Assistive Technology for Individuals with Disabilities

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INTRODUCTION

Census 2000 figures indicate that more than 19% of the U.S. population aged five and older are people with disabilities (Goddard, 2004). Technology has the great potential for improving the education and quality of life of individuals with special needs. Blackhurst (2005) identifies six distinct types of technology impacting education: (1) *technology of teaching* (instructional approaches designed and applied in very precise ways); (2) *instructional technology* (videotapes and hypermedia); (3) *assistive technology* (AT) (devices designed to help people with disabilities); (4) *medical technology* (devices which provide respiratory assistance through mechanical ventilation); (5) *technology productivity* tools (computer software and hardware); and (6) *information technology* (access to knowledge and resources).

AT (also called "adaptive technology") can particularly help balance weak areas of learning with strong areas of learning for students with disabilities (Behrmann & Jerome, 2002). There is a growing recognition that an appropriate up-to-date preparation of teachers/tutors and other educational professionals working with students with disabilities has to focus on information and communication technology (ICT), especially on AT (Feyerer, Miesenberger, & Wohlhart, 2002).

Since educational attainment can enhance occupational attainment, individuals with disabilities (mobility impairment, visual impairment, hearing impairment, speech impairment, and learning disabilities) should be encouraged to participate in higher education. AT for students with disabilities increases options for assisting students with a variety of exceptional learning needs, allowing them to accomplish educational goals that they could not accomplish otherwise in the same amount of time or in the same manner (Rapp, 2005).

BACKGROUND

AT was practically unknown in 1975, the year of landmark legislation establishing equal educational rights for students with disabilities (and personal technology tools for education were in their infancy at that time); in 1997, the Individuals with Disabilities Education Act (IDEA) amendments required AT consideration in every student's Individualized Educational Program (IEP) (Dalton, 2002). IDEA is the nation's special education law, originally enacted in 1975 (Boehner & Castle, 2005): "The Act responded to increased awareness of the need to educate children with disabilities and to judicial decisions requiring states to provide an education for children with disabilities if they provide an education for children without disabilities" (p. 1).

The late 1970s and early 1980s saw the introduction and refinement of the micro-computer; the 1980s also witnessed an increased emphasis on AT and the emergence of technology literature and computer software targeted directly at special education; and major technology advances such as the evolution of the Internet occurred during the 1990s (Blackhurst, 2005).

The first significant law dedicated to AT was the Technology Related Assistance for Individuals with Disabilities Act (TRAID) of 1988 (Public Law 100-407), which established a definition and criteria for those in the field of AT (Campbell, 2004):

The legislation's primary accomplishment was to provide grant funding for states to establish AT resource centers.... Although many regard AT (such as computer software) as high tech, this definition is all encompassing. The law also provides for low-tech devices, such as pencil grips, weighted writing implements, and magnifying glasses.... In 1998, the federal government passed the Assistive Technology Act (ATA) (Public Law 105-394), which reaffirmed the government's commitment to AT. (p. 168)

With the implementation of these federal laws, institutions of higher learning are able to utilize state agencies in the development of technology programs based on a universal design model.

In 2001, the American Library Association Council approved the AT policy that libraries should work with people with disabilities, agencies, organizations, and vendors to integrate AT into their facilities and services to meet the needs of people with a broad range of disabilities, including learning, mobility, sensory, and developmental disabilities (Goddard, 2004).

ASSISTIVE TECHNOLOGY FOR INDIVIDUALS WITH DISABILITIES IN THE INCLUSIVE EDUCATION SYSTEM

Over the past two decades, for instance, the enrollment of students with disabilities and the demands for related services in higher education have greatly increased (Christ & Stodden, 2005). Online programs have worked to make Web sites accessible to deaf and blind users particularly by providing closed-captioned text and textual descriptions of graphics, even though experts have found out that online programs often lack accommodations for students with learning disabilities such as dyslexia and attention-deficit disorder (Carnevale, 2005).

Inclusion and AT Devices

Inclusive education (the practice of keeping special education students in regular classrooms as much as possible and feasible) is part of the regular school system in many European countries, and inclusive teachers should be able to reach the special educational needs of all students (Feyerer, 2002). ICT can facilitate this challenging task, and AT has the enormous potential to improve access to education and employment for disabled individuals. AT also has the potential to ensure that computing is as *effective* and as *comfortable* as possible for all learners.

AT devices include: books on tape for a student who cannot read; word processors, laptop computers for a student who has a problem with writing; augmentative communication devices for a student who has communication problems; and a large monitor for a visually impaired student. A vast array of application program software is available for instructing students through tutorial, drill-and-practice, and simulation; AT can be combined with instructional programs to develop and improve cognitive, reading, and problem-solving skills (Behrmann & Jerome, 2002).

Students with disabilities often need adaptations made for them so that they can be successful in school. AT can give learners the help that they need by providing "low" technology strategies (switches, writing devices, or software applications), and "high" technology strategies (those that use sophisticated devices or software applications for students with mild and severe disabilities that enable them to access information) so that they can perform tasks that they would otherwise be unable to do (Lewis, 1998). Inclusive teachers should be able to reach the special educational needs of all learners, and AT should be part of inclusive teacher training (Feyerer, 2002).

Current Applications and AT Resources

AT is divided into two categories: (1) 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; and (2) any service that directly assists a university's teacher education programs to provide future teachers with knowledge of AT and its importance in helping students learn (White, Wepner, & Wetzel, 2003).

The typical AT products or devices for individuals with learning needs are outlined in Table 1. Table 2 describes valuable AT Web sites for students with disabilities.

Challenging Questions, Universal Design, and AT Research

The primary goal of AT is the enhancement of capabilities and the removal of barriers to performance. Five Guiding Principles for Assistive Technology (2004) planning are quite useful: (1) AT can be a barrier; (2) AT may be applicable to all disability groups and in all phases of education and rehabilitation; (3) AT is related to function, not disability; (4) assessment and intervention involve a continuous, dynamic process of systematic problem solving; and (5) AT does not eliminate the need for social and academic skills instruction.