

# Distance Learning: Universal Design, Universal Access

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Keywords: distance learning, Internet, access, disability, World Wide Web, instruction, class, course, accommodation, technology, universal design, accessibility

## Distance Learning: Universal Design, Universal Access

### Abstract

Distance learning courses offer opportunities for education and career enhancement for those who have access to the technologies they employ. However, many people find themselves on the wrong side of the digital divide that separates those with access to new technologies and those without. Even if they have access to these technologies, some people with disabilities find themselves on the wrong side of a second digital divide that is caused by the inaccessible design of coursework. This paper discusses access, legal and policy issues, and it presents an overview of design considerations for assuring that a distance learning course is accessible to potential instructors and students with a wide range of abilities and disabilities. The field of universal design provides a framework for this discussion. The content of this article can be used to help distance learning programs develop policies, guidelines and procedures for making their courses accessible to everyone.

## Distance Learning: Universal Design, Universal Access

I proudly submitted my newly punched deck of cards to the computer operator in the sterile computer room at the University of Washington. The next day, I picked up my cards with a printout of the successful run of my first FORTRAN program. It worked! I was a math major. Computers solved math problems. Wasn't that enough?

Not today. Together with networking and other advanced technologies, computers allow us to shop, participate in the community, learn about almost anything and communicate with friends and colleagues anywhere at anytime. We have yet to see a limit to the uses for these ubiquitous tools.

In no area of education do we see a greater impact of technology than in the field of distance learning. Offering instruction at a distance is not new. Correspondence courses using printed material have brought together instructors and students separated by great distances for hundreds of years. Televised courses have been broadcast since the early days of television. Some interactive televised courses now bring instructors at one location together with students in several specially equipped classrooms. Online courses, once delivered using only e-mail, are now dominated by web-based instruction. Today, multiple modes of delivery blur the lines between different types of distance learning. For example, the content of a course may be delivered using printed materials and television; course discussion may occur using e-mail; a weekend retreat may bring participants together face-to-face, and resources may

be provided on the World Wide Web. These options make learning available to anyone, anywhere at anytime. Well, almost anyone.

Some people find themselves on the wrong side of the “digital divide” between the technology “haves” and “have-nots.” Computer-based information, communication, services and instruction are less available to those who are poor, live in rural areas, are members of minority racial/ethnic groups, and/or have disabilities (National Telecommunications and Information Administration, 1999; Kaye, 2000). Without access to new technologies, their options for taking courses, teaching courses and pursuing careers are limited. But simple access to technology is not enough. Within the group of “haves,” people with disabilities face a “second digital divide.” This line separates people who can make full use of the technological tools, services and information to which they have access, from those who cannot. Too often, people with disabilities who are on the right side of the first digital divide, still find themselves on the wrong side of this second digital divide (Waddell, 1999).

#### ACCESS CHALLENGES FOR PEOPLE WITH DISABILITIES

The rapid development of assistive technology makes it possible for individuals with a wide range of disabilities to gain access to computers, networking and telecommunications technologies and multi-media products (Closing the Gap, 2001). However, barriers to these technologies persist for people with some types of disabilities. The next few paragraphs provide

examples of access challenges faced by students and instructors in distance learning courses. It is followed by a summary of legal issues, a discussion of principles of universal design, examples of strategies for making distance learning courses accessible to people with disabilities and a list of policy considerations. The content of this article can be used to help distance learning programs develop policies, guidelines and procedures for making their courses accessible to everyone.

### Mobility Impairments

For some people, mobility impairments affect their ability to move their hands. To access a computer and the Internet, they use alternative keyboards and mice, speech control and other input devices to operate navigational tools and access Internet-based course materials. Some students and instructors with mobility impairments do not have the fine motor skills required to select small buttons on the screen. And, if their input method is slow, they cannot effectively participate in real-time “chat” communications. Some students and instructors require wheelchair-accessible locations to attend on-site meetings required in some distance learning courses.

### Visual Impairments

Individuals who are blind often use computers equipped with screen reader software and speech synthesizers. With a synthesized voice, this system reads whatever text appears on the computer screen. They may use a browser that only reads text presented on the World Wide Web or they may use a

multimedia browser with the graphics-loading feature turned off. This type of system cannot interpret graphics. For example, a speech synthesizer may simply say “image map” at the place where an image map would be displayed to someone using the full features of a multimedia Web browser. Text alternatives to graphic images need to be provided at a web site for blind students and instructors to make sense of the content. Printed materials, videotapes, televised presentations and other visual materials also create access challenges for some students enrolled in distance learning courses; tactile materials, audio presentations and electronic text may be required.

Students who are not blind but have limited vision may use special software to enlarge screen images. They view only a small portion of a standard screen page at a time. Consequently, web pages that are cluttered and page layouts that are not consistent from page to page can make navigating web sites and understanding content difficult. Printed materials in standard font sizes may also be inaccessible to students with visual impairments. People who are colorblind encounter barriers erected by coursework that requires that they be able to distinguish one color from another to navigate the site or understand the web content.

### Learning Disabilities

Some specific learning disabilities impact the ability to read, write and/or process information. Some students with learning disabilities that affect their ability to read use audiotaped books. For some, speech output and/or screen

enlargement systems similar to those used by people with visual impairments help them read text on a computer screen. People with some learning disabilities have difficulty understanding web sites when the information is cluttered and the screen layout changes from one page to the next.

### Hearing Impairments

Most Internet resources do not require the ability to hear and are, therefore, accessible to people who are deaf or hard of hearing. However, when web sites include audio output without providing text captioning or transcription, individuals with hearing impairments cannot access the content. The audio content of videotapes that are not captioned is also inaccessible to individuals who are deaf. Deaf students may also be unable to participate in audioconferencing—where several individuals communicate using the telephone at the same time—or videoconferencing sessions unless sign language interpreters or other accommodations are provided.

### Speech Impairments

E-mail and other modes of communication that do not require the ability to speak are fully accessible to students with speech impairments. However, they may not be able to effectively participate in audioconferences that are part of a distance learning course.

### Seizure Disorders

Some attention-grabbing features of web pages include flashes or flickers. Flashes at certain rates (often between 2 to 55 hertz) can induce seizures for

people who are susceptible to them (Architectural and Transportation Barriers Compliance Board, 2000).

### LEGAL ISSUES

Even assuring that individuals with disabilities can participate in distance learning courses, programs not covered by Section 508 can be argued on ethical grounds (Woodbury, 1998). Many people agree that it is simply the right thing to do. Others are more responsive to legal mandates (Waddell & Thomason, 1998).

Section 504 of the Rehabilitation Act of 1973 (U.S. Department of Education, 1973), although it did not specifically address access to technology-based educational offerings, mandated that qualified people with disabilities have access to programs and services that receive federal funds. The Americans with Disabilities Act (ADA) of 1990 reinforced and extended Section 504, requiring that people with disabilities have access to public programs and services, regardless of whether or not they are federally funded (U.S. Department of Justice, 1990). According to this law, no otherwise qualified individuals with disabilities shall, solely by reason of their disabilities, be excluded from the participation in, be denied the benefits of or be subjected to discrimination in these programs and services, unless it would pose an undue burden to do so. A United States Department of Justice ruling (ADA accessibility, 1996) clarified that the ADA accessibility requirements apply to programs offered on the Internet. It stated, "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, these courses must be made accessible to them.

Section 508, which was added in 1986 to the Rehabilitation Act of 1973 and amended in 1998 (U.S. Department of Education, 1998), requires that electronic and information technologies that federal agencies procure, develop, maintain and use are accessible to people with disabilities, both employees and members of the public, unless it would pose an undue burden to do so. The Rehabilitation Act Amendments of 1998 required the U.S. Architectural and Transportation Barriers Compliance Board (Access Board) to develop electronic and information technology accessibility standards to which Federal agencies must comply. The standards provide criteria that determine whether a product is "accessible" (Architectural and Transportation Barriers Compliance Board, 2000). Although the law directly applies to federal agencies, "states which receive federal funds under the Technology Related Assistance for Individuals with Disabilities Act of 1988 are required by that Act to comply with Section 508" (Waddell & Urban, 2001; U.S. Department of Education, 1998).

Even for distance learning programs not strictly required to comply with Section 508, the accessibility standards developed for the federal government can serve as a model as they develop their own policies and guidelines for accessibility. These programs can also benefit from following the leadership of

the federal government in being proactive rather than reactive regarding accessibility issues. This is because some people with disabilities, even if they use assistive technology, cannot access the content of electronic and information technology products—World Wide Web pages, video clips—if they are not designed to be accessible to them. “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” (U.S. Department of Justice, 2000).

#### UNIVERSAL DESIGN OF DISTANCE LEARNING COURSES

Potential students and instructors may have mobility, visual, hearing, speech, learning and other types of disabilities that could impact their participation in many distance learning classes as they are currently designed. For example, people who are blind might apply to teach a Web-based writing course that has been developed without text alternatives for critical content displayed using graphics; if one of them is the best candidate for the job, the program will need to be modified for that person to teach it. Clearly, planning for access as courses are being developed is easier—and therefore less expensive—than developing accommodation strategies once a student with a disability enrolls in or a person with a disability applies to teach a course.

Simple design decisions can be made to assure that a course is accessible to students and instructors with a wide range of abilities and disabilities. This

process is called “universal design.” Universal design 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.”

([http://www.design.ncsu.edu/cud/univ\\_design/ud.htm](http://www.design.ncsu.edu/cud/univ_design/ud.htm)) At the Center, a team of architects, product designers, engineers and environmental design researchers established a set of principles of universal design to provide guidance in the design of environments, communications and products. General principles include: the design accommodates a wide range of individual preferences and abilities; the design communicates necessary information effectively, regardless of ambient conditions or the user’s sensory abilities; the design can be used efficiently and comfortably, and with a minimum of fatigue; and appropriate size and space is provided for approach, reach, manipulation and use regardless of user’s body size, posture or mobility (Anders & Fechtner, 1992).

People with a wide variety of characteristics can use the products developed when designers apply universal design principles. These characteristics include height, age, race, ethnicity, gender, native language and level of ability to hear, see, move and speak. When the wide range of characteristics of potential students and instructors is considered, distance learning course designers create learning environments where all qualified individuals can fully participate, just as architects design buildings that can be

used by everyone, including those who walk with crutches, push baby strollers and use wheelchairs.

Applications of universal design to instruction in general have recently appeared in traditional print media (Bar & Galluzzo, 1999; Bowe, 2000). Most articles and books about distance learning, however, do not cover universal design principles nor address access issues for students and instructors with disabilities (Schmetzke, 2001). However, there are few exceptions (Burgstahler, 1997). The greatest number of articles that focus on the application of universal design to web pages appear in library publications (Schmetzke, 2001). Only a few published works that discuss access issues for people with disabilities cover a wide range of technologies and strategies currently used in distance learning courses (Burgstahler, 2000; Kessler & Keefe, 1999). Comprehensive policies, such as the mandate that distance learning options offered by California Community Colleges must afford students with disabilities maximum access (California Community Colleges Chancellor's Office, 1999) are rare. Few colleges and universities have policies and guidelines that specifically address the accessibility of distance learning tools and resources; most who have guidelines at all deal only with the accessibility of web pages. Not surprisingly, many college, university, library, and other educational web pages are not universally accessible (Schmetzke, 2001).

It is unlikely that a distance learning course will be accessible to students and instructors with a broad range of abilities and disabilities unless the

universal design of its media and technological tools is considered as the course is being developed. The following sections provide examples of considerations for making distance learning accessible to everyone. They will help distance learning course designers begin to think about access issues as they develop their courses. Policy considerations follow.

### On-Site Instruction

The weekend retreats, interactive video sessions and proctored examinations required in some distance learning courses demand that students and instructors attend on-site meetings. In these cases, care should be taken to assure that facilities are wheelchair accessible; that furniture is flexible enough to accommodate wheelchair-users; and that nearby restrooms, telephones and parking spaces are accessible to individuals with disabilities. Instructors should speak clearly and face students who might be lip reading. They should read aloud and describe text and other visual materials for students who cannot see them. All other standard accommodations, such as sign language interpreters and printed materials in alternative format, should be provided upon request.

### Electronic Communication

Text-based resources such as Usenet discussion groups, bulletin boards, e-mail, and distribution lists are fully accessible to students with disabilities, regardless of the assistive technology they use. If a prerequisite to a course is for students to have access to e-mail, then participants can choose to use any software that supports e-mail on the Internet. Therefore, computer access issues

that students with disabilities might face have already been resolved before enrolling in the course. Their own computer systems, perhaps including assistive technology, provide whatever accommodations they need to communicate via e-mail. Communication via e-mail between individual students and course administrators, instructors and fellow students is accessible to all parties, regardless of disability. The syllabus, lessons, assignments and announcements can be delivered using e-mail and “guest speakers” with disabilities can join e-mail-based course discussions without concern about disability-related access issues.

Some distance learning programs employ real-time “chat” communication in their courses. In this case, students communicate synchronously—at the same time, as with telephone communication—as compared with asynchronously—not necessarily at the same time, as is the case with e-mail. Synchronous communication imposes scheduling challenges and is difficult or impossible to use by someone whose input method is slow. For example, those with limited hand use who can only type characters slowly or those with a learning disability who take a long time to compose their thoughts may not be fully included in the discussion. Instructors who choose to use a synchronous tool of this type should be prepared to provide an alternative means of participation, such as e-mail, where all students and instructors can fully participate.

### Web Pages

When universal design principles are applied in their design, web pages are accessible to students and instructors using a wide variety of assistive technology. The Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C), an industry group that develops common protocols that enhance interoperability and guide the evolution of the Web, developed Web Content Accessibility Guidelines (1999) for designing web pages that are accessible to people with disabilities (Chisholm, Vanderheiden, & Jacobs, 1999). More recently, in response to Section 508 legislation, the Access Board created a list of standards for making web pages accessible (Architectural and Transportation Barriers Compliance Board, 2000). Web pages created by and used by the federal government must meet these access requirements. Although not all distance learning programs must comply with these standards, they provide a good model for the design of accessible web-based materials.

To create pages that are accessible to everyone, developers must either avoid certain types of inaccessible features or formats or create alternative methods for carrying out the functions or accessing the content provided through an inaccessible feature or format. For example, providing “alt” tags with descriptive text makes graphics accessible to individuals who are blind. Avoiding page elements that flicker between the 2 and 55 hertz range minimizes the likelihood of inducing seizures (Architectural and Transportation Barriers Compliance Board, 2000). Web pages for a distance learning class should be tested with a variety of monitors, computer platforms and web browsers,

including text-only browsers and multi-media browsers with graphics and audio-loading features turned off. If the web pages still make sense, then most people with sensory impairments can read them, too. Another good accessibility test is to determine if all functions at a web site can be accessed using a keyboard alone. Web sites can also be tested for accessibility using HTML validator programs such as *Bobby* (Center for Applied Special Technology, 2002).

### Printed Materials

Students who are blind or who have specific learning disabilities that affect their ability to read may require that printed materials be converted to Braille, large print, audiotape or electronic formats. Making the text of printed materials available online may provide the best solution for students who have access to the Internet. Their computer-based screen enlargement, Braille and speech output systems can then convert the text to their preferred format.

Graphics and pictures need to be described using text or presented in tactile form for students who are blind.

### Videotapes, Video Clips, Televised Video, and Interactive Video

Ideally, whenever videotapes, video clips or televised presentations are used in distance learning courses, captioning or transcription is provided for those who have hearing impairments. Likewise, audio description— aural description of the visual content—should be provided for those who are blind. If the publisher of a videotape does not make these options available, the distance learning program should have a system in place to accommodate students who

have sensory impairments. Obtaining a transcript of the content in an accessible format from the publisher is one option that should be considered. This option may be less expensive than hiring someone local to a blind student to describe visual material or arranging for a sign language interpreter to describe audio material for a student who is deaf. Real-time captioning—developed at the time of the presentation—or sign language interpreting should be provided when requested by deaf participants attending videoconferences. Speakers in videoconferences should also be careful to fully describe visual materials for students who cannot see them.

For video and multimedia products, distance learning programs can use the policy of the federal government as a model. Section 508 guidelines state: “All training and informational video and multimedia productions which support the agency’s mission, regardless of format, that contain speech or other audio information necessary for the comprehension of the content, shall be open or closed captioned. [Note: Open captioning means the captioning appears on the media at all times; closed captioning requires special equipment that is standard on new televisions.] ... All training and informational video and multimedia productions which support the agency’s mission, regardless of format, that contain visual information necessary for the comprehension of the content, shall be audio described.” (Architectural and Transportation Barriers Compliance Board, 2000)

### Audioconferencing

Audioconferencing is used in some distance learning courses for communication in small groups. Without accommodation, this mode of communication is inaccessible to students who are deaf. One option for including a deaf student in an audioconference is to provide him with a speakerphone and a sign language interpreter at his location. Using the public relay service—where a hearing person translates voiced content and transmits it to the deaf student via a TTY text device; the student who cannot speak can also submit text for the relay worker to voice to the group—may work in some situations. However, this method is often too slow to allow the student to fully participate. When audioconferencing is available for small group discussions in a distance learning course, it is desirable to give students an alternative method—for example, to conduct the discussion online—that is accessible to everyone in the group.

In all cases, when access barriers occur, an instructor should consult with the student about the best accommodation for him. Students with the same disability may require very different accommodation options.

### Benefits of Accessible Design to People without Disabilities

People without disabilities may have situational limitations that are similar to the limitations imposed by disabilities. For example, a student for whom English is a second language experiences reading challenges similar to those experienced by people with specific learning disabilities; a distance

learning instructor working late at night may prefer a noiseless system while other members of the household are sleeping, creating a situation similar to that experienced by people who are deaf; a student who cannot access graphics because of computer system or Internet connection limitations faces challenges similar to those who are blind.

Applying universal design principles assists many people without disabilities. For example, using clear and simple language and navigational mechanisms on web pages benefits students and whose primary language is not the one in which the course is taught. Captions provided for pictures and video clips on web pages assist people who work in environments that are noisy or noiseless and people for whom English is a second language. People with slow Internet connections, who use older equipment or who have turned off support for images on their browsers to maximize access speed benefit when text alternatives are provided for content presented using multimedia. Similarly, speech output systems benefit people operating computers in the dark and those who cannot view the screen because they must attend to other tasks. Making sure that information conveyed with color is also available without color benefits students who use monochrome monitors. Providing multiple formats to present content addresses the needs of students with a variety of learning styles.

#### DEVELOPING A DISTANCE LEARNING ACCESSIBILITY POLICY

Programs that offer distance learning options should develop policies and procedures that assure that their offerings are, as legally required, accessible to individuals with disabilities. Libraries, university departments, museums and other groups who offer content used in instruction should take steps to assure that their materials are accessible. It is difficult to develop policies in an area where technological changes occur constantly. How can an organization begin the process of developing its policies, procedures and guidelines? Considerations should include the following.

- Make sure that all stakeholders, including potential students and instructors with disabilities, are represented as accessibility policies, procedures and guidelines are being developed.
- Review policies and guidelines that have been created by other organizations, such as the California Community Colleges.
- Develop a policy statement that commits the organization to making programs, services and resources accessible to people with disabilities.
- Articulate access challenges that may face potential participants with disabilities in the context of the programs, services and/or resources offered and the tools used for their delivery.
- Consult with legal experts to fully understand the requirements for program, information, and service accessibility mandated by the ADA and other legislation relevant to your organization.

- Develop guidelines for all media, tools and strategies used in the distance learning courses; consider Section 508 standards as a model as appropriate.
- Assign a person or a department within the organization to be responsible for updating disability-related program access policies and guidelines and assuring compliance throughout the organization.
- Disseminate accessibility policy, guidelines and procedures throughout the organization.
- Provide regular training and support regarding accessibility issues.
- Consider developing a plan to phase in compliance with program accessibility guidelines for previously developed courses, with a date at which all programs will be compliant.
- Regularly evaluate progress toward accessibility.
- Besides taking proactive steps to assure accessibility, develop procedures for responding quickly to requests for disability-related accommodations.

## CONCLUSION

Punch cards are long gone. Computers still solve math problems. But they do so much more. Let's make sure that they do as much for people with disabilities as they do for others. Designed correctly, distance education options create learning opportunities for everyone. Designed poorly, they erect barriers to equal participation in academics and careers for potential students and instructors with disabilities. Employing universal design principles as we create

technology-based distance learning courses can bring us closer to making learning accessible to everyone, everywhere, at any time. Together, we can eliminate the second digital divide.

## REFERENCES

- Anders, R., & Fechtner, D. (1992). *Universal Design*. Brooklyn, NY: Pratt Institute Department of Industrial Design and Pratt Center for Advanced Design Research.
- ADA (1996). ADA accessibility requirements apply to Internet Web pages *The Law Reporter*, 10(6), 1053-1084.
- Architectural and Transportation Barriers Compliance Board (2000). Electronic and information technology accessibility standards: Final rule. *Federal Register*, 36 CFR Part 1194, December 21. Retrieved from the World Wide Web February 18, 2002: <http://www.access-board.gov/sec508/508standards.htm>
- Bar, L., & Galluzzo, J. (1999). *The accessible school: Universal design for educational settings*. Berkeley, CA: MIG Communications.
- Bowe, F.G. (2000). *Universal design in education*. Westport, CT: Bergin & Garvey.
- Burgstahler, S.E. (2000). Access to Internet-based instruction for people with disabilities. In Petrides, L.A. (Ed.), *Case Studies on Information Technology in Higher Education* (pp. 76-88). Hershey, PA: Idea Group.

Burgstahler, S. (1997). Teaching on the net: What's the difference? *T. H. E.*

*(Technology and Higher Education) Journal*, 24(9), 61-64.

Center for Applied Special Technology (CAST) (2002). *Bobby* [software].

Peabody, MA: Author. Available <http://www.cast.org/bobby/>

Chisholm, W., Vanderheiden, G., & Jacobs, I. (Eds.) (1999). *Web content*

*accessibility guidelines*. World Wide Web Consortium Web Accessibility

Initiative. Available <http://www.w3.org/TR/WAI-WEBCONTENT>

Closing the gap (2001). *Closing the Gap 2001 resource directory* [Online]. Retrieved

from the World Wide Web February 18, 2002:

<http://www.closingthegap.com/rd/index.html>.

California Community Colleges Chancellor's Office (1999). Distance education: Access

guidelines for students with disabilities. Retrieved from the World Wide Web

February 18, 2002:

<http://www.htctu.fhda.edu/dlguidelines/final%20dl%20guidelines.htm>

Kaye, H.S. (2000). *Disability and the digital divide*. University of California, San

Francisco, Disability Statistics Center. Retrieved from the World Wide

Web February 18, 2002:

[http://www.dsc.ucsf.edu/UCSF/pub.taf?\\_UserReference=AB0505502005](http://www.dsc.ucsf.edu/UCSF/pub.taf?_UserReference=AB0505502005)

[BBEBBF46A6E5&\\_function=search&recid=118&grow=1](http://www.dsc.ucsf.edu/UCSF/pub.taf?_UserReference=AB0505502005BBEBBF46A6E5&_function=search&recid=118&grow=1)

Kessler, D., & Keefe, B. (1999). Going the distance. *American School and University*,

7(11), 44-46.

National Telecommunications and Information Administration (1999). *Falling through the net: Defining the digital divide*. Retrieved from the World Wide Web February 18, 2002: <http://www.ntia.doc.gov/ntiahome/fttn99/>

Schmetzke, A. (2001). Online distance education: 'Anytime, anywhere' but not for everyone. *Information Technology and Disability Journal*, 7(2). Retrieved from the World Wide Web February 18, 2002: <http://www.rit.edu/~easi/itd/itdv07n2/axel.htm>

U.S. Department of Education (1973). Section 504 of the Rehabilitation Act of 1973. 29 U.S.C. Section 794. Retrieved from the World Wide Web February 18, 2002: <http://www.ed.gov/offices/OCR/docs/auxaids.html>

U.S. Department of Education (1998). Q&A: Title IV – Rehabilitation Act Amendments of 1998. Section 508: Electronic and Information Technology. Retrieved from the World Wide Web February 18, 2002: <http://www.usdoj.gov/crt/508/archive/deptofed.html>

U.S. Department of Justice (1990). Americans with Disabilities Act of 1990 104 STAT. 327. Retrieved from the World Wide Web February 18, 2002: <http://www.usdoj.gov/crt/ada/statute.html>

U.S. Department of Justice (2000). Information technology and people with disabilities: The current state of federal accessibility. Section II, Introduction. Retrieved from the World Wide Web February 18, 2002: <http://www.usdoj.gov/crt/508/report/content.htm>

Waddell, C.D. (1999). The growing digital divide in access for people with disabilities: Overcoming barriers to participation in the digital economy.

*Understanding the Digital Economy Conference*, May. Available

[http://www.icdri.org/the\\_digital\\_divide.htm](http://www.icdri.org/the_digital_divide.htm)

Waddell, C.D., & Thomason, K.L. (1998). Is your site ADA-compliant ... or a lawsuit-in-waiting? *The Internet Lawyer*, 4(11). Available:

<http://www.internetlawyer.com/>

Waddell, C.D., & Urban, M.D. (2001). An overview of law and policy for IT accessibility: A resource for state and municipal IT policy makers.

International Center for Disability Resources on the Internet. Retrieved from the World Wide Web February 18, 2002:

[http://www.icdri.org/an\\_overview\\_of\\_law\\_.htm](http://www.icdri.org/an_overview_of_law_.htm)

Web Content Accessibility Guidelines (1999). World Wide Web Consortium.

Retrieved from the World Wide Web February 18, 2002:

<http://www.w3.org/tr/wai-webcontent>

Woodbury, M. (1998). Defining web ethics. *Science and Engineering Ethics*, 4, 203-212.

## RESOURCES (SIDEBAR )

To learn more about creating accessible distance learning courses, the following resources provide a good place to start.

Americans with Disabilities Act ADA Home Page

<http://www.usdoj.gov/crt/ada/adahom1.htm>

Captioned Media Program

[www.cfv.org](http://www.cfv.org)

Center for Applied Special Technology (CAST) Universal Design for Learning

<http://www.cast.org/udl/>

The Center for Universal Design

<http://www.design.ncsu.edu/cud/index.html>

Closing the Gap

<http://www.closingthegap.com>

DO-IT

<http://www.washington.edu/doi>

EASI (Equal Access to Software and Information)

<http://www.rit.edu/~easi>

Falling Through the Net

<http://www.digitaldivide.gov>

International Center for Disability Resources on the Internet

<http://www.icdri.org>

The Internet Lawyer

<http://www.internetlawyer.com/>

National Center for Accessible Media (NCAM)

<http://main.wgbh.org/wgbh/pages/ncam/>

National Center for the Dissemination of Disability Research

<http://www.ncddr.org/>

Recordings for the Blind and Dyslexic

<http://www.rfbd.org/>

Trace Research and Development Center

<http://www.trace.wisc.edu/world/>

Web Accessibility Initiative of the World Wide Web Consortium

<http://www.w3.org/WAI/>

WebABLE

<http://www.webable.com/>

Section 504 of the Rehabilitation Act

<http://www.ed.gov/offices/OCR/docs/auxaids.html>

Section 508 Standards of the Access Board

<http://www.access-board.gov/sec508/508standards.htm>

#### ACKNOWLEDGEMENT

This article is based upon work supported by the National Science Foundation (grant # 9800324) and the U.S. Department of Education, Office of Postsecondary Education (grant #P33A990042). Any opinions, findings and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of Federal government. Much of the content of this article is similar to that in a publication at [www.washington.edu/doi/Brochures/Academics/distance.learn.html](http://www.washington.edu/doi/Brochures/Academics/distance.learn.html).

### Author Bio

Dr. Sheryl Burgstahler directs project DO-IT (Disabilities, Opportunities, Internetworking and Technology) at the University of Washington. DO-IT promotes the success of students with disabilities in postsecondary programs and careers. DO-IT employs technology to help young people with disabilities achieve success in postsecondary education and careers. It sponsors programs that increase the use of assistive technology and promote the development of accessible facilities, computer labs, electronic resources in libraries, Web pages, educational multi-media and Internet-based distance learning programs. DO-IT has been the recipient of many awards, including the National Information Infrastructure Award in Education, The President's Award for Mentoring, the Golden Apple Award in Education, and the AHEAD Program Recognition award. DO-IT is funded by the National Science Foundation, the U.S. Department of Education, the State of Washington, corporations, foundations and private donors.

Dr. Burgstahler has published dozens of articles and delivered presentations at national and international conferences that focus on the full inclusion of individuals with disabilities in postsecondary education, distance learning, work-based learning, and electronic communities. She is the author or co-author of six books on using the Internet with pre-college students. Dr. Burgstahler has extensive experience teaching at the pre-college, community college, and university levels. She is Assistant Director of Information Systems

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Her Ph.D. Dissertation was on computing services for students with disabilities in higher education.