

Accessibility and Computers

Computers as Technology

All technology carries strengths and weaknesses, but some groups feel these more than others. While technology can foster equity, it can also be the driving force of inequity if implemented without considering everyone's needs. Because computers are used so widely, we must pay attention to how people with disabilities are affected.

Different disabilities also affect the usage of computers in different ways. For example a person with a hearing impairment might have different accessibility needs than a person with a visual impairment. We are going to examine these disabilities and how they interact with computers:

- Hearing Impairment
- Mobility and Touch Issues
- Visual Impairment

Furthermore, we will look at how biometric security measures can be incompatible with some disabilities.

What is Web Accessibility in 60 seconds!

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Let's talk about web accessibility and the importance of it in 60 seconds! Technology must be equally accessible for people with and without disabilities, so...

VIEW ON YOUTUBE >

Learning Objectives

At the end of this module, you will be able to:

- 1 Describe how hearing, visual, mobility and touch impairment can affect computer usage
- 2 Apply equitable design practices to computer program design
- 3 Identify design elements that are not accessible
- 4 Describe how biometric security is not accessible

Hearing Impairment

People with hearing impairments have some degree of hearing loss. This can range from mild to profound, which means some people with hearing impairments are completely deaf, while others are hard of hearing and retain some level of hearing.

When we design programs that are accessible to people with hearing loss, the most important thing to remember is that a well-designed program is a program where hearing isn't necessary. Obviously, there are some exceptions to this, such as programs that edit audio and video, but it is still a good rule of thumb.

A well designed program is a program where **hearing isn't necessary.**

Many of the tools we design for people with hearing impairments are also useful for other groups! For example, many people with autism enjoy TV shows and movies with subtitles because they have trouble with auditory processing. Furthermore, programs that don't rely on sound are more accessible for people who have to use a computer without sound. Some people may not have access to speakers or headphones, or they have to use a computer at the library, which makes sound-based programs difficult to use.

Mobility and Touch Impairment

Mobility and touch impairments affect the way that some people move and interact with the world. This type of impairment covers a wide range of disabilities including arthritis, amputation and reduced dexterity.

While technology can provide new ways of interacting with the world for people with mobility and touch impairment, it can also be a barrier for some. It is important to remember that some users may struggle to use a mouse and keyboard, and that many of the technologies used to mitigate this can still be difficult.

Vision Impairment

Vision impairments describe disabilities that affect a person's ability to see. It is important to remember that not everyone with a vision impairment is blind, so we must design accordingly.

Unfortunately, computers, by their very nature, often require reading from a screen, and many people with vision impairments will not be able to see shapes or read text on a screen. In order to assist people with visual impairments, tools such as text-to-speech software, adjustable brightness and zoom, braille keyboards, and speech-to-text have been developed. People with visual impairments rely on these tools to be able to use computers so it is very important to consider these tools when making any computer program.

While these tools are powerful new developments in technology, they are not a fix-all. Many of these tools will still struggle with poorly designed websites. For example, many websites and documents

have poorly organized text that makes it difficult for text-to speech programs to use. Images without alt-text give visually impaired people no option to experience images. The last thing to consider is that listening to text often takes much longer than reading it.

Pictures of Text

Pictures of text (rather than text) present a huge problem for people with visual impairments. These pictures are very popular across the internet and within businesses, but unfortunately they are impossible for text-to-speech readers to read. Furthermore, these images can become pixelated when zoomed in which also makes it difficult to read for people who have less severe vision impairments.

Best practice would be to not include these images at all, but if one is absolutely necessary, be sure to include alt-text with all the relevant information so that text-to-speech readers can be used.

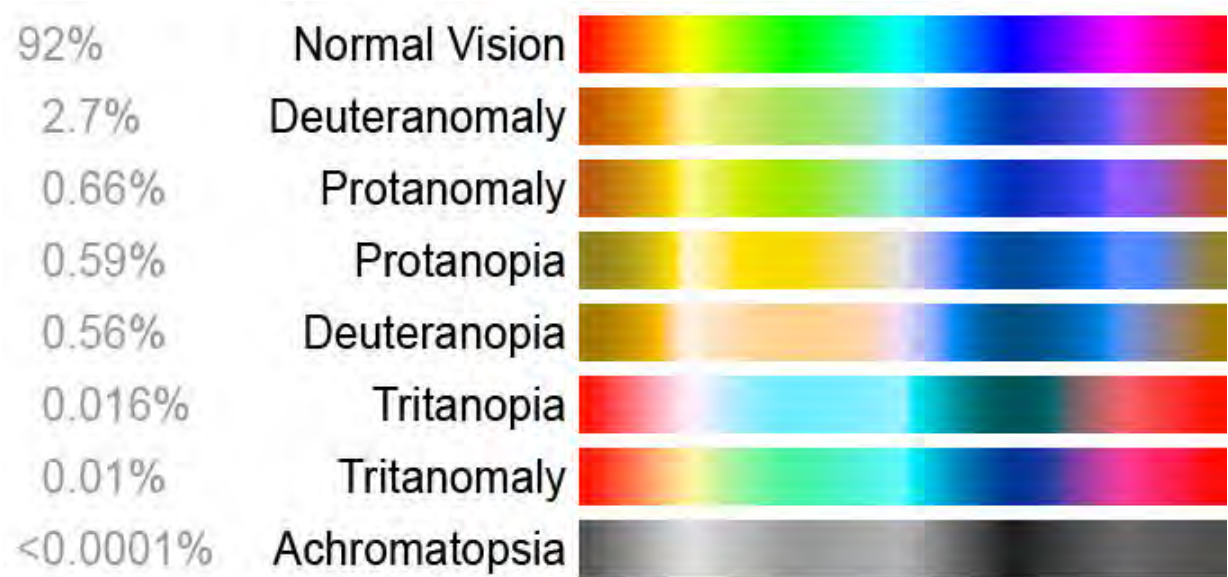


An image with the text "Hello World". This is to demonstrate that sighted people are able to read this image, but a person with visual impairment who is using a text-to-speech program will not be able to read this image.

Color Blindness

Color blindness is a disability in which an individual has varying degrees of difficulty distinguishing between certain colors. Color blindness is important to consider due to the fact that nearly 8% of men and about 0.5% of women are affected by it.

There are many different types of color blindness that range from not being able to tell red and green apart to being unable to distinguish any color at all. The most common type is red-green color blindness.



An image showing the colors that different spectrums of color blindness can see.

- 92% Normal Vision
 - 2.7% Deuteranomaly
 - 0.66% Protanomaly
 - 0.59% Protanopia
 - 0.56% Deuteranopia
 - 0.016% Tritanopia
 - 0.01% Tritanomaly
 - < 0.0001% Achromatopsia
-

Biometric Security

Biometric security uses parts of a person's body instead of, or in addition to, a traditional password to login to an account. Some examples include:

- Face recognition
- Fingerprint scanning
- Hand geometry readers
- Iris and retina scanning

Biometric security will always restrict who can use the service because biometric security requires access to certain body parts that some people will not be able to provide. For example, someone with a hand injury may not be able to provide fingerprints.

What Can You Do?

As educators, our job is to make sure ALL of our students can access our materials in the fullest way possible. Therefore, it's on us to make sure our computer-based materials are accessible for all students. Here's a list of some Do's and Don'ts:

- **DO** create documents that are structured. Using chapters, sections, headers, and other named parts will make it easier for text-to-speech programs to follow the flow of the document

- **DO** supply alternate text for any pictures you want to use in a website, presentation or any other document
- **DO** use tools like the Check Accessibility tool in PowerPoint and Word.
- **DO** use a site like [TopTal](#) to check websites you create or assign to be sure that they're usable by people with color blindness.
- **DO NOT** make pictures of text. If you make a graphic with text on it, stay away from file formats like JPG, PNG, and GIF. Instead use PDFs which will usually be able to be read by text-to-speech programs.
- **DO NOT** rely on colors to convey meaning. For example, a person who is color blind will not be able to tell the difference between a green "go" sign and a red "stop" sign.

Some Activities

Below is a list of some activities that will help you think about accessibility and how frustrating interacting with inaccessible technology could be.

Activity 1

Open up your favorite video game and turn off the sound completely. Play the game for a while and reflect on whether it was easier or harder to play. How much easier or harder was it?

Activity 2

Try to use your computer with only your mouse and no keyboard. Then try to use only your keyboard. Finally, try using your computer only using Siri or Cortana. How difficult was it to use your computer with each restriction?

Activity 3

Pick a couple websites that you use frequently. Navigate to [Toptal](#) and view each of them through the different color blindness filters. Are any of them hard to read or understand?

Activity 4

Look through your email from the last two weeks and see if you can find an email where someone has sent you an image of text. Did they supply a text description or alternate text?

Activity 5

Think of some new upcoming technologies that you are excited about (VR headsets, 3D displays, etc.). For each one, answer the following questions:

- What disabilities might make using this technology impossible?
- What disabilities might make using this technology more difficult, even if it's not impossible?
- Would the widespread adoption of this technology give any particular groups advantages or disadvantages?

Lesson 2 of 2

Knowledge Check

A quick knowledge check on Accessibility and Computers

Question

01/03

A person with a hearing impairment is completely deaf and a person with a visual impairment is completely blind

True

False

Question

02/03

Which if the following increase accessibility for people with visual, auditory, etc. issues.

- Keyboards
- Text-to-speech programs
- Subtitles
- Alt-text
- The Check Accessibility tool in Word

Question

03/03

Which choice is not accessible?

- An image of text
- An image with alt-text
- A document that is structured