBMA) is an undergraduate program offered by the School of Communication at the University of South Australia. The aim of the program is to facilitate the development of the skills and knowledge students require to design and to communicate effectively using new and traditional communication technologies, and for graduates to be aware of and demonstrate commitment to social and ethical action. Students enrolled in any of the multimedia majors offered within the program are required to complete *Digital Media Techniques*, which is a first-year core course that provides students with foundation skills in the theory of design as it applies to digital media, film and television production and Web design. Students specialising in either the Interactive Multimedia or Web Development majors also complete a core third-year Web design course (*Electronic Publishing on the Internet*) and have the option to take an advanced course focusing on Web accessibility (*Accessible Interactive Media*) in their final semester of study. These three courses, *Digital Media Techniques, Electronic Publishing on the Internet* and *Accessible Interactive Media* introduce students to the skills required to design Web sites that meet the W3C WCAG 1.0 guidelines and emphasise the importance of designing for diverse audiences.

The requirement for students to create compliant Flash sites has proved challenging, given the complexity of the techniques students need to master in a relatively short space of time. Moreover, it is likely that students would find great difficulty in applying these principles once they have graduated and are employed in industries, where there is pressure to complete aesthetically appealing sites within tight timelines. To address these issues, the first author of this paper, in consultation with the coordinator of the course (the second author), developed a series of guidelines, referred to as the Flash Content Accessibility Guidelines (FCAG), which are directly mapped against the W3C Web Content Accessibility Guidelines (1.0). Templates to assist designers in understanding how to employ these techniques in practice were also developed to accompany the guidelines. This next section of the paper elaborates on the challenges in creating accessible Flash content and elaborates on the guidelines and techniques in some detail.

Flash and accessibility challenges

Flash poses several issues for web accessibility making it extremely difficult for navigation and interaction with assistive technologies. While an XHTML web page follows a strict semantic linear language, the relationship of objects within Flash is non-linear and far more complex. XHTML enables developers to add elements to a page, such as a paragraph of text or an image. While Flash also allows developers to add these same elements, Flash also enables developers to add objects within Flash, called Movie Clips, to the main Movie. This provides developers with greater control on grouping of elements within a Flash movie, as well as more power when controlling the accessibility properties of an object.

The Flash authoring environment includes many tools to assist developers in creating accessible Flash content. However the Accessibility Panel, which enables the developer to make individual objects within Flash accessible, is not visible by default. Many of the properties available from the Accessibility Panel are then exposed to screen readers such as JAWS on Windows-based PCs which can be read aloud to the user to assist with interpretation, interaction and navigation. Student designers must be familiar with both the Accessibility Panel and ActionScript, Flash's programming language, to enable accessibility settings in a movie. While the Accessibility Panel and accompanying ActionScript are useful in creating accessible Flash content, their use is only one aspect of accessibility within the Flash movie, and closely follow FCAG Guideline 1, Accessible Alternatives.

Although recommendations and guidelines have previously existed for Flash development such as those developed by Stiover and Nielsen (2002), Regan (2004b, 2005), MacGregor (2003), Perry (2002), Celic and Arch (2003), and Smith (2004), none have been as comprehensive as the recommendations made in the WCAG 1.0. In 2005, Regan developed a set of Flash accessibility guidelines for Flash MX 2004 and Flash Player 7 based on the Priority 1 and 2 checkpoints as recommended by the WCAG 1.0. The FCAG extends these guidelines, as well as includes WCAG Priority 3 checkpoints to create the equivalent of Triple-A compliance in a Flash format.

Flash content accessibility guidelines (FCAG)

In 2005, Regan developed a set of Flash accessibility guidelines for Flash MX 2004 and Flash Player 7 based on the Priority 1 and 2 checkpoints as recommended by the WCAG 1.0. The FCAG extends these

guidelines to also include WCAG Priority 3 checkpoints to create the equivalent of Triple-A compliance in a Flash format.

The FCAG Checkpoints have been directly mapped against the recommendations of one or more Checkpoints from the WCAG. While the techniques of application in Flash differ from an HTML/XHTML authoring environment, the principles of each WCAG Checkpoint, where applicable, have been translated into a Flash authoring environment technique. The FCAG have been grouped into eight Guidelines (Table 1) with Checkpoints, including the supporting WCAG Checkpoint for each FCAG Checkpoint mapped to show the relationship between the WCAG and FCAG checkpoints.

Table 1: Flash content accessibility guidelines

1. Accessible alternatives

Provide accessible alternatives to images, video, audio, as well as accessible non-Flash alternatives

WCAG	***FCAG***	
1.1	1.1	Provide a text Name for every non-textual element
1.1	1.2	Provide a description for every non-textual element where the complexity of the element requires further description beyond a simple text name
1.3	1.3	Provide a descriptive audio track containing the important information of any visual track
1.4	1.4	Provide captions for any time-based presentation containing audio
5.5	1.5	Provide summaries for Data Grids
6.2, 6.5	1.6	Ensure that as the Flash movie's content changes, accessibility labels change dynamically
10.2, 12.4	1.7	Ensure all objects are individually labelled
6.3, 8.1	1.8	Make Flash content directly accessible, or compatible with assistive technologies
6.5, 11.4	1.9	If, after best efforts, you cannot create accessible Flash content, provide an accessible link to a non-Flash accessible alternative that uses W3C technologies, is accessible, has equivalent information (and or functionality) and is updates as often as the inaccessible Flash version.

2. Colour

Recommendations for colour selections and considerations

WCAG	*FCAG*	
2.1	2.1	Do not use colour to convey critical information
2.2	2.2	Provide adequate contrast between foreground and background colours
2.2	2.3	Provide a mechanism for improving contrast between foreground and background colours

3. Content presentation

Concepts for developing and presenting accessible content within a Flash application

WCAG	*FCAG*	
3.1, 3.3, 11.4	3.1	Separate content from presentation
3.3, 6.1, 11.1	3.2	Use supported Cascading Style Sheet properties to improve presentation of XHTML content
3.4	3.3	Ensure Context Menus remain enabled and include default options
3.4	3.4	Enable dynamic runtime resizing of text
3.5, 3.6, 3.7, 4.1, 4.2	3.5	Use ActionScript to enhance the accessibility of HTML content
11.1	3.6	Use supported W3C technologies for content presentation
11.2	3.7	Avoid deprecated W3C technologies
11.2	3.8	Embed fonts into applications to ensure correct text rendering

4. Language

Basic concepts for preparation of language for content and hosting documents

WCAG	*FCAG*	
14.1	4.1	Use the clearest and simplest language appropriate for a site's content
4.3	4.2	Identify the primary natural language of a hosting document
14.2	4.3	Supplement text with graphic or auditory presentations where they will facilitate comprehension of the content, and vice versa

5. Flash publishing

Suggestions for creating accessible hosting documents and access to accessible non-Flash alternatives

WCAG	*FCAG*	
3.2	5.1	Create hosting documents that validate to published formal grammars

3.2	5.2	Ensure Flash content is displayed using valid hosting document code
6.3	5.3	Ensure content can be retrieved if Flash is not available or not supported
13.2	5.4	Provide metadata to add semantic information to pages and sites

6. Animation and Audio

Recommendations for the use of animation and audio within Flash

WCAG	*FCAG*	
7.3	6.1	Turn off accessibility properties for animating objects
7.1	6.2	Avoid causing the screen to flicker
7.2	6.3	Avoid causing content to blink
7.2	6.4	Avoid movement in pages

7. Interactivity

Concepts for the application of interactivity, navigation and keyboard support

WCAG	*FCAG*	
6.1, 9.4	7.1	Control the tab index of all objects in the movie to maintain a logical reading order
6.4, 9.2	7.2	Ensure interaction coding is input device independent, scalable and reusable
9.3	7.3	Ensure complex navigation interactions are accessible
7.4	7.4	Provide keyboard shortcuts to important links, form controls and objects
-	7.5	Provide tooltips to supply further information on an object
13.4	7.6	Use navigation mechanisms in a consistent manner
13.5	7.7	Group navigation mechanisms into logical blocks
-	7.8	Provide static navigation, or a means to force moving navigation to freeze

8. Usability

Suggestions for improving the usability of Flash content

WCAG	*FCAG*	
7.4	8.1	Avoid automatically and periodically refreshing pages
7.5	8.2	Avoid automatically redirecting the user
10.1	8.3	Do not cause pop-ups or other windows to appear without informing the user
13.3	8.4	Provide layout information in the form of a site map or table of contents
13.7	8.5	Provide search functions with selectable skill levels and preferences
13.1	8.6	Clearly identify the target of each link
13.8	8.7	Frontload content including paragraphs and headings
12.3	8.8	Separate large blocks of content into more manageable nested movies where natural and appropriate
13.9	8.9	Provide document collections for content that spans multiple pages
14.3	8.10	Develop and use a consistent style of presentation across all pages
11.3	8.11	Ensure content is fully loaded prior to presentation
11.3	8.12	Retrieve content according to stored preferences

Each Checkpoint in the FCAG has been assigned a priority level based on the WCAG priorities to provide a consistent measurement of the impact of implementing each Checkpoint. Part of the development process for the FCAG included the implementation of a series of accessible components, classes and development frameworks to assist developers in achieving accessible Flash content for delivery on the Web. Due to the complexity and potential ambiguity of the implementation of some FCAG Checkpoints, templates were also created to provide students with working examples for easy-to-enable accessibility in their own applications, with full source code available to enable the students to see how the Checkpoint is satisfied and to enable extensions of the templates to improve the functionality or appearance. These include:

- PHP Content Presentation System, which features a shared XML-based content data source for the storage of XHTML content, distributed by a PHP-driven web service. Included in the framework is a client for both Flash and PHP implementations to enable content to be shared across both Flash and non-Flash solutions.
- Tooltip Generation Class, which dynamically builds tooltips for selected objects at runtime based on the accessibility properties of the object.
- HTMLExtension Engine, which provides contextual information for XHTML content, generated by attributes within XHTML that follows the recommendations of the WCAG.
- Pre-Loader and Bandwidth Detector Component, which features two implementation methods to suit developers of all skill levels.
- Presentation Driver Component, which enables dynamic presentation and control of TextField content within Flash, including two methods of resizing and a colour contrast mechanism.

For example, the Presentation Driver Component enables dynamic presentation and control of TextField content within Flash, including two methods of resizing and a colour contrast mechanism. This allows students to set the implementation method, and contrast visibility using the Component Inspector within Flash during build time. Button colours and rollover effects can be modified using the same Inspector, to help integration with any interface design. A list of TextField objects, relative to the _root, can be specified for the component to control.

The incremental implementation provides users with the ability to increment or decrement the point size of the text content as required. This enables style sheets to be written once for each TextField, and then have the internal Style Sheet representation modified at runtime. The control for this implementation is shown in Figure 1 below.

Figure 1: Presentation driver component enables students to develop Flash content which includes control over text size using an incremental method

The Style Switcher implementation provides users with the choice of three different style sheets – small, medium and large (Figure 2). Developers can specify external CSS files using the Component Inspector.

Figure 2: Presentation driver component enables students to develop Flash content which includes control over text size using style switcher implementation

Benefits of the approach

With the increasing demand for Flash-based delivery on the Web, the content of *Accessible Interactive Media* required refinement to include more specific modules on developing accessible Flash, including reference to the FCAG. Through the addition of the FCAG to the content, students will be able to widen and strengthen their knowledge of Web accessibility across multiple media, including XHTML and Flash, while still retaining the key accessibility concepts originally recommended in 1999 by the WCAG.

Flash designers are traditionally thought to have a poor view of accessibility, especially the young developers who Clark (2000) asserts are "even worse than HTML designers". It is argued that if such assumptions are correct, a significant part of the problem relates to their lack of understanding of the complexities involved in developing accessible Flash content since Flash object's parent-child relationship "does not follow the paradigm of HTML" (Regan, cited in Lawson 2003). *Accessible Interactive Media,* as the capstone course within the Media Arts and double degree programs for students focusing on Web design, aims to address these challenges. The solution outlined in this paper, has therefore been designed to help these students gain a greater understanding of the importance of the coalescence of form and function in design, and to provide a mapping tool enabling them to apply the principles of accessible design they have acquired in their previous studies in *Digital Media Techniques* and *Electronic Publishing on the Internet* to the more complex accessibility issues associated with Flash content. In this way, students graduating from the Bachelor of Media Arts program will be more confident in dealing with the tensions they are likely to encounter with clients who place greater importance on aesthetics than usability and accessibility.

Through *Accessible Interactive Media*, students are provided with the knowledge and understanding to make inclusive design decisions, together with techniques to ensure the content within a Flash-based Web site is accessible to all users, including those without required plug-ins or software versions. Students completing *Accessible Interactive Media* are well equipped to not only promote inclusive design through their own practices but to also educate clients about the need to ensure their sites are accessible to a diverse audience. The benefits for students completing all three sequential courses (*Digital Media*

Techniques, *Electronic Publishing on the Internet* and *Accessible Interactive Media*) focusing on inclusive design practice are best summarised in the following quote from a former student and graduate:

> The skills gained from my studies at UniSA have given me an eye for detecting, correcting and preventing accessibility problems in my own work. Through the emphasis on this aspect of web design, I have raised the issue with my current full-time employer, and have been appointed the accessibility officer and have written an accessibility policy for the company, as well as leading the audit process on all current and developing sites. Without the skills, inspiration and wisdom gained through studying courses focusing on accessibility, a role such as this could not have been achieved.

Conclusion

This paper has provided an overview of the literature relating to inclusive design and argued that both form and function are necessary and achievable components in Web design. Yet despite the promises afforded by new technologies, research has shown that users who stand to benefit the most from the promise of the rich media experiences made possible by the changing landscape of Web technologies, remain isolated through a lack of attention to fundamental Web accessibility concerns. Possible reasons for the apparent resistance by some Web designers to designing accessible sites have been proposed and an argument presented in support of the need for a design curriculum that introduces students to the skills required to act ethically and responsibly in the design of Web sites that are accessible to diverse audiences. It is further argued that academics have a responsibility for ensuring that the design curriculum provides students with an understanding of their ethical and social obligations as future designers, and equips them with the technical skills required to create fully compliant sites that are accessible to diverse audiences.

The case study presented in this paper demonstrates an approach that has been successfully applied in digital media related programs at the University of South Australia. The sequenced approach, together with the development of guidelines that can be applied by design students in the creation of accessible Flash content described in this paper provides a model that can be adapted and applied successfully to the design curriculum in a variety of contexts. While this paper has focused on one particular area of advanced media, the same approach could be readily applied to design and development of guidelines and templates that address other emerging technologies that are rapidly transforming the landscape of Web design, including 3D virtual worlds. A further extension of our work in this area made possible through funding provided by the Australian Learning and Teaching Council, involves embedding these guidelines into a peer review instrument currently under development, which aims to guide academics in assessing the accessibility of content developed for their courses, as well as the development of accessibility guidelines and learning objects that can be applied to 3D virtual learning environments. The outcomes from both these projects will be reported at future conferences and the open source applications released to the higher education community at the completion of the projects.

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