DISABILITIES AND  
ASSISTIVE TECHNOLOGY

# Introduction:

This chapter will begin with a general overview of the various categories of disabilities, specifically the four disabilities the course will focus on. Then it will briefly introduce four classes of assistive technology related to those disabilities. The following chapters will address specific assistive technology packages.

# Disabilities:

There are four basic classifications of disabilities that are discussed in this chapter. They are: blindness, low vision, learning disabilities, and orthopedic disabilities. There are other disabilities that are addressed by assistive technology (i.e. speech and hearing impairments), but they will not be the focus in this course.

Keep in mind that the criteria for classifying disabilities, as discussed in this chapter, are specifically for the purposes of exploring assistive technologies. The definitions of disabilities in this chapter are not those used for legal, medical, or any other purpose.

## Blindness:

People are classified as blind when they can not read enlarged materials. They may or may not have some sight, but that is not the only criteria used in determining whether or not to classify them as blind. If materials can be enlarged enough to be read and still be practical, then the person is generally not classified as blind. Again, this criterion is only for the purposes of identifying and selecting appropriate assistive technology. It is not for legal, medical, or any other purpose.

## Low Vision:

Low vision is distinguished by the ability to read enlarged print. A person with low vision cannot read standard print since it is too small. However, print can be read when enlarged through some type of magnification device, by increasing the print of a document through the word-processor's font size controls, or on a photo copier.

## Learning Disabilities:

Learning disabilities cover a wide range. A basic definition of a learning disability is a brain disorder, that does not effect intelligence, but does interfere with the brain’s ability to process reading, language, and math skills. Learning disabilities are often confused with developmental disabilities, but they are quite different. While developmental disabilities do effect intelligence, learning disabilities do not. In fact, individuals with learning disabilities typically have average or above intelligence levels.

The main learning disabilities that are addressed by the assistive technology available on this campus are reading and language. The assistive technology that is available will assist students in reading printed materials or in writing and proof reading a document on the computer.

## Orthopedic Disabilities:

An orthopedic disability is any type of physical disability which effects motion. An orthopedic disability can make it difficult for a person to type on a standard computer keyboard or use a standard pointing device. Orthopedic disabilities include, but are not limited to: carpal tunnel, arthritis, amputation, and paralysis.

# Disability Law and Assistive Technology:

The Rehabilitation Act of 1973 was the first civil rights law prohibiting discrimination based on disability in any program or activity receiving Federal financial assistance. Section 504, subpart E of the Rehabilitation Act deals with post-secondary education and addresses issues such as: recruitment, admittance, general treatment of students, housing, financial/employment assistance to students, and academic adjustments which include auxiliary aids. Auxiliary aids include assistive technology. This law says “auxiliary aids” may include but are not limited to: sign language interpreters, taped texts, notetakers, readers, and other assistive technology such as talking calculators, electronic readers, computers equipped with voice synthesizers, braille printers, computer keyboards with large keys, adapted gym equipment, reachers for library use, raised line drawing kits, or assistance in filling out forms.

In 1988, Congress passed the Technology-Related Assistance for Individuals with Disabilities Act, also called the “Tech Act” of 1988. This act was amended in 1997, adding several provisions. The “Tech Act” defines assistive technology as, “…any item, piece of equipment, or product system, whether acquired commercially off-the-shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.” This is the definition that is primarily used for determining if something is considered assistive technology.

In 1990, the Americans with Disabilities Act (ADA) was made law. It did not replace the Rehabilitation Act or the Tech Act, but expanded them. These three laws together are what public entities comply with to provide equal access to individuals with disabilities. They also define assistive technology.

The following chapters will focus on a few of the assistive technology systems currently available. These chapters are by no means exhaustive or in-depth on the topic of assistive technology. They are designed to give a basic overview of a few assistive technology items available. Not all individuals will have an interest in all chapters since some items would not prove beneficial. The following sections of this chapter will give a general definition of the four categories of assistive technology that this book covers. These sections will help determine which of the remaining chapters may prove to be of interest to the individual student.

## Screen Reading Systems:

Screen reading systems verbally announce the screen output so that individuals who are blind can operate the computers without having someone read the screen for them. JAWS for Windows (JFW) is the primary screen reading program used by blind students on campus. It is designed to work with many of the Windows operating systems, including Windows XP, Windows Vista, Windows 7, Windows 8, and their related applications.

Some other screen reader programs on the market include: Super Nova, NVDA, System Access, Window-Eyes, and Voice Over (which is for Mac systems). In this course, we will use JFW as the focus program.

## Screen Magnification Systems:

Screen Magnification systems are designed to magnify the print and graphics on the computer screen so individuals with low vision can read them. Some of them also allow for color control for better contrasting. The contrast control can also be beneficial for individuals with some forms of dyslexia.

ZoomText is the primary screen magnification system used on campus. It is completely software based so it requires no special video cards or drivers. A couple of other magnification systems available on the market are Magic and Looner.

## Print Access Systems:

Print access systems assist individuals in reading either printed materials or documents on the computer. They are advantageous to people with vision impairments and/or learning disabilities. There are several of these systems on campus and they will be discussed in more detail in later chapters.

Open Book Unbound Scanner System scans printed material into the computer in a text format and then reads it back. The document can also be loaded into a word-processor and the print size increased to make a large print document. When printed on the laser printer, the document is easier to read for a student with low vision. A similar system for the visually impaired is Kurzweil 1000.

Universal Reader is a program that allows the user to select text on the computer screen and have the computer read it back. Adjustments such as word highlighting and voice can be made to fit the individual’s personal tastes. It works with many applications such as word processors, e-mail programs, and web browsers.

Read & Write is a program that assists individuals in creating and editing documents. It is similar to Universal Reader except it also provides many writing tools. It works in Windows based applications including word-processors such as Microsoft Word, web browsers such as Internet Explorer, and e-mail programs such as Outlook and Outlook Express. Read & Write uses the multi stimuli of color, sound, and motion to assist the writer in the areas of sentence content, thought completion and topic flow. The program also uses word prediction and spell checking as writing tools.

Kurzweil 3000 is a scanning system that is used by individuals with learning disabilities to assist with reading and studying. It has tools that allow the individual to: scan printed materials into the computer, read the materials back in a synthesized voice, and mark up the information with features such as highlighting, bookmarks, and either text or voice notes. Another similar system is WYNN which stands for “What You Need Now.”

Video magnifiers are closed circuit television systems that magnify printed materials through a camera and monitor system. Regular printed material can be magnified up to 60 times its original size on some of these systems. They are useful to persons with low vision and/or learning disabilities.

Digital book players allow the individual to read specially formatted electronic books. A properly designed digital book gives excellent navigational capabilities which allows the user to find chapters, sections, and pages quickly and easily. These have replaced the cassette books.

## Reduced Motion Systems:

A reduced motion system is designed to cut down on the amount of movement needed to perform a task. In computers, these systems reduce the number of key strokes or the amount of mouse motion needed to operate the machine. These systems can be beneficial to individuals with limited hand mobility. Some research has also shown that some reduced motion systems can also benefit individuals with some types of learning disabilities.

Dragon Naturally Speaking is a voice recognition program. It allows an individual to operate the computer and do word-processing by voice instead of keystrokes and mouse clicks. The user must spend some time training the system before it will recognize his/her voice, but then the computer can be controlled, virtually hands-free, depending on the version of Dragon NaturallySpeaking being used.

Other programs such as Read&Write Gold include some voice recognition capabilities as well. Read&Write is very comparable to Dragon in features. Many users find it more user friendly than Dragon and choose to use it instead. It is really a matter of personal taste.

On-screen keyboards can assist individuals with limited hand abilities in entering information. The keyboard appears on the screen and the keys can be activated in several ways such as clicking with a mouse or other pointing device or selecting with a switch and scanning system. The Windows operating system has an on-screen keyboard system built-in which works very well for many people.

Alternative Keyboards and Pointing Devices allow for more comfortable positioning of fingers, wrists, elbows, and whole arms. The Microsoft Natural Keyboard and the Comfort Keyboard are used by some students to reduce wrist strain. Also, some students use trackball, joystick or touchpad pointing devices to direct the mouse pointer in order to reduce hand motion and wrist strain.

# Factors to Consider:

When assessing an individual to help select appropriate assistive technologies, several factors need to be kept in mind: the technical factor, the environmental factor, and the human factor. If either are ignored or neglected, the results will most likely be very unsatisfactory.

The technical factor refers to the device’s ability to perform the task. For example, will a video magnifier work to enlarge all of the materials the individual needs or will other technologies be needed? Will voice recognition provide the level of computer access desired? Will the software or hardware needed connect to the system being used? Is a complex, high tech solution really needed or will a simple, low tech solution be better.

The environmental factor deals with where and how the technology will be used. For example, voice recognition may be very functional for a person in their home, but not at work because they are located in a large, noisy open area with other people working nearby. Perhaps a person can use a large video magnifier to read print just fine, but it isn’t portable enough to use for accessing materials in classes.

The human factor looks at how the person feels about the technology. For example, a teen-ager who wants to fit in at school may resist using a piece of technology that makes him or her stand out as different. An adult may resist using a device that looks childish. People with “hidden” disabilities may prefer devices that either look mainstream or don’t draw attention to the disability.

All of these factors have to be considered when selecting assistive technologies. Ignoring one or more can be very expensive and frustrating.

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