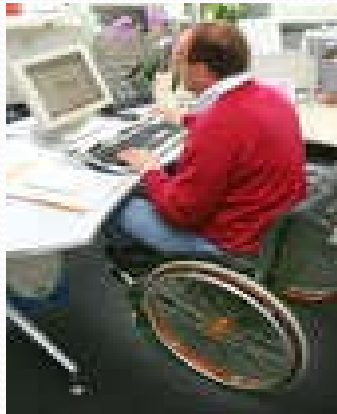


# Accommodating Learners with Disabilities in a Distance Education Environment

Anne Elisa Hanson







# Table of Contents:


- Introduction
- Defining Learners with Disabilities
- Legislation
- Basic Requirements for Providing Access
- Available Technologies
- Implications
- Conclusion
- References


# Introduction

- Distance Education provides access to postsecondary education for many students with disabilities that may not have been able to attend more conventional classes.
- Flexibility in the location, scheduling, and delivery of distance education programs is a large reason disabled students choose DE.


- 
- In addition to improving access, students with disabilities should receive the support they require to ensure success in their studies.
  - Studies show that postsecondary students with disabilities who receive appropriate support services persist in their studies and graduate at the same rates as their non-disabled counterparts (Horn & Berktold, 1999).


- 
- Keeping up in an online class, and participating in the development of a group project online, can create *huge obstacles* for disabled learners.
  - Individuals with visual, motor, or learning disabilities constantly encounter the challenging predicament of attempting to use computer files, software, and Web sites that are not accessible.


- 
- With proper accommodations, the distance education (DE) environment can be markedly more efficient for the disabled learner than the conventional, face-to-face setting.
  - The development of learning management systems (LMS) via open-source software (OSS) methods enhances the online environment for disabled learners.

- 
- For more than three decades, students with disabilities have been attending postsecondary institutions in both Canada and the United States in increasing numbers.
  - In the United States, services for students with disabilities are mandated by legislation and programs for ensuring access for students with disabilities are common.




- 
- Because technology is used to communicate in online learning environments, it can cause issues for students with disabilities. While the technology can be adapted or designed to include individuals with disabilities, inadequate or lack of any accessible design can impose new barriers to full participation in educational opportunities.

- 
- People with low vision, those who are blind, who have cognitive limitations, or who have limited physical mobility may have great difficulty in utilizing these online learning opportunities.
  - Students with disabilities can benefit from distance learning due to multimedia forms of communication like text, video, audio, and synthetic speech.
  - Thoughtful planning by the teacher or online course developer that incorporates or facilitates the use of these types of technologies can make online learning a successful experience for all learners.

- 
- Since most of distance-learning courses are web-based, the web design must ensure that audio, graphics, and video clips are accessible to people with sensory or cognitive disabilities. For example, a deaf student will not be able to access the audio or video clips unless the audio portion is also provided in captioned format. A blind student or a student who has learning disabilities will not be able to navigate a web page that is not coded to convey web content to text browsers and screen readers.


# Defining Learners with Disabilities

- Many distance students do share broad demographic and situational similarities.
- Variables exist such as age, gender, ethnic background, disability, location, and life roles.
- U.S. federal law prohibits requiring students to identify themselves as disabled on application forms.

- 
- Obtaining accurate statistics on the number of disabled students enrolled in DE courses is largely impossible.
  - The U.S. Census Bureau (2000) categorized 19.3% (or 49,746,248 people) of the U.S population as having some sort of disability.

# Legislation

- Due to legislation efforts, educational institutions are obligated to comply with civil rights laws, such as Sections 504 and 508 of the Rehabilitation Act and Titles II and III of the Americans with Disabilities Act when designing online learning resources.
- At the federal level, requirements for access for persons with disabilities were first imposed by Section 504 of the Rehabilitation Act of 1973, and its accompanying regulations.


- 
- Similar requirements were later imposed on all public entities, regardless of whether or not they receive federal funding, by the Americans with Disabilities Act and the regulations implementing Title II of the ADA.
  - The United States Department of Education, Office for Civil Rights (OCR) is responsible for ensuring that all educational institutions comply with the requirements of all federal civil rights laws, including Section 504 and Title II of the ADA.


# Basic Requirements for Providing Access


The following is a brief summary of the general principles that should be followed in ensuring that distance education courses are accessible to students with disabilities.

- 1. One of the primary concepts of distance education is to offer students "Learning anytime, anywhere."
- 2. Distance education resources must be designed to provide "built-in" accommodation where possible (i.e. closed captioning, descriptive narration) and/or interface design/content layout which is accessible to "industry standard" assistive computer technology in common use by persons with disabilities.



- 
- 3. Whenever possible, information should be provided in the alternative format preferred by the student.
  - 4. Adoption of access solutions which include assigning assistants (i.e. sign language interpreters, readers) to work with an individual student to provide access to distance education resources should only be considered as a last resort when all efforts to enhance the native accessibility of the course material have failed.

- 
- 5. Access to distance education courses, resources and materials include the audio, video and text components of courses or communication delivered via satellite, Instructional Television Fixed Services (ITFS), cable, compressed video, Local Area Network/Wide Area Network (LAN/WAN networks), Internet, telephone or any other form of electronic transmission.
  - 6. Distance education courses, resources and materials must be designed and delivered in such a way that the level of communication and course taking experience is the same for students with or without disabilities.

- 
- 7. After the adoption date of these guidelines resources must be accessible to students with disabilities unless doing so would fundamentally alter the nature of the instructional activity.
  - 8. Colleges are encouraged to review all existing distance education curriculum, materials and resources as quickly as possible and make necessary modifications to ensure access for students with disabilities.


- 9. In the event that a discrimination complaint is filed the Chancellor's Office and the U.S. Department of Education , Office for Civil Rights will not generally accept a claim of undue burden based on the subsequent substantial expense of providing access, when such costs could have been significantly reduced by considering the issue of accessibility at the time of initial selection.

- 10. In all cases, even where the college can demonstrate that a requested accommodation would involve a fundamental alteration in the nature of the instructional activity or would impose an undue financial and administrative burden, it must nevertheless provide an alternative accommodation which is equally effective for the student.
- 11. Ensuring that distance education courses, materials and resources are accessible to students with disabilities is a shared college responsibility.

# Available Technologies


- *ATutor 1.4* is a standards-compliant, Web-based Learning Content Management System (LCMS). Its developers claim that *ATutor* is the only fully accessible LCMS software on the market, allowing access to all potential learners, course developers, instructors, and administrators, including those with disabilities who may be accessing the system using assistive technologies. Research conducted for this report did not reveal any other software with the same functionality for accessibility. Users have some control with regard to development, use, and distribution of the software.


- Numerous features help to equalize the learning experience for disabled learners. For example, accessibility preference configurations, synchronous text-based communication via *AChat-PHP*, text alternatives for images, and adaptive navigation facilities including bypass options that skip over non-essential navigation elements in order to go directly to content. The product is available in 12 international languages, with 42 other language packs currently in development.

- 
- Using these features, disabled learners can participate fully in learning course content and can collaborate with their peers in an online environment. Whether for disabled or non-disabled learners, content developer, or course administrator, *ATutor* is an excellent tool for distance education learners.
  - As with *ATutor*, *ACollab* is available in an increasing range of languages, and is comparable with costly commercial alternatives.




- ***ACollab*** is a collaboration tool for integration with *ATutor*. *ACollab* enables full participation for learners and system administrators using assistive technology, with accessibility features similar to those of *ATutor*. *ACollab* contains tools allowing users to share resources, schedule activities, and work together on documents via the Drafting Room. Collaboration tools shared with *ATutor* include Discussions, *AForum*, *AChat*, Inbox, Private and Public messages, and file sharing. Various forms of Help are available, including *HowTo* documentation, public forums, and a multi-lingual interface.

- 
- *Just Vanilla* is an online service that provides a customizable website interface assisting all users, particularly visually impaired, to use the Internet. The “Access Gateway” provides access to other websites by using *Just Vanilla* as a “browser,” while maintaining personal preferences, such as color, text size, etc. This feature provides all users with a faster method for performing research on the Internet.


- 
- An easy-to-use Navigation Bar
  - Choice of background color (though no background images)
  - Variable fonts: bold, increase/decrease size, upper and lower case options in body text
  - Minimal graphics, but alternative text attribute descriptions applied with essential images
  - No frames (except “chat” and “gateway” if preferred)
  - No scrolling, moving or flashing text
  - No plug-ins (e.g., Shockwave/ Flash content)

- The add-on software *Vanilla Talk* provides audio options. It is very easy to install, and opens in a browser display with a top menu of neon green buttons on a black background. *Vanilla Talk* is operated by combinations of six hot keys. Clicking the Speak button voice-enables content on any chosen webpage and on the text-based navigation buttons.

- 
- When clicked, each menu button describes the action it was performing - e.g., the Back button 'says' aloud: "Go back. The title of the page is . . . ." Slight errors were made on some words, and punctuation was not necessarily followed - e.g., pauses in places that did not require them, which affected comprehension of the content slightly.

# Low Vision


- Students with vision impairments may not be able to read the characters displayed on the screen because of their size or color. This category of software modifies the video process in the computer enabling the student to control the size of the text generated on the screen. Most software in this category allow for flexible control of text size.

- 
- The larger the text becomes however, a smaller portion of the entire screen the student is able to see, requiring the student to control a scrolling process which provides access to the entire screen. Also, color contrast can be used to increase legibility. The display colors can be inverted so the text is white and the background is black.

- **ZoomText Plus (Win):** Ztwin is a standard Windows application program. Ztwin is a software based large print display program, which magnifies both text and graphics. It is compatible with the majority of commonly used Windows applications. Ztwin can adjust text magnification to 16x either horizontally, vertically or both.



- Also, it is able to track the movement of the mouse cursor, the text caret, menus, or keyboard-controlled selection of Windows controls, such as buttons, check boxes, and radio buttons. The tracking options may be used separately or in combination. The program contains a wide array of options that benefit persons with low vision. Scrolling of enlarged text is smooth and very controllable.

- 
- ***Natural Voice*** -Developed by AT&T, this software's *Text-to-speech Reader* software converts text to spoken words enabling users to listen to text rather than reading it. The user can choose between several human-sounding voices.
  - **Closed Circuit TV (CCTV):** Text magnifier.

# Screen Readers

- They work in conjunction with either a speech synthesizer or certain sound cards to provide verbalization of everything on the screen including menus, text, punctuation, and graphical buttons. This software makes a computer accessible to limited or no vision students, for it can be used with a scanner to provide access to printed material, confirm keystrokes, and commands without needing to look at the screen.

# Specialized Word Processing Software

- Many disabled students are very slow using the keyboard. Generating a word processing document may be an extremely time-consuming process as a result. Software exists to help with this problem. Whether as a stand alone word processing program, or as a word prediction program which works on top of an existing word processing program, this type of software reduces the keystrokes necessary to produce a document.

- With this software running, as a student types, based on the keystrokes entered, the program "guesses" what word the student is trying to type, and displays these guesses at the top of the screen. If the student notices one of the guesses is the actual word that they are trying to generate, a single keystroke selects and enters it into their document. It is claimed that such software reduces keystroking by 75%.


- **HandiWORD (Win):** HandiWORD is a statistically weighted word predictor which can save keyboard input time. HandiWORD learns what words are used most often and adjusts itself to predict those words first. The more HandiWORD is used, the more it learns to "think" like the user. In addition to the extensive dictionary that is provided with HandiWORD, the user can add and remove words.

- **WiVik Rate Enhancement Pak (Win):**  
this is a word predictor much like HandiWORD. However this is an option which blends with the on-screen keyboard WiViK.

# Blind Student Adaptive Devices

- There are several hardware and software solutions available for blind or severe sight impaired students.
- **Megadots:** This is a word processor that is also a Braille translator. It can be used with a screen reader for typing. The text can be printed as Braille or ink print. It contains a user-friendly spell check and can import and translate DOS and Windows word processor documents. It offers grade I and 2 Braille. It contains Braille paragraph style help menus.



- 
- **Tactile Image Enhancer:** This is a high quality graphical embosser. It raises images so they can be felt. It can be used to raise images, which can not be translated into Braille like pictures, or music scores, or mathematical graphs.
  - **Braille Output:** The High Tech Center has the equipment to produce Braille documents.

- **TeleSensory Versapoint:** This Braille Embosser prints at a rate of 40 characters per second, and it allows for various paper sizes and weight. Its memory can hold up to 30 Braille pages. And, it can print sideways.
- **Braille Translator:** This software transfers computer generated text into Braille data. It creates a Braille version of the original text file, which can be embossed.

# Reading Machines

- A reading machine transforms printed material into an electronic data form that is read by a speech synthesizer.
- **Kurzweil:** This is a stand-alone reading machine, which incorporates a scanner, speech synthesizer, and other components into a single unit. It has voice type and speed control as well as punctuation and tone control. It can easily read books, handouts, and printouts. It can scan, recognize, and store up to thirty pages before beginning to read. Its control pad is the size of a numerical keypad.

# Pointing Devices

- Students with severely limited hand mobility or limited speech may be able to use a pointing device to access a computer. A pointing device or typing aid is typically a wand or stick used to strike keys on the keyboard. They are commonly worn on the head, held in the mouth, strapped to the chin, or held in the hand. They can be used with alternate keyboards such as an on-screen keyboard which can be accessed with a track ball or a head mouse.

- **Head Master:** Head master is for students who are unable to use their hands but have good head control. Head master replaces the mouse with a head set. The headset moves the mouse cursor on the screen. All mouse actions can be performed with it. A puff switch or other switches perform the mouse button clicks. In order to enter text, an on screen keyboard like WiViK is needed.

- **WiViK:** WiVik is an on screen keyboard that enables students to type with any Windows pointing device (such as a Headmaster, track ball, mouse, etc) in any Windows application. Keys are selected by pointing to the keyboard and clicking or dwelling. The keyboard is a movable, resizable window. It has word predication with the rate enhancement package.
- **Gyro-Mouse:** This device is designed to provide reliable mouse manipulation for people with disabilities.

# Speech Recognition

- **DragonDictate for Windows:** DragonDictate is a large vocabulary, speech-recognition system. It lets you enter commands and dictate text with speech. DragonDictate can be used with most Windows applications and Windows itself. It can work with a keyboard, mouse, or completely hands free. The dictation is done with short pauses between words. It can reach dictation speeds of up to 35 words per minutes.

- **Dragon Naturally Speaking:** Dragon Naturally Speaking is a speaker dependent, continuous speech recognition system. The active vocabulary size is 30,000 words with a 230,000-word dictionary, which allows for accurate word prediction and spelling. Text can be dictated at around one hundred words per minute at very high levels of accuracy. This program is recommended for persons with repetitive strain injury or moderate to severe physical disabilities.



# Implications

- Of the institutions offering distance education courses, 18 percent indicated that they followed established accessibility guidelines or recommendations for users with disabilities to a major extent, 28 percent followed the guidelines to a moderate extent, 18 percent followed the guidelines to a 'minor extent, 3 percent did not follow the guidelines at all, and 33 percent did not know if the web sites followed accessibility guidelines (Hoffman 2005).

# Conclusion

- For the most part, distance education students with disabilities can get the equipment they need to make up for their impairments. Blind students can use software that reads on-line text aloud or produces a Braille message for the students to follow and students who cannot move their arms easily can use adaptive equipment to manipulate the computer with other parts of their bodies.(Carnavale 1999).
- There is still much to be done if virtual classrooms are to be held to the same accessibility standards as conventional classrooms.

- For the answers to questions about assistive technology (AT), to demonstrate a new device, preview software, or locate a new way to present augmentative communication symbols, find the nearest Assistive Technology Resource Center(s) (ATRC). Every state has at least one ATRC.
- Most ATRCs offer individual or group training, a loan library, and a physical lab to view and explore options for augmentative communication, software and devices.
- Much of what colleges can do to make Web pages accessible is fairly simple. But making sure that the education disabled students get is equivalent to that received by other students requires more effort--and maybe more cash.

# References

- Ashton, Tamarah M. (2006). "Assistive Technology". *Journal of Special Education Technology*. Norman: Fall 2006. Vol. 21, Iss. 4, p. 55-57 (3 pp.)
- Carnevale, D. (1999). "Colleges Strive to Give Disabled Students Access to On-Line Courses." *The Chronicle of Higher Education*, October 29, 1999.
- Carnevale, D. (2003). "Congress May Boost Online Programs That Aid Students Who Have Disabilities". *The Chronicle of Higher Education*. Washington: Nov 28,. Vol. 50, Iss. 14, p. A.34
- Farrell, G. (2003). *COL LMS Open Source*. Vancouver, BC.: Commonwealth of Learning. Retrieved November 20, 2007 from: <http://www.col.org/Consultancies/03LMSOpenSource.htm>
- Bob Hoffman, Kendall Hartley, Randall Boone. (2005). "Reaching Accessibility: Guidelines for Creating and Refining Digital Learning Materials". *Intervention in School and Clinic*. Austin: Jan 2005. Vol. 40, Iss. 3, p. 171-176 (6 pp.)
- Horn, L., & Berktold, J. (1999). *Students with disabilities on postsecondary education: A profile of preparation, participation and outcomes*. (NCES 1999-187). Washington, DC: US
- Los Medanos College. *Disabled Students Programs and Services*. Retrieved December 10<sup>th</sup> 2007 from: <http://www.losmedanos.edu/hightechcenter/software.html>

- Moisey, Susan D . (2004). “Students with Disabilities in Distance Education: Characteristics, Course Enrollment and Completion, and Support Services”. *Journal of Distance Education*. Ottawa: Spring 2004. Vol. 19, Iss. 1, p. 73-91 (19 pp.)
- Richardson, John T. E., Long, Gary L., Foster, Susan B. (2004). “Academic Engagement in Students with a Hearing Loss in Distance Education”. *Journal of Deaf Studies and Deaf Education*. Cary: Winter 2004. Vol. 9, Iss. 1, p. 68
- Smith, Sean J., Meyen, Edward L.. (2003). “Applications of Online Instruction: An Overview for Teachers, Students With Mild Disabilities, and Their Parents”. Focus on Exceptional Children [H.W. Wilson - EDUC]. Feb 2003. Vol. 35, Iss. 6, p. 1-15
- Thompson, Melody M. (1998). "Distance Learners in Higher Education." In Chere Campbell Gibson, ed., *Distance Learners in Higher Education: Institutional Responses for Quality Outcomes*. Madison, WI: Atwood Publishing, pp. 10-18.