Accessible Information Technology for Persons with Disabilities

Introduction

Information technology has the power to advance civilization into the future. But it also has the potential to leave many in the past. We hear a lot about the "digital divide," the reality that not all families can afford computers and are therefore not allowed the benefits and opportunities available to others. However, what we don't hear much about is another kind of divide. This divide is created when information technology, for one reason or another, is not accessible to those with disabilities. Imagine trying to surf the Internet if you were blind. How would you do it? Imagine typing an e-mail if you were quadriplegic. How would you type? This topic will discuss the background of this important issue, the laws that were designed to protect those with disabilities, the types of disabilities that exist, and the technology that has been created to provide access to the Information Age.

Discussion

The History of Accessibility Laws

In 1978, Congress enacted The Rehabilitation Act. This law required that federally conducted or sponsored programs be accessible to persons with disabilities. However, because computers were not yet then common household appliances, this law did not envision information technology. In 1988, the Telecommunications Accessibility Enhancement Act was enacted to require that the government take a proactive approach in making the federal telecommunications system accessible to those with hearing and speech impairments. This was probably the first law that recognized the emergence of an information technology (IT) accessibility problem.

In 1990, after PCs had become commonplace, the Americans with Disabilities Act (ADA) was enacted. This law required that places that served the public, such as theaters, restaurants, and museums, provide "barrier-free access." This law extended to state and local government services, transportation, and telecommunications services as well, but for some reason the law did not really address the issue of information technology.

However, in 1998, under the reauthorization of the earlier 1978 Rehabilitation Act, the law was amended to directly address the issue of information technology accessibility. With this amendment, Section 508 of Public Law 102-569 (the reauthorization of The Rehabilitation Act), which was commonly referred to by most simply as "Section 508," Congress made IT accessibility an explicit requirement in federal government (Usability and Accessibility, n.d.).

Section 508 addresses the following technologies:

- software applications and operating systems
- web-based information or applications
- telecommunication products
- video and multimedia products
- self-contained, closed products (e.g., information kiosks, calculators, and fax machines)
- desktop and portable computers (Section 508 Standards Guide, n.d.)

Because the federal government is charged with providing information to the general public, the tentacles of this legislation have been felt at the all levels of government and even in industry. If you were to visit the Web sites of most major information technology corporations, such as Microsoft, IBM, Adobe, or Macromedia, you would find that they all have internal organizations devoted to the issue of making their products accessible to those with disabilities. You will also see, if you visit the GSA Section 508 Web site, that there are many public and private organizations devoted to this issue as well. We have come a long way since 1978.

Types of Disabilities

For those of us who do not have a disability, it might be difficult to understand what types of disabilities make access to information technology a challenge. Microsoft has expanded upon the primary three disabilities referred to by the General Services Administration (GSA) to include an additional two categories (**Microsoft Commitment to Accessibility, 2015**). The five impairents are:

- visual
- hearing
- mobility
- language
- learning

The next section will discuss technology, referred to as "assistive technology," which has been created to make information technology accessible to individuals with disabilities.

Technology by Disability

Visual Impairments

When we think of this disability, we often assume it means complete blindness. However, the population of individuals with visual impairments is much greater when you include other forms of visual impairments, such as poor vision and color blindness. These two additional conditions also make access to information technology complex. Following are some of the technologies created to improve accessibility in this area.

- **Screen readers** are software programs that read everything that appears on a computer screen, including text, graphics, and buttons.
- **Screen enlargers** (or screen magnifiers) work like a magnifying glass and allow a person to zoom in and out of a portion of the computer screen.
- **Speech recognition systems** and speech synthesizers allow people to read or enter text that appears on a screen by using a microphone. This helps to minimize or limit the requirement for a keyboard.
- **Special displays called "Refreshable Braille"** display tactile output of whatever appears on a user's screen. The reader touches the screen line by line to read the output that is presented. Braille embossers act much like printers, but produce embossed output that can also then be read by the blind.

Let's not forget that most word processors have the ability to zoom in on or enlarge text, thereby making it easier for people with minor visual impairments to use them. This may not seem all that significant, but if you consider the days of DOS and non-graphic user interfaces (GUI), you will remember that text came in one size … small.

Hearing Impairments

Unlike those with visual impairments, those with hearing impairments have the ability to read and view textual and graphic information presented on computer screens. Consequently, not much assistive technology is necessary. However, for those who are hard of hearing, volume adjustments can easily be made with all common computer operating systems.

Mobility Impairments

These types of impairments are numerous and include diseases such as arthritis, stroke, cerebral palsy, multiple sclerosis, spinal cord injury and others, or accidents that have left a user unable to use his or her arms or fingers. Touch screens allow a user to interact with an application directly by physically touching the screen, thereby eliminating the need for a keyboard or mouse. Additionally, on-screen keyboard programs can allow a user to interact with the PC by using a joystick, mouse, touch screen, or other pointing device.

As with visual impairments, speech recognition programs allow users with mobility impairments to interact with the computer screen without having to physically enter data with their arms or fingers. Programs called keyboard filters allow users to enter data without having to be as exact. This software uses predictive technology to "guess" what the user is attempting to enter. These applications significantly reduce the number of required keystrokes and help users select only the keys they want. Alternative input devices, such as "Sip-and-Puff" or oversized keyboards, created specifically for individuals with mobility impairments, help them enter data into the PC without having to use a traditional keyboard or mouse.

Language Impairments

There are several conditions that can cause an individual to have a language impairment. These include aphasia (the loss or impairment of the ability to comprehend spoken words), delayed speech, and other conditions that result in difficulty solving problems, remembering, or perceiving information.
Many of the same technology solutions that apply to the mobility impaired (discussed above) also apply to those with language impairments. These include keyboard filters, speech recognition systems, speech synthesis programs, and touch screens. Additionally, screen review utilities combine speech with a visual representation of the data that appears on the screen. They convert text that appears on the screen into a computer voice. Combining the visual display with the spoken word can help those with certain language impairments.

Learning Impairments

Many in our society suffer from a condition known as dyslexia, which makes reading very difficult. Other learning impairments, such as Attention Deficit Disorder (ADD), which happens to be one of the most common reasons for family practice referrals (Joseph Biederman, M.D., and Stephen Faraone, Ph.D., 2002), and mental retardation, can make interacting with information technology very difficult. However, difficult does not mean impossible. Through the use of assistive technology, information can be presented in a form that will allow those with learning impairments to learn.

As with language and mobility impairments, many of the same assistive technologies apply to those with learning impairments. These include word prediction programs, speech synthesizers, and speech

recognition systems. Some of the technologies that are fairly unique to learning impairments include reading comprehension programs designed to help users improve their reading skills, and reading tools that make textual information more easily accessible. This is accomplished through the reformatting or scanning of text, allowing for additional navigational methods to move through text, and providing voice to assist in the text recognition process.

Summary

We have come a long way in closing the other digital divide, the one that can prevent accessibility to information technology for those with visual, hearing, mobility, language or learning impairments. Because of a greater focus by the federal government through the enactment of laws, specifically Section 508, industry and lower levels of government are now embracing positive change. Additionally, the very same technological advances that could have complicated accessibility have been used to create technology that supports greater accessibility. Most of us know individuals with disabilities. We should be aware of solutions that can increase their accessibility to what we often take for granted.

References

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