ALT-J, Research in Learning Technology
Vol. 14, No. 1, March 2006, pp. 79–102

The development of accessibility indicators for distance learning programs

Sheryl Burgstahler*
University of Washington, USA

A study was undertaken to explore program policies and practices related to the accessibility of American distance learning courses to qualified students with disabilities. A literature review was conducted, a draft list of accessibility indicators was created, examples of applications of the indicators in existing distance learning programs were collected, the indicators were systematically applied to one distance learning program, input from a variety of distance learning programs was used to further refine the indicators, and these programs were encouraged to adopt the indicators and make use of resources provided by the project. Results of this exploratory work suggest that incorporating accessibility considerations into policies, procedures and communications of a program requires consideration of the unique needs of students, course designers, instructors and evaluators; involves approval and implementation at a variety of administrative levels; and is an ongoing process that may be implemented in incremental steps.

Introduction

The widespread availability of the Internet has led to a worldwide explosion of distance learning (e-learning or online learning) offerings (Waits & Lewis, 2003). Although some claim online learning will bring education to anyone anywhere at anytime, this goal cannot be realized unless distance-learning programs offer courses that are accessible to *all* potential students, including those with disabilities. A review of the literature on distance learning suggests that people with disabilities are rarely considered in the design of distance learning courses (Kinash *et al.*, 2004). For example, benchmarks for the success of Internet-based distance learning programs identified in a study by the Institute for Higher Education Policy (2000) were grouped into seven areas—institutional support, course development, teaching/learning, course structure, student support, faculty support, and evaluation and assessment. Although

*Box 355670, University of Washington, Seattle, WA, 98195, USA. Email: sherylb@u.washington.edu

ISSN 0968-7769 (print)/ISSN 1741-1629 (online)/06/010079–24

DOI: 10.1080/09687760500479753

there are disability-related issues within each of these benchmark categories (e.g. student support: how can programs address the unique support needs of students with disabilities?), none are explicitly discussed in the study report. Similarly, a recent review of distance learning literature led to the identification of 32 trends in distance learning that can help administrators in program planning; they were organized into the categories of students and enrollment, faculty members, academics, technology, the economy, and distance learning. Relevant accessibility issues were not discussed in the report of findings (Howell *et al.*, 2003). However, a consistent message in the relatively small body of literature on e-learning and people with disabilities is that making courses accessible to students with disabilities not only assures their civil right to access, but promotes best practices in online learning for all students (Opitz, 2002; Kinash, *et al.*, 2004).

Based on years of application and writing in this field (some of which is documented in Kinash *et al.* [2004]), I propose that at least four conditions make accessibility an important topic for distance learning program administrators to address:

1. Many people consider it unethical to bar some eligible participants from program access.
2. Legislation mandates that programs be accessible to qualified people with disabilities.
3. Applying accessible design principles is considered a best practice for all students.
4. Costly redesign may be required when a student with a disability enrolls in an inaccessible course.

In the following sections I provide an overview of disability-related access challenges and solutions, legal issues, universal design, and accessibility guidelines and standards. These sections are followed by a report of a research study that explored policy and practice issues related to the accessible design of distance learning programs in the United States.

Access challenges and solutions

Today, assistive technology makes it possible for individuals with almost any types of disabilities to operate computers (Closing the Gap, 2005). Such assistive technology includes text-to-speech software for individuals who are blind or who have reading-related disabilities, alternative keyboards and mice for people who have mobility impairments, and specialized software for students with learning disabilities. However, the inaccessible design of electronic materials can erect barriers even to students who have access to assistive technology (National Council on Disability, 2004). For example, text-to-speech software reads aloud text that appears on the screen and, therefore, provides access to only the content of electronic resources that are provided in text formats. Distance learning designers can avoid erecting barriers to students who are blind by providing text alternatives such as <alt> tags to fully describe the content presented in graphic images. Similarly, text-only versions of

documents in Portable Document Format (pdf) make their content accessible to individuals who are blind and captions on video presentations make them accessible to students who are deaf.

Some distance learning tools need to be avoided or used in limited ways to prevent accessibility barriers. For example, real-time chat and other tools that allow students to communicate synchronously (at the same time) are difficult or impossible to use by someone whose input method is slow, perhaps because of limited hand function or a learning disability, and some synchronous tools are not accessible to those who are blind. Similarly, standard telephone conferencing is inaccessible to students who are deaf or have speech impairments. An instructor who allows students to use a synchronous tool for small group discussions should require that members of a group use an alternative, such as electronic mail or a discussion forum, when the synchronous tool is not accessible to all participants. It should be noted, however, that, although inaccessibility due to disability-related issues is one reason why a synchronous tool might not be accessible to everyone in a group, a more common barrier is simply the inability of a group to agree on a specific time to meet. Providing an asynchronous option addresses all of these access issues.

Most publications about distance learning course development do not discuss universal design or address specific access issues for people with disabilities (Kinash *et al.*, 2004); there are few exceptions (for example, Burgstahler, 1997; Schmetzke, 2001; Waits & Lewis, 2003). In addition, few published works that consider accessibility discuss access issues for the wide range of technologies and strategies currently used in distance learning courses (for example, Kessler & Keefe, 1999; Burgstahler, 2000, 2002). Not surprisingly, many courses are not accessible to people with some types of disabilities. In a recent study, although almost all postsecondary institutions surveyed used websites for distance education courses, only 18% indicated that they followed established accessibility guidelines to a major extent; 28% followed guidelines to a moderate extent, 18% followed guidelines to a minor extent, 3% did not follow guidelines at all, and 33% did not know if the websites adhered to accessibility guidelines (Waits & Lewis, 2003).

Today, since most distance learning courses are not fully accessible to students with disabilities, any disability-related adjustments to the course would need to be made when a student with a disability enrolls in a course; in other words, 'accommodations' for the individual student would be provided. Planning for access as distance learning courses are being developed is potentially easier and therefore less expensive than quickly developing accommodation strategies each time a student with a disability enrolls in a course. The process of making decisions while a course is being developed to assure that it is accessible to potential students with a wide range of abilities, disabilities, learning styles, and other characteristics is called universal design (UD).

UD is defined by the Center for Universal Design at North Carolina State University as 'the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design' (North Carolina State University, 1997). The Center established a set of principles that provide guidance in the design of products and environments (Anders & Fechtner,

1992). Universally designed buildings can be comfortably and inclusively used by those who walk independently, push baby strollers, walk with crutches and use wheelchairs.

UD has been applied to many products (e.g. educational software, websites, textbooks, laboratory equipment) and environments (e.g. classrooms, libraries, museums, dormitories, distance learning courses) in education (Disabilities, Opportunities, Internetworking, and Technology [DO-IT], undated b; Preiser & Ostroff, 2001). The Center for Applied Special Technology has focused attention on the application of UD to technology-based curriculum, defining UD for learning as 'a research-based set of principles that together form a practical framework for using technology to maximize learning opportunities for every student' (Rose & Meyer, 2002, p. 5). Applying the results of brain research and the capabilities of information technology (IT), the Center for Applied Special Technology identifies three essential qualities of curriculum that applies UD for learning—multiple means of representation, expression and engagement (ERIC/OSEP, 1998; Rose & Meyer, 2002). Several researchers have developed principles and performance indicators for the UD of instruction (Silver *et al.*, 1998; Scott *et al.*, 2003; Burgstahler, 2005; Mason & Orkwis, 2005) that demonstrate how UD can be applied to all aspects of instruction, including class climate, physical access and usability, safety, delivery methods, information resources, interaction, feedback and assessment (Burgstahler, 2005).

Similarly, distance-learning courses that incorporate UD features can be accessed by students with diverse characteristics, including those defined by age, race, ethnicity, gender, native language, and level of ability to hear, see, move and speak (Schmetzke, 2001; Burgstahler, 2002; Burgstahler *et al.*, 2004; National Council on Disability, 2004).

Legal issues, standards, and guidelines

Section 504 of the Vocational Rehabilitation Act of 1973 mandates that qualified people with disabilities in the United States have access to programs and services that receive federal funds. The Americans with Disabilities Act of 1990 (ADA) reinforced and extended the mandates of Section 504 and prohibits institutions from excluding and otherwise discriminating against people with disabilities in public programs and services, regardless of whether or not these programs and services are federally funded (Edmonds, 2004). In 1996, the US Department of Justice (Patrick, 1996, p. 1) clarified that ADA accessibility requirements apply to programs offered on the Internet by stating: 'Covered entities that use the Internet for communications regarding their programs, goods, or services must be prepared to offer those communications through accessible means as well'. Specifically, if qualified individuals with disabilities enroll in distance learning courses offered via the Internet, these courses should be made accessible to them.

Section 508 of the Rehabilitation Act of 1973 requires that IT which US federal agencies procure, develop, maintain and use be accessible to people with disabilities, both employees and members of the public, unless it would pose an undue burden to

do so. As mandated in the Rehabilitation Act Amendments of 1998 (US Department of Education, 1998), the US Architectural and Transportation Barriers Compliance Board developed accessibility standards for technology to which federal agencies must comply. The standards include criteria for making webpages and other Internet tools accessible (Architectural and Transportation Barriers Compliance Board, 2000). Although this law applies directly to federal agencies, many states, post-secondary institutions and other entities have adopted Section 508 standards as one effort to meet their obligations under the ADA. The Web Accessibility Initiative of the World Wide Web Consortium has developed more comprehensive Web Content Accessibility Guidelines (World Wide Web Consortium, 1999, 2003) that tell how to design webpages accessible to people with disabilities. Both the Section 508 standards and the Web Accessibility Initiative guidelines were guided by universal design principles.

Distance learning programs can benefit from following the leadership of the US federal government in being both proactive and reactive, rather than only reactive regarding accessibility issues:

> Use of an 'ad hoc' or 'as needed' approach to IT accessibility will result in barriers for persons with disabilities. A much better approach is to integrate accessibility reviews into the earliest stages of design, development, and procurement of IT. (US Department of Justice, 2000)

Being both proactive (by applying universal design principles) and reactive (by providing accommodations) in offering courses results in more inclusive programs and minimizes the need for accommodations for specific students.

In 1999, the California Community Colleges developed the first comprehensive distance learning guidelines in response to a 1998 ADA compliance review by the US Office of Civil Rights (California Community Colleges Chancellor's Office, 1999). The 'Distance Education Access Guidelines' are for print media, audio conferencing, video conferencing/video transmission, software and web resources (based on the Web Content Accessibility Guidelines). Other distance learning programs have developed accessibility policies that encourage or demand compliance with Section 508 standards and/or Web Content Accessibility Guidelines. The Michigan Virtual University (2002) distance learning program provides an example of how accessibility guidelines are integrated into overall course design standards. Its 'Standards for Quality Online Courses' includes four subsections—technology, usability, accessibility and instructional design. Based on the Web Content Accessibility Guidelines, the accessibility categories include basic content, tables/frames, and media.

The study

A study was undertaken to explore program policies and practices related to making distance learning courses accessible to qualified students with disabilities. The research question was:

> What are program-level policies and practices related to delivering courses that are fully accessible to students with disabilities?

Research methods

The goals of this exploratory research were to create and refine a list of distance learning program accessibility indicators, to test their application in existing programs, and to recommend research and other activities to further this work beyond the exploratory level. The steps employed in this study were to:

1. build a draft list of accessibility indicators based on prior work;
2. collect examples of applications of the indicators in existing distance learning programs;
3. systematically apply the indicators to one distance learning program; and
4. gather input from a variety of distance learning programs to further refine the indicators, as well as encourage these institutions to adopt the indicators.

Based on experiences in creating accessible distance learning courses (Burgstahler, 2000), collaboration with the University of Washington (UW) Distance Learning program in making its courses accessible (Burgstahler *et al.*, 2004), and work with disabled student services and distance learning administrators nationwide, I identified and published steps toward improving the accessibility of distance learning programs. Actions included the development of policies, procedures and guidelines; the dissemination of information to stakeholders; and the provision of ongoing training, technical support and evaluation (Burgstahler, 2002). In collaboration with UW Distance Learning administrators, a case study of our work was developed and published (Burgstahler *et al.*, 2004). Building on this work, I drafted an initial list of 'Distance Learning Program Accessibility Indicators' (DLP Accessibility Indicators) that could be used as a checklist for documenting programmatic changes that lead to the improved accessibility of the courses of any distance learning program.

A staff member from the UW Distance Learning Program was assigned to work with distance learning programs at institutions whose disabled student service directors were part of projects funded by the US Department of Education (grant #P333A020044 and #P333A990042) and directed by DO-IT (undated b) at the University of Washington. The larger project focused on faculty and staff training at post-secondary institutions in an effort to improve the post-secondary academic and career outcomes for students with disabilities nationwide. Of the 23 schools represented in this grant-funded project, 18 had distance-learning programs that offered courses primarily at a distance and in multiple academic areas. Distance learning administrators of two of these 18 schools declined to participate in our exploratory work, resulting in an 89% participation rate.

The 16 participating schools possess a wide range of institutional characteristics: large and small schools; two-year institutions (five schools) and four-year institutions (11 schools); and schools from rural, suburban and urban areas. At the time of the study, 14 schools offered primarily web-based distance learning courses, and two used primarily teleconferencing technology. Working 20 hours per week for one year, the staff person dedicated to this project contacted distance learning professionals at the 16 participating schools to:

- share the 'DLP Accessibility Indicators', web resources and DO-IT publications and training videos to increase participant awareness of accessibility issues and solutions;
- encourage schools to join an electronic discussion list focused on the accessibility of distance learning courses;
- collect and share examples of each indicator applied at other institutions as models for participants to consider;
- perform accessibility reviews of distance learning webpages and offer suggestions for improvements regarding accessibility; and
- encourage participants to adopt the indicators at their schools.

This person helped develop a website and electronic discussion list as part of 'AccessDL', the National Center on Accessible Distance Learning (DO-IT, 2004), maintained records of the implementation of the indicators at the 16 participating schools, and continued the accessibility efforts at the UW Distance Learning program, where she had worked for many years.

Over a period of one year, the DLP Accessibility Indicators were refined through formative feedback from participants within an iterative process. Periodically I would share the current list of indicators via email, telephone conferences and in-person meetings with participants in the larger funded project. They were asked to give feedback on the overall breadth of the indicator list, the stakeholders to which each indicator applied and the clarity of each indicator on the list. Whenever modified, the list was shared again and further feedback was solicited. In addition, the project staff member assigned to sharing the indicators with the distance learning staff of participating schools recorded and shared with me responses of the individuals with whom he/she communicated, and this input was considered when the indicator list was edited for clarity and completeness.

Research results, phases one and two: examples of applications of the indicators

Each DLP Accessibility Indicator developed in this study and listed in the next section of this article relates to one of four key stakeholders in the delivery of distance learning courses:

1. Students and potential students.
2. Distance learning designers.
3. Distance learning instructors.
4. Distance learning program evaluators.

On many campuses, particularly those with small distance learning programs, one person may perform more than one role. The DLP Accessibility Indicators developed in this study are presented in Table 1. Examples to illustrate these indicators are presented in the following paragraphs. They are drawn from institutions with a variety of characteristics and shed light on how the indicators might be applied in distance

Table 1. Focus and description of Distance Learning Program Accessibility Indicators

Focus	Indicator number	Indicator description
Students and potential students	1	The distance learning homepage is accessible to individuals with disabilities (e.g. it adheres to Section 508, World Wide Web Consortium, or institutional accessible-design guidelines/standards)
	2	A statement about the distance learning program's commitment to accessible design for all potential students, including those with disabilities, is included prominently in appropriate publications and websites, along with contact information for reporting inaccessible design features
	3	A statement about how distance learning students with disabilities can request accommodations is included in appropriate publications and webpages
	4	A statement about how people can obtain alternate formats of printed materials is included in publications
	5	The online and other course materials of distance learning courses are accessible to individuals with disabilities
Distance learning designers	6	Publications and webpages for distance learning course designers include: a statement of the program's commitment to accessibility, guidelines/standards regarding accessibility, and resources
	7	Accessibility issues are covered in regular course designer training
Distance learning instructors	8	Publications and webpages for distance learning instructors include: a statement of the distance learning program's commitment to accessibility, guidelines/standards regarding accessibility, and resources
	9	Accessibility issues are covered in training sessions for instructors
Evaluators	10	A system is in place to monitor the accessibility of courses, and, on the basis of this evaluation, the program takes actions to improve the accessibility of specific courses and to update information and training given to potential students, students, course designers and instructors

learning programs. Inclusion of a specific example does not, however, imply a recommendation or endorsement. It should also be noted that websites used as examples may have undergone changes since this article was published. Although the quotations provided here still serve as examples of the indicators, they may no longer reflect the content of the webpages referenced.

Indicators that focus on students and potential students

DLP Accessibility Indicators 1–5 focus on students and potential students, and are based on the premise that distance learning programs committed to accessibility assure that students and potential students know of the programs' commitment to accessible design, how to report inaccessible design features they discover, how to request accommodations and how to obtain alternate formats of printed materials;

the distance learning homepage and all online and other course materials of distance learning courses are accessible to individuals with disabilities.

DLP Accessibility Indicator 1. The University of Wisconsin-Madison 'Continuing Education and Outreach page'[1] provides an example of an accessible homepage.

DLP Accessibility Indicator 2. The 'Virtual Classroom' at Mt. San Antonio College[2] includes the following short statement:

> This page is designed to be accessible to all users. If you have any questions or concerns, please contact techSup@vcom.mtsac.edu.

The Santa Fe Community College Distance Learning website[3] also contains a short statement:

> This page is designed to be accessible to all users. If you encounter any barriers, please contact Technical Support [linked to email addressed to technical support staff].

The 'Accessibility Statement' of Arizona State University's ASUonline[4] provides an example of more detailed content that addresses accessibility DLP Accessibility Indicator 2:

> The Online Teaching and Learning Group in Distance Learning and Technology makes every effort to provide accessible information to people with disabilities and comply with Section 508 of the Rehabilitation Act Amendments of 1998. Here are highlights of ways in which ASUOnline is universally accessible:
>
> 1. All images are annotated with descriptive text which can be read by screen reader software. Purely decorative graphics include null ALT attributes.
> 2. All pages in ASUonline have the same primary navigation structure.
> 3. Whenever possible, links are written to make sense out of the context.
> 4. There are no links that open in pop-up windows.
> 5. Cascading Style Sheets (CSS) are used throughout the website.
> 6. Text transcripts are provided for most audio/visual media files.
> 7. Faculty and student tutorials are provided in several file formats: text, PDF and Flash.
>
> We will continually update this page to inform users of new accessibility features. Please let us know how we can serve you better. If you have any difficulties accessing the site and require further accommodations please email dltonline@asu.edu.

DLP Accessibility Indicator 3. The following statement appears in the University of South Carolina Student Guidebook: 'Policies and Procedures for Distanced Education Classes':[5]

> Students requiring accommodations for disabilities or learning needs are advised to contact the Office of Disability Services (864) 503-5199. The staff works to ensure accessibility for all university programs, services, and activities in compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act. Services offered include priority registration, test proctoring, classroom adaptation, sign language interpreters, readers, and note takers.

DLP Accessibility Indicator 4. The University of Minnesota 'Independent and Distance Learning Course Catalogue' contains the following statement: 'This publication is available in alternative formats on request. Call One Stop Student Services (800-400-8636) for assistance.'

DLP Accessibility Indicator 5. Compliance with DLP Accessibility Indicator 5 can be determined only by the testing of specific courses for accessibility, which is beyond the scope of this article. For example, one could test how well specific courses offered through 'ASUonline' meet the program's published accessibility guidelines, provided as an example of DLP Accessibility Indicator 2.

Indicators that focus on distance learning designers

DLP Accessibility Indicators 6 and 7 are based on the premise that distance learning programs that are committed to accessibility assure that course designers understand the programs' commitment to accessibility, have access to guidelines and resources, and learn about accessibility in training provided to course designers.

DLP Accessibility Indicator 6. The University of Iowa's 'Accessibility Standards for Web Resources V1.3'[6] begins with this statement of purpose:

> The University of Iowa is committed to providing equal access to information, programs, and activities through its technologies, web pages, services and resources. Fulfilling this promise is critical because the Internet is fast becoming the central nervous system of university life. When properly designed, web pages facilitate an inclusive environment and culture, and enhance learning, teaching, research, scholarship, creativity, and public service and outreach. When improperly designed, without regard for the needs and abilities of our diverse community, web pages may become barriers that can block our educational commitment.
>
> A comprehensive, formal web accessibility policy is the key to ensuring that web resources are accessible, usable, understandable, and navigable. Such a policy signifies that the University of Iowa values all of its members and provides tangible proof of the University's commitment to empowering people and promoting their independence. This policy establishes minimum standards for achieving these goals in a manner that preserves the freedom of designers and developers to create cutting-edge, state-of-the-art, well-designed pages, resources, and services.

The University of Wisconsin Madison 'Accessibility' website[7] includes this statement:

> The UW Policy is an effort to make the web more accessible for people with vision, hearing or other disabilities. … We are committed to help you make your web pages accessible. Whether you are a web master, an instructor with a course on the web, or a department administrator, we can help. We have instructional resources to teach you to make your own site changes, or you can hire someone to review and fix your site. […] For more information about appropriate use and other policies, see www.doit.wisc.edu/security/policies.

DLP Accessibility Indicator 7. Training for UW distance learning designers includes a session on legal and technical accessibility issues and Section 508 standards. Initially, this training was delivered to UW distance learning instructional designers by DO-IT. Now accessibility is integrated into ongoing training for designers provided by program staff. DO-IT and the Access Technology Lab[8] provide ongoing technical support via email and telephone.

Indicators that focus on distance learning instructors

DLP Accessibility Indicators 8 and 9 are based on the premise that, in distance learning programs committed to accessibility, publications and webpages for distance learning, instructors include a statement of the distance learning program's commitment to accessibility, guidelines regarding accessibility, and resources and training for instructors including accessibility content.

DLP Accessibility Indicator 8. The 'Indiana Higher Education Telecommunication System' website includes resource links, as well as policies and guidelines that 'address distance learning and the use of technology in the classroom from the faculty perspective of teaching and learning'. In addition, within the 'Course Design' section of 'Faculty Benchmarks and Principles'[9] is this statement:

> Distance learning courses will be carefully planned to meet the needs of students within unique learning contexts and environments.

The University of Maryland University College website entitled 'Accessibility in Distance Education: A Resource for Faculty in Online Teaching'[10] includes the following introductory statement:

> The Accessibility in Distance Education (ADE) Web site focuses on helping faculty develop accessible online learning materials for people with disabilities. It is divided into five major sections, targeting common accessibility questions.

DLP Accessibility Indicator 9. A website at Cal State San Marcos entitled 'Web Accessibility: Applying ADA Principles to Online Teaching and Learning'[11] includes content and resources from a faculty training session.

Indicators that focus on program evaluators

DLP Accessibility Indicator 10 is based on the premise that distance learning programs committed to accessibility have systems in place to monitor accessibility efforts and make adjustments based on evaluation results.

DLP Accessibility Indicator 10. An example of Indicator 10 is where the UW applies quality assurance tests to all of its courses before they are published. Included in this

process is an accessibility review. Barriers to accessibility discovered in the review are recorded and removed as the course is updated.

Research results, phase three: application of the 'Indicators' at the UW Distance Learning Program

The efforts of the UW Distance Learning Program to develop and apply accessibility policies and procedures helped to conceptualize, develop and test the feasibility of the 10 'Distance Learning Program Accessibility Indicators' reported in this article (Burgstahler *et al.*, 2004). This program uses a course delivery system that was for the most part developed at the university. It set a goal to improve the overall accessibility of its online courses, thus maximizing program access and minimizing the need for special accommodations. A report of the UW Distance Learning Program accessibility efforts is summarized in the following.

Indicators that focus on students and prospective students

DLP Accessibility Indicator 1. With the assistance of DO-IT and UW Access Technology Lab (undated) staff, the UW central computing organization, Computing & Communications, developed a website devoted to guidelines and resources for making campus webpages accessible (see 'The Goal: Making UW Web Sites Accessible to Everyone'[12]), first pointing to Section 508 standards as campus guidelines and then to the more in-depth guidelines and resources, including those provided by the World Wide Web Consortium. Although, at the time of publication of this article, the 'UW Online Learning' homepage[13] does not yet meet all of the Section 508 standards, efforts are ongoing. Progress is slow, in part because the distance learning program staff involved in the reported project are not responsible for the development and maintenance of this site. However, the two units continue to work together and hope to make accessibility adjustments during the next revision cycle.

DLP Accessibility Indicator 2. A statement about the UW Distance Learning Program's commitment to accessible design for all potential students is included in appropriate publications and websites, along with contact information for reporting inaccessible design features. For example, within the 'Online Student Handbook: Getting Started'[14] is the following question and answer:

> Are online learning courses accessible to students with disabilities? We strive to make our online courses accessible to everyone. We specifically consider design features that make our courses accessible to individuals with disabilities, including those using assistive technology for computer access. If you find a feature/course inaccessible to you, please contact Online Learning Technical Support (linked to contact information at http://www.extension.washington.edu/ol/handbook/contact.asp#pss).

DLP Accessibility Indicator 3. A statement about how students with disabilities can request accommodations is included in appropriate publications and webpages. For

example, the UW Extension website[15] and the 'Online Student Handbook: Additional Resources and Information'[16] include the following information:

> The University of Washington is committed to providing access, equal opportunity and reasonable accommodation in its services, programs, activities, education and employment for individuals with disabilities. To request disability accommodation, contact the Disability Services office at 206-543-6450/voice, 206-543-6452/TTY, 206-685-7264 (fax), or e-mail dso@u.washington.edu at least 10 days prior to the start of your course or examination. You may also request accommodation in the certificate program application process by contacting Disability Services at least 10 days before you submit your application.

DLP Accessibility Indicator 4. A statement about how people can obtain alternate formats of printed materials is included in UW Extension publications that promote distance learning courses.

DLP Accessibility Indicator 5. To help assure that UW online and other course materials are accessible to students with disabilities, the Distance Learning Design Department of the UW Extension Program has designed a template for their online courses that specifically addresses accessibility issues.

Indicators that focus on distance learning designers

DLP Accessibility Indicator 6. Publications and webpages for UW Distance Learning course designers include: a statement of the program's commitment to accessibility, guidelines/standards regarding accessibility, and resources. In the UW Extension Distance Learning Design Department, the following statement for instructional designers is found on the department's Intranet:

> We are responsible for creating Web pages that are accessible to users with visual, auditory, and/or motor impairments. People with visual impairments rely on screen readers to read Web pages aloud, and our HTML must be formatted so that screen readers can follow it. For people with auditory disabilities, transcripts of auditory files must be provided (speech to text software makes this relatively easy). Our navigation must be such that people with motor disabilities are able to follow links.

DLP Accessibility Indicator 7. Accessibility issues are covered in regular course designer training. A two-hour session on legal and technical accessibility issues and Section 508 standards was delivered to UW Distance Learning Instructional Designers by DO-IT,[17] and the UW Access Technology Lab[18] provide ongoing technical support via email and telephone.

Indicators that focus on distance learning instructors

DLP Accessibility Indicator 8. Publications and webpages for UW Distance Learning instructors include: a statement of the distance learning program's commitment to

accessibility, guidelines/standards regarding accessibility, and resources. UW Extension staff have created an 'Online Instructor Handbook' that includes the following information:[19]

> UWEO course materials are designed to comply with Section 508 of the Rehabilitation Act Amendments of 1998. Course materials are accessible to students who are blind or have low vision, who cannot navigate using a mouse, or who have a hearing impairment.

DLP Accessibility Indicator 9. Accessibility issues are covered in training sessions for instructors. For example, the UW 'Online Learning Instructors Handbook' contains accommodation request information and instructions about how to address accessibility barriers in their courses.[20,21]

In addition, each quarter the UW Center for Teaching, Learning, and Technology offers a Web Design Workshop on Accessibility and Usability that is free to campus educators, including faculty, librarians, instructors, teaching assistants and instructional staff. Accessibility is also integrated within web design courses.

Indicators for program evaluators

DLP Accessibility Indicator 10. At the UW, a system is in place to monitor the accessibility of courses, and, on the basis of this evaluation, the program takes actions to improve the accessibility of specific courses and to update information and training given to potential students, students, course designers and instructors. Specifically, within the program's quality assurance tests of all new courses before they are offered, accessibility barriers are identified and addressed.

Research results, phase four: outreach to distance learning programs

Only two of the 18 schools that had distance learning programs declined to participate in this work, yielding a high participation rate (89%). All of the 16 distance learning programs contacted in this study were given informative publications, web resources and training videos from DO-IT to help them in their own efforts to make their courses more accessible; they were invited to join a discussion list (DO-IT, 2004) for ongoing communication regarding the accessibility of distance learning courses. All participating schools were enthusiastic about receiving materials and having access to the 'AccessDL' website developed in the project. At 10 of the 16 participating schools, one or more distance learning staff members joined a discussion list on accessibility of distance learning courses. Participants also expressed an interest in linking their distance learning staff to the 'AccessDL' website (DO-IT, 2004).

Table 2 summarizes the beginning state and the ending state regarding implementation of each indicator, where 'Y' means yes an indicator was applied, 'S' means it was applied to some extent but not fully, and 'N' means it was not yet applied. When only one of these characters appears in the table it means that the state did not change from the beginning to the end of the study. Two characters with a slash between them

Table 2. State of each indicator at each school at the beginning/end of study

	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5	Indicator 6	Indicator 7	Indicator 8	Indicator 9	Indicator 10	Total changes
Institution 1	Y	N/Y	Y	N	Y	Y	N	Y	Y	N	1
Institution 2	N	N	N	N							0
Institution 3	N	N	N	Y	S	N	N	N	N	N	0
Institution 4	N	S	S			Y		Y			0
Institution 5	S	S	S	N	S	N	N	N	N	N	0
Institution 6	N	N	N	N	Y				S		0
Institution 7	N/Y	S	S	N	Y	N/Y	N/Y	N/Y	S/Y	N/Y	6
Institution 8	N	S	S	N	Y	N/Y	Y	N/Y	Y	Y	2
Institution 9	Y	N/Y	N	N	N	N	Y	N	N	N	1
Institution 10	N/Y	N/Y	N	N	S	N	N	N	N/Y	N/S	4
Institution 11	N	Y	Y	N							0
Institution 12	N	N	N	N							0
Institution 13	N	S	S	S	S	N/Y	N/Y	N/Y	N/Y	N	4
Institution 14	N	S	S	S	S						0
Institution 15	Y	N	Y	Y	Y						0
Institution 16	N	Y	Y	Y	S						0
Total											18

Note: Y, indicator applied; S, applied to some extent; N, not applied.

means that the state of an indicator changed from the first state to the second. Blank cells indicate that the state of the indicator was not known by research staff. The final column includes the total number of known changes to indicators that were made by each institution from the beginning to the end of the study. The state of six indicators was changed by one institution; four by two institutions, two by one institution, and one by two institutions. It should be noted that changes made at three schools (institutions 7, 10 and 13) accounted for 14 (78%) of the changes overall.

Table 3 presents, for each indicator, the number of schools whose indicator state was Y or S at the beginning of the study, the number of schools whose indicator state was Y or S at the end of the study, and the difference between these two figures, which indicates the number of schools for which this indicator changed from N (not applied) to Y or S (applied to some degree) during the course of the study. A total of 16 changes in the state of indicators occurred from the beginning to the end of the study, all in a positive direction. The state of DLP Accessibility Indicators 3, 4, and 5 did not change at any school. Each of the other indicators was changed in a positive direction in at least one participating school. DLP Accessibility Indicators 2, 6 and 8 were changed in a positive direction at three schools; DLP Accessibility Indicators 1, 9 and 10 changed at two schools. This means that a total of five changes were made in the five indicators of change for students and potential students, three in the two indicators for distance learning designers, five in the two indicators for distance learning instructors, and two in the one indicator for program evaluators.

As revealed in Tables 2 and 3, at the beginning of this exploratory study the 16 participating schools had implemented a total of 48 indicators, at least partially, representing an average of three per school; at the end of the study, they had

Table 3. Indicator states at participating schools

Indicator	Y or S at beginning	Y or S at end	Changes from N to Y or S
For students and prospective students			
Indicator 1	4	6	2
Indicator 2	8	11	3
Indicator 3	10	10	0
Indicator 4	5	5	0
Indicator 5	11	11	0
For distance learning designers			
Indicator 6	2	5	3
Indicator 7	2	4	2
For distance learning instructors			
Indicator 8	1	4	3
Indicator 9	5	8	3
For distance learning evaluators			
Indicator 10	0	2	2
Total Y or S states	48	66	18

implemented or partially implemented a total of 66 indicators, an average of 4.1 per school. Thus, each school gained an average of one indicator during the year of this exploratory study. Six of the 16 schools (38%) included in the study changed at least one indicator in a positive direction (e.g. N to S or Y; or S to Y) at their schools from the beginning to the end of this study. Although 12 schools indicated that their distance learning courses were to some degree accessible (DLP Accessibility Indicator 5), no testing of course materials was conducted by research staff.

It should be noted that some participants took concrete steps that did not result in the change of an indicator. For example, some made improvements in the accessibility of their homepages that were not in areas captured by the Section 508 standards, such as *improving* the descriptive text for content in graphic images. They may have also made changes of which project staff were unaware (e.g. changing wording in a program catalog) or that did not represent enough improvements to change an indicator from 'no' to 'some' or 'yes'. Some participants suggested that the DLP Accessibility Indicator list be expanded in such a way that small, positive changes could be documented. Anecdotal information gathered by the project staff member suggests that improvements in accessibility are slow and ongoing. Several contacts and conversations were often required for a program to take action that resulted in a change in the state of one indicator.

The enthusiasm in receiving DO-IT instructional materials and in communicating with project staff by all participating schools, as reported by the staff member assigned to working with these programs, suggests increased awareness, interest and skills that may lead to ongoing, systemic changes in the distance learning programs involved in the project. In most cases, project participation resulted in opening or increasing communications between staff from disability services, distance learning and computing services. Most distance learning staff in participating schools expressed a commitment to continue to improve course accessibility.

Discussion

The reported study was undertaken to explore program policies and practices related to the accessibility of distance learning courses to qualified students with disabilities in the United States. Seventeen post-secondary institutions in the United States were involved in this exploratory study. The following steps were taken: building a draft list of accessibility indicators, collecting examples of applications of the indicators in existing distance learning programs, systematically applying the indicators to one distance learning program, and gathering input from 16 other distance learning programs to further refine the indicators, as well as encourage these institutions to adopt the indicators.

'Distance Learning Program Accessibility Indicators' were drafted and refined and examples of applications of the indicators were collected. The staff member assigned to communicate with participants in this exploratory study reported that it was difficult to find examples of the 'DLP Accessibility Indicators', suggesting that many schools are not dealing with accessibility issues in policies and practices. It should be noted,

however, that the state of some of the indicators cannot be determined by inspection of a program's public web resources. Supporting these reported experiences is the fact that an average of only 3.3 of the 10 indicators (33%) were found to be implemented to some degree at participating schools as the project began. These findings are consistent with published literature that concludes that students with disabilities are rarely considered in the design of distance learning courses (Kinash *et al.*, 2004).

Experiences with both the case study and the outreach efforts of this research suggest that implementing change is slow, but implementation by staff within a distance learning program who are committed to accessibility and where the distance learning program administrator is supportive is easier than when this staff member contacts program staff at other schools in an effort to improve the accessibility of their programs. It should be noted, however, that the case study reports on work that was in the making more than twice as long as those in the outreach efforts, and therefore results are not directly comparable. These findings are consistent with literature that concludes systemic change is often a slow process (Bruce & Wyman, 1998; Guy & Oliver, 1998).

The staff member working on this effort reported that several communications and time to review materials sent were required to obtain the needed buy-in in order for programmatic changes to be made. Sometimes, several distance learning staff members were consulted before the correct person who could make specific programmatic changes was consulted, and this person was not the same for each indicator. The fact that changes made at three (19%) of the participating schools accounted for 78% of the overall known changes made coupled with reports from research staff suggest that, once a program commits to making one change, further changes come more quickly. That initial buy-in is a key step in the process of making significant programmatic changes related to accessibility.

It was also reported by project staff that the idea of accessibility, once understood, was enthusiastically received by most of the distance learning program staff members contacted. They also expressed appreciation for printed publications, videos, web resources and the discussion list made available to them through DO-IT. Lack of time to address accessibility issues and the need to work with other staff were the most commonly reported reasons for not implementing specific 'DLP Accessibility Indicators'.

In summary, the results of this exploratory study suggest that incorporating accessibility considerations in policies, procedures and communications of a program:

- requires efforts related to students, course designers, instructors and evaluators;
- requires approval and implementation at a variety of staff levels;
- moves more quickly once one change is made; and
- is an ongoing process that may be implemented in incremental steps.

Limitations of the study

Limitations of this study are related to the fact that the research was, by design, exploratory in nature and therefore lacked some of the characteristics of a more

controlled research study. For example, a limitation of this work is that participating schools were not selected randomly, but rather were made up a sample of convenience. The UW and the other institutions of the 16 distance learning programs that participated in this exploratory study were part of a larger project funded by the US Department of Education.

Another limitation is that, although participants gained support from the staff member assigned to this work, from shared resources and from one another through discussion lists, no attempt was made to quantify the types and levels of support actually used by each school. Interaction with participants was informal and inconsistent from school to school; project staff worked the most with schools most interested in working with them; and, since only one staff member made contacts with the distance learning programs, the potential amount of support was related to the order in which contacts with schools were made. In addition, the indicator list may not reflect incremental programmatic changes and did not capture increased awareness that might eventually result in program change.

Much of the data collected in this exploratory study relied on self-report; some program staff might have given statements in order to put their programs in a positive light with respect to being accessible to students with disabilities. Their responses may also be inaccurate because of a limited understanding of accessibility issues. All of these limitations might have had an impact on the accuracy of the results; therefore, this exploratory study should be interpreted with caution.

Future research and outreach activities

DO-IT continues to support the discussion lists and the website discussed in this report as part of its National Center on Accessible Distance Learning (AccessDL), which is now funded by a new grant from the Office of Postsecondary Education in the US Department of Education (#P333A50064) that are now open to anyone interested in these topics (DO-IT, 2004).

Now that draft 'DLP Accessibility Indicators' have been developed, potential next steps in ongoing efforts include the following:

1. Further validate the indicators. One approach would be to conduct a formal Delphi process with distance education experts to further refine and validate the indicators and, perhaps, to add substeps to the list to promote greater understanding of each category and to track specific efforts within a given category. The Delphi method is well suited to better understanding a narrowly defined issue, such as accessibility. It is a structured process for collecting and distilling knowledge from a group of experts, using a series of questionnaires to gain feedback from participants to facilitate the formation of a group judgment (Gordon, 1994; Egan & Akdere, 2005).
2. Involve specific stakeholders in the refinement and validation of the indicators. This would include students with disabilities, instructors, distance learning designers and evaluators. Getting experiences and input from students with

disabilities is particularly important, since they are the potential consumers within the context of these studies.
3. Expand the research to include institutions outside the United States.
4. Design further studies to explore the following research questions:

   - What are the promoters and inhibitors of systemic change to improve the accessibility of distance learning courses?
   - What are the current experiences, including benefits and challenges, of students with a variety of disabilities in accessing distance learning courses?
   - What are accessibility challenges faced by people with disabilities who are current or potential designers or instructors of distance learning courses?
   - What technological tools and supports are available to help distance learning designers and faculty make their courses accessible to students with disabilities, and what additional products and supports are needed?

Other potential activities to promote the accessible design of distance learning programs include the following:

1. Disseminate information to encourage distance learning programs to take steps to make their courses accessible to students with disabilities.
2. Encourage distance learning professional organizations to take a leadership role in promoting the development of accessible distance learning courses.

Conclusion

Distance education creates learning opportunities for all qualified students when accessibility considerations are institutionalized into program policies, procedures and communications. Otherwise, distance learning courses can impose needless barriers to equal participation in academics and careers for potential students and instructors with disabilities. Employing UD principles as Internet-based distance learning courses are created can bring us closer to making learning accessible to anyone, anywhere, at any time. It is important to develop a programmatic commitment to accessibility as an ongoing effort:

> a learning organization is a group of people pursuing common purposes … with a collective commitment to regularly weighing the value of those purposes, modifying them when that makes sense, and continually developing more effective and efficient ways of accomplishing those purposes. (Leithwood *et al.*, 1995, p. 5)

Distance learning programs are encouraged to apply the 'Distance Learning Program Accessibility Indicators' presented in this report. Distance learning professional organizations are encouraged to take a leadership role in promoting this important work.

Acknowledgments

The author would like to acknowledge Bill Corrigan, Joan McCarter, Mary Waters and the DO-IT Admin Team members (see http://www.washington.edu/doit/

Brochures/Academics/admin.html) for their contributions to the project described in this article. The content of the article is based upon work supported by the National Science Foundation (cooperative agreement #HRD-0227995) and the US Department of Education, Office of Postsecondary Education (grant #P333A020044 and #P333A990042) and the National Institute on Disability and Rehabilitation Research (grant # H133D010306). Any opinions, findings and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the funding agencies.

Notes

1. http://www.wisc.edu/outreach/conted.htm
2. http://vclass.mtsac.edu/
3. http://learn.sfccnm.edu/
4. http://asuonline.asu.edu/accessibility.cfm
5. http://www.uscupstate.edu/academics/distance/guidebook_students.pdf
6. http://cio.uiowa.edu/Policy/WebAccessibility.htm
7. http://www.doit.wisc.edu/accessibility/index.asp
8. http://www.washington.edu/computing/atl/
9. http://www.ihets.org/progserv/education/distance/guiding_principles/#intro
10. http://www.umuc.edu/ade/
11. http://www.csusm.edu/accessibility/onlinecourses/
12. http://www.washington.edu/computing/accessible/
13. http://www.extension.washington.edu/ol/
14. http://www.extension.washington.edu/ol/handbook/start.asp#access
15. http://www.extension.washington.edu/ext/studentinfo/gen_info.asp#disability
16. http://www.edoutreach.washington.edu/ol/handbook/resources.asp#disability
17. http://www.washington.edu/doit/
18. http://www.washington.edu/computing/atl/
19. http://www.outreach.washington.edu/teaching/online_instructor_training/instr-training/disabilities.html
20. http://www.outreach.washington.edu/teaching/online_handbook_files/disability-student.html
21. http://www.outreach.washington.edu/teaching/online_handbook_files/disability-instructor.html

References

Accessibility (2004) The University of Wisconsin Madison. Available online at: http://www.doit.wisc.edu/accessibility/index.asp (accessed 6 January 2006).

Accessibility in distance education: a resource for faculty in online teaching (2005) University of Maryland University College, Adelphi, MD. Available online at http://www.umuc.edu/ade/ (accessed 6 January 2006).

Accessibility standards for web resources v1.3 (2002) The University of Iowa, Iowa City, IA. Available online at: http://cio.uiowa.edu/Policy/WebAccessibility.htm (accessed 6 January 2006).

Accessibility statement (2005) Arizona State University. Available online at: http://asuonline.asu.edu/accessibility.cfm (accessed 6 January 2006).

Americans with Disabilities Act of 1990 (1990) 42 U.S.C.A. § 12101 *et seq.* Available online at: http://www.usdoj.gov/crt/ada/statute.html (accessed 6 January 2006).

Anders, R. & Fechtner, D. (1992) *Universal design* (Brooklyn, NY, Pratt Institute Department of Industrial Design and Pratt Center for Advanced Design Research).

Architectural and Transportation Barriers Compliance Board (2000) Electronic and information technology accessibility standards, final rule, *Federal Register,* 65(246), 80500–80528. Available online at: http://www.access-board.gov/sec508/standards.htm (accessed 6 January 2006).

Bruce, R. R. & Wyman, S. (1998) *Changing organizations: practicing action training and research* (Thousand Oaks, CA, Sage Publications).

Burgstahler, S. (1997) Teaching on the net: what's the difference?, *THE Journal,* 24(9), 61–64.

Burgstahler, S (2000) Access to Internet-based instruction for people with disabilities, in: L. A. Petrides (Ed.) *Case studies on information technology in higher education* (Hershey, PA, Idea Group Publishing), 76–88.

Burgstahler, S. (2002) Distance learning: universal design, universal access, *Educational Technology Review,* 10(1). Available online at: http://www.aace.org/pubs/etr/issue2/burgstahler.cfm/ (accessed 6 January 2006).

Burgstahler, S. (2005) *Universal design of instruction* (Seattle, WA, University of Washington, DO-IT). Available online at: http://www.washington.edu/doit/Brochures/Academics/instruction.html (accessed 6 January 2006).

Burgstahler, S., Corrigan, B. & McCarter, J. (2004) Making distance learning courses accessible to students and instructors with disabilities: a case study, *Internet and Higher Education,* 7, 233–246.

California Community Colleges Chancellor's Office (1999) *Distance education: access guidelines for students with disabilities.* Available online at: http://www.htctu.fhda.edu/publications/guidelines/distance_ed/disted.htm (accessed 6 January 2006).

Closing the Gap (2005) Resource directory, *Closing the Gap,* 23(6), 37–195.

Distance learning (2004) Santa Fe Community College, Santa Fe, NM. Available online at: http://learn.sfccnm.edu/(accessed 6 January 2006).

DO-IT (undated a) *Resources for student services staff* (Seattle, WA, DO-IT, University of Washington). Available online at: http://www.washington.edu/doit/Conf/staff_resources.html (accessed 6 January 2006).

DO-IT (undated b) DO-IT, University of Washington, Seattle, WA. Available online at: http://www.washington.edu/doit/(accessed 6 January 2006).

DO-IT (2004) *AccessDL* (Seattle, WA, DO-IT, University of Washington). Available online at: http://www.washington.edu/doit/Resources/accessdl.html (accessed 6 January 2006).

Edmonds, C. D (2004) Providing access to students with disabilities in online distance education: legal and technical concerns for higher education, *American Journal of Distance Education,* 18(1), 51–62.

Egan, T. M. & Akdere, M. (2005) Clarifying distance education roles and competencies: exploring similarities and differences between professional and student-practitioner perspectives, *American Journal of Distance Education,* 19(2), 87–103.

ERIC/OSEP (1998) *A curriculum every student can use: Design principles for student access,* ERIC/OSEP Topical Brief (Reston, VA, Author) (ERIC Document Reproduction Service No. ED423654). Available online at: http://www.cec.sped.org/osep/udesign.html (accessed 6 January 2006).

Gordon, T. J. (1994) *The Delphi method,* AC/UNU Millennium Project. Available online at: http://www.futurovenezuela.org/_curso/5-delphi.pdf (accessed 6 January 2006).

Guiding principles for faculty in distance learning (2005) The University of Wisconsin Madison. Available online at: http://www.ihets.org/progserv/education/distance/guiding_principles/#intro (accessed 6 January 2006).

Guy, T. C. & and Oliver, J. P. (1998). Infusing multicultural education: a process of creating organizational change at the college level, *Innovative Higher Education,* 22(4), 271–289.

Howell, S. L., Williams, P. B. & Lindsay, N. K. (2003) Thirty-two trends affecting distance education: an informed foundation for strategic planning, *Online Journal of Distance Learning*

Administrators, 6(3). Available online at: http://www.westga.edu/~distance/ojdla/fall63/howell63.html (accessed 6 January 2006).

Institute for Higher Education Policy (2000) *Quality on the line: benchmarks for success in Internet-based distance education* (Washington, DC, Author). Available online at: http://www.e-guana.net/organizations.php3?action=printContentItem&orgid=104&typeID=906&itemID=9239&User_Session=2b9753da4fdaea5d2c3b027ed53e3750 (accessed 6 January 2006).

Kessler, D. & Keefe. B. (1999) Going the distance, *American School and University,* 7(11), 44–46.

Kinash, S., Crichton, S. and Kim-Rupnow, W. S. (2004) A review of 2000–2003 literature at the intersection of online learning and disability, *American Journal of Distance Education,* 18(1), 5–19.

Leithwood, K., Jantzi, D. & Steinbach, R. (1995) An organizational learning perspective on school responses to central policy initiatives, paper presented at the *annual meeting of the American Educational Research Association*, San Francisco (Eric Document Reproduction Service No. 385 932).

Mason, C. & Orkwis, R. (2005) Instructional theories supporting universal design for learning—teaching to individual learners, in: Council for Exceptional Children (Ed.) *Universal design for learning: a guide for teachers and education professionals* (Upper Saddle River, NJ, Pearson Prentice Hall).

Michigan Virtual University (2002) Available online at: http://standards.mivu.org/

National Council on Disability (2004) *Design for inclusion: creating a new marketplace* (Washington, DC, Author). Available online at: http://www.ncd.gov/newsroom/publications/2004/online_newmarketplace.htm#afbad (accessed 6 January 2006).

North Carolina State University (1997) *What is universal design?,* College of Design. Center for Universal Design. Available online at: http://www.design.ncsu.edu/cud/univ_design/ud.htm (accessed 6 January 2006).

Online instructor handbook (2005) University of Washington, Seattle, WA. Available online at: http://www.outreach.washington.edu/teaching/online_handbook_files/home_page.html (accessed 6 January 2006).

Online student handbook: additional resources (2005) University of Washington, Seattle, WA. Available online at: http://www.edoutreach.washington.edu/ol/handbook/resources.asp#disability (accessed 6 January 2006).

Online student handbook: getting started (2005) University of Washington, Seattle, WA. Available online at: http://www.extension.washington.edu/ol/handbook/start.asp#access (accessed 6 January 2006).

Opitz, C. (2002) Online course accessibility: a call for responsibility and necessity, *Education Technology Review,* 10(1). Available online at: http://www.aace.org/Publs/etr/issue2/optiz-xl.cfm (accessed 6 January 2006).

Patrick, D. L. (1996) Correspondence to Senator Tom Harkin, 9 September. Available online at: http://www.usdoj.gov/crt/foia/cltr204.txt (accessed 6 January 2006).

Preiser, W. F. E. & Ostroff, E. (2001) *Universal design handbook* (New York, McGraw-Hill).

Rose, D. H. & Meyer, A. (2002) *Teaching every student in the digital age: universal design for learning* (Alexandria, VA, Association for Supervision and Curriculum Development).

Schmetzke, A. (2001) Online distance education—'anytime, anywhere' but not for everyone, *Information Technology and Disability,* 7(2). Available online at: http://www.rit.edu/~easi/itd/itdv07n2/axel.htm (accessed 6 January 2006).

Scott, S. S. & Gregg, N. (2000) Meeting the evolving education needs of faculty in providing access for college students with learning disabilities, *Journal of Learning Disabilities,* 33(2), 158–167.

Silver, P., Bourke, A. & Strehorn, K. (1998) Universal instructional design in higher education: an approach for inclusion, *Equity and Excellence in Education,* 31(2), 47–51.

Student guidebook: policies and procedures for distanced education classes (undated) University of South Carolina, Spartanburg, SC. Available online at: http://www.uscupstate.edu/academics/distance/guidebook_students.pdf (accessed 6 January 2006).

US Department of Education (1998) *Q&A: Title IV—rehabilitation act amendments of 1998: Section 508: electronic and information technology*. Available online at: http://www.usdoj.gov/crt/508/archive/deptofed.html (accessed 6 January 2006).

US Department of Justice (2000) *Information technology and people with disabilities: the current state of federal accessibility*. Available online at: http://www.usdoj.gov/crt/508/report/content.htm (accessed 6 January 2006).

UW Access Technology Lab (undated) University of Washington, Seattle, WA. Available online at: http://www.washington.edu/computing/atl/(accessed 6 January 2006).

UW Online Learning (2005) University of Washington, Seattle, WA. Available online at: http://www.extension.washington.edu/ol/(accessed 6 January 2006).

University of Wisconsin-Madison continuing education and outreach (2005) The University of Wisconsin-Madison. Available online at: http://www.wisc.edu/outreach/conted.htm (accessed 6 January 2006).

Virtual classroom (2005) Mt. San Antonio College, Walnut, CA. Available online at: http://vclass.mtsac.edu/(accessed 6 January 2006).

Vocational Rehabilitation Act (1973) Pub. L. 93-112, US Code. Vol. 29, § 701 *et seq*.

Vocational Rehabilitation Amendments (1998) Pub. L. 105-220, US Code. Vol. 29, § 794d.

Waits, T. & Lewis, L. (2003) Distance education at degree-granting postsecondary institutions: 2000–2001, US Department of Education, National Center for Education Statistics (NCES 2003-017). Available online at: http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2003017 (accessed 6 January 2006).

Web accessibility: applying ADA principles to online teaching and learning. Cal State, San Marcos, CA. Available online at: http://www.csusm.edu/accessibility/onlinecourses/(accessed 6 January 2006).

World Wide Web Consortium (1999) *Web content accessibility guidelines 1.0: W3C recommendation 5-May-1999*. Available online at: http://www.w3.org/tr/wai-webcontent/(accessed 6 January 2006).

World Wide Web Consortium (2003) *Web content accessibility guidelines 2.0: W3C working draft 24 June 2003*. Available online at: http://www.w3.org/tr/2003/wd-wcag20-20030624/(accessed 6 January 2006).