

Online Course Accessibility: A Call for Responsibility and Necessity

*Christine Opitz
Arizona State University
Tempe, AZ 85281
opitz@asu.edu*

Samantha is faced with the task of writing a 10-page research paper for her online political science class. She must cite at least 10 resources and is encouraged to use the Internet to obtain the information. Since Samantha is a distance student, the only means she has of contacting other students within the class—or her instructor for assistance—is by e-mail or phone. One would think this a common task to fulfill within a distance education setting, one in which a web-based class is offered online for those students who cannot attend class during the day or who reside in other geographic locations and want to progress their education. However, Samantha's situation is different in that she is also blind. Although she has a computer equipped with a screenreader, the content delivered by the Internet learning module may be inaccessible or incompatible with the screenreader so that it cannot read the presented material.

Has technology become so advanced that we have forgotten to make the latest trend in distance education accessible to persons with disabilities? Has the educational community simply focused on promoting classes in a distance setting for those learners without disabilities in order to capitalize on the financial success and prestige of the event? Educational personnel must be educated about web accessibility issues and how they pertain to distance learners, and what implications can be recommended for make online education more accessible to all. This article presents historical, current and

plausible future proposals for promoting equal access of educational content via the Web. As individuals with disabilities continue to promote and advocate web resources, equalization of an accessible playing field is a critical component in an online learning environment.

Increasing Population of Learners with Disabilities

Samantha is not alone in her ambitions to take advantage of online learning, nor is she the only one taking classes via the Internet who has a disability that incurs difficulty in obtaining the presented material. Approximately 20 percent of the U.S. population has some kind of disability, with one in 10 having a severe disability (US Census Bureau, 1997). In postsecondary education, the percent of full-time, freshmen that have disabilities has increased dramatically since the 1970s. In 1988, 16 percent of all college freshmen reported having some type of disability, and by 2000, the percentage rose to 40 percent (Henderson, 2001). This presents itself as a serious concern for making education available to this population, especially since the percentage is increasing.

Legal Mandates: Americans with Disabilities Act

To understand this issue in its entirety, it is essential to become familiar with what has been legally mandated for learning institutions to provide all students with equal access to education, and how this has reflected in today's educational environment. Established in 1990, the American Disabilities Act, ADA, was designed give equal access to people with disabilities (Department of Justice, 1994). It was created to remove barriers that prevent all individuals with disabilities from accessing opportunities that are available to people who are not disabled. The ADA was also established to provide legal resources to those who have experienced discrimination on the basis of disability. Every

employer and labor organization—educational institutions included—is required to post information in accessible format to applicants, employees and members describing the applicable provisions of the ADA. The mandate was also created to ensure that the federal government played a central role in enforcing these standards by providing the authority to regulate commerce addressing the issues concerned with discrimination issues encountered by people with disabilities, which prompted the "Tech Act" and Section 508 of the Rehabilitation Act.

Technology-Related Assistance for Individuals with Disabilities Act

In the United States, the Technology-Related Assistance for Individuals with Disabilities Act (PL 100-407)—otherwise referred to as the Tech Act—was established in 1988, eventually evolving into the Assistive Technology Act in 1998. It was designed to provide funding to develop statewide information and training programs designed to meet the assistive technology needs of individuals with disabilities (Architectural and Transportation Barriers Compliance Board, 2000). The Department of Education interprets the Assistive Technology Act (AT Act) as requiring states receiving assistance under the AT Act State Grant program to comply with Section 508 of the Rehabilitation Act. In 1998, the Workforce Investment Act was invoked to include an updated edition of Section 508 of the Rehabilitation Act of 1973. The standards promoted by the revised version of Section 508 imposed stringent requirements on federal agencies to promote access to electronic information and technology to all persons with disabilities. Federal organizations were targeted as a platform to raise the awareness about the many disabled, long-time employees in the workforce. Responsible accommodations for implementation in accordance with Section 508 include hardware, software and Internet/Intranet usage

that may require adaptive components to be available for those with multiple disabilities. Also included are web designs that would offer unlimited access either as stand-alone components or connective appliances.

Assistive Devices for Learners with Special Needs

It is an educational institution's responsibility to provide auxiliary aids and services in a timely manner for students with disabilities. The purpose of assistive technologies is to equalize the opportunity for a student with a disability to participate in a program or activity. Assistive technologies specifically designed for those persons requiring additional help in performing tasks on the Web have also enabled learners with disabilities to adapt to difficult navigation and information retrieval situations. Some examples of the various types additional aids and assistive technologies may include:

- taped texts
- note takers
- interpreters
- screen readers
- video text displays
- television enlargers
- talking calculators
- electronic readers
- Braille calculators, printers or typewriters
- telephone handset amplifiers
- closed-caption decoders
- open and closed captioning
- voice synthesizers

Assistive technologies often have unforeseen benefits for those without disabilities. For instance, voice recognition software allows persons with motor disabilities to access computers, but also permits non-disabled persons with carpal tunnel syndrome limited keyboard usage. Screen readers give blind persons access to the Internet, but also help children read and write by mimicking the sounds of words.

Providing accessible information targets the needs of all users rather than forcing them to conform to advancing technology's limitations. The question of whether educational communities need a federal mandate to make education available to those who require special assistance has spurred particular interest. Equal access to education is mandated to serve not only for those with disabilities, but for an aging society as well. Assistive technologies such as magnification devices, alternative keyboards and web pages created using a broader screen width and larger fonts will be tremendous assets not only for individuals with disabilities, but also for aging learners who may incur disabilities later in life.

Although laws and mandates concerning individuals with disabilities have been enacted, accessibility concerning the Web only recently became a concern in online learning environments. Today, there are more than 168 million people in the United States—60 percent of the total American population—who use the Internet, 10 percent of whom have disabilities and who may be using the Internet to fulfill postsecondary education requirements for obtaining and researching information through online resources (Nua, 2001).

Distance Education and the Internet

Distance education has welcomed web-based, online courses. The “sage on the stage” concept has been replaced with the “guide on the side,” in which instruction has shifted from an instructor-facilitated interaction, to more complex interactions. Learning is paced by the student's ability and capacity to acquire material. Moore and Kearsley (1996) detail learner-content, learner-instructor, and learner-learner interactions as the essential types of interactions that distance teachers must foster. This is especially so

within online learning environments. An asynchronous, collaborative environment is typically established when the learner can communicate with the content, instructor and other learners within the class. Experts available asynchronously are able to discuss issues and interpretations, provide an opportunity for the distance learners that the traditional students would not have, and are able to bring about a higher level of understanding and analysis (Holland, 2000).

Some have expressed the concern that students taking online courses are not getting the education they pay for. In response to this criticism, higher education organizations such as the Western Cooperative for Education Telecommunications' "Principles of Good Practice for Electronically Offered Academic Degree and Certificate Programs" have been endorsed by many higher education entities within the U.S. and the regional accrediting communities (Western Cooperative for Educational Telecommunications [WCET], 1999). The accepted definition of quality education, according to WCET, ensures that any program of study reflects appropriate learning outcomes for the degree, instructed by qualified faculty. It mandates that all electronic degree or certificate programs are lucid, and that each program accounts for the amount of real and delayed time incurred for both faculty and students. As the standards for accountable curricula become clearer, technology can maximize the benefits of the distance-learning domain. The Internet promotes effective communication, availability of resources 24 hours a day and unlimited use, which students can utilize in a successful manner for them. Learners are able to work at their own pace, at any given time, and locate themselves in an environment that is flexible and conducive to their learning style and employment setting.

Career Integration

Online education also supports flexible scheduling to accommodate career needs. Jobs now require employees to use the Internet and mention computer skills to survive and climb the ladder to financial success (Denning, 1997). As non-traditional students are usually more dedicated to both family and career, they are the most in need of a flexible, convenient learning environment such as that fostered by distance learning. As technology continues to transform the global economy into a more knowledge-based economy, the role of higher education plays a vital role in developing the economic potential of employees and employers all over the world. Web-delivered courses enable learners to interact more with the Internet to obtain resources and practice their Internet skills, which can be invaluable tools both in the educational and corporate realm (Simonson, Smaldino, Albright, & Zvacek, 2000).

Essential Components of a Web-based Course

The essential components of a web-based course determine the degree of the learners' success in understanding, communicating and synthesizing the content that is presented. Klass (2001) compares Plato's publication of Socrates' Dialogues to that of the interaction of online education—interactive, dynamic dialogue amongst seekers of knowledge. Mediocrity is apparent if the user is restricted to simply memorizing the information for short-term recall instead of utilizing the material presented in a class to further educate oneself and apply it to a realistic setting. Yet, more technology does not, by itself, make education more efficient (Janicki & Liegle, 2001). A key element in creating a web-based course is to engage students in active learning experiences. Active learning strategies are needed to motivate students to participate in course activities. A

virtual community provides support and encouragement; emphasis on sharing among the learners enrolled helps to overcome inherent and literal isolation. Another successful component is setting guidelines for student accountability. As the instructor is not present in a face-to-face format to monitor and evaluate progress, methods must be in place within the class format to establish accountability for the learner. Communication is critical for students to understand the content and expectations of the class, which reinforces the necessity for clarity of course guidelines. Finally, distance education enables dynamic changes to take place in instructor roles from providers of content to designers of learning. The teacher evolves from strictly controlling the teaching environment to sharing and experiencing the learning environment with the students as fellow learners. Within this environment, learners not only process information, but also take active roles in creating meaning and understanding.

Learning Advantages

Online courses also provide students with the benefits of viewing topics from multiple perspectives. The online format permits learners to have the independence of managing their own time and learning processes, allowing them to become complex problem-solvers instead of passive students who memorize factual data to pass assessments targeting static concepts (Collins & Berge, 1996). For students who are isolated due to financial, demographic or disabling limitations, the online course becomes a lifeline to the outer world. It is a doorway enabling them to interact and learn with experts in the field and other students who may be in the same predicament. Activities such as virtual chats, discussion forums and collaborative projects require learner participation and evoke communication of information throughout the class. Procedures

for submitting assignments and assessing learning are also crucial components that make a course easy to conduct in a distance setting. Online help or technical assistance can help aid the student in difficult endeavors, and the instructor can also clarify these procedures within the course syllabus.

As more and more people utilize e-mail to communicate, it can also be a useful tool in eliciting feedback from the instructor and other learners (Heinich, Molenda, Russell, & Smaldino, 1999). Documented feedback can be provided by the instructor using e-mail, relative to a specific document to notify the learner of suggested improvements within the assignment. Personal attention achieved from e-mailed feedback or online responses is critically important in that it reaffirms that the students are important, what they do does matter and that they are able to perform a task well enough to receive feedback and praise (Kilian, 1997). Learners also make use of e-mail correspondence in collaborating with other students in designing and completing group assignments. Listservs and user groups also use e-mail to promote understanding and share information postings for a large community of users. Previously, distance learning may have been conceived to be prepackaged text, audio, and video courses taken by learners who received mailed or phoned feedback from the instructor, when in fact distance learning far surpasses the interactivity of the traditional classroom. Distance learning can allow student interaction with other students, other faculty and area experts from around the world, and resources like books, journals and other dynamic electronic resources. Yet, to avail these types of resources to students, the Internet needs to be accessible to all learners.

Web Accessibility and the Distance Learner

Before the 1980s, computers were fairly easy to use and existed as a piece of equipment that presented material on a global scale. As technology offered more innovative design and differing methods of presentation, changes made it easier for those without disabilities to use the Web, yet created barriers for those with persons with disabilities. Such features as point-and-click, mouseover events that change images, and animated graphics that deliver sound have made navigating through the Web a series of obstacles in a landmine of information for the user with disabilities. Web-based courses incorporating these features may limit the progress of distance learners with disabilities and further segregate them from utilizing the innovations produced by technology and education.

A divide exists between learners who do and do not have access to the Internet for means of education (Rowland, 1999). The intent of postsecondary education is to assist in preparing students to become participating and active members of the workforce and society. Although the Internet has the ability to provide even greater independence for individuals with disabilities, it can often exclude the audience that can benefit the most. Students use the Web as a fundamental tool to gather course information, conduct research, submit assignments and participate in collaborative interaction with other students. Inaccessibility restricts the educational experience provided for non-disabled learners and inhibits their success in learning how to efficiently gather information via the Web. Most of the access problems incurred in web courses can be alleviated or remedied by support from technical staff or instructor assistance. However, one aspect that does segregate those who can use the Web to obtain instruction from those that are at

a severe disadvantage when it comes to navigation and information retrieval are those persons with disabilities, who may find a website and its corresponding pages inaccessible to the assistive technologies that they require to operate the Internet. This concern has become more pronounced as the increased use of the Web has led to innovative technologies aimed at those without disabilities, which have created a minefield of obstacles for those with handicapping conditions. The web pages, essential for effective presentation and communication of the course content, are the very components of distance learning that restrict those persons with disabilities in performing any or all of the tasks required of them in an online course. Web accessibility has not only been targeted as a limitation of distance learning but has limited overall web usage by all that use the Internet. Educational institutions are required by law to provide reasonable accommodations and ensure equal access for educational opportunities to students with disabilities. Various governmental agencies and non-profit organizations have made web accessibility their primary target in their plight to provide equality of web access.

Ramifications for Online Courses

The General Services Administration Center for Information Technology Accommodation, CITA, and the Federal Access Board have provided assistance to federal agencies in making their hardware, software and web resources accessible for persons with disabilities. Various organizations like the Federal Information Technology Accessibility Initiative and the World Wide Web Consortium (W3C) have launched awareness campaigns to educate the general public about web accessibility. WebAim and other associations have offered classes, often free of charge, to web developers, educators

and employers about the benefits of designing web pages that are accessible (Access Board, 2000). The W3C has also implemented the Web Accessibility Initiative (WAI) to assist various users and developers for creating accessible websites by publishing a listing of recommended guidelines specifically pertaining to user agents that present the Web (Chisholm, White, & Vanderheiden, 2001). Although these guidelines were constructed for web developers of governmental sites, they can be synthesized and applied to presentation format useful for instructors to follow in creating their web-based content.

Validation Practices

Validation tools developed by the W3C, CAST, and The Special Needs Opportunities Windows, or SNOW Initiative, have also aided developers in checking their markup language for accessible compliance (Chisholm et. al, 2001; Rose, 2000; Harrison, 2000). These tools, also free to download from the Internet, scan the web page or website for components that could make a page inaccessible for persons with multiple disabilities. Problems such as not providing alternative text tags that describe images for a screenreader to read for persons with visual disabilities, and audio files not containing captioning, are targeted by these validation tools. The tool typically specifies a line number within the programming code for the developer to remedy, after which the validation exercise can again be executed to ensure compliance with accessibility guidelines.

BOBBY is a validation tool that checks a site's webpages for accessibility for persons with disabilities. It rates a page as 'approved' or 'not approved' based on accessibility and browser compatibility. In a study conducted by Flowers, Bray, and Algozzine (1999), 73 percent of the 89 special education home pages from national

universities with special education departments had accessibility problems. Seventy-one percent of these errors severely restricted access for individuals with disabilities. Further studies conducted by the National Center for the Dissemination of Disability Research (1998), an organization dedicated to the promotion of content for persons with disabilities, indicate that 43 percent of its grantees had front pages that receive BOBBY approval. Schmetzke (2000) reported similar in a study conducted on web pages from 24 departments at the University of Wisconsin. Findings revealed that 59 percent of the library pages and 50 percent of general campus pages were BOBBY approved, that is, only half of the resources available to those with disabilities. Although BOBBY reports conservative ratings, and is not infallible, it is a common tool used globally to measure the accessibility of a website (Rowland & Smith, 1999).

The Center for Applied Special Technology, CAST, has also launched groundbreaking efforts in promoting what is referred to as Universal Design strategies for presenting content via the Web (Rose, 2000). These efforts target not only elemental design layout of a website, but also emphasize versatility and flexibility of content and presentation for individuals with specific learning needs. The fundamental methods of Universal Design are achieved by promoting the idea that students with disabilities fall along a continuum of learner differences rather than constituting a separate category. To accommodate for this continuum, the instructor is to make adjustments for learner differences, not only for those with disabilities, but also for all learners. In this manner, curriculum materials are varied, diverse and flexible to accommodate the many learner differences. Considering all that has been facilitated on the implementation of distance

education and granting access for person with disabilities, what can be done to alleviate the limitations caused by inaccessible design features of online learning?

Design Implications for Post Secondary Institutions

Today, at least two-thirds of America's four-year degree institutions offer online courses (McMurray & Dunlop, 1999). The Internet offers lifelong learning; web-based education can be disseminated to individuals who could not previously consider a college education due to demographic, time and career-related circumstances. Learning institutions that do not capitalize on the use of the Internet to offer educational opportunities are often viewed as provincial and lacking in innovation. Stakeholders within the distance setting are the students, faculty, web developers and administrators. Within the next decade, two million teachers will be hired due to increasing student enrollments and an aging teaching force (Wright & Custer, 1998). As postsecondary education institutions are offering more online courses to meet the needs of a fast-paced, computer literate society, more instructors are being faced with designing online materials to either supplement or represent their traditional classes. Cooper (2000) offers several ways for instructors to increase interaction among their students, increase their students' opportunities for learning and improve the learners' satisfaction with the class. Offering an initial class meeting, promoting online communication through e-mail and discussion forums, and promoting diverse instructional materials are some of the key elements she emphasizes as essentials in online classes. Because students have different learning styles and abilities, and respond in different manners to activities offered, it is useful to offer instruction in a variety of formats to appeal to the entire learning audience.

In this way, the chances of reaching each and every student are increased, as well as the chances for learning.

As Kilian (1997) states, “Technology should offer them (learners) choices, not requirements” (p. 34). Findings from the recent Harris Poll indicate that people with disabilities spend twice as much time on the Internet as people without disabilities (Taylor, 2000). Ignoring accessibility issues can cause many businesses to miss out on the financial and legal advantages of creating pages that appeal to the largest audience: both those with and without disabilities. Granting equal access also allows persons with older technologies as much access to the Internet as those with cutting-edge devices. Sites can be incompatible with specific browsers or older versions of the browsers in question. Although hardware and software adaptations have been implemented, a learner with a disability cannot access the material due to the site’s design.

Accessible Design Strategies

For all learners to fully utilize the Internet and web-based materials, a web site will need to grant equal access to all its users. Although students may have preferred learning styles and needs that require adaptations, utilizing a range of processes will appeal and apply to more students than a single process that may exclude a large population of learners. Students typically prefer clear, precise, focused curriculum so that they can learn quickly within the constraints of their lifestyles and career schedules. Design strategies employing the Active, Collaborative, Customized, Excellent quality and Lifestyle-fitted techniques are summarized in the ACCEL model (Boettcher & Fell, 1997). This model, implemented to build on learning principles and characteristics, was designed to be facilitated in an assistive environment in which the instructor builds a

mentoring relationship within a learning community of students. A development team focused on creating an asynchronous, online, distance learning course typically consists of a project manager, faculty serving as content experts, instructional designer, web developer and graphic designer. As advanced courseware becomes more available, faculty members may find themselves in a multifunctional role, wearing hats of all the participants within a design team.

In determining the content to be included within a class, the instructor must consider the different types of knowledge encountered on the Internet: technological and procedural knowledge (Williams, 2000). Technological knowledge is divided into knowledge that relates to an activity and that which relates to the body of content, referred to as procedural or conceptual knowledge. Procedural knowledge is developed when a solution to problem is deduced. Visual mapping strategies and flow-block diagrams help to emphasize the knowledge process to distance learners involved in problem-solving procedures. Although these processes are not always linear, sitemapping or the visual diagramming of topics help learners to view their path through the content in arriving at a final conceptual understanding of the material. However, in an online learning environment, the instructor and instructional designer—as one transparent component—should deliver both procedural and conceptual knowledge to the student. Verbal and visual demonstrations should be available for information that was only previously available in text. Presentation media are active tools to deliver content in a stimulating, encouraging and motivating setting in which the learner can interact and take a more active approach to learning. Multimedia, streaming video and simultaneous web casts enable the learner to dynamically interact with the content and provide alternative

formats for learning that can capture the capabilities and interests of learners with disabilities as well. Although simulations exist, they are not to be the focal point, but used as a peripheral of an online course. Often, simulations are distracting if presented on a continuum and are more appropriately suited for advanced, specialized courses and experiments (Hannafin & Peck, 1988). In addition to providing a well rounded knowledge base, a web page or site can present concise material using various dynamic elements.

Accessible Web Page Format

Key Elements

A variety of design elements can be incorporated into the page to display information that is accessible to all learners. Siegal (1997) emphasizes that sites do not have to be intellectually static to be accessible. Images can be effective in providing alternative examples or explanations of content. The addition of an alternate text tag to the image enables a screen reader used by a visually disabled person to read the textual description to the learner, describing the attributes of the image. Adding a title representative of a description of an image also allows learners without disabilities a more detailed explanation of the image. Sounds can also be used, but captions or alternative text benefit the deaf and those with hearing by providing a written script to follow and to refer back to at a later date. Easy-to-read content benefits all learners by ‘chunking’ the information into blocks of important information that can be easily read and understood by any audience. By providing high contrast in color, for text, images, tables, and so forth, the delivery can be more effective and distinguished for all people to read. Last, alternative formats such as plug-ins or HTML versions available for Adobe

PDF documents—often hard to read by persons with normal vision and inaccessible for those without vision—can provide alternative means to attain the presented material.

Navigation

Homepages or default entry pages should serve as navigation pages and not a means to achieve a static destination. Developers of a successful site consider who their customers are and what their needs are. In the case of distance education, the learners are the customers. If the learners' needs are not of paramount concern in the design phase, the occurrence of a user checking out a site once or twice, and never returning is heightened. This type of scanning through the course and its content may hinder motivation for the learners to continue and prevent them from attaining full understanding and procedure through the course. Lastly, user testing is necessary to ensure appropriate relevance to the content and delivery method. Nielson (2000) also emphasizes user testing *before* the final product is released to properly evaluate its intent, content and delivery.

Design Checklist

As a result of the need to provide some sort of template for designers and instructors to make their course sites accessible for persons with disabilities, guidelines have been adapted from the formalized standards of Section 508 delivered by the Access board. This type of checklist gives course developers an outline to follow in creating accessible content on the Web, as illustrated in the following text (Shuman, 1998).

Although more technical criteria exist, the following pertain to presentation and organization of content directly applicable to online course presentations:

- Implement maximum use of white space—keep information and display simplistic.
- Design to inform, not entertain—make content readable and legible.

- Limit the number of colors on the screen.
- Use larger lettering and bulleting lists to separate information.
- Organize according to similar content by consistency and close proximal placement; this provides a cognitive advantage to learning.
- Provide top and bottom navigation to promote consistency.
- Utilize the 'less is more' approach when it incorporates images and text. Messages derived from the content should be clearly obtained within three seconds upon first sighting.
- Test design on users before final product is complete. Redesign is much easier and adaptable when the process is actively continuing.
- Reduce effort required to interpret message—use alignment, common shapes and asymmetrical positioning to make it easy for the reader to focus and understand relationships.

Conclusion

The power of accessibility lies within hands of the individuals, just as the power of the Internet lies within the empowerment of the individual. As developers and educators, alike, reflect on the capabilities and purpose of the Internet, the objective for obtaining information and utilizing it as an effective means of communication pertains to its entire audience. Users of all levels will need accessibility to its offerings, especially online education made available by web-based, distance courses. The widespread use of the Internet in distance courses has originated from the need to pursue further education for career enhancement. It can provide available and flexible learning environments to persons who would not normally be able to attend a traditional class. With the increase in universities addressing the need of learners of a growing distance population, equal access to online courses becomes paramount. Web accessibility has become a primary concern for instructors and developers in creating attainable, accessible and available

online courses. Learners, faculty and administrators express the call for instructional guidelines for more accessible offerings. United with courseware developers, instructors can utilize these guidelines to effectively deliver the content that may have once been inaccessible, and create a more conducive, successful learning environment in which all learners have equal access to achieving an education.

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Abstract

There is becoming an increasing population of online learners with disabilities worldwide; a large percentage of the online learners reside within the United States. In addition to revised legal mandates stipulating equal access to education and the surge of assistive technologies available to individuals with disabilities, distance education institutions are facing the call for action to provide accessible online content. This article discusses the essential components of a web-based course, the learning advantages that arise from equal access web formatting, and design strategies that leads to creating accessible, online materials.