



I. T. Accessibility Toolkit

Developing Accessible E-Learning

Version 1.0

Developing Accessible E-Learning v1.0

What is Accessible e-Learning?

E-learning is defined as self-paced, web-based training and instructor-led virtual training.

Accessibility, as it relates to e-learning, means that your e-learning course should be accessible to a variety of users—for example, learners with disabilities, the aging population, and those for whom English is a second language. Simply put, this means that information must be provided in a format that does **not** rely on a **single** sense or ability.

Accessibility considerations also apply to virtual classrooms and on-line, instructor-led training. Virtual classes must also be designed and delivered in a way that does not force a learner to rely on a single sense or ability.

For example, a person with a hearing impairment may not receive the full benefit of a virtual e-learning experience if audio is the only vehicle through which the instructor interacts or provides information.

Benefits of Accessibility for E-learning Providers

You may believe that accessibility is not an issue for your audience. However, there are a number of reasons why **you**--as a course designer, developer, or on-line instructor--will benefit by building accessibility into your instructional offerings. These include:

- Meeting regulatory standards.
- Reaching a broader audience.
- Demonstrating social responsibility.
- Increasing your own effectiveness as an e-learning provider.

Meeting Regulatory Standards

Accessibility is gaining increasing regulatory and legislative importance world-wide. Key legislation defining standards for the accessibility of electronic and information technology and web-based applications include [Section 508 of the Rehabilitation Act of 1973](#), [Section 255 of the Telecommunications Act](#), and other state and international legislation, including the [Commonwealth of Virginia Information Technology Accessibility Standard](#) (GOV 103-00) and the [Commonwealth of Virginia Web Site Standard](#) (GOV 106-00).

Reaching a broader audience

There are approximately 54 million people with disabilities in the United States, and the number of people with disabilities is expected to keep rising. This translates into approximately 2.5 million individuals with disabilities in Virginia who benefit from the use of accessible technology.

In many cases, the same methods used to accommodate persons with disabilities can also benefit others—for example, those working from low-bandwidth connections, PDA's, closed captioning, cell phones, and small pocket computers.

By considering accessibility when designing and developing your courses, you will reach more people.

Advantages of Accessible E-learning for Learners with Disabilities

It is also helpful to think about and understand the benefits of accessible e-learning for persons with disabilities. By keeping these benefits in mind, you will be better able to maximize benefits in your distance learning offerings. Some of these benefits are listed below.

Developing Accessible E-Learning v1.0

- **No travel required:** E-learning provides an attractive option for those who have difficulty travelling. Synchronous and asynchronous e-learning also offers the following benefits:
 - **Synchronous training:** Virtual classroom/instructor led training allows collaboration with peers, and access to an instructor, facilitator or subject matter expert (SME) without the need to travel to a classroom. “Synchronous” means that a group of learners participate in training at the same time.
 - **Asynchronous web-based training:** Stand alone courses or web-based training is usually self-paced and allows learners to progress through a course at their own speed. “Asynchronous” means that learners may initiate and progress through a course when they wish.

Additional benefits of accessible e-learning:

- **Training tailored to individual learner needs:**
Developed correctly, e-learning works with assistive technologies to provide speech and Braille output, closed captioning, screen magnification, and other aids for learners. These assistive technologies can be utilized by each learner according to his or her own specific need.
- **Anonymity:**
E-learning allows those with disabilities to choose whether to reveal their disability to the instructor or fellow learners.
- **Enhanced effectiveness of training:**
In many cases, a course designed and developed for accessibility enhances the effectiveness of training for all learners, because it accommodates the multiple ways in which information is absorbed.

Benefits of providing accessible e-learning:

Accessible e-learning allows organizations to recruit and retain employees with disabilities as well as the aging workforce. Accessible e-learning allows organizations to attract new talent and maintain their investment in their high performance knowledge workers. In short, accessible e-learning can be more than a compliance goal; it can also be a competitive advantage.

Accessibility is a crucial component of web-based and on-line training. By designing and developing for accessibility, you provide benefits not only for your audience, but for yourself as an e-learning professional.

Disabilities that can benefit from Accommodation in an E-learning Context

There are several types of disabilities that should be considered when presenting information in an electronic or online format for distance learning. These include:

- Blindness and Vision Impairments
- Deafness and Hearing Impairments
- Speech Impairments
- Mobility Impairments
- Multiple Disabilities

Assistive Technologies

There are a number of assistive technologies (AT) available to facilitate “electronic” communication and training. Some examples are listed below.

Developing Accessible E-Learning v1.0

For blindness and visual impairments:

- **Augmented Output Devices**
 - Screen readers (JAWS, Window Eyes)
 - Screen Magnification (MAGic, ZoomTEXT)
 - Braille displays
- **Augmented Input Devices**
 - Voice recognition (Dragon Naturally Speaking)
 - Alternative Keyboards
 - Alternative pointing devices

For hearing impairments:

- **Visual representation** of auditory information via closed-captioning, graphics, and similar technologies.

For speech impairments:

- **People with speech impairments** may communicate using an Alternative Augmentative Communications (AAC) device that speaks out loud as they enter text via a keyboard or by pressing buttons on a Pocket PC or Tablet PC with specialized software.
- **Multiple assistive technologies** should be used where possible to accommodate those with multiple disabilities.

For Mobility Impairments:

- **Alternative keyboards** and pointing devices can also be used by those with mobility impairments. The most common mobility assistive devices include head pointers, mouth sticks, voice activation, eye activation, mouse keys, and sticky keys (Windows feature).

Designing to the Standards

Designing for accessibility is a challenging yet rewarding endeavor. The challenge is not to diminish sound instructional design, but rather to enhance it.

Impact on instructional design requirements

The primary goal for designing an accessible web-based training course is to meet accessibility standards without sacrificing educational goals. This means you must do your best to ensure that:

- All learners are able to access all content required to master the course objectives;
- All learners are able to complete the assessments;
- Your course includes a provision for learner interaction to assist all learners in achieving mastery of instructional material.

Interactivity improves effectiveness

Interactivity may be one of the most important elements in instructional design. Interactivity enhances the learning experience and aids in the retention of information.

However, highly interactive content may fail to meet accessibility requirements. Conflicts between interactive training elements and assistive technologies may render the training inaccessible to some users. Before you give up, consider the definition of "[interactivity](#)" and why interactivity works to improve learner performance.

Developing Accessible E-Learning v1.0

Designing for interactivity

Common interactive tools are: analogies, examples, and scenarios. When utilizing these techniques for engaging the learner, ask yourself:

- How useful are the analogies?
- How useful are the literal examples?
- How useful are the scenarios?

When possible, avoid analogies, examples, or scenarios that are exclusive to non-disabled learners. For example:

Understanding accessibility is like:

- **riding** a bike
- **seeing** the sun rise every morning
- **hearing** a Mozart concerto

These are not analogies that aid in learning or comprehension and may exclude some learners. Again, thinking about accessibility concerns often result in an overall enhancement of your instructional design.

Assessments and learning checks as an interactive tool

Assessments or practices within a lesson or topic may be the ultimate way in which to create interactivity. When creating these, it is important to choose formats in which all learners can demonstrate their level of mastery. Avoid complex tests or assessments that require learners to spend more time figuring out the questions versus selecting their responses. Also avoid tests that rely on manual dexterity or complex response mechanisms that may exclude learners with disabilities.

To reinforce the value of assessments and learning checks be sure to provide feedback that will be meaningful for the largest number of learners possible. Ensure that you can check for mastery and provide remediation if needed.

Increase effectiveness

Instructional designers can increase the effectiveness of accessible e-learning materials by utilizing:

- Accessible on-line help
- Alternative text for images
- Appropriate color and contrast
- Accessible and consistent navigation
- Interactive elements that can be integrated with assistive technologies
- Tool tips
- Mind maps
- Closed captioning for audio/video materials

Depending on your responsibilities as a designer, not all of these elements may be under your control. However, ensuring that they are available will enhance the value of your course.

Accessible On-line Help should be:

- Easy to Access
- Easy to Navigate
- Easy to Search
- Available to Print

Graphics and “alt” text

One of the responsibilities of developers is ensuring that all non-text elements have alternate text. Questions developers should ask include:

- Do all Graphics have Alt Tags or Alt Attribute?
- Do text descriptions convey the same information that is communicated by the corresponding images?
- Do images, movies, sounds, and applets have Alt Tags?

As a designer (whether or not you are responsible for creating alternate text), it is critical that you keep this requirement in mind. Think about what information you choose to convey via graphical versus textual means. If you believe a visual or graphical representation will enhance learning, think about how and if it can be described in alternate text. At the same time, some graphics are gratuitous and, therefore, may not need alternative text. When this is the case, a “null” Alternative Tag is used, which provides you with some flexibility in your use of graphics.

Charts are often a very efficient way of presenting information as they combine the benefits of textual information with a visual, almost graphical, layout that reinforces connections and relationships between various pieces of data. However, charts are primarily of use to sighted individuals. When using charts, consider the following:

- Is there an equivalent alternative for presenting essential information?

The amount of alternative information to provide depends on the contextual use of the chart or graph. The best practice is to include all information available to a sighted individual in an alternative format. As a designer, you must consider whether this is feasible and be ready to provide information in both formats.

Use of appropriate color and contrast

When designing learning checks, assessments, or interactive elements that rely on color, remember that one out of every twelve American men is colorblind. Consider the following example:

“Click the green button to win a car or the red button to erase your hard drive.”
(see graphic)

Ask yourself:

- Is Color used as a unique marker to emphasize text, button or tasks?
- Does the Text have inadequate contrasts with background color or pattern?

If the answer to either of these questions is “yes,” reconsider your approach.

Audio & Multimedia: Considerations for developers

- Is there a distinction between the transcript and a description of multimedia content?
- Captioning (closed or opened¹)
- Transcription

Make sure that any information that is conveyed via Audio or multimedia format is available in a text format via captioning (closed or open) or transcription.

¹ The term "open captions" generally refers to captions that are always rendered with a visual track; they cannot be turned off. The term "closed captions" generally refers to captions that may be turned on and off.

Video: Questions developers should ask

- Does the description summarize:
 - visual information
 - video action
 - settings
 - situations
 - characters

If, as a designer, you choose to use multimedia as a method of delivery, ensure the content you provide is suitable and that accessibility standards can be applied.

Developing an accessibility e-learning plan

Step 1: Conduct a Learner Analysis

As previously discussed, define the target population, subject area competency, attitudes, basic skills and language level characteristics, and learning preferences. Consider other possible deficiencies or special needs. The characteristics of your audience will affect how you structure student learning objectives and assessments as well as pacing and delivery methods.

Step 2: Perform a Learner Task Analysis

Specify the main tasks or skills the learner is expected to master upon completion of instruction.

Accessibility checklist/questions to ask: Does the task or skill require reliance on a specific sense or ability?

Step 3: Create Performance Objectives

Objectives must be designed in such a way that they are measurable—in other words, achievement of the objective by the learner can be concretely assessed within the context of your course. Objectives should be attainable by all learners—including learners with disabilities.

Accessibility checklist/questions to ask:

- Do your objectives measure specific mobility skills or rely on a single sense or ability to achieve? (if so, change)
- Do your objectives use “sense” words—for example, “after **viewing** a list of images, the learner will..... “ (if so, change)

Step 4: Design Performance Measures (practices and learning checks)

In Web-based trainings (WBTs), assessments or learning checks should be designed in such a way as to enable all learners to complete them without sole reliance on physical or sensory ability.

Accessibility checklist/questions to ask:

- If images or diagrams are used in assessments, are they accessible to visually impaired?
- Do “drag and drop” questions provide an alternative means of responding by learners who may have a mobility impairment?
- Are forms properly labeled and easily navigated?

Developing Accessible E-Learning v1.0

Step 5: Select Instructional Strategies

Remember what you have learned so far when choosing instructional strategies. Remember to include accessibility in your design of:

- Analogies, examples, scenarios
- Assessments and practices
- Reflective exercises
- Use of color, graphics, and charts.

Step 6: Determine Delivery Methods

Delivery can be web-based, CD, or downloadable.

Step 7: Solicit feedback and evaluation

Solicit input and feedback from developers, IT (other departments?), and learners with disabilities to evaluate technological feasibility (integration with assistive technologies, IT requirements, etc.)

Common Barriers for Course Developers

Once the content of a course has been designed, developers must ensure that the course content accommodates accessibility considerations. Common barriers include:

- Images that do not have “alt” text
- Complex images or video that do not have adequately designed description
- Tables that do not read correctly
- Frames that are meaningless
- Poorly labeled or navigated forms
- Pages with absolute font sizes that cannot be changed easily
- Lack of captions for audio/video elements

Rules of Thumb for Course Developers

Following are accessibility rules of thumb:

- Ensure that accessible on-line help and installation instructions are available.
- Utilize accessible and consistent navigation.
- Use tool tips.
- Provide “mind maps.”
- Develop “alt” text for all images, graphics, and multimedia.
- Provide alternatives for audio/video including closed captioning or transcripts.
- Ensure all interactive elements are accessible.
- Check appropriate use of color and contrast.
- Identify language changes.
- Create “text only” pages when accessibility cannot be achieved through other methods.
- Avoid flickering and blinking content.
- Accommodate for timed responses.
- Identify row and column headers for tables and charts.
- Ensure frames are meaningful.
- Use relative font sizing.

Developing Accessible E-Learning v1.0

Accessible and consistent navigation

The guidelines for creating accessible and consistent navigation include the following:

- Design pages with a consistent user-interface (UI)².
- Confirm page name as soon as it is loaded.
- Minimize the need for scrolling.
- Group options in the same vicinity when offering selections.

Alternatives for multimedia

Transcripts

When pure audio/video methods are chosen as a means of delivering instruction, accessible user controls must be provided. From a development perspective, the Media Player object must be included in a table. Enter the name of the video .asx file as the value of the "Filename" parameter for the object and as the value for the SRC attribute of the <embed> tag. Always provide a **transcript** of the narration.

The primary guideline for transcripts is to ensure that the transcript delivers the same information as provided via audio or visual means.

For more information on developing accessible content, please refer to "Developing Accessible Software Applications and Content".

² In computer science and human-computer interaction, the *user interface (of a computer program)* refers to the graphical, textual and auditory information the program presents to the user, and the control sequences (such as keystrokes with the computer keyboard, movements of the computer mouse, and selections with the touchscreen) the user employs to control the program.