

Got Access?

Introduction

Federal laws mandate the nondiscriminatory inclusion of people with disabilities in education and in the workplace. Even so, with the rapid increase in the use of multimedia, today's classrooms and vocational environments are faced with a unique challenge. That challenge comes from the melding of multimedia and accessibility for people with disabilities. "In 1998, Congress amended the Rehabilitation Act of 1973 to reflect the focus on technology."¹ Section 508 of the Rehabilitation Act requires federal employees with disabilities to have access to computer systems and electronic information that is equal to the access provided to their non-disabled colleagues. Section 508 also ensures that, within the general public, people with disabilities will have barrier-free access to government information.

Section 504 of this same act "...prohibits discrimination against persons with disabilities in any Federally funded programs or activities."¹ Programs receiving Federal funds "must be accessible to people with disabilities."¹ Section 504 states that "No qualified person with a disability shall, solely by reason of his disability, be excluded from the participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving federal financial assistance."¹ Simply stated, sections 501, 504, and 508 of the Rehabilitation Act are written and designed to protect the civil rights of people with disabilities.

As a result of these and other legal mandates, accessible multimedia design is a topic of increasing interest in the area of information technology and education. Even so, the majority of professionals in the multimedia industry lack the skills necessary to successfully design engaging, accessible multimedia products.

Significance

Putting all civil rights issues aside, why is it important to include accommodations for people with disabilities in the design of multimedia products? People with disabilities comprise the second-largest minority group in the United States – second only to women. Over 54 million Americans have disabilities.⁸ Dr. Jim Caldwell, chairman of the Texas Governor's Committee on People with Disabilities provides an interesting perspective on this group. He states, "The minority group of people with disabilities differs from other minority groups in two significant ways. First, as a member of this minority group, your 'minority status' can be taken away if you are given the right tools and accommodations in the work place."¹² Stated differently, if specialized tools and accommodations allow people with disabilities to perform their job duties at the level of their non-disabled peers, then they are no longer "disabled" on the job. Dr. Caldwell goes on to say that the second way this minority group differs from other minority groups is that "anyone can join it at any time."¹² Age, injuries, and disease can cause anyone to become disabled.

Dr. Caldwell's perspective provides a strong argument for including the needs of people with disabilities in technology development and multimedia design. In addition to his perspective, there's a growing realization that educational and vocational trends are moving rapidly toward an expanded use of technology. Given this reality, it is becoming increasingly important to address

how people with disabilities will keep pace. Without equal access to media-rich information systems, people with disabilities may literally be left sitting at the cyber curb.

Discussion

If accessibility concerns are important enough to be mandated by law, why does it seem so difficult to incorporate them into multimedia design? Stephen Covey's advice to "begin with the end in mind" holds true even in the design of multimedia products. In his book, The 7 Habits of Highly Effective People, Covey states that beginning with the end in mind "is based on the principle that *all things are created twice*. There's a mental or first creation, and a physical or second creation to all things" (page 99).¹³ The concept of Instructional Design itself is based on the premise that the design should fully support the desired learning outcomes. The best place for accessibility to be considered in multimedia development, is in the beginning design phase.

Think about buildings that have been retrofitted for wheelchair access. When added as an afterthought, access modifications invariably detract from the design of a building. Yet for buildings where access is considered before the foundation is poured, accommodations for people with disabilities are able to fit naturally and seamlessly into the design, and can actually add a higher level of functionality for all people who use the building. Architects are not forced to abandon creative design and innovative engineering in order to make accommodations for people with disabilities, and the same holds true for multimedia developers. If access is not a concern at the Instructional Design level, adding it as an afterthought will detract from the functionality and design of the product. On the other hand, if access is incorporated into the Instructional Design from the very beginning, it will fit naturally into the product and will potentially enhance learning outcomes for all people who use it.

Dr. John Slatin, Director of the Institute for Technology and Learning (ITAL) at the University of Texas at Austin, refers to the inclusion of accessibility concerns in the Instructional Design process as "AccessFirst" design. He believes that, "...meeting the needs of learners with disabilities should be the starting-point for design" (page 7).⁹ As stated by Sharron Rush, Executive Director of Knowbility, a national nonprofit organization devoted to barrier free information technology, "Accessibility doesn't overwrite creativity, it just adds another enriching feature for the creative designer to incorporate. The challenge for the multimedia designer is weave accessibility into the tapestry of the design."¹⁰ As evidenced by the following quotes from their book, Maximum Accessibility, Slatin and Rush consistently stress the importance of AccessFirst design:

"...accessible design is inclusive by its nature and precludes the necessity for cumbersome alternative "accommodations" (Chapter 3: Accessibility in Law and Policy).¹¹

"Taking the needs of people with disabilities as the starting-point for design leads to aesthetically richer, more productive, and more satisfying Web experiences for *everyone*, not just for people with disabilities" (Chapter 7. User Experience: In the Museum).¹¹

“It’s important to remember, too, that what people with disabilities want—just like everyone else—isn’t just *information*: it’s a quality *experience*. (Chapter 7. User Experience: In the Museum).¹¹

Multimedia designers need not sacrifice rich media for the sake of accessibility. Both of these aspects of design are vitally important to the experience of the end user and they can both be simultaneously achieved. Even so, designing accessible multimedia requires specialized knowledge and skill. Designers must be familiar with basic terminology related to accessible multimedia and they must be familiar with common barriers to access. In their web-based training materials, *508 Universe*² provides a clear understanding of the three basic barriers to access for people with disabilities. They are as follows:

1. **Visual Barriers:** People with visual impairments may be classified as totally blind with no vision at all, or legally blind with some limited vision. People with limited vision can have a variety of visual capabilities. They may have light perception only, blurry vision, tunnel vision, or color blindness. They may also experience extreme near or far sightedness. Visual impairments can prohibit people from being able to use a mouse as a computer navigation tool. The following link provides a simulated experience of what it is like to navigate the Internet without the benefit of sight: <http://www.webaim.org/tutorials/simulations/screenreader>
2. **Auditory Barriers:** Just as people with limited vision experience a variety of visual capabilities, people with hearing impairments experience a variety of auditory capabilities. These capabilities range from total deafness to varying degrees of frequency losses. Hearing impairments can prohibit people from participating in live voice mail or online, audio chats. The following link provides a simulated experience of what it is like to have a moderate or severe hearing loss: www.neurophys.wisc.edu/animations
3. **Mobility Barriers:** Mobility impairments “... restrict voluntary movement.”² They can be caused by a variety of conditions and/or events, including genetic birth disorders, injuries, disease, and the aging process. These impairments can create barriers to accessibility that range from relatively minor to extremely restrictive.

When faced with barriers to access, people with disabilities may employ the use of assistive technology (AT) devices. Multimedia designers don’t need to become experts on all of the assistive technology devices that are available, but they should be aware of common accessibility features offered by various devices. For example, people with visual impairments may use assistive technology devices or software that allow text on the computer screen to be read aloud to them or presented to them in Braille. Multimedia designers should know that screen readers and refreshable Braille displays read the underlying code and not necessarily the text presented on the screen. If text is presented in graphic form, a screen reader will not be able to recognize it. People with visual impairments may also use software applications that allow them to enlarge the print on a computer screen and change the color combinations in order to meet their individual visual preferences. People with mobility impairments will frequently use assistive technology devices and software that allow them to use the keyboard for navigation purposes, rather than mouse. They may also use input devices that replace the standard keyboard altogether.

The National Center for Accessible Media (NCAM) states that multimedia “software should allow fonts to be adjusted, provide clear contrast for objects that students must locate and manipulate, include keyboard commands to reduce mouse dependence, and provide a system cursor that moves with important screen events so that magnifiers can track them.”¹⁴

“The key to accessible design is that it should be easy for everyone to use, including a person with a disability.”² According to *508 Universe*, design that is accessible accomplishes the following:

- It creates new opportunities for people with disabilities.
- It creates a less hostile work environment for people with disabilities.
- It often reduces fatigue and increases speed for all users.
- It broadens the audience that can be reached with the multimedia product. In fact accessible design can assist with the acquisition of language skills for people learning English as a second language and it can improve educational outcomes for people with learning disabilities.

In terms of using multimedia in web design, *508 Universe* states that, “The foundation of accessible web design is that all pages must be ‘keyboard enabled.’ If features such as navigating frames require the use of a mouse you may prevent users who can’t or don’t use a mouse from accessing that information. Since the latest innovations in wireless web access can preclude the use of a mouse, the 508 standards - and the techniques we suggest to meet compliance - are not only the law, they are also good programming techniques.”²

Frames and Style Sheets are common web design tools. Frames essentially allow the web designer to provide order and structure to a web page. The main accessibility considerations for using frames include:

1. Titling each frame with text to help people with visual impairments navigate through the site.
2. Providing an alternative format, such as a single-column display for people who are either unable to view frames or who choose not to view frames.

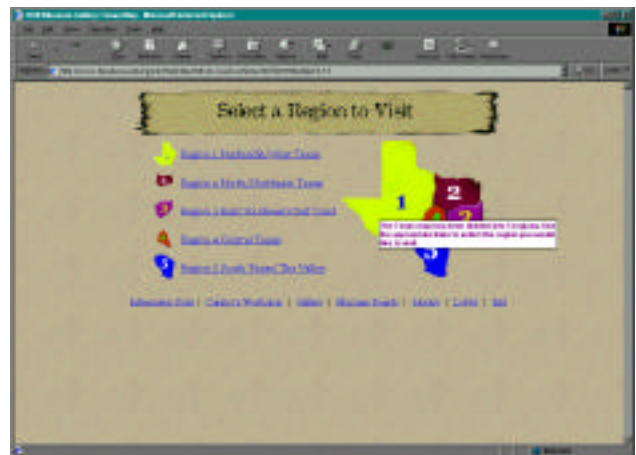
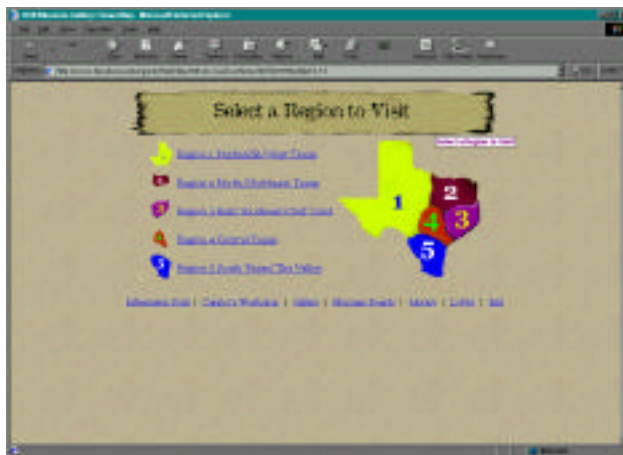
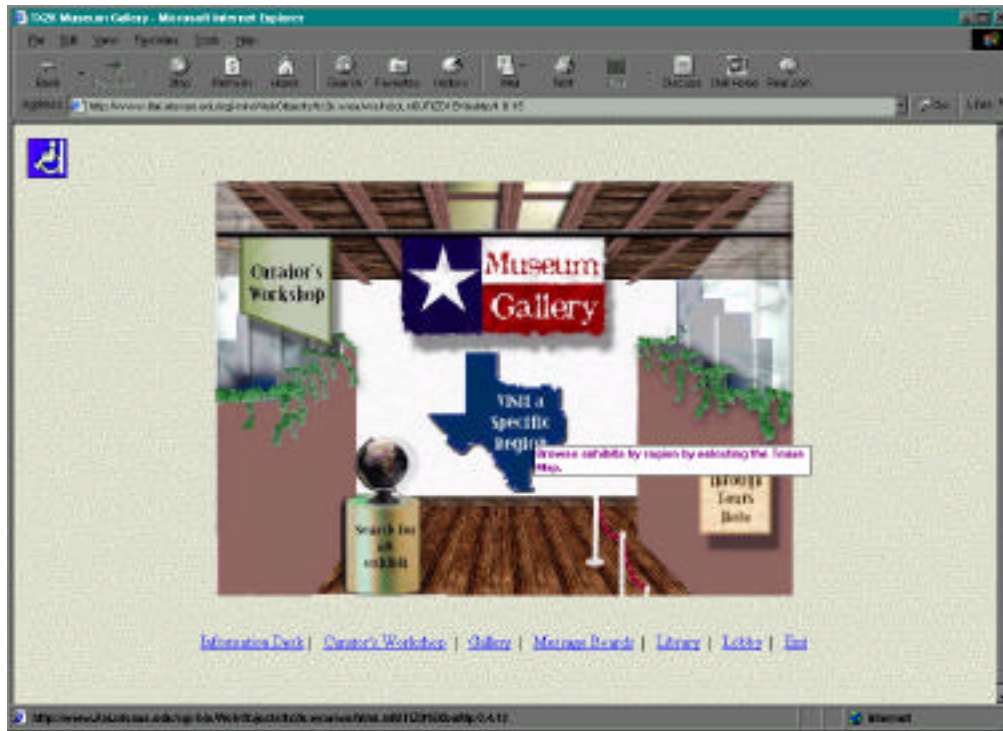
Using Style Sheets and Cascading Style Sheets (CSS) can offer more flexibility with accessible design than using frames. With Style Sheets, the web designer can:

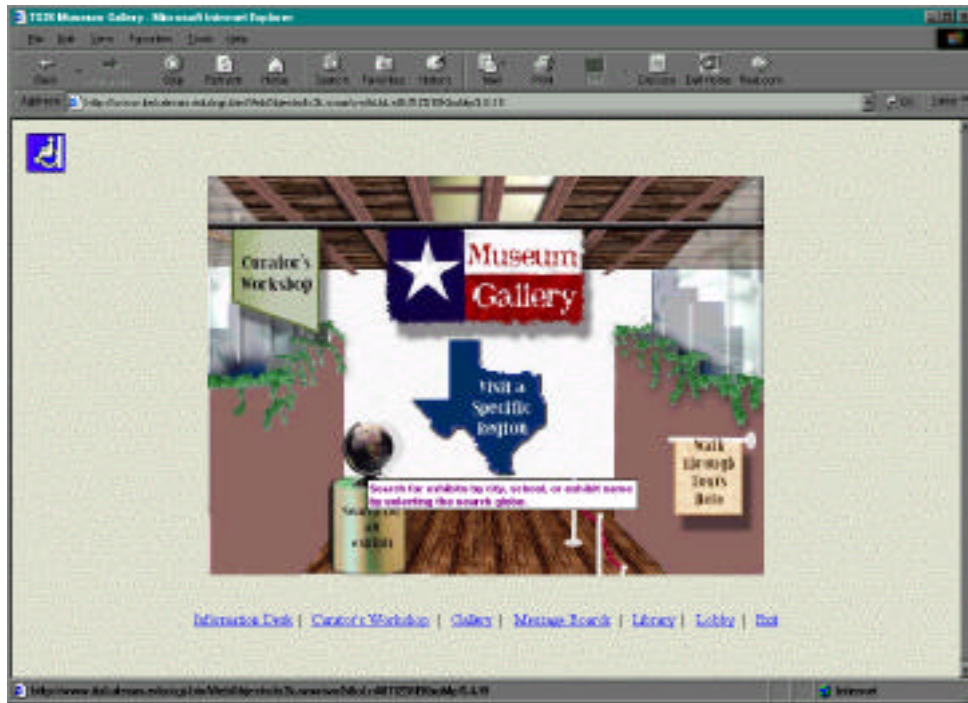
- Specify font preferences for an entire web site.³
- Create HTML documents that contain only naturally accessible content.³
- Shorten revision cycles by eliminating the need to update formatting elements.³

In addition to these benefits for the designer, users can design their own style sheet to override the designer’s sheet, thereby allowing for more flexibility on the part of the end user to meet individual needs and preferences.³

Good accessible design will begin with the end in mind and make accommodations for potential barriers to access. The following screen shots show the clean and intuitive design used by the Institute for Technology and Learning’s online multimedia project entitled, “TX2K: The Texas 2000 Living Museum. “TX2K is a year-long, interdisciplinary project designed for teachers and

students throughout Texas. Students act as curators of the living museum, researching and preparing three exhibits about their communities and publishing them on the web site.”⁹ These screen shots show the layout of one of the main screens, as well as the “Alt Tags” that are used to describe the screen’s graphic components. Alt tags are comprised of textual descriptions that appear in rectangular shaped boxes on the screen. For people with visual impairments, Alt tags are read by screen readers and refreshable Braille displays.





Alt tags are an example of providing an equivalent alternative to media elements, which is the primary directive of the Web Content Accessibility Guidelines (WCAG). The WCAG “explains how to make web content accessible to people with disabilities. The guidelines are intended for all web content developers, (page authors and site designers) and for developers of authoring tools. The primary goal of these guidelines is to promote accessibility.”¹⁵

Dr. Slatin states that “in order to support participation in and identification with the learning community, we must enable participants to recognize, understand, and remember how the site is organized. It’s critical, therefore, to:

- Devise a clear, consistent navigation scheme (WCAG #13)
- Provide contextual and orientation information (WCAG #12); and
- Provide an “equivalent alternative” for any visual or auditory material (WCAG #1).

Meeting these requirements also has the advantage of making the site easier to learn and use, and faster to navigate as well” (page 8).⁹ Accessible multimedia design incorporates the elements of sound Instructional Design from the very beginning.

Becoming a successful multimedia designer requires a broad range of knowledge and skills. There are many venues through which a designer can learn basic authoring tools, but learning to incorporate accessibility into the design process has the potential to dramatically increase a designer’s marketability. For whatever reason, in spite of the legal requirements, developers are paying little attention to the issues of accessible design. As evidenced by the overwhelming number of inaccessible web sites and inaccessible multimedia products, very few businesses and development companies have grasped the importance of this concept.

The National Center for Accessible Media (NCAM) provides information resources on authoring tools for a variety of platforms. A few authoring packages and development companies are beginning to see the importance of accessible design. We are seeing evidence of this through their development of accessibility resources and products. The following list of resources, categorized by “Development Platforms,” are quoted directly from NCAM’s article entitled, “Making Educational Software Accessible”¹⁴:

Windows OS Development Platform

- Microsoft Accessibility Home Page www.microsoft.com/enable
- Microsoft Active Accessibility: Introduction www.microsoft.com/enable/msaa
- Microsoft Windows Guidelines for Accessible Software Design www.microsoft.com/enable/dev/guidelines/software.htm

Mac OS Development Platform

- Third-party disability products for the Macintosh. www.apple.com/education/k12/disability
- Macintosh Human Interface Guidelines Accessibility information is sprinkled throughout this document. developer.apple.com/techpubs/mac/HIGuidelines/HIGuidelines-2.html#avail1-0
- Universal Access in: Macintosh Human Interface Guidelines developer.apple.com/techpubs/mac/HIGuidelines/HIGuidelines-40.html#MARKER-9-55
- The Human Interface Design Principles in: Macintosh Human Interface Guidelines Key accessibility information is included in this section. developer.apple.com/techpubs/mac/HIGuidelines/HIGuidelines-16.html#HEADING16-0
- Alva Access Group: The home page for Alva Access Group, developers of the outSPOKEN screen reader and inLARGE, a screen magnifier. Programmers should

download Alva's time-based demos of their products for testing purposes.
www.aagi.com

Java Development Platform

- Guidelines for Writing Accessible Applications using 100% Pure Java <http://www-3.ibm.com/able/snsjavag.html>
- Sun Microsystems' Accessibility Program www.sun.com/access
- The Java Access Bridge www.java.sun.com/products/accessbridge
- Sun Microsystems' Accessibility Program - Developer Information www.sun.com/access/developers

Macromedia Development Platform

- Macromedia Director is a commonly used authoring tool for educational software, but it has significant limitations for accessible design. No comprehensive guidelines are available for creating accessible software in Director.
- Applications created with Director are not compatible with assistive technologies. For example, text drawn to the screen may be read by a screen reader, but no information about the object containing the text is communicated. This means a blind user might hear the words on a button but not realize that it is a button.
- Director does not by default support using the keyboard to interact with on-screen controls.
- If an application has a series of buttons displayed, the developer must add code to permit use of the tab key to move the focus from item to item and to have the enter key or spacebar trigger activation of the button.
- A Director Xtra (a programmer's tool which expands the functionality of Director) adds text-to-speech to Director applications. In some cases, a product can be designed to include default features for low-vision users, such as a choice of font size or high contrast colors
- For information on Xtras and on implementing keyboard access, consult Electronic Ink at www.printomatic.com/products.cfm for the Yak Xtra for text-to-speech.

Summary

Multimedia design can simultaneously incorporate media rich experiences and accessibility for people with disabilities. Designers do not have to sacrifice creativity for accessibility. As authoring tools become more sophisticated and legal requirements continue to increase,

designers and product developers will be influenced to exercise “AccessFirst” design concepts if they expect to compete in the digital economy. In the interim, the responsibility to advance accessible design rests largely on the shoulders of educators – particularly those educators working in organizations that receive Federal funds. Federally funded educational institutions are bound by the legal mandates outlined in the 1998 revision to the Rehabilitation Act of 1973. If educators will adhere to high standards of accessible design in product procurement and development, they can become active change agents in helping industry understand and adopt AccessFirst design. Also, as the primary provider of education and training for tomorrow’s technology workforce, educational institutions could dramatically influence accessible design by incorporating its concepts into their standard courses. As Dr. Caldwell said, anyone, at any time, can join the minority group of people with disabilities. Therefore, it is ultimately in the best interest of everyone to ensure that people with disabilities are not disenfranchised by inaccessible media.

References and Related Links

1. 508 Universe, Designing Accessible Web Sites. Lesson: It's the Law! [On-line]. Available: <http://todl.anteon.com/508/asp/Lessons.asp?courseID=AW>
2. 508 Universe, Designing Accessible Web Sites. Lesson: Disabilities and Accessibility [On-line]. Available: <http://todl.anteon.com/508/asp/Lessons.asp?courseID=AW>
3. 508 Universe, Designing Accessible Web Sites. Lesson: Frames and Style Sheets [On-line]. Available: <http://todl.anteon.com/508/asp/Lessons.asp?courseID=AW>
4. 508 Universe, Designing Accessible Web Sites. Lesson: Alternatives for Multimedia [On-line]. Available: <http://todl.anteon.com/508/asp/Lessons.asp?courseID=AW>
5. 508 Universe, Resources [On-line]. Available: <http://todl.anteon.com/508/asp/resourceLinks.asp>
6. 508 Universe, Glossary [On-line]. Available: <http://todl.anteon.com/508/asp/glossary.asp>
7. Federal Information Technology Accessibility Initiative [On-line]. Available: <http://www.section508.gov/index.html>
8. Waddell, Cynthia D., J.D. (1999). The Growing Digital Divide In Access For People With Disabilities: Overcoming Barriers To Participation [On-line]. Available: <http://www.aasa.dshs.wa.gov/access/waddell.htm>
9. Slatin, John M. (2001). The Art of ALT: Toward a More Accessible Web. Computers and Composition: An International Journal for Teachers of Writing (18.1 and 2), March-June 2001.
10. Rush, Sharron (2001). Interview conducted October 12, 2001.
11. Slatin, John M., Rush, Sharron (2002). Maximum Accessibility, Addison Wesley, January 2002.
12. Caldwell, Jim, Ph.D. (2001). Interview conducted August 31, 2001.
13. Covey, Stephen R. (1990). The 7 Habits of Highly Effective People, Simon & Schuster.
14. National Center on Accessible Media (NCAM). Making Educational Software Accessible [On-Line]. Available: <http://ncam.wgbh.org/cdrom/guideline/benefits.html>
15. Web Content Accessibility Guidelines (WCAG) [On-Line]. Available: <http://www.w3.org/TR/WAI-WEBCONTENT/>
16. World Wide Web Consortium (W3C) [On-Line]. Available: <http://www.w3.org/>

17. National Center on Accessible Media (NCAM). Media Access Generator (MAGpie) [On-Line]. Available: <http://ncam.wgbh.org/webaccess/magpie/>
18. World Wide Web Consortium (W3C). Synchronized Multimedia [On-Line]. Available: <http://www.w3.org/AudioVideo/>
19. Microsoft: Accessibility Technology for Everyone. Empowering People Through Great Software [On-Line]. Available: <http://www.microsoft.com/enable/>
20. Apple. Quicktime [On-Line]. Available: <http://developer.apple.com/quicktime/>
21. Apple Internet Developer. Accessibility and Section 508 [On-Line]. Available: <http://developer.apple.com/internet/html/access.html>
22. World Wide Web Consortium (W3C). Web Accessibility Initiative (WAI) [On-Line]. Available: <http://www.w3.org/WAI/>
23. NCAM News. MACROMEDIA AND NCAM PARTNER TO CREATE ACCESSIBLE WEB AUTHORING SOLUTIONS [On-Line]. Available: <http://ncam.wgbh.org/bp/news/webnews17.html>
24. WebAble: Making the Internet and the World Wide Web Accessible to People with Disabilities. Course offerings [On-Line]. Available: <http://www.webable.com/>
25. UsableNet, Website Testing Solutions [On-Line]. Available: <http://www.usablenet.com/>

This paper was written by Jan McSorley
for the course EDC385G Multimedia Authoring
at the University of Texas - Austin