Enhancing Lives with Assistive Technology:

A guide for parents of children with physical disabilities

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Overview

Raising children with physical disabilities can be a rewarding journey. However, when many of these children were born, there families were told that they would never be able to walk, talk, or live independently (Kunselman 2005). As found by McCubbin and Huang (1989) families raising children with disabilities face cyclical stressors and challenges that can be overwhelming at times. These stressors may occur when children are transitioning into schools and communities and are required to demonstrate more independence to be successful. Yet the perseverance of many of these children along with their family's support has enabled them to enjoy life and seek better ways to live more independently.

Computers have opened many doors for people with disabilities by allowing them to experience the world around them, communicate effectively, and participate in life. Deciding on assistive technology can be an overwhelming task. Choices are abundant and finding the right fit of technology for the child's specific needs can be daunting. (Lahm & Etling 2005). The purpose of this paper is to provide an overview of computer assistive technology devices to give families answers to five "wh" questions. What is assistive technology? Why is assistive technology important? What is computer assistive technology? Who benefits from using computer assistive technology? And lastly this paper will answer the question of where to get assistive technology? The knowledge gained from this overview of assistive technology will empower families and their children to continue defying all odds and enjoying their unique journeys together.

What is Assistive Technology?

Assistive technology is any device that allows individuals to complete tasks with more ease and independence. In addition, assistive technology can be a service or device which would allow the user to more fully access their education. As defined by Reed & Lahm (2005), assistive technology is any device which helps a person complete a task with more ease, speed, and independence than they would be able to without the particular device. According to the legal definition, assistive technology is ".. 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 the functional capabilities of a child with a disability." (Star 2004 and Reed & Lahm 2005). Assistive technology is used quite often by people with and without disabilities in performing everyday tasks. Examples of assistive technology include calculators, computer spell check features, automatic door openers, magnifiers, pencil grips and palm pilots. Assistive technology encompasses a wide variety of products and devices which makes everyday life easier.

Why is Computer Assistive Technology Important?

Computers are vital to our society. Many schools, businesses, and even churches rely on the use of computers to complete daily tasks. This advance in using technology has also assisted people with disabilities in becoming more involved in society. The use of these devices has begun to level the playing field for individuals with disabilities by providing them the means to increase their participation in society, enhance their independence, and improve their self-esteem (Star 2004). According to Duhaney (2000), computer technology has also improved children's learning and promotes their

participation in group activities. Furthermore, the use of technology has empowered children to be more attentive, creative, and responsible for their own learning (Duhaney 2000). It is important to note that technology doesn't magically replace the child's abilities or lack thereof, but coupled with the proper teaching and training, the choice of device can enhance the child's skills.

What is computer assistive technology?

Computer assistive technology includes devices to help the user input and retrieve information. Such technology is called input and output devices. Input devices allow users to put information into the computer. The mouse and keyboard are commonly used standard input devices. Output devices allow the user to retrieve information from the computer. The monitor and the printer are output devices. However, children with physical disabilities may have difficulty using these devices because of decreased fine motor skills, low trunk and head control, and problems with positioning. Computer assistive technology has enhanced the standard input and output devices to include an array of other input choices to assist children with physical disabilities. Such devices include alternative keyboards, keyguards, pointing aids, Eyegaze communication systems, mouse modifications, trackballs, voice recognition systems, touch screens, and print guards.

An alternative keyboard is an overlay which provides numerous options. As noted by Star (2004) the alternative keyboard can be much larger than the standard QWERTY keyboard. This allows the user who has difficulty locating and targeting the smaller keys access to the appropriate keys. Alternative keyboards also provide mini-keyboards which are helpful for children with limited motor abilities. The smaller more

compact keys allow the user to reach the keys more effectively. The keys on the alternative keyboard can have the QWERTY layout or the keys can be placed in alphabetical order.

Keyguards are another modification to allow people with disabilities to input data into computer systems. Keyguards provide an overlay to be placed over each of the keys on the keyboard. As noted by Star (2004) they "are rigid coverings, placed over keyboards, designed to accommodate limitations in accuracy." This type of device provides the user the comfort of stabilizing the fingers, hands or pointing device to allow for a more accurate selection of keys.

According to Star (2004) pointing aides are another type of input device created for people who have difficulty with fine motor control. This device can be placed on a person's head to allow them to activate the computer by moving their head to initiate the pointing device. The pointing aides can be used by any part of the person's body which has enough motor control to sustain the device. Additional areas include the hand, foot, chin and mouth.

The Eyegaze Communication System is great for children with more complex physical disabilities. This device allows the child to operate the computer by using only his eyes. According to Williams (2004) the child would,

> "sit in front of the Eyegaze monitor, a specialized video camera mounted below the monitor observes one of the user's eyes. Sophisticated image-processing software in the Eyegaze System's computer continually analyses the video linage of the eye and determines where the user is looking on the screen. Nothing is attached to the user's head or body."

The Eyegaze system would allow the person to "press" a key based on how long they look at the key. A specified period of time is programmed for these functions. This

system provides various menu options, simple word-processing features, and keyboards to choose from. The Eyegaze system also includes a telephone program with a computerized telephone book.

Mouse modifications include devices which enable the child to activate the computer through a more ergonomically designed method. The mouse may have a knob resembling a joystick controller to allow the user to grab the mouse for easier use. In addition, the buttons for selecting options may be raised, larger, and placed around the device to allow user better ease at locating and clicking certain functions (Star 2004).

Track balls are another assistive technology device designed for people who have difficulty with fine motor skills that prevent them from using the standard mouse. The track ball is curved and shaped like a ball to fit under the palm of the child's hand. There are different features depending on the manufacturers. Track balls can come with buttons to allow the user to click, drag, double click and set the speed control.

Voice recognition systems are voice controlled input devices, which have shown just how far technology has evolved over the past 10 years. With this type of device, children can input information and interact with the computer by using their voices (Dorman, 1998). They can speak their options into the computer by using a microphone. This type of input device opens a world of doors for users who have very limited mobility but can use their voices to interact with the computer.

Touch screens also allow users access to computers. These devices are mounted on to the monitor, and allow the child to touch the screen to select options to input data. The touch screen allows users who are unable to manipulate keyboards or switches to

also access the computer by simply touching the menu bars and options which appear on the screen. (Dorman, 1998).

For children with physical disabilities, retrieving information from the computer can also be enhanced by assistive technology. Adaptations to the standard monitor and printer in the forms of auditory output, enhanced images, and print guards have made it possible for children with disabilities to read, complete, save, and print their work.

Auditory output devices allow the user to hear the documents read to them. This device is helpful for children with physical disabilities because it enables to them to replay what they've input into the computer to ensure accuracy before printing. For children with physical disabilities who have low trunk control, this type of device would alleviate their need to stare at the computer for long periods of time, which could cause neck, back, or muscle tension. In addition, children can benefit from screen magnification programs which enhance the print and graphics on the screen. This device allows children the ease of reading magnified print and images prior to printing their document.

For children with physical disabilities, handling diskettes may be difficult because of decreased fine motor skills. As explained by Pruitt-Mentle (2003) disk guards are homemade devices which can be made out of dowels and wood. This allows the child to place the disk onto the guard and push it into the disk drive. Some children who are unable to use their hands for this function can use an extension device to move the diskette forward into the drive. Disk handles can also be used to help children with physical disabilities store their documents. Disk handles are "…metal extensions that are placed on the top edge of the disk to help the person guide the disk into the drive."

(Pruitt-Mentle, 2003). To allow for more independence for children with physical disabilities, positioning of the printer and hard drive should also be considered when setting up workstations.   This will allow the child more ease in reaching the disk drive and retrieving their printed documents.

Who Benefits from Computer Assistive Technology?

With the wide variety of assistive technology devices available there appears to be something for everyone. According to Reed and Lahm (2005) any child who needs assistance with life functions such as walking, talking, reading, remembering and seeing may benefit from assistive technology. However, parents seeking technology to make their children independent have to understand that assistive technology is used as a compliment to your child's wishes, abilities, and motivation. It is important to use assistive technology as a vehicle to help children reach their full potential. It is not an end all solution to their needs. As noted by Fleisch (2004) when evaluating assistive technology for her son she had realized that technology was not enough. As she states so vividly about an assessment at a local hospital for new communication systems for her son assistive technology is something to really consider before purchasing.

> "The therapist there had set out and programmed three different devices for us to try. They put them in front of Colin who was excited with all three and they worked and played for several hours. When, at last, they were finished and had removed the array of keyboards and monitors, exposing Colin's own manual alphabet on the wheelchair tray, Colin began to spell in earnest. The experts sat and watched intently as he very clearly and urgently spelled out P-O-T-T-Y. The message had not been programmed into any of the fancy systems that had been covering his tray. We need to work on both manual systems that offer convenience and tech systems that offer advancement and independence. Technology can't do the job alone."

Fleisch points out the importance of not putting all of your hopes into one new advanced product. Yes, assistive has benefits for many children. But parents should be including their children in the decision making process to determine what fits their unique situations.

To begin determining if assistive technology is right for a particular child, it is important to look at the technology through the eyes of the child's needs, rather than the specific disability. There is an abundance of computer assistive technology software available to enhance children's learning in the classroom and at home. Such software is able to help children organize information, comprehend meaning, abstract important content, read easier, correct spelling and prepare presentations. As adapted from the Maryland State Department of Education's Universal Design (2002), the following table provides an overview of a few types of technological options.

Who Benefits from Computer Assistive Technology?

Challenges for some Children with Physical Disabilities	Assistive Technology Solutions
Child has difficulty carrying books	AV Books™ provides CD of audio, test, and video which can be read and listened to on a computer, DVD player or an iPods™. This is great for children who may use wheelchairs and have difficulty carrying their books.
Child has difficulty organizing ideas	Kidspiration™ provides users' options to build graphic organizers by helping them visually combine pictures and text to organize their thoughts. This is useful for children who are emerging readers or who need additional help with word meaning and use. DraftbuilderTM
Child has difficulty reading	Kurzweil™ provides children with the ability to improve their reading, comprehension, and reading speed. This software is great for a child who learns well through the multisensory approach because the information is presented with visual and auditory access.
Child may have difficulty locating information in books due to decreased fine motor skills	The internet provides numerous resources for finding meanings of words and/or information. Children can search www.encyclopedia.com which is an online encyclopedia. In addition www.yourdictionary.com provides an online dictionary. These online resources will assist individuals who have difficulty with fine motor skills. Both of these resources can be used in conjunction with speaking software to have the information read aloud to the child.
Child has difficulty with spelling	Spell check on word processor and CoWriter™ provide the user options to help spell their words correctly.

Where to Get Assistive Technology?

Before purchasing any assistive technology device, parents should talk with their children to determine what they would like to accomplish with such devices (Lahm & Etling 2004). Their input is valuable because they are the ones who will be learning the new device and implementing it into their daily lives. In addition, the child's teacher, IEP team, physical therapist, occupational therapist and assistive technology coordinator are also vital to this decision process.. This team collaboration will provide opportunities to discuss what is expected in the classroom. Furthermore, these conversations would help the team determine what types of devices would enhance the child's learning, independence, and participation. Having an idea of what is expected in the classroom and how the assistive technology could help them achieve their goals would greatly improve the chances of ordering the correct devices for the child.

It is also important for parents to research, research, research! The internet is a great source for reviewing assistive technology descriptions and costs. Furthermore there are a variety of books, publications, and articles written on the benefits of assistive technology (Lahm & Etling 2004) which can be found in local bookstores, libraries, or referenced online.

Most states have established computer resource centers to provide opportunities for people with disabilities to explore adaptive technology. They provide assessments to help families determine what types of devices would benefit their children in their homes, schools and communities. They also provide lending libraries to test out equipment prior to investing in the device.

Assistive technology can become expensive. However, some civic organizations, such as Easter Seals, United Cerebral Palsy, and the Lions Club have provided assistance to families to help purchase assistive technology devices (Williams 2004). In addition insurance companies and Medicaid may pay for some of these assistive technology devices, depending on the medical need specified by the child's doctor.

Summary

Assistive technology has provided children who otherwise would have been considered unteachable a chance at a quality education (Williams 2004).   Williams (2004) further states that the advances of technology and the widespread use of it by mainstream society has made it easier to accept and welcome people with disabilities into schools, communities, and businesses.   The benefits of using assistive technology are enormous. They provide opportunities for children to shine. Consider the comments made by Rosetti and Tashi who sum up the importance of giving every child a chance to succeed.

> If I were to go fishing for a week and not catch any fish, there would be two assumptions that could be made. First, I could say "there are no fish in the lake since I did not catch any, and I know what I am doing." Or, second, I could say simply that "I did not catch any fish that week, and I will keep on trying."

This is an encouraging statement to families who are continuing to make new decisions on their journey.   Give children with disabilities the opportunities, tools, and time to become successful. Assistive technology will begin to help children with disabilities reach their full potential.

Helpful Online Websites

To learn more about assistive technology, visit the following Websites:

http://www.intellitools.com – Intellitools/Intellikeys provides information on alternative keyboards.

http://www.donjohnston.com – Don Johnston provides products to assist with learning needs. Products are provided to assist with reading, writing, word study, and access intervention.

http://www.abledata.com provides an abundance of information on assistive technology products.

http://www.mdtap.org – Maryland Technology Assistance Program provides information on assistive technology products.

http://www.linc.org – Learning Independence Through Computers is a not for profit organization which provides assistive technology assessments and loaners to people with disabilities.

http://www.edmark.com – Edmark provides reading software.

http://family-networks.org – Provided by the Maryland Developmental Disabilities Council, the Family Networks project lists great resource information in the assistive technology section.

http://www.enablemart.com – Enablemart provides an online resource of products, information and news.

http://www.ergodirect.net – Ergodirect provides information on a variety of ergonomic products such as keyboards and, trackballs.

http://www.jouse.com – Provides information about the mouth controlled joystick.

http://www.nichcy.org - The National Information Center for Children and Youth with Disabilities provides an online resource on topics from A-Z.

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