An Evaluation of a Wiki Tutorial On Web Accessibility for UC Irvine Web Programmers

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An Evaluation of a Wiki Tutorial
On Web Accessibility for
UC Irvine Web Programmers

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To my parents who instilled in me a passion for knowledge, my wife Meghan, for her loving support, to Dr. Ivers for keeping me focused and on track and to those at UC Irvine, whose cooperation and support made this project possible.
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Abstract

Education is shifting from the real world classroom to a virtual Internet world where learning can occur at any time and any place. The development web sites and virtual learning environments ultimately fall to programmers who create the code, unfortunately many programmers have not been educated about the necessary steps that need to be taken to ensure the web sites they create are accessible to all learners, even those with disabilities. This project includes a review of literature on web accessibility and a collaborative web based training tutorial designed to educate programmers at the University of California, Irvine about web accessibility, its legal implications and methods to employ to ensure web sites created by the programmer are accessible for users with disabilities. The tutorial allows UC Irvine programmers to learn how to build accessible on ramps for individuals with disabilities to the information superhighway.
CHAPTER ONE
INTRODUCTION

The World Wide Web has provided a new cost-effective medium for distribution of instructional materials. With the increase of colleges and universities that offer distance learning programs, a plethora of individuals can now easily acquire a higher level of education which can help in obtaining a higher position in the workplace as well as facilitating promotion (Grimaldi & Goette, 1999).

Due in part to its cost effectiveness and flexibility, the popularity of distance learning has exploded. A study by the U.S. Department of Education found nearly 2.9 million students enrolled in college-level distance education courses in 2000-01, more than double the enrollment of 1997-98 (Lewis & Setzer, 2005).

Pre-college students are also experiencing this trend as an estimated 36 percent of public schools districts, or 5,500 out of more than 15,000 districts, had students enrolled in distance courses in the 2002-2003 school year. Most of the students are in high school, but some are in middle school or even elementary school (Lewis & Setzer, 2005).

However, for the estimated 20 percent of the world population and 54 million people in the United States who have a disability (Hollis, 2003), the very technology that has opened the door to unprecedented access to education also harbors the possibility of closing the door on educational opportunities for disabled students.

Just as there are enabling and disabling conditions in the physical environment, so are there conditions associated with digital technology that result in the inclusion or exclusion of certain people. Technology that is not universally designed, without consideration for the full spectrum of human abilities, is likely to contain access barriers for people with disabilities.
This issue affects web programmers in particular, as accessing distance learning courses for disabled individuals can be difficult and sometimes impossible due to a lack of authoring tools or programmer know how to assist programmers in creating accessible content.

While computer modifications can compensate for some types of disabilities, improper site design can be a detrimental factor for access. Blind people often use software called a “screen reader,” which sorts through the HTML code and conveys information about the site. It does this by reading much of the internal text, image descriptions, and link information aloud.

If the site creator has neglected to include this information in his/her design the screen reader might read “image, image, link, link, link” (Jackson-Sanborn, Odess-Harnish & Warren, 2002). This can be overwhelmingly frustrating, if images and links make up most of a site, as the user will be missing crucial information.

Statement of Purpose

The purpose of this study is to investigate the benefit of a web-based training (WBT) module to teach web programmers the need for accessibly designed web sites and provide some simple things web programmers can do to increase the accessibility and usability of their Web pages. Specifically, this study looks at:

- Why is there a need for web accessibility training?
- Why should web programmers be the target of accessibility training and not accessibility specialists, instructional designers, and faculty or department managers?
- What are the advantages of designing accessible web pages? This tutorial will explain why accessible web development is more beneficial and economical than creating inaccessible web sites.
• What are the legal requirements for creating accessible web sites? This tutorial will explain the relevant legislation that pertains to web accessibility, what it mandates and what organizations are affected by it.
• In what ways do interactive, web-based training (WBT) modules have an effect on adult student’s learning?
• What are the educational benefits of web based training tools like Wikis?
• What are the different strategies that should be employed when teaching adults as opposed to non-adults?
• What are some principals for effective design of interactive tutorials?

Rationale

Web programmers are the individuals who change or create a web site’s code -- not the teacher, accessibility specialist, instructional designer or unit manager. Therefore determining the technical solution and getting it implemented are two different actions, and nothing will change unless the programmer is influenced to change it (Dudley-Sponaugle, Greenidge & Lazar, 2004).

Many programmers claim that web accessibility is difficult to accommodate and simply fail to consider accessibility (Hull, 2004). Another reason is the lack of exposure students of computer science and information systems have to accessibility training as it is not a standard part of any national curriculum in Computer Science (CS), Information Systems (IS), or Information Technology (IT) (Lazar, 2002).

The University of California (UC) system is currently investigating ways in which to ensure web sites system-wide are accessible. Though the UC System is exempt from Section 508
compliance, this may change in the future, so there is a need for a learning module to educate web programmers system wide.

The University of California Office of the President has convened a team of web programmers at the different campuses to help distill resources. The group has released guidelines but no requirements and has discussed how system wide developers should be coding to accessibility standards, specifically Section 508.

At University of California, Irvine, an electronic mailing list on accessibility for web programmers is the extent of the campus’ current accessibility attempts. An educational module for accessibility would provide a good first step in promoting accessibility and providing a prototype that could be implemented at other UC campuses or system wide.

Operational Definitions of Terms

Disability: A disadvantage or deficiency, especially a physical or mental impairment that interferes with or prevents normal achievement in a particular area.

Internet: A global network connecting millions of computers. More than 100 countries are linked into exchanges of data, news and opinions.

Programmer: Refers to the people in an organization who create the code that determines how the web interface looks and behaves. This is in contrast to interaction designers, visual artists and others involved in providing elements of the graphic design of a web site.

Section 508: (the 1998 Amendment to Section 508 of the Rehabilitation Act) requires the federal government to make all goods and services—including web pages—fully accessible. It identifies
specific standards for Internet and web accessibility, which are often used as a basis for evaluating whether or not web sites meet accessibility requirements.

**Web accessibility:** Refers to the practice of making web pages accessible to people using a wide range of user agent software and devices, not just standard web browsers. This is especially important for people with disabilities.

**WBT:** Short for **Web-based training**, a generic term for training and/or instruction delivered over the Internet or an intranet using a web browser. Web-based training includes static methods -- such as streaming audio and video, hyperlinked web pages, live web broadcasts, and portals of information. It also includes interactive methods such as bulletin boards, chat rooms, instant messaging, videoconferencing and discussion threads.

**Wiki:** A wiki is a web application that allows users to add content, as on an Internet forum, but also allows anyone to edit the content.

**World Wide Web:** Has two major meanings: First, loosely used: the whole constellation of resources that can be accessed using Gopher, FTP, HTTP, telnet, USENET, WAIS and other tools. Second, the universe of hypertext servers (HTTP servers), more commonly called "web servers," which are the servers that serve web pages to web browsers.

**Assumptions and Limitations**

This research is subject to a few known limitations. In this study the subjects will only be from one institution, the University of California, Irvine. At this institution, the type of computer
the subjects use will be uncontrolled. The effectiveness of some of the media and WBT functionality could vary depending on the type of web browser used and the availability of certain plug-ins, (i.e. Flash) on the users system.

Overview of Remaining Chapters

The remainder of this project is organized into four separate and distinct chapters. Chapter Two consist of an introduction and a review of the literature related to the areas of web accessibility and web based training. Chapter Three comprises an evaluation model and assessment methodology. Chapter Four consists of an overview, and discusses learning task analysis, media selection, instructional strategies selection, creation and implementation, personal analysis, production work plan estimated budget and implementation plan. Chapter Five completes this research, presenting findings, conclusions and recommendations.
CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

Issues related to web accessibility training and literature relevant to Web-based Training (WBT) are reviewed in support of the instructional project. The primary focus of the study is on the ways in which collaborative Web-based Training tools, such as Wiki’s may prove beneficial in educating programmers about the need for web accessibility and steps that can be taken to create accessible and usable web sites.

An Inaccessible Web

Prior studies have demonstrated the disappointing amount of accessible online sites across the government, education and commercial domains and have highlighted the need for developer education to improve accessibility.

An analysis of the accessibility of State Department of Education homepages and special education pages using the accessibility tool BOBBY revealed that 26 percent of the state department home pages achieved accessibility compliance and a greater number of the special education pages, 52 percent, achieved compliance. Findings regarding section 508 compliance conformity revealed that 16 percent of the state department home pages achieved approval, while a greater proportion of the special education pages, 42 percent, achieved approval (Opitz & Rowland, 2003).

Advances in web technology have also had a detrimental affect on the accessibility of most web sites. Using an admittedly limited accessibility metric that evaluated the complexity of a web site by assigning a score to each HTML tag, such as object tags (i.e. <OBJECT> and </OBJECT>) which received a value of 100, Hackett and Parmanto assessed education web sites
from the Association of American Universities and 22 government web sites. The study showed that government web sites, which take web accessibility seriously since they are required to by law, had much better accessibility scores than higher education web sites. In fact, the data revealed a rather distressing fact that the more recent education web sites were more inaccessible than the ones they replaced (Hackett & Parmanto, 2005).

For example, the University of Colorado at Boulder’s home page scored a 4.0 (accessible) in 1997, but its 2000 counterpart scored 14.11 (inaccessible). With the increasing complexity of web development tools and languages, it is difficult for programmers to stay updated on ways to make or continue to make web pages accessible.

Using the site accessibility evaluator BOBBY, researchers discovered that while 40 percent of a sampling of commercial clothing sites passed the accessibility check, only 15 percent of a sampling of popular web sites that included many commercial sites passed the accessibility check (Jackson-Sanborn et al., 2002). The majority of accessibility errors were extremely easy to fix demonstrating a lack of awareness amongst programmers about accessibility methods and how and where to use them.

Legal Mandate

In order to eliminate barriers to technology for people with disabilities and increase accessibility awareness, Congress has enacted a number of legal provisions. These include Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act (ADA) of 1990, the Telecommunications Act of 1996, and Section 508 of the Rehabilitation Act of 1973, as amended in 1998 (Yu, 2002).
Section 504 imposes requirements on entities that receive federal aid for access for person with disabilities. It also mandates reasonable accommodations for employees with disabilities (Yu, 2002).

The ADA mandates effective communication, reasonable accommodations and auxiliary aides and services. The law pertains to higher education institutions, libraries, state and local government which are required to communicate effectively with people who have hearing, vision, or speech disabilities (Yu, 2002).

Section 508 applies to federal agencies and to educational institutions performing information technology services on behalf of the government. It is intended to create opportunities for people with disabilities to access electronic and information technologies by creating standards that explain how to make products such as computers, software and other electronic equipment available to people with disabilities, such as those with vision, hearing and mobility impairments (Hollis, 2003).

Accessibility for individuals with disabilities has also gained momentum internationally. The United Kingdom’s Disabilities Discrimination Act of 1995, which is similar to the United States’ ADA, gives legal backing to expedite compliance. In addition to legal parameters surrounding accessibility issues, political initiatives such as the Barcelona Declaration of 1995 and the European Union’s eEurope have arisen in order to increase consciousness and try to effect change (Jackson-Sanborn et al., 2002).

The World Wide Web Consortium (W3C) has also recognized the importance of facilitating access for web users with disabilities by establishing the Web Access Initiative (WAI) which has released a number of guidelines to assist developers in creating accessible web pages (Coombs, 1998). These guidelines include the four principles of Web Content
Accessibility, content must be perceivable, interface elements in the content must be operable, content and controls must be understandable and content must be robust enough to work with current and future technologies that will ensure creation of an accessible web site (Caldwell, Chisholm, Slatin and Vanderheiden, 2005).

The Impact of the Programmer on Web Accessibility

Determining the technical solution and getting it implemented are two different actions, and nothing will change unless the programmer is influenced. In order to get the code changed, the programmer’s perspective regarding how they code must be changed, rather than simply asking for a list of changes (Law et. al., 2005). Due to the great influence programmers have on the accessibility of current or soon to be created web sites, accessibility education efforts need to include web site programmers.

Despite their heavy influence on the accessibility of web sites, there is a substantial lack of understanding or training amongst programmers regarding this topic that needs to be addressed through education.

In a 2003 survey of web programmers, Dudley-Sponaugle et. al. found that while 65.7 percent of the respondents had created an accessible web site for users with visual impairments, 43.4 percent of respondents did not know if the site they were currently overseeing was accessible to users with visual impairments.

In the open ended question, “What do you think is the biggest challenge of making a web-site accessible for users with visual impairments,” one respondent replied by saying “I suppose that education of webmasters must be critical,” another replied “‘Selling’ the importance of accessibility to various stakeholders..[it’s] often perceived as trivial/non important.” Another open-ended question asked whether the programmer considered making the site accessible to all
users when doing updates. One respondent replied, “It crosses my mind, but I don’t know what it would take.”

The responses demonstrate the lack of exposure students of computer science and information systems have to accessibility training as it is not a standard part of any national curriculum in Computer Science (CS), Information Systems (IS), or Information Technology (IT) (Lazar, 2002).

In addition to the lack of formal accessibility training, a survey of some popular web development textbooks reveals a dearth of discussion on the topic of web accessibility.

For example, the fifth edition of Musciano and Kennedy’s 645 page *Definitive Guide* does not contain an entry for ‘accessibility’ in the index and the index of Crowder and Baily’s 930 page *Creating Web Sites Bible* does not have any mention of accessibility.

Out of 480 pages, there are only three on which accessibility is mentioned in Elizabeth Castro’s *Visual Quickstart Guide*. One of the three mentions explains the use of the LONGDESC attribute for frames, but the other two simply state that U.S. Government websites are required by law to be accessible. Dan Cederholm’s *Bulletproof Web Design* contains a two-page discussion of accessible table design, which occurs about two thirds of the way through the text.

Jennifer Niederst’s *Web Design in a Nutshell* contains a chapter titled “Accessibility,” which contains a summary of the Web Content Accessibility Guidelines, that accounts for only seven of the book’s 618 pages. The index entry for “accessibility,” however, only refers to pages 74-80 which make up the “Accessibility” chapter.

The “Comprehensive” edition of Patrick Carey’s *New Perspectives on HTML and XHTML* contains a section on “Making the Web More Accessible” which is contained in Appendix D of the 736 page text.
If it is mentioned at all accessibility is given the impression that is an add-on (like ALT text for HTML IMG elements) – something extra that one can do, but ancillary to the primary task of designing visually attractive pages. This can create a perception amongst many programmers to treat ALT text and other accessibility measures like code comments – something you go back and throw in after you’ve completed a project. In some cases, like using tables for page layout, accessibility conflicts with common web design techniques further muddling the message about the importance of accessibility (Rosmaita, 2006).

Since it is difficult for programmers to find in depth and coherent information about accessibility in either their formal education or reference books, organizations may need to take it upon themselves to educate and create awareness amongst their own developers about accessibility.

Suggested education on web accessibility issues include understanding laws, policies, and guidelines; having good comprehension of the major disparities; and being aware of available resources to make Web sites accessible (Yu, 2002).

Adult Learning Strategies

Adult e-learners are empowered, self managed individuals, who are looking for involvement and engagement, the last thing these adults need is an academician who is going to unilaterally direct their learning (Scheuermann, 2002).

Adult learning courses must offer the student an opportunity to utilize their workplace experiences during the learning process. Students should be empowered and their education a constructive process instead of a passive activity, one that allows them to participate in the formulation of their learning, which in turn will make it more effective.
These learners would benefit most from a constructivist-learning environment, which stipulates that each individual can explore and produce unique concepts based on their experiences and biases. This learning method is heavily learner-centered and the role of the instructor is seen as a guide who helps learners as they construct their own knowledge.

In *How People Learn*, the co-authors provide four methods to optimize adult learning which align with the constructivist-learning environment.

Students should be actively involved in creating their own knowledge. Preconceptions and prior knowledge and attitudes should be taken into account in order to better understand the appropriate way to reach a learner. By utilizing the collaborative discussion tools of the Wiki, learners can share their prior knowledge and experiences and provide a resource for others. They can also pose discussion questions or challenges they are facing. By taking ownership of their learning students develop a greater understanding of the topic. Discussion amongst fellow learners can foster a process of feedback and reflection. Learning is a process of on-going refinement of conceptualization – construction – identification, with dialogue playing a key role in each stage (Cairncross, 2001). However if there is only a small community of learners or learners are not willing to participate in the discussion or sharing of their knowledge, learners can become frustrated and withdraw from the environment all together.

The second method involves integrating what is taught, with why, when, where and how it might be valuable to the student. Survey results show that some programmers don’t understand the impact web accessibility has on both disabled and non-disabled individuals. A 2003 survey of web programmers by Dudley-Sponaugle et. al. asked the question “What factors would influence you to make your current site accessible for users with visual impairments?” One respondent replied, “If it’s the law,” however in some cases it is already the law for government
web sites and organizations who receive funding from the government. In response to the question “What do you think is the biggest challenge of making a web-site accessible for users with visual impairments,” one response was “Tedium, cost, and compliance with a law that may well get over-turned in the years to come.” Making a web site accessible is not overly tedious and costly and can usually be easily achieved with a modicum of time and effort. These answers demonstrate the ignorance some programmers have about these issues.

Assessing knowledge in these environments should allow students ways to make their knowledge visible and provide opportunities for them to revise and improve on certain areas of their learning. Based on examples and assistance from the community of learners on the wiki, programmers should be able to create fully accessible or at least partially accessible web pages. This would allow the programmer to assess his/her own progress while also allowing the instructor and community of learners to view it too and provide necessary feedback and encouragement. However, this type of assessment could only work if the programmer had the necessary time and management approval to incorporate accessibility features in an upcoming project or retrofit of a current web page.

Creating a community of learners that includes those not affiliated with UCI or the UC system allows students to draw on a wider knowledge and experience base. By opening the Wiki to UC system programmers or to any programmer for that matter, the knowledge base and discussion can be greatly enhanced and collaborative accessibility efforts between campuses could be fostered. Unfortunately due to internal political squabbles and lack of cooperation between units and campuses, attempting to create a community of learners could be met with resistance to sharing knowledge.
In addition to the educational framework, it is also important to consider ways in which material is presented and what ways work best in fostering meaningful learning, or a deep understanding of the material, which includes attending to important aspects of the presented material, mentally organizing it into a coherent cognitive structure, and integrating it with relevant existing knowledge (Mayer, 2003).

Some people absorb information best by reading (visual learners), some by hearing (aural learners), and some by doing (kinesthetic learners). Research has shown that by utilizing dual coding, such as by watching a video which allows information to be obtained through both the aural and visual channel, information is better retained in memory. For this, certain sections of the Wiki tutorial related to important points of accessibility contain video segments in addition to textual explanations.

The capacity for physically presenting words and pictures is virtually unlimited, and the capacity for storing knowledge in long-term memory is virtually unlimited, but the capacity for mentally holding and manipulating words and images in working memory is limited. Therefore, it is important to avoid creating cognitive overload by filling up the limited amount of cognitive processing that can take place in the verbal channel at any one time, and the limited amount of cognitive processing that can take place in the visual channel at any one time (Mayer, 2003). By creating a module that can be viewed over and over again and videos that can be viewed multiple times, it is easier for the learner to achieve meaningful learning of important accessible points through dual coding.

A Case for Web-Based Training (WBT) with Wiki’s

Web-based training is fast becoming the primary method for course delivery. The United States market for web-based training had a compound annual growth of 95 percent from 1997 to
2002. Indicators such as these show that web-based training will continue to grow as an educational medium and has the potential to supplement or replace a wide range of instructor-led training programs (Williams, 2002).

The explosion in web-based training is attributable to the benefits it provides for learners who can obtain easy access to a variety of learning materials at school, home or work. Logistical issues such as bringing learners together at the same time and place can be avoided with web-based training which can occur anywhere and at a time that is most convenient for the learner. Management of course information is also made easier through web-based training since updates only need to be made to a single web site by a programmer or in some cases by the learner. Changes can be immediately accessed by all users, as opposed to other multimedia-based learning, which would require users installing software updates (Alessi & Trollip, 2002).

Web-based training also facilitates easier communication between learners and instructors. Harmon, Jones & Lowther (2002) provide five levels of educational use of the web that are common in schools, colleges, and corporations. Level 5 or immersive web use, is the highest level where students and faculty contribute to the knowledge base of the course. The classroom becomes a true learning community in which knowledge is acquired, created and distributed amongst all participants.

There are two types of web-based learning environments, interactive and passive. Interactive web-based training environments are better suited to constructivist learning principles than passive learning environments, such as traditional web sites, which consist of text files (e.g. syllabus, guidelines, lecture notes, and cases) and/or presentation slides (a copy of visual aids used to deliver the lectures, e.g. PowerPoint files).
Interactive learning environments enable learners to explore the learning material freely at their own pace and to interact with the instructor or other learners. Exploration is a key requirement for constructivism, while interaction enables the extension of constructivism to collaborative learning. In contrast to learning through passive exposure to information, interactivity is especially valued for its ability to engage learners in the material.

Khalifa and Lam (2002) demonstrated in their comparison of the two learning environments, that an interactive web-based environment was superior to a passive web-based environment. Students perceived the interactive learning environment as providing a more active and explorative learning process and was perceived to be more effective in supporting student’s learning methods and more enjoyable to use.

One such web-based learning tool that is both an interactive learning environment and an example of level 5 web use is a Wiki. A Wiki is a group of web pages that can be a powerful tool for constructivist learning because it facilitates collaboration by allowing users to add content, similar to discussion forums or blogs, but also permits others to edit the content (Burns & Duffy, 2006). By allowing the information to be edited and discussion amongst students to take place, the Wiki fosters an immersive web use environment that is more suitable to adult learners. Pages can be interconnected and organized as required, and are not presented by default in a reverse-chronological, hierarchical, or any other predetermined order. The interconnectedness of the Wiki’s hypertext facilitates the process of remembering, concept formation, and understanding (Khalifa & Lam, 2002). Designed correctly, the hypertext representation of the learning material has the potential of bridging the gap between the schema of the expert and that of the novice. A Wiki offers the ability to interact with an evolving document over time, while version control
tools allow authors to track the history of specific pages, and the history of their personal
ccontributions (Bruns & Duffy, 2006).

Despite the educational benefits of a Wiki they also present some challenges. Some
Wikis have no page locking system, so if two people edit the page simultaneously, one set of
changes will be silently deleted. Social issues must also be considered as some content may be
subject to an ‘edit war.’ This is the continuous editing and re-visioning of content by a
community member with a particular agenda (Bruns & Duffy, 2006). Getting learners involved
in the work of other participants in the learning community is another drawback of the Wiki. It is
important to develop a “communication and comment culture” from the start where learners have
to comment on and correct the work produced by other members of the learning community. The
pedagogical justification of this “comment culture” is that it involves learners in making
comments about the concepts of other learners helps construct personal knowledge and enhances
meta-cognitive capacities (Notari, 2006).

Given the logistical challenges of programmer schedules, diversity of skill levels, and
differing learning styles, a Wiki web-based training module would help meet the training needs
of UCI’s web programmers.

Principles of Effective Web-Based Training Design

Interface design is only one aspect of a successful web-based training environment; there
must also be a strong focus on pedagogical aspects of the training module. The first step is to
determine what students should learn by creating a series of learning objectives.

Oftentimes faculty write vague statements rather than concrete learning objectives that
can be used to craft the content for a module. Their content expertise can blind them to the
incremental steps students require to master new concepts. It is up to an instructional designer to ask probing question about what the instructor intends for the students to learn.

After nailing down the learning objectives, the next step is to group the objectives into logical sections and arrange them into the module. Fernandez and Rubens (2005) suggest a series of components lead to a successful module planning framework.

With the learning activities specified and course objectives defined, developers must think about the activities that will be required in order for students to practice and eventually master the module content. UCI has decided to conform to the Section 508 web accessibility standards so it will be imperative that the module focus on learning activities that allow the programmer to master the sixteen sections of web accessibility standards that comprise the Section 508 web accessibility standards.

The type of interaction required of the student during the module must also be considered. If there is automated feedback in the module, all of the possible types of responses must be considered and appropriate responses programmed. If the tasks are open-ended, requiring instructor feedback, then all the possible places in the module where feedback may be critical to student progress must be addressed. Certain tasks may require peer feedback, this requires figuring out where feedback will be helpful and what type of support students will need to do a credible job of providing useful responses. The accessibility module will rely on students responding to open ended questions and feeding off and learning from their peer’s comments.

The type of assessment strategy will need to be determined as well. Will the tutorial use a piece of written work, answer a multiple choice quiz or create a project? Tasks that mimic what students would experience if they applied the learned concepts in the real world are more effective, however, they are more expensive and require more instructor oversight. Quizzes and
tests can be used as an intermediate step to assess the progress and attained knowledge of the student. Programmer time is at a premium and it could be difficult to have them complete a capstone project, therefore a multiple choice assessment, despite its low fidelity, would be more conducive to the time of the programmers.

Multimedia elements for the course module need to be evaluated to determine the appropriate types of multimedia for each portion of the module. Basic textual information is easy to create and distribute but is not as engaging or easily coded as other multimedia elements. Video and animations are more engaging and take advantage of dual coding to increase remembrance of the material, but are costly to produce and can lead to cognitive overload of the student which negatively affects their ability to remember the material presented.

Associated module documents, such as textbook chapters, journal articles or reports, which are required reading for students must be made easily accessible on the web-based training module and instructions have to be written to help students find the material or links have to be provided so that they can easily access the documents online via the module. A listing of links to other web resources, experts in the field, professional organizations or bibliographies should also be considered and if deemed necessary included in the module.

Finally, estimation must be made of the amount of time necessary for a student to complete the module and the information should be shared with the student to better prepare them for the time required of them to complete the course. A representative group of students should be selected and a formative evaluation of the module should be done to identify problems, inadequate information presentation; unclear test questions or directions; or unclear objectives and expected outcomes. In addition to catching errors, this process will also determine how long it will take an average student to complete the module.
SUMMARY

There are numerous guidelines, legal mandates, tools and resources pertaining to web accessibility however most web sites are still inaccessible to users with disabilities and many programmers are unaware or unconcerned about web accessibility. These issues stem from 1) a lack of information on web accessibility in either computer science curriculums or web development books, 2) a negative perception amongst programmers that accessibility is necessary for only a fringe group of users and creating accessible sites is tedious and time consuming, 3) programmers not knowing where to go for information on creating accessible web sites.
CHAPTER THREE
DEVELOPMENT OF THE OVERALL PROJECT/METHODOLOGY

Introduction

This chapter provides information on the product itself (a Wiki based Web-based training (WBT) module), the target audience of the product (UCI web developers), and the evaluation of the effectiveness of the product delivered to a sample target audience.

The product provides an overview of web accessibility, the laws that govern web accessibility and a tutorial demonstrating what programmers can do to create web sites that meet the 16 Section 508 government standards pertaining to web accessibility. Wiki’s have been successfully used in education since 1999 and offer a plethora of pedagogical benefits that make them superior to traditional web sites (Konieczny, 2007).

First, one does not need to download any software to work with Wikis second, learning how to edit a Wiki is very easy and intuitive. Third, by default, Wikis are designed to support collaborative projects and allow virtually anybody to edit anything.

Because Wikis can easily shift between the teaching paradigm and the learning paradigm and allow students to actively engage the material in ways difficult or impossible to achieve with traditional web pages, they are valuable for active learning. Wiki’s also foster cooperative learning activities amongst co-workers which can lead to increased understanding of concepts learned amongst group members (Konieczny, 2007).

The Participants

The target audience of this tutorial will be UCI web developers who are in charge of creating internal or external web sites that have the potential to be viewed by a disabled individual. Volunteer sampling will be used to gather five programmers that want to take this
online tutorial. The sample selection provides for a participant base that is reflective of the general UCI web programmer population that the tutorial wishes to target.

The Instruments

The individuals with the most sway in whether a site will be built for accessibility or not are programmers and their clients. It is likely that if neither of these groups of people are aware of or passionate about web accessibility, then a web site will be built to be inaccessible.

Despite policy and law in many countries that encourage web accessibility, training in accessibility for current web programmers is rare outside of government (Lazar, 2005). In a survey of professional web developers, Ballin, Rossin and Rode (2005) found that 95 percent of respondents reported that some of their web development skills were self-taught and 32 percent acknowledge the use of online tutorials as a method of learning. This reinforces the central role of tutorials, online help, and other learning aids in transferring knowledge to web programmers. The survey also demonstrated that respondents were most likely to rely on community-oriented activities like consulting a Frequently Asked Question document, looking for similar sites or tracking down a relevant colleague when faced with the prospective of learning something new.

While many studies of web accessibility examine the programmers perception and knowledge of accessibility, or focus on creating web accessibility classes for students enrolled in undergraduate or graduate computer science programs, few studies examine the success of accessibility tutorials for the work place that focus on increasing programmers knowledge of web accessibility and methods which they can utilize to create accessible web sites.

The purpose of the current Wiki based tutorial is to attempt to discover whether online, collaborative accessibility tutorials increase the knowledge and perception of accessibility in the mind of the web programmer and increase their knowledge of methods to create accessible web
sites. The study will be qualitative in nature relying on post-survey and participant comments to assess the value of the tutorial and identify areas that work well or need improvement.

Strauss and Corbin (1990) claim that qualitative methods can be used to better understand any phenomenon about which little is yet known. They can also be used to gain new perspectives on things about which much is already known, or to gain more in-depth information that may be difficult to convey quantitatively. Qualitative methods are appropriate in situations where one needs to first identify the variables that might later be tested quantitatively, or where the researcher has determined that quantitative measures cannot adequately describe or interpret a situation.

Methodology

The tutorial will be developed using open source MediaWiki software that will publish web pages that will reside on an external web server for the subjects to view. Due to time and resource constraints, participants will be contacted via email with a brief explanation explaining the project and its goal. The learners will be provided a link to the Wiki and be given a deadline for which to complete the tutorial. Upon completing the tutorial, the participants can take a ten-question quiz along with the post-survey to help access the reliability and the validity of the tutorial.

A report of the learner’s time it took to take the lesson will be presented. From this information, more evaluation will be done to see how effective this tutorial was and if there is any room for improvement. The survey form that is completed after the tutorial is taken looks like this:

CONFIDENCE QUESTIONS:
All of the confidence and agreement questions are to be evaluated on a sliding scale of 1 to 5, with 1 being least confident/disagree strongly and 5 being very confident/agree strongly.

1. After viewing the Introduction to Web Accessibility section, I feel that I better understand web accessibility.

2. After viewing the Overview of Assistive Technologies, I feel that I better understand assistive technologies and how they are used to access the web.

3. After viewing Accessibility and the Law section, I feel that I better understand the legal ramifications of creating accessible web sites.

4. After viewing the Section 508 checklist information I feel that I understand and can ensure my web pages meet Section 508 standards.

5. After viewing the Testing Accessibility section, I feel that I better understand how to test the accessibility of my web site.

6. I feel I am more knowledgeable about web accessibility and methods to create accessible web sites after taking this tutorial.

7. I would voluntarily use this tutorial in the future

8. I would recommend this tutorial to a fellow UCI web developer.

9. The exercises were helpful to learning

10. Using a web-based tutorial was an effective means of presenting this material.

11. This training met the standard objectives.

12. The training was a valuable use of my time.

13. The materials were well organized and of high quality.

14. I could utilize the skills and information presented at my current job.
OPEN ENDED FEEDBACK:

15. For what reason(s) would you consider using this tutorial in the future.

16. For what reason(s) would you recommend or not recommend this tutorial to a fellow UCI web developer.

17. What part(s) of the tutorial did you find most helpful and why.

18. What parts of the tutorial did you find least useful and why.

19. How do you think the tutorial could be improved to help programmers like you learn about web accessibility and methods to implement it.

20. How many minutes did it take you to complete the tutorial.

21. Additional comments.

Data Analysis

In addition to open-ended feedback question, analysis of the Likert Scale responses will be done to measure the individual’s level of agreement based on a five-point scale (ie. Strongly Agree, Agree, Disagree, Strongly Disagree) presented with a statement. The number beside each response becomes the value for that response and the total score is obtained by adding the values for each response. Likert scale measures are fundamentally at the ordinal level of measurement because responses indicate a ranking only.

Microsoft Excel will be used to create a spreadsheet of the raw data. The spreadsheet records all individuals' responses to the confidence survey questions that utilized a five-point Likert scale (5 = High importance or satisfaction, 1 = Low importance or satisfaction). Excel tables displaying collated, tabulated and summarized data will also be created along with bar charts to visually represent the range of responses for each confidence question.
CHAPTER FOUR

DESCRIPTION OF THE INSTRUCTIONAL PRODUCT

Introduction

Currently the University of California system is exempt from Section 508 compliance, but this may change in light of recent legislation, other university system accessibility initiatives and recent litigation that may mandate accessible web sites.

California Senate Bill 105 (2002), states:

In order to improve accessibility of existing technology, and therefore increase the successful employment of individuals with disabilities, particularly blind and visually impaired and deaf and hard-of-hearing persons, state governmental entities, in developing, procuring, maintaining, or using electronic or information technology, either indirectly or through the use of state funds by other entities, shall comply with the accessibility requirements of Section 508 of the Rehabilitation Act of 1973. (p. 3)

This bill is significant because prior to being signed into law in September 2002 the reach of the federal law requiring Section 508 compliance did not extend down to state agencies. Yet, as a state, California required all of their pages (and those of state agencies) to be 508 compliant. Even some of the higher education systems, like the California Community Colleges, took it upon themselves to institute a Section 508 compliancy statute. SB 105 (2002) removes any grey area that may have existed in the interpretation of Section 508 as a federal law and its jurisdiction over the California systems of higher education.

Spurred in part by the passage of SB 105 (2002), the California State University system established an Accessible Technology Initiative through Executive Order 926 (EO 926). The executive order mandates information technology resources like web sites are made accessible to
all California State University students, faculty, staff and the general public regardless of disability.

In February 2006, a blind University of California, Berkeley student sued Target because the retailer’s website cannot be accessed by blind internet users. The lawsuit cites violations of accessibility laws. This lawsuit brings accessibility laws and their application on websites to the forefront and highlights the vague nature of the obligations faced by United States based website operators.

Due to the recent attention being paid to web accessibility the University of California Office of the President has convened a team of Web developers at each of the 10 University of California campuses to help distill resources. Currently there are guidelines, but no requirements and as a first step, the University of California, Irvine has created an email list on accessibility for Web developers.

A central resource on web accessibility that provides information and tutorials as well as a collaborative learning environment that would allow fellow developers to share their knowledge and experience would provide an example of how UC Irvine is addressing the issue of web accessibility.

Instructional Challenge

There are a number of instructional challenges with respect to providing learning to programmers. There is the logistical challenge of providing an instructional module that addresses the logistical and temporal differences in programmers’ schedules. UC Irvine is a 1,000 acre campus, not including the Medical Center located in Orange. The vast size of the campus makes providing a time and place that works for all UC Irvine programmers virtually
impossible, in addition some programmers work non-standard hours which also create scheduling conflicts.

There is also the need to create an instructional module that addresses the learning styles of programmers. In a survey of professional web developers, Ballin, Rossin and Rode (2005) found that 95 percent of respondents reported that some of their web development skills were self-taught and 32 percent acknowledge the use of online tutorials as a method of learning. This reinforces the central role of tutorials, online help, and other learning aids in transferring knowledge to web programmers. The survey also demonstrated that respondents were most likely to rely on community-oriented activities like consulting a Frequently Asked Question document, looking for similar sites or tracking down a relevant colleague when faced with the prospective of learning something new.

**Solution Proposal**

To overcome the instructional challenges of creating a learning module for programmers, a Wiki based learning tutorial will be created. Wikis have been successfully used in education since 1999 and offer a plethora of pedagogical benefits that make them superior to traditional web sites (Konieczny, 2007).

First, one does not need to download any software to work with Wikis; second, learning how to edit a Wiki is very easy and intuitive. Third, by default, Wikis are designed to support collaborative projects and allow virtually anybody to edit anything.

Because Wikis can easily shift between the teaching paradigm and the learning paradigm and allow students to actively engage the material in ways difficult or impossible to achieve with traditional web pages, they are valuable for active learning. Wiki’s also foster cooperative
learning activities amongst co-workers which can lead to increased understanding of concepts learned amongst group members (Konieczny, 2007).

Logistical issues such as bringing learners together at the same time and place can be avoided with a web-based Wiki which allows training to occur anywhere and at a time that is most convenient for the learner. The Wiki can also be a powerful tool for constructivist learning because it facilitates collaboration by allowing users to add content, similar to discussion forums or blogs, but also permits others to edit the content (Burns & Duffy, 2006). By allowing the information to be edited and discussion amongst students to take place, the Wiki fosters an immersive web use environment that is more suitable to adult learners. Pages can be interconnected and organized as required, and are not presented by default in a reverse-chronological, hierarchical, or any other predetermined order. The interconnectedness of the wiki’s hypertext facilitates the process of remembering, concept formation, and understanding (Khalifa & Lam, 2002). Designed correctly, the hypertext representation of the learning material has the potential of bridging the gap between the schema of the expert and that of the novice.

Goal

There is currently no central campus resource for UC Irvine web developers on the topic of web accessibility. Given the increased attention paid to web accessibility and the possibility of future legal or system wide mandates, providing a collaborative campus wide resource is a good first step in educating programmers on how to create accessible content.

Learner Objectives/Analysis

To achieve this goal, the tutorial will:

• Provide a general overview of the Wiki resource and why it is beneficial for campus web developers
• Provide an Introduction to Web Accessibility

• Provide an Overview of Assistive Technologies

• Provide a section on accessibility and the law

• Provide a Section 508 checklist that gives tutorials on how to ensure your pages meet all of the Section 508 guidelines.

• Provide links to resources of tools that allow programmers to test the accessibility of their web sites

• Provide an assessment that will allow the programmer to gauge their knowledge after having completed the tutorial

Audience Analysis

The intended audience will be the web programmers at the University of California, Irvine. This group will have a wide range of experience with web accessibility from none-at-all to expert knowledge of web accessibility and web accessibility methods. However, their proficiency with computers, the Internet and web based learning tools like Wiki’s are above average and they will not need any additional training in this area.

Media Selection

Since this is a web based learning module, the hardware of the computer used will vary based on what each programmer has. The Wiki will be powered by MediaWiki, a free software package that is employed by a number of organizations including Wikipedia, PHP and MySQL will be needed to provide a data source for the Wiki’s content as well as the assessment tool for the learner. A series of streaming videos will also be employed to augment the text and appeal to those learners whose learning style is better suited for visual and auditory learning. Sample screen shots of the instructional product can be viewed in Appendix A.
Content

The information architecture and content of the Wiki are based on similar tutorial resources at the University of Wisconsin, Madison, the University of California, Berkley and the University of Florida. The content of the instructional model provides instruction and reinforcement of knowledge and skills that are important in gaining proficiency on the topic of web accessibility and methods of creating accessible web pages and web sites.

Product Work Plan

The schedule time for the design, delivery and evaluation for this product was set for January – May 2007. The table below displays the projected and actual dates for benchmark completions.

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<td>03.30.07</td>
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<tr>
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<td>04.06.07</td>
</tr>
<tr>
<td>Media Support (Graphics/Video)</td>
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<td>04.06.07</td>
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<td>Evaluation/Assessment Creation</td>
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<tr>
<td>Project Work Plan</td>
<td>01.08.07</td>
<td>05.07.07</td>
</tr>
</tbody>
</table>
## Project Budget

### Content acquisition

1. Internet research - 10 hours @ $75.00 per hour = $750.00  

| Total hours for Content Acquisition: | 10 |
| Total cost for Content Acquisition: | $750.00 |

### Project Design

1. Needs analysis – 20 hours @ $100.00 per hour = $2000.00  
   2. Create paper prototype/wire frame – 10 hours @ $100.00 per hour = $1000.00  

| Total hours for Project Design: | 30 |
| Total cost for Project Design: | $3000.00 |

### Scripting

1. Create practice test – 6 hours @ $100.00 per hour = $600.00  

| Total hours for Scripting: | 6 |
| Total cost for Scripting: | $600.00 |

### Screens – Design & Storyboard

1. Main screen – 4 hours @ $100.00 per hour = $400.00  
   2. Introduction to Web Accessibility – 4 hours @ $100.00 per hour = $400.00  
   3. Overview of Assistive Technologies – 2 hours @ $100.00 per hour = $200.00  
   4. Accessibility and the Law – 2 hours @ $100.00 per hour = $200.00  
   5. Section 508 Checklist – 8 hours @ $100.00 per hour = $800.00  
   6. Testing Accessibility – 4 hours @ $100.00 per hour = $400.00  
   7. Practice test screens – 2 hours @ $100.00 per hour = $200.00  

| Total hours for Screens: | 26 |
| Total cost for Screens: | $1800.00 |

### Graphics

1. Editing photos - – 10 hours @ $100.00 per hour = $1000.00  

| Total hours for Graphics: | 10 |
| Total cost for Graphics: | $1000.00 |

### Video

1. Convert Flash video – 10 hours @ $100.00 per hour = $1000.00  
   2. Upload video to server – 4 hours @ $100.00 per hour = $400.00  

| Total hours for Video: | 14 |
| Total cost for Video: | $1400.00 |

### Wiki Installation and Setup

1. Install Wiki on server - 8 hours @ $100.00 per hour = $800.00  
   2. Configure Wiki - 10 hours @ $100.00 per hour = $1000.00  
   3. Populate Wiki with content - 40 hours @ $100.00 per hour = $4000.00  

| Total hours for Installation and Setup: | 58 |
| Total cost for Installation and Setup: | $5800.00 |

### Data collection
### Feedback

1. **Total hours for Data collection**: 10
   - **Total cost for Data collection**: $750.00

### Project management

1. **Oversee project** – 45 hours @ $120.00 per hour = $5400.00
   - **Total hours for Project management**: 45
   - **Total cost for Project management**: $5400.00

### Other out-of-pocket expenses

1. Soda / Late night snacks
   - **Total cost for Out-of-pocket expenses**: $1000.00

### Project Summary

- **Total hours billed @ $75.00 per hour = 20**
  - **Total expenses**: $1500.00
- **Total hours billed @ $100.00 per hour = 144**
  - **Total expenses**: $14400.00
- **Total hours billed @ $120.00 per hour = 45**
  - **Total expenses**: $5400.00
- **Fixed cost**: $1000.00

   - **Total expenses**: $22300.00
   - **Taxes: 7.75%**: $1728.25

   - **TOTAL COST**: $24028.25
The implementation of the Web Accessibility Tutorial involved a target audience of five UC Irvine web programmers. The trial was conducted on the test participants work computers. The subjects had a clear understanding of learning expectations which was to learn about web
accessibility, its relevance to the programmers work and methods they could employ to ensure their web pages were accessible, then complete the sample survey below.

CONFIDENCE QUESTIONS

1. After viewing the Introduction to Web Accessibility section, I feel that I better understand web accessibility.

2. After viewing the Overview of Assistive Technologies, I feel that I better understand assistive technologies and how they are used to access the web.

3. After viewing Accessibility and the Law section, I feel that I better understand the legal ramifications of creating accessible web sites.

4. After viewing the Section 508 checklist information I feel that I understand and can ensure my web pages meet Section 508 standards.

5. After viewing the Testing Accessibility section, I feel that I better understand how to test the accessibility of my web site.

6. I feel I am more knowledgeable about web accessibility and methods to create accessible web sites after taking this tutorial.

7. I would voluntarily use this tutorial in the future

8. I would recommend this tutorial to a fellow UCI web developer.

9. The exercises were helpful to learning

10. Using a web-based tutorial was an effective means of presenting this material.

11. This training meets the standard objectives.

12. The training was a valuable use of my time.

13. The materials were well organized and of high quality.
14. I could utilize the skills and information presented at my current job.

OPEN ENDED FEEDBACK:

15. For what reason(s) would you consider using this tutorial in the future?

16. For what reason(s) would you recommend or not recommend this tutorial to a fellow UCI web developer?

17. What part(s) of the tutorial did you find most helpful and why?

18. What parts of the tutorial did you find least useful and why?

19. How do you think the tutorial could be improved to help programmers like you learn about web accessibility and methods to implement it?

20. How many minutes did it take you to complete the tutorial?

21. Additional comments.
CHAPTER FIVE

FINDINGS, CONCLUSIONS, RECOMMENDATIONS

Findings

The design and development of the instructional project “Web Accessibility Wiki” was conducted by one person, so it was not until the Beta testing phase with actual programmers that significant evaluative feedback was received.

A Beta or end user test was conducted during the week of April 9, 2007. The test consisted of five programmers from the target population who used the tutorial and provided candid feedback. After introducing the module and its intent, the users were told to take the tutorial and provide feedback on it via a web form with specific questions to be answered on a Likert scale of 1 to 5 and a series of open-ended feedback questions.

Based upon the feedback received via the web form, which can be viewed in its entirety in Appendix B, several changes were made to the lesson. Without having the input of actual end users, the tutorial would have been less effective and not as well received. The average ratings for Likert scale questions are reproduced below: (Scale 1-5, with 1 being low, 5 high):

I better understand web accessibility 4.2
I better understand assistive technologies 4.2
I better understand the legal ramifications of creating accessible web sites 3.4
I understand and can ensure my web pages meet Section 508 standards 4.4
I better understand how to test the accessibility of my site 3.6
I am more knowledgeable about web accessibility and development methods 4.0
I would voluntarily use this tutorial in the future 3.8
I would recommend this tutorial to a fellow UCI web developer 3.4
The exercises were helpful to learning 3.6
Using a web based tutorial was effective 4.0
The training meets the standard objectives 3.6
The training was a valuable use of my time 4.2
The tutorials were well organized and of high quality 3.4
I could utilize the skills and information at my current job 3.8

Changes made to the lesson based upon the open-ended user feedback included:

- The verbiage in the tutorial was changed to reflect the appropriate year of the
accessibility legislation. The tutorial discussed California Senate Bill 105 and its impact on web accessibility without referencing the year. In the current legislative session (2007-08) Senate Bill 105 deals with taxation for domestic partners.

- Reworking of the way the tutorial quiz gives results so that the letter of the correct answer along with the verbiage of the correct answer is displayed together. As one user stated in the open-ended feedback, “There is sometimes no correlation between what the application tells us what we put as our answer, and what the correct answer is (i.e., "you answered c." "The correct answer is a bag of donuts" -- which may have been answer "c," but how can I remember that? The response SHOULD be "The correct answer is c, a bag of donuts")”

- Placed the section links in the side bar of all pages so users would not have to return to the main page of the Wiki to proceed to the next section.

- Some users had issues playing the video, so links to download and setup the video player were provided so a user could install the player.

- Addition of more accessibility testing tools such as HTML Validator extension for the FireFox browser.

- Miscellaneous typographical and formatting errors were corrected after being identified by the test group.

- Incorporate a Wiki plugin that allows UC Irvine developers to login into the Wiki via their UCInetID, a campus wide username and password. This streamlines the Wiki login process and facilitates easier discussion and negates the need for creating another username and password specifically for the Wiki.

Conclusions
Creating an online web accessibility tutorial that UCI programmers could consult for information as well as provide a place for collaborative learning and discussion was well received by the target audience. However, based on the feedback there is still more work to be done toward creating a more complete tutorial while at the same time not trying to be a repository for data that may be better handled and maintained elsewhere. One user responded, “Don't try to be everything to everyone. It's OK to link to other resources that may do a better job explaining a particular point (i.e., DOJ ruling on ADA).”

The information architecture was found to be very intuitive and the content was easy to understand and helped explain a somewhat complicated topic in a simple way. A user left the following comment in the open-ended feedback, “It is presented in a way that is easy to access and explains complicated information in a simple way.”

Users spent a more than expected amount of time on the tutorial, as most users spent an hour or more taking the tutorial and reviewing the information, and a few users asked about forwarding the tutorial onto their colleagues. One user said he would forward it onto his supervisors in an effort to educate them too, “I'll pass the link on to my supervisors who are very uninformed with these policies and concepts.”

However, some users mentioned that they would not recommend the tutorial due to spelling, grammatical and typographical errors that needed to be fixed first. Because the designer, the subject matter expert, and the developer were the same, in this case the attention to detail was not as critical as it should have been. It is likely that in a collaborative team the attention to detail and chances of catching these mistakes before Beta testing would be more likely.
After reviewing the documentation of the project, the responses of the end user Beta test, and personal reflection of the process, changes were made to improve the final product as mentioned in the findings section. Another area for improvement is the use of more videos to illustrate some of the Section 508 standards and how they can be implemented. Demonstrative videos would not only be more captivating than text, but would also benefit visual and aural learners.

Recommendations

The tutorial was well received and proved useful to the testers and the method of delivery. Allowing users to complete the tutorial at their own pace and at a time of their choosing was extremely beneficial.

One area that needs further study is the collaborative aspect of the tutorial. There was not enough time to foster a collaborative environment and it may take a period of a few weeks to a month for true collaboration to begin. The Wiki should continue to be maintained in an easy to access location so campus web developers will be able to access and foster discussion and collaborations on various web accessibility topics and problems.

There is also a need to establish a way for the Wiki to be maintained and updated so it does not become antiquated and lose its relevance. A Wiki is meant to be a collaborative environment where the users often dictate the topic of discussion and content, but there will still be a need for a moderator or group of moderators to eventually decide what content is relevant for a UCI specific accessibility Wiki. For example, one user in the open-ended feedback suggested including a section on creating accessible AJAX applications. The user even provided a link to a site the Wiki could point to or information could be culled from. However, the UCI campus does not currently employ AJAX technology and is not likely to in the near future, so the
relevance of adding content pertaining to AJAX accessibility may not be necessary or prudent since discussion on such a topic could detract from discussion and focus on another area of accessibility that may be more pressing to UCI programmers.

A rollout strategy for this tutorial to the general campus programmer population must also be considered. Should this be something that newly hired programmers be mandated to take or consult? Should programmers be required to view the tutorial every year or two years, like the campus wide sexual harassment tutorial, to ensure they are refreshed of the content and exposed to new issues and problems related to web accessibility?
References


Appendix A

Sample Screen Shots
Appendix A (continued)

Accessibility Tutorial Quiz

What is your name?

1. Identify the statement about alt-text that is true.
   - Alt-text should always be a very general description of an image
   - Alt-text should always begin with the words, “Image of…”
   - The length of alt-text may vary, however the length shouldn’t exceed 265 characters.
   - Alt-text is assigned to an image only through direct entry of HTML code

2. What alternative is the best option for an audio file on a web page?
   - Produce a PowerPoint slideshow to accompany the audio file
   - Be sure that you provide a hyperlink that lets users contact the department if they have accessibility issues.
   - Provide a text transcript of the audio file
   - No alternative is needed

3. How does a skip navigation link assist an individual using a screen reader?
   - It allows the listener to bypass lengthy listings of navigation links and start at the main content of the page
   - It allows the listener to move from link to link using a keyboard shortcut that the user must assign
   - A listener is able to hear all the links on the page extracted from the rest of the page content due to this implementation.
### SUBJECT 1

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<tr>
<td>Question #7:</td>
<td>5</td>
<td>Question #14:</td>
<td>5</td>
</tr>
</tbody>
</table>

**Question #15:**

I will pass it around to my colleagues. Will this be available later if I bookmark it or should I try to print out all the pages?

**Question #16:**

Its presented in a way that is easy to access and explains complicated information in a simple way. I'll pass the link on to my supervisors who are very uninformed with these policies and concepts. It’s sad.

**Question #17:**

508 compliance check list.
Question #18:
No response

Question #19:
AJAX info. Maybe you already had that in here. I've found some cutting edge info on AJAX and accessibility at sitepoint.com

Question #20:
60+ minutes

Question #21:
No response.
**SUBJECT 2**

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</table>

**Question #15:**

Good to have a central location for information, and examples, but it needs to be more complete.

**Question #16:**

Would recommend for the same answer given in question 15. However, I would not recommend it as it needs to be proofread for spelling, grammar and accuracy. It's a good start, but not quite ready for prime-time.

**Question #17:**

The 508 checklist - good examples.

**Question #18:**
Some facts need checking (i.e., SB 105) as they could be misleading. For example the last question on the assessment is wrong, it's neither SB 105 or SB 103 for this year – when referencing legislation, you should always reference the year of the legislative session, since the numbers are re-used every 2 years. If a piece of legislation eventually becomes law, cite the public law number (in California, this is the "chaptered" number).

**Question #19:**

Don't try to be everything to everyone. It's OK to link to other resources that may do a better job explaining a particular point (i.e., DOJ ruling on ADA). Be mindful of facts that are date/time sensitive (i.e., citing legislative bill numbers)

**Question #20:**

60+ minutes

**Question #21:**

SB 105 - this isn't accurate. That bill in the current (2007-08) legislative session deals with taxation for domestic partners. If it was in a previous legislative session, state what year, who the author is, and what the final status was. You can look up current and past legislation at http://www.leginfo.ca.gov/bilinfo.html. The video on screen readers wouldn't load after several attempts. Adapted Keyboards - how does an onscreen keyboard relate to a disability, as implied in the lead sentence to the section? It may help with accessibility (such as for a public kiosk application). The mention of a "single external button called a switch" is confusing. What is this? How is it used?
Appendix B (continued)

**SUBJECT 3**

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**Question #15:**

This provides a one stop shop I can reference for accessibility information instead of having to scour the web for resource or examples of how to implement accessibility.

**Question #16:**

Typos, grammatical and spelling errors hurt the credibility and professionalism of the content.

These items need to be addressed before it can be used as an official campus resource.

**Question #17:**

The section on how to ensure compliance for 508 standards provides easy to follow examples of how one can implement changes to ensure compliance on the web pages you manage.

**Question #18:**
Accessibility & the Law: ADA section: mention of the DOJ policy ruling requiring "effective communication" --not clear how this relates to the ADA. Is the term "effective communication" defined someplace? What is the interpreted meaning? Effective in the judgment of the average person with a disability, or for anyone? If the ruling itself is unclear, that should be pointed out.

**Question #19:**

The videos did not load when I tried to view them. The videos would definitely enhance the information presented, maybe make them downloadable or have site check the user’s browser for the appropriate plug-in and offer a way to download it if they don’t have it.

**Question #20:**

60+ minutes

**Question #21:**

You should look into integrating the UC Irvine WebAuth plugin Eric Carter has developed for the Media Wiki software. The plugin will prompt people to login using their UCInetID and automatically create accounts based on UCInetIDs. This will make using the wiki easier since users won’t have to create yet another username and login to remember.
Question #15:
I have to say I'm impressed by how simply you've managed to layout what can be a very confusing topic.

Question #16:
It provides a central location UCI programmers can reference when they have accessibility questions. The use of a Wiki to present this information is a great idea too, not only does it allow users to take ownership of the material and make it a living resource, but it also provides a forum where programmers can discuss accessibility issues they encounter and learn from each others knowledge and experiences. It could use more editing to fix typos and spelling mistakes.

Question #17:
I think all the sections work well to compliment each other and provide a broad overview of the topic. This isn’t just a how to about making web sites accessible, it explores the reasons, both legal and social for why web accessibility is necessary and provides you with easy to follow steps and tools you can utilize to check to ensure your pages are accessible.

**Question #18:**

The videos did not load for me.

**Question #19:**

Another tool to consider adding is the HTML Validator extension for Firefox ([http://users.skynet.be/mgueury/mozilla/](http://users.skynet.be/mgueury/mozilla/)) which now includes accessibility warnings as an option.

**Question #20:**

45 - 60 minutes

**Question #21:**

One suggestion I have is to make the module links available in each section. It's not obvious to go back to the main page to continue on with the rest of the information. Maybe add the links to the modules in the Navigation box on the left?
SUBJECT 5

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Question #15:

Good repository of information and the Section 508 checklist section will be a good reference point for developers when and if the UC system mandates that all sites meet Section 508 compliance. However, the shoddy editing and blatant mistakes in referencing legislation need to be addressed before I would recommend it to others.

Question #16:

I would suggest that the text be reviewed by a strong copy editor before it's finalized.

Question #17:

The 508 checklist section does a good providing an explanation of why it is necessary to implement the suggested changes and then provides good examples of how to enact the changes
on a web site. The code examples do a good job of showing us what to do instead of just telling us.

**Question #18:**

The test. Need to "practice what we preach" here -there is sometimes non correlation between what the application tells us what we put as our answer, and what the correct answer is (i.e., "you answered c" "The correct answer is a bag of donuts" -- which may have been answer "c", but how can I remember that? And how can a screen reader remember that? -- the response SHOULD be "The correct answer is c, a bag of donuts")

**Question #19:**

When running a validation program against the Wiki, it shows many warnings for these pages. It is likely due to the MediaWiki application, but it definitely hurts credibility to make a web site about accessibility and then not have it validate as accessible when some of the tools mentioned to test accessibility are used on it.

**Question #20:**

30 - 45 minutes

**Question #21:**

No response.
Appendix C

IRB Letter of Approval
MEMORANDUM

DATE: 1/23/07

NAME: Eric Kowalik

Your Proposal entitled “Web Accessibility Tutorial” has been reviewed. Since your research is producing an instructional product and not involving human participants it does not require IRB review and may commence immediately.

[Signature]
Dr. Ron Oliver, Chair
Institutional Review Board (IRB)

[Signature]
Date of Approval 1/23/07
From: Eric Kowalik  
To: Ron Oliver, Chair, IRB Committee  
    California State University, Fullerton  
CC: Dr. JoAnn Carter-Wells, Dr. Joyce Lee, MSIDT Program

The purpose of this memo is to request that my project entitled, Web Accessibility Tutorial, be given exempt status from review by the CSUF Institutional review board (IRB). I am submitting this letter on recommendation from my faculty advisors in the Masters of Instructional Design and Technology (MSIDT) program so as to expedite the IRB process.

As a student in the Masters of Instructional Design and Technology Program at CSUF I am required to submit an instructional product which demonstrates the knowledge and skills that I have acquired in the program. As you know the MSIDT program is an online Master's degree program designed for professionals working in a variety of settings including pre-K through higher education, the military, and business. The program focuses on the application of technology for teaching, learning and curriculum development used by professionals. A requirement for completion of the program is the creation and assessment of a unit of instruction that can be used to meet an instructional need.

Along with this letter I am submitting an abstract which describes my instructional product in more detail. Once this product has been developed I will need to conduct an assessment that will evaluate the products effectiveness with a specific group of learners. This assessment will also provide me with information that will help me improve the instructional
product. The assessment is qualitative in nature and as such will not be generalizable to other situations. The results of the assessment will only appear in my Master’s project. The anonymity of those participating in the assessment will be maintained at all times.

If you have any questions or concerns please do not hesitate to contact me at the following address.

Eric Kowalik
444 Stanford Court
Irvine, CA 92612
(949) 293-4414
eric_kowalik@hotmail.com

I appreciate your help with this matter, as this will greatly facilitate the completion of my final instructional project for the MSIDT program.

Sincerely,

Eric Kowalik
Project Abstract

The Internet provides instant access to a vast quantity of information; unfortunately the estimated 20 percent of the world population and 54 million people in the United States who have a disability, are unable to access this information due to badly designed and/or inaccessible web sites.

With the increase of colleges and universities that offer distance learning programs, there is a strong need to educate these web developers in the creation of accessible online content so every individual, including those with disabilities, can also take advantage of these online distance learning programs.

The Web Accessibility Tutorial will be a web site devoted to educating web developers at the University of California, Irvine about web accessibility and how to achieve it on their various web projects. In addition to the web site, there will also be a pre-test and post-test to gauge individuals knowledge of accessibility prior to taking the tutorial and the post-test would gauge what users learned after taking the tutorial and also provide the user an opportunity to offer suggestions and improvement to the product.