Web Accessibility

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INTRODUCTION

The development of the Internet has changed a purely text-based environment with relatively simple presentation features to one driven by graphics and multimedia (including complex scripting). This development has presented many difficulties for those computer users with disabilities ranging from congenital causes, aging, or injury. Web accessibility is related to usability, or the design of Web pages that can be used by as many computer users as possible, and Web accessibility refers to designing a Web page "so that more people can use...[a] web site effectively in more situations" (Thatcher et al., 2002, p. 13). "... The objective is to make the world directly usable by as many people (with and without disabilities) as possible." (Vanderheiden, 2003).

Web accessibility is an issue that affects computer users everywhere and is the degree to which a given Web site is accessible by all users. Tim Berners-Lee, inventor of the World Wide Web stated: "The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect" (W3C WAI - http://www.w3.org/WAI/). In regard to Web accessibility, Norman Coombs (2002) described a different meaning to the term "digital divide" (p. 1): rather than having one's access to information on the Internet limited by poverty, a computer user facing access barriers created by inaccessibility is similarly limited in his/her access to the information on the Internet. In the United States, the 1998 Section 508 amendment to the 1973 Rehabilitation Act mandated that Federal agencies "make their electronic and information technology accessible to people with disabilities" (Section 508, 2006). The Architectural and Transportation Barriers Compliance Board (Access Board) published the Section 508 standards for compliance (Wright State University, 2005). The Web Accessibility Initiative (WAI) was formed by the World Wide Web Consortium (W3C) to address accessibility concerns. In 1997, the WAI further developed the Web Content Accessibility Guidelines (WCAG) that are based on the Section 508 Standards.

These Guidelines address Web accessibility in the use of a wide variety of Web related technologies. The WAI provides resources regarding software, browsers, user agents, training, and validation of compliance with the standards. The WCAG 1.0 presented the following techniques of Web accessible design (W3C-WCAG 1.0 -http://www.w3.org/TR/WCAG10/):

Provide appropriate alternative text...; provide headings for data tables...; ensure users can complete and submit all forms...; ensure links make sense out of context...; caption and/or provide transcripts for media...; ensure accessibility of non-HTML content, including PDF files, Microsoft Word documents, PowerPoint presentations and Adobe Flash content...; allow users to skip repetitive elements on the page...; do not rely on color alone to convey meaning...; make sure content is clearly written and easy to read...; make JavaScript accessible...; design to standards....(from WebAIM (2008), "Principles of accessible design")

The second version, WCAG 2.0 (still in development), uses a four-principle approach in presenting guidelines (W3C-WCAG2.0 - http://www.w3.org/TR/WCAG20/):

- Perceivable: Available to the senses (vision and hearing primarily) either through the browser or through assistive technologies (e.g. screen readers, screen enlargers, etc.)
- Operable: Users can interact with all controls and interactive elements using either the mouse, keyboard, or an assistive device.
- Understandable: Content is clear and limits confusion and ambiguity.
- Robust: A wide range of technologies (including old and new user agents and assistive technologies) can access the content (from WebAim, "Focusing on Web Accessibility")

Studies of Web site accessibility (following the 508 Standards and W3C Guidelines) have shown that

a minority of U. S. state department of education and special education home pages are accessible (Opitz, Savenye, and Rowland (2003). Burgstahler, Corrigan and McCarter (2004) studied efforts to "improve the accessibility of [University] distance learning courses," describing considerations for planning accessibility efforts. Issues of Web accessibility are concerns for designers of Web pages worldwide, as well as for instructional designers and educators using the Internet to deliver learning (anytime, anywhere). These issues include motivational considerations (Why should a designer consider Web accessibility?) as well as the refinement of the standards and guidelines of presentation that various entities have developed to address Web accessibility.

BACKGROUND

Computer users with disabilities can encounter barriers to accessing the information on a Web page (Thatcher et al., 2002, p. 17). Inaccessible Web pages affect computer users with all types of disabilities (including aging individuals with developing impairments in cognition, hearing, physical abilities and vision). A Web page that is poorly organized, or that contains instructions that are poorly written or unnecessarily wordy, will hinder comprehension for the computer user with a learning disability. The contents of an audio file without a transcript are inaccessible to the deaf computer user. Overly busy elements of a Web page, such as flashing text, can cause seizures in some users with epilepsy. A Web page containing features that are mouse-dependent is inaccessible to the computer user without the use of hands to manipulate a computer mouse. A certain color combination on a Web page will present problems for the computer user who is color-blind. Unlabeled graphics on a Web page will be ignored by the screen reader (such as JAWS) on which the blind computer user is relying to access the Web page content. Font that cannot be manipulated by the user, or Web pages with too much text, will frustrate the user with low-vision or dyslexia. A variety of assistive technology has been developed to aid such users, and Web page code that is incompatible with certain types of assistive technology presents accessibility problems.

Accessible Web pages include design features in content as well as layout. Such features are compatible with assistive technology. The asynchronous nature of online learning can help the computer user who is easily distracted by conventional classroom situations. An accessible Web page will benefit computer users with learning disabilities, as effective design of online materials includes the presentation of content in short, manageable chunks of material that appeal to learners who learn best with individual tasks such as those with learning disabilities. Audio files can be accompanied by transcripts of the content for the deaf computer user. Color combinations have been researched and documented to appeal to users with color-blindness. Flashing or overly busy elements can be easily eliminated from Web design, or allowances can be made for user-control of these features. Keyboard accessibility (rather than the mouse-dependent element) is easily designed into a Web page, enabling the computer user with a mobility disability to access the content through assistive technology such as voice-activated software. Web page design code can include "alt" tags - alternative text that describes the content of a graphic for the blind user. These tags are interpreted by screen readers that read only text. Web page design can use Cascading Style Sheets (CSS) that enable user-manipulation of font size. The computer user applies his/her own style sheet in manipulating the presentation of the Web page. The use of audio books benefits students with visual disabilities and dyslexia (Weir, 2005, p. 1).

IMPLICATIONS FOR DESIGNING WEB PAGES WITH ACCESSIBILITY IN MIND

Approximately 20% of the world's population has a disability - cognitive, hearing, mobility or vision (Goggin and Newell, 2003). "The disabled population [in the United States] is ... the largest minority group, ... approximately 54 million." (Golledge, 2005). Distance learning is becoming more common, as educators strive to harness the potential of the online environment to increase learning. Thus, the implications of Web accessibility affect all users, both learners and teachers. Schopp, Hales, Brown, and Quetsch (2003) wrote that of the two percent of persons with disabilities that use the Internet, 60% reported having received little help with Internet access).The development of learning and teaching materials includes the training of both learners and teachers to be aware of and to use methods and devices that enable Web accessibility. The Web designer should be trained in the writing

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