



An Overview of Assistive Technology for Students with Severe Disabilities

Advances in technology over the last decade have had a huge impact on education for students with severe disabilities.

By Jane Farrall and Katie Lyon

Many students who have a significant physical disability are now able to complete reading and writing tasks completely independently with the assistance of technology. They are able to surf the net, email, read a book from the library, communicate with an electronic device to ask and answer questions, and participate in many other aspects of daily education with the help of one or more pieces of technology. Students with multiple disabilities, including intellectual disability, can also complete many more tasks with help and scaffolding provided by technology.

Technology that assists anyone with a disability to participate in school, work or community environments is referred to as assistive technology. Assistive technology is defined as “the software and technology which helps people with disabilities and special needs to overcome the additional challenges they face in communication and learning” (BECTA, 2003).

Case Study

Tom is a young man with athetoid cerebral palsy. He attended his local mainstream primary school for seven years and has moved to a mainstream secondary college this year. Scope Victoria defines cerebral palsy as a developmental disability that results from damage to or dysfunction of the developing brain. The impairments associated with cerebral palsy are nonprogressive but permanent. Varying degrees of disability related to functional mobility (movement and posture), daily living skills, and communication/socialization skills result from these impairments.

Tom uses a small range of technology to help him participate in all school activities. He has a wheelchair for mobility. Currently, a school services officer or teacher pushes Tom’s wheelchair, but in the near future he will begin to use a motorized wheelchair to enable him to drive independently around the school.

For communication, he uses a speech generating device, which allows him to ask and answer questions, plan assignments with his peers, socialize and tell stories. It also functions as a computer, which means he can use it for writing tasks, emailing and web browsing. This same device also has an interface that allows him to send and receive text messages and an infrared module that allows him to control all infrared technology in his environment, such as a door with a remote control. This single piece of technology has been crucial in Tom’s inclusion and educational participation.

Due to Tom’s physical disability, he is unable to use a mouse, keyboard or touch screen to access this device directly. Eight years ago, when he began using his first speech-generating device, the only option for him to control it was a single switch operated with his head. This is a very slow form of access, as Tom needs to watch a cursor which moves slowly across the screen and press the switch with his head when it reaches his desired target. With the advancements in technology, Tom is now able to control his device with a tracker. This consists of a small reflective dot, placed on his forehead, and a camera that is connected to the device or to other computers. Tom moves his head in the same way most users would move a mouse to control the cursor. To select an item, he simply pauses for a few seconds. In the near future, Tom will be investigating the latest advance in access technology – eye gaze. There are now several systems available that enable an individual to control all functions of a computer or speech generating device just by looking.

For those situations where Tom is required to use a school computer, such as in the library, an infrared receiver is directly plugged into the computer. Tom is then able to remotely control the school computer using his speech-generating device and his normal method of access.

Tom also has a page turner. This is a mechanical device which allows him to read a normal book, turning pages back and forth as required. This has been crucial for allowing quick access to all school and library resources. Over the last couple of years, this has been used less as more books are available in PDF format, which means that a PDF reader can read them aloud to Tom from his speech-generating device.

Technology has not solved all problems for Tom. There are times when it breaks down. There are times when the vocabulary he needs is not in his speech-generating device. There are times when it runs out of charge! But without this technology, it

would have been incredibly difficult for Tom and his team to include him in a mainstream classroom. Tom’s school services officer, who has transitioned from primary to secondary school with him, stated, “Although Tom’s technology can create some work, this is more than compensated for by all the challenges it overcomes. Overall, it reduces rather than adds to my workload”.

Types of Assistive Technology

As this case study has demonstrated, there is a range of assistive technologies available to help with many situations and many are used widely in education settings with people with severe disabilities.

Augmentative and Alternative Communication

Students who have complex communication needs may need to use assistive technology to communicate with others. AAC (augmentative and alternative communication) strategies are divided into low technology or high technology systems. Low technology systems include communication boards, books and objects boards (Sigafoos & Iacono, 1993). High technology communication systems utilize computers and specialized software. They may have the capacity to provide printed output as well as voice output (Sigafoos & Iacono, 1993).

Access Equipment

There is a range of equipment suitable for people with physical disabilities that can facilitate their access to technology.

A switch is a device that can be operated by any area of the body (for example, hand, head, eye blink, muscle contraction) that allows an individual to operate a computer or other electrical device. A switch interface is usually needed to make the computer switch accessible. Using a switch, the student can scan a selection of pictures, words or groups of items within compatible software until the desired item is reached. The student can then make contact with the switch to select this item. There are many different types of switches to choose from depending on the student’s individual needs.

Touch screens are the most direct and simple method of computer access and interaction. They are ideal for students who cannot understand the relationship between the mouse or the keyboard and movement on the screen (National Centre for Technology in Education, 2009).

A standard mouse presents many challenges for people with disabilities and there are a number

of alternatives available. Joysticks may be suitable for some people. Trackers are mouse replacement devices that enable people with little or no hand movement to perform all mouse functions by moving their head (Spectronics, 2009). Eye gaze technology may also be an option for some. Eye gaze is a relatively new area of access and developments in this area are constantly being made.

Standard keyboards can be difficult for people with disabilities to access either because of the layout of the keys, the size of the keys or the size of the keyboard itself. A large range of alternatives exist, including on-screen keyboards, enlarged keyboards, tablet keyboards, ergonomic keyboards and keyguards.

Environmental access equipment, such as remote door openers and ramps, are also sometimes considered under this category.

Environmental Control Units

ECUs (environmental control units) allow an individual to control devices which have an infrared receiver, such as most televisions, modified doors, air conditioners, and so on. ECUs are sometimes built into AAC systems or computers.

Assistive Listening Devices

There are a range of devices designed to assist a student who is either deaf or hearing impaired, including hearing aids and amplifiers. There are also devices, such as a teletypewriter, which enable individuals to communicate via text instead of a traditional telephone.

Visual Aids

For students with vision impairment, there are a large number of assistive technologies available, both new and old, to help them access the curriculum. These include magnifiers, screen readers, talking word processors and Brailers.

Mobility and Positioning

These are probably the most common forms of assistive technology within schools. Wheelchairs, adapted classroom chairs, slant boards and wedges all allow a student to be in a good supported position to enable them to learn most effectively.

The above text provides an overview of the types of assistive technologies that can support students with severe disabilities and their team in the inclusion process. Each category contains some examples, but, as with all areas of technology, this area is constantly growing and changing and it is always worth contacting a local assistive technology centre to discuss the latest options and possible solutions for particular students.

While the assistive technology itself can create its own set of challenges for the school support team, inclusion without the support of this technology is usually far more difficult and less successful for students with severe disabilities. According to Tom's school support officer, "Without technology, even with its challenges, the inclusion process would be impossible for Tom and for all of us". ■

A full list of references is available upon request to editorial@australianmediagroup.com.

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Ms. Katie Lyon is a speech pathologist who has worked with people with complex communication needs for the past eight years. She has a particular interest in developing individualized communication aids and resources for people of all ages, and providing education and training for people who support individuals with communication difficulties. She is coordinator of the Non-electronic Communication Aid Scheme which provides low tech communication aids to adults in Victoria and started with the Spectronics team in 2007.



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