

E-learning Accessibility

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Application-Focused Learning Objectives

- Articulate reasons why accessibility is important in e-learning (e.g., stimulate job opportunities). This knowledge is helpful when speaking with colleagues who are less familiar with disability issues and who need to be persuaded to devote resources to accessibility.
- Describe frequently encountered accessibility barriers in e-learning courses (e.g., assistive technology does not read course text). Such examples are instructive when collaborating with technical designers of online training who previously were unaware of problems faced by people with disabilities in using e-learning systems.
- Develop accessible e-learning applications. Utilize Section 508 Standards (e.g., provide keyboard equivalents in software) as well as additional usability guidelines (e.g., provide font adjustability).
- Ask 3 evaluation questions to vendors about accessibility of their e-learning products (i.e., accessibility requirements, product features, testing reports). Procurement officials who are not experts in e-training may use these basic requests for information to feel confident that accessibility has been considered in courseware design.

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PART 1 – SECTION 508

What is the Access Board?

- Independent Federal agency
- Promotes accessible design for persons with disabilities
- Provides technical assistance and training
- Promulgates accessibility guidelines under the ADA and other laws
- Issued Federal standards (Section 508) that ensure comparable access to people with disabilities in the use of information technologies (IT), such as: websites, software, telecommunications products, computers and multimedia videos. Applies to procurement and development of e-learning.

(**POINT:** Section 508 Standards were developed through an open and inclusive rulemaking process and can be used by anyone designing e-learning training, even if you are not with a federal agency.)

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

Why is Section 508 Important in e-learning?

- Supports education and employment of people with disabilities
- Encourages improvements in accessible design (i.e., “raises the bar”)
- Increases availability of accessible products (i.e., make it for one, sell it to all)
- Enhances product usability (e.g., everyone appreciates consistency in page layout)
- Raises awareness in those who previously were not faced with addressing disability issues

Why design accessible courseware? (business perspective)

- Reach a larger audience
- Demonstrate social responsibility
- Attain a competitive advantage
- Meet possible regulatory obligations. IT accessibility is gaining popularity (e.g., adoption by states and colleges, even other countries)

(**POINT:** From a strategic planning standpoint, it is wise to realize that consumers will eventually expect e-learning accessibility, if they are not already demanding it, and laws or policies may also be a driving force.)

Link to list of state IT accessibility initiatives (dated research):
<http://accessibility.gtri.gatech.edu/sitid/stateLawAtGlance.php>

PART 2 – INTEROPERABILITY: ACCESSIBILITY AND AT

Accessibility vs Accommodation

- Accessibility is technology-centered; Accommodations are person-centered
- Accessibility occurs before the fact; Accommodations happen after the fact
- Accessibility focuses on mainstream technologies; Accommodations primarily focus on assistive technologies

(POINTS: The goal in accessibility is, from the start, to design an e-learning application to be usable by all, not to wait until you receive a special accommodation request or complaint before beginning to address it. The part of the solution we are focusing on is in the design of the e-learning application, not in the provision of special technology to the person with a disability.)

Some assistive technologies (AT) used with e-learning.

- *Screen readers:* Software products designed for users with visual and learning disabilities. Screen readers vocalize information on the computer screen for the user using text-to-speech audio hardware and software.
- *Refreshable braille displays:* Tactile devices that move small pins up and down to create braille letters. These displays are the primary means of access to computers for users who are deaf-blind.
- *Screen magnifiers:* Assistive software that allows users with low-vision to enlarge the size of images and text displayed on screen, and to permit users to change the default colors of the display.
- *Speech recognition:* Assistive software that allows users to input data and control the computer by speaking. Benefits people unable to use their hands.
- *Single switches* (e.g., puff-n-sip switch): Hardware solutions for users with physical disabilities who can only control the computer with one or two specific movements.

(POINT: AT may not work effectively if not used within an accessible e-learning application. Simply providing a student with AT is insufficient if the technological learning environment is overlooked.)

Consider 3 types of access in design specifications:

- Communication access (e.g., in video/voice conferencing systems)
- Information access (e.g., in computer and web-based training)
- Physical access (e.g., in handheld device interfaces)

(POINT: Accessible e-learning helps people with a variety of disabilities including: hearing, speech, vision, dexterity and cognition.)

PART 3 – ACCESS ISSUES WITH LEARNING TECHNOLOGIES

Problem areas of e-learning systems

- The learning management system
- A proprietary player
- The course itself
- Incompatibility with a particular version of assistive technology

Online education technology barriers can be found in:

- Collaboration tools such as e-mail, listservs, bulletin boards, whiteboards, and chat rooms;
- Interactive environments such as simulations and games; and
- Evaluation tools including self-assessment and multiple-choice testing.

Examples of reported difficulties in web-based courses:

- Pictures are used as “hot spots”, but are not labeled and do not have a corresponding control in the menu
- Text is embedded in a graphic image in such a way that it is not rendered to a screen reader as text, but as a graphic
- On-line help does not stand on its own as a description in text, but is instead dependent on graphics
- Text is placed on a patterned background, making it difficult for people with low vision to see
- The course requires users to simultaneously monitor two or more events occurring far apart from each other on the screen
- Videos are shown without synchronized captions for people who are deaf. This applies to live webcasts as well as prerecorded video.
- Using color coding as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element. (Problem for people who are color blind.)

JAVA and Accessibility

- JAVA is a programming language used in creating e-learning courses
- E-learning courses developed using JAVA may not work with assistive technology and may override user selected display attributes
- The JAVA Access Bridge developed by Sun Microsystems can be used during courseware development to help make courses accessible. (See: <http://java.sun.com/products/accessbridge/>)

PART 4 – ACCESSIBLE DESIGN IN E-LEARNING

Two Basic Approaches to Accessibility

- *Directly accessible.* Advantage: Built-in speech output can be heard by all courseware users, even those without expensive add-on screen readers.
- *Compatibly accessible.* Advantage: Course can be read by users utilizing their individual AT customized to personal preferences (e.g., favorite voice in screen reader).

(**POINT:** Either strategy is allowable as a method of accessible design in online distributed learning. Some companies created built-in speech as a way of addressing difficulties in designing for AT compatibility.)

Principles of Accessibility in Online Distributed Learning

Adhere to these guidelines from the outset of the design process, since retrofitting an inaccessible product is often significantly more difficult, labor-intensive and expensive.

1.) *Allow for Customization Based on User Preference*

Some examples of items that can be customizable by the users fall into two categories:

Customizable display elements, such as:

- Font, font style, font color, and font size.
- Cursors size, style, and blink rate.
- Size of text and images, including video.
- Screen layout, colors, and backgrounds.

Customizable interface features, such as:

- Timing of events. (For example, dialog boxes and alerts should remain on screen until they are cleared by the user.)
- Keyboard settings

2.) *Provide Context and Orientation Information*

Application developers should design their products to:

- Teach users how to navigate.
- Inform the user of the length of the document. For example, page numbers can be expressed as "Page X of Y pages".
- Provide a way for users to skip standard page headers and navigation links. Users who are already familiar with the page layout should be able to skip directly to the primary content.
- Maintain a consistent layout between pages.
- Provide alerts/text warnings whenever a new browser window will be automatically opened.

3.) Provide Equivalent Access to Auditory and Visual Content

To make applications accessible to those with hearing disabilities developers and instructors should:

- Caption all auditory content (required in multimedia video)
- Provide a text transcription of auditory content (required when the content is audio only, such as during a conference call on in an audio file)
FYI: Example of a conference call captioning service: <http://www.fedrcc.us>

For users with visual disabilities, developers of learning technology should:

- Add text descriptions (alternative text or alt-text) to all static images (e.g. pictures, logos, charts, links, other graphics) so the text can then be read by assistive technology.
- Utilize the "longdesc" attribute for images that have useful content and require more lengthy descriptions.
- Provide audio description tracks for multimedia, describing visual aspects of the content.

4.) Provide Complete Keyboard Access

- Developers should provide complete keyboard access to all elements of an application and its content, including menus, help directories, toolbars, and dialog boxes.
- In other words, never assume that all users can operate a mouse.

5.) Follow Relevant Specifications, Standards, and/or Guidelines

- IMS specifications are open technical specifications for interoperable learning technology. (See: <http://www.imsglobal.org>)
- Developers within the online distributed learning industry should adopt these broad guidelines to help ensure that applications, software, and content conform to standard operating system protocols, and thus making it more likely that assistive technologies will be able to operate with them.
- These specifications continue to evolve and will include additional, specific sections intended to improve accessibility of online distributed learning technologies.

6.) Consider the Use of XML

- XML (Extensible Markup Language) is ideal for solving interoperability problems and therefore lends itself to accessibility.
- Assistive technologies often require interoperability between the application delivering the actual course content and the specialized application (adaptive software) used by a learner with a disability to access that content.
- XML allows presentation content to be transformed to meet the individual needs of users with disabilities, even if the author didn't consider those transformations.

PART 5 – ASSURANCE OF ACCESSIBILITY

Roles and Responsibilities

Even if a vendor has made all features of an authoring environment accessible, and has provided the tools that support creating accessible courseware, there is no guarantee that a course author will take advantage of them. Therefore, in order to make learning technologies accessible to everyone, all parties must share responsibility.

Stakeholders include:

- Courseware and software vendors
- Educational publishers
- Authors/content developers
- Educational institutions (including administrators)
- Instructors
- Administrative staff
- Users (students/employees/members of the public)
- Government agencies
- Accessibility consultants

You Don't Have to be an Expert

There are three basic questions you can ask a vendor when you are considering purchasing their product. Even if you do not have the skills or resources to test the product, this may help you determine whether the developer considered accessibility in the product design.

1.) *Which specific provisions from Section 508 apply to your product?*

To prove that they read these design requirements, ask them to supply you with a Voluntary Product Accessibility Template (VPAT). This is a chart listing the 508 Standards, indicating which requirements they think apply to their product.

(See: <http://www.buyaccessible.gov/>)

2.) Which accessibility features of your product serve as evidence of conformance to the 508 standards?

If they claim, for example, that the product conforms to provision 1194.21(d), then they should be able to show you that “sufficient information about a user interface element including the identity, operation and state of the element is available to assistive technology”. For example, a screen reader would be able to tell someone who is blind that a particular checkbox has been selected.

3.) If you documented your product evaluation, may we have a copy of your test report?

In early stages of the product development lifecycle, you may wish to discuss accessibility test methods with vendors, so they know what to expect.

CAPTCHA Accessibility

(completely automated *public Turing test* to tell computers and *humans* apart)

This issue is relevant to the following 508 requirement: “*ensure that textual information shall be provided through operating system functions for displaying text*”.

A CAPTCHA is a program that can generate and grade tests that most humans can pass, but current computer programs can't pass. For example, humans can read distorted text as the one shown below, but current computer programs can't:



NSF

Should websites use an audio CAPTCHA as well as a visual one? Absolutely! Audio CAPTCHAs help ensure that people with visual disabilities are not inadvertently filtered out of websites

To hear an audio CAPTCHA, try setting up an account with Google and click on the symbol of the wheelchair:

<https://www.google.com/accounts/NewAccount?hl=en&cd=GB&service=groups2&continue=http%3A//groups.google.co.uk&followup=http%3A//groups.google.co.uk>

The CAPTCHA Project is a project of the School of Computer Science at Carnegie Mellon University: <http://www.captcha.net/>.

Place holder for in-class demonstration



Audio description & captioning



Relevant 508 provisions:

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.

All training and informational video and multimedia productions that support the agency's mission, regardless of format, that contain visual information necessary for the comprehension of the content, shall be audio described.

Discussion Questions

- Do we have to remediate our legacy system?
- If a system works with some AT, but not all brands/versions, is that a 508 violation?
- What is “content essential for comprehension”?
- Does 508 apply to IPods and podcasts?
- Where can I get a list of 508-certified products?
- How do I make PDFs accessible?
- Does receipt of federal funding require us to follow 508?
- We don’t have any students (or employees) with disabilities, so can we take a pass on accessibility?
- Can we exempt a password protected site/course from accessibility requirements? (We believe that no one with a disability will enter it.)
- Can I just state “contact me for alternative formats” instead of making a website accessible?
- If an e-learning application does not meet all the accessibility requirements, can I buy it anyhow?
- Should I use COTS* web evaluation and repair tools?
(*COTS = commercial off the shelf)
- Where can I find an accessibility consultant?
(Consider using the Accessibility Consultant Chooser:
http://www.ittatc.org/technical/ACC/i_ACC_Intro_Page.php?sid=6407f003ea4f88c5665bc78a74372ada)
- How should we deal with pushback? (A misconception that accessible design is always difficult and expensive)

Job Aid for Accessible Design in E-learning

- Ensure that administrative matters such as course registration and course listings are accessible
- Provide accessible installation instructions
- Ensure access to menus and time allocations
- Provide accessible on-line product support help
- Ensure that when e-learning software is installed, it does not disrupt or disable accessibility features of other products.
- Ensure that e-learning applications offer keyboard equivalents
- Provide text equivalents for graphics (e.g., "alt tags" for images)
- Design tables for navigation (label row and column headers)
- Ensure fillable forms are labeled and navigable
- Provide alternatives for multimedia content (i.e., captioning and audio description)
- Ensure that testing protocols are flexible enough to enable all learners to complete assessments (e.g. set timed responses to provide a warning with a means of extending time).
- Ensure that "drag and drop" questions provide an alternative means of responding for people who don't use pointing devices
- Provide a well-defined on-screen indication of the current focus so that assistive technology can track focus and focus changes.
- When animation is displayed, provide the information in at least one non-animated presentation mode displayable at the option of the user.
- When a product permits a user to adjust color and contrast settings, provide a variety of color selections capable of producing a range of contrast levels.
- To minimize the occurrence of photoepileptic seizures, ensure that content using blinking elements has a flash frequency greater lower 2 Hz or higher than 55 Hz.
- Title frames with text that facilitates frame identification and navigation
- Design pages with consistent look and feel
- Confirm page name as soon as it is loaded
- Design tables for logical reading order
- Provide scalable fonts (relative, not absolute)
- Provide "mind maps" (and site maps)
- Group options in the same vicinity when offering selections to minimize the need for scrolling
- For hardware, such as student clickers, ensure that controls and keys are: tactilely discernable and operable with one hand without tight grasping, pinching or twisting of the wrist. In addition, the status of all locking or toggle controls or keys shall be visually discernible, and discernible either through touch or sound.
- Ensure accessible text chat in online conferencing/collaboration systems