

Technology for Integration of Students with Disabilities in Higher Education

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Introduction

The last quarter century has opened many doors for individuals with disabilities as more and more persons with sensory, physical, learning, and intellectual disabilities have begun to take advantage of postsecondary education. Whether they attend two year community colleges or four year universities or whether they earn a college degree or take coursework targeted toward further development of vocational skills, they are extending their learning experiences the same way their peers do after graduating from high school. The college experience is a significant time for all young adults, providing the opportunity to mature and become independent in the years following high school.

To a large extent these opportunities are the result of federal and state policy development and implementation for persons with disabilities. Section 504 of the Rehabilitation Act of 1973 established the rights of students with disabilities to attend institutions of higher education early on since most IHEs received federal funding and discrimination on the basis of disability was prohibited. Section 504 evolved into the Americans with Disabilities Act (1990, 1997) which requires that public and private organizations provide reasonable accommodations to persons with disabilities and provided specific rights to computers and telecommunications equipment to not only students, but faculty and staff in higher education. The Technology Related Assistance Act of 1988 (now the Assistive Technology Act of 1998 and 2004) provided definitions of assistive technology devices and services that have been used by the ADA and other federal and state laws including the Individuals with Disabilities in Education Act (IDEA) of 1990 and which is now the Individuals with Disabilities in Education Improvement Act of 2004. The IDEA began as the Education for All Handicapped

Children's Act of 1975 (PL 94-142) and was passed because there were nearly 2 million children with disabilities in the United States who were not allowed to attend public schools. As a result of this law, children with disabilities are guaranteed a free appropriate public education in the least restrictive environment. The problem in K-12 education is actually in determining what the word "appropriate" means versus what is the "best" or "ideal" service.

As children with disabilities reach the age of majority (18) and graduate from high school (under IDEA they have the right to stay in school through the age of 21), they leave a world of mandatory services and enter the world of eligibility where the rights to services are not guaranteed and the concepts of "reasonable accommodations" comes in to play. Under IDEA, services are mandatory for individuals who have a disability that has an adverse effect on their education, including assistive technology. Under the ADA, in higher education, the student has the right not to be discriminated against, but must be their own advocate and ask for support services. In higher education, assistive technology may be available, providing that it is determined to be a "reasonable accommodation" for the student.

Technology is increasingly important to succeed in our society—in work, at play, at home and in the community as well as in our efforts in lifelong learning. Whether using online banking or an ATM, sending your mother an e-mail, purchasing a theater ticket on the internet, or preparing an analysis and report for work, access to appropriate technology is ubiquitous. Fortunately, there are a broad range of assistive technologies that enable persons with disabilities to access those technologies, or to meet everyday functional needs. Students with impaired speech can use augmentative communication

devices, students with vision impairments can use screen readers to access computers, students with hearing impairments can have speech translated to sign through signing avatars, students with physical disabilities have mobility devices to let them move around the school environment, and students with intellectual or learning disabilities have organizational and memory tools to assist them in completing their work. Assistive technology is improving at the same or better rate than other technologies and our imagination is the only limit to finding new and creative solutions that enables everyone who wants to attend postsecondary institutions to do so. We must continue to strive to develop policies and services to enable these students to benefit from higher education.

University Policy: Rights and Services for Students with Disabilities

The past three decades has seen a dramatic growth in the numbers of students with disabilities entering higher education. The percentage of students with disabilities enrolled in postsecondary institutions has tripled since 1978 (NCES, 2001). The percentage of freshman who reported a disability ranging from hearing impairment, orthopedic, learning, visual impairment and blindness among others, rose from three percent in 1978 to nine percent in 1998. In addition, 50 percent of students with disabilities enrolled persist to complete a degree or certificate (Stodden, Conway & Chang, 2003).

This growth can be partially attributed to several laws passed to ensure equal rights and opportunities for students with disabilities. These laws include provisions to ensure access and services in the area of assistive technology. Section 504 of Rehabilitation Act of 1973, the American with Disabilities Act of 1990 and most recently

Section 508 of the Rehabilitation Act (1998), mandating access to web based materials for people with disabilities, have all contributed to greater access to assistive technology at higher education institutions.

Brief Discussion of Laws

Section 504 of the Rehabilitation Act of 1973 was the first civil rights law that protected people with disabilities from discrimination at the postsecondary level, stating that “No otherwise qualified individual with a disability in the United States shall, solely by reason of her or his disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance...” (29 U.S.C. § 794(a)) (1973). The main focus of the Section 504 was to ensure that people with cognitive, sensory as well as mobility limitations could access federally funded programs and services. Section 504 covers areas including admissions, academic adjustments, housing, financial aid in addition to non-academic services. The regulations under section 504 list a number of academic adjustments that may be made including assistive technology equipment and services is referred to as auxiliary aids (34 CFR §104.44). Auxiliary aids such as software programs, video magnifiers or Braille embossers may be used to provide access to materials in alternative formats such as electronic text, large print and Braille.

The American with Disabilities Act (ADA), 1990, extended the provisions under the Rehabilitation Act of 1973 to the private sector including private institutions of higher education and privately owned businesses. The ADA also provides protection against

discrimination in the areas of physical access to facilities, employment practices, and telecommunications (42 U.S.C. §12101 et. seq., 1990). Since the passage of ADA in 1990, postsecondary institutions have seen a dramatic increase in resources and courses taught on-line. While the question of accessibility of electronic materials was raised in ADA, it provides no specific guidelines or standards for services or materials delivered online (Edmonds, 2004). This issue has just recently been addressed through section 508 of the Rehabilitation Act.

Section 508 of the Rehabilitation Act mandates that electronic and information technology is (or should be) accessible. This law currently covers institutions that receive federal funding however, many public institutions fall into this category. In addition, several states and higher education institutions have begun to develop their own policies regarding web accessibility to ensure that their programs are accessible to students with disabilities as defined in Section 504. Section 508 provides specific guidelines and standards that are applicable to the six areas of technology: software applications and operating systems, web-based information and applications, telecommunication products, video and multimedia products, self-contained, closed products (e.g., fax machines and kiosks), and desktop and portable computers (29 U.S.C. § 794(d), 1998). In compliance with Section 508 federal agencies must develop, procure, maintain, or use electronic and information technology that meets very specific standards and is accessible by both people with disabilities and by those without disabilities unless it imposes an undue burden on the agency.

Organizational Structure

The above mentioned laws help to guide services provided to both students and employees with disabilities at postsecondary institutions. Typically there are two entities primarily responsible for ensuring compliance with these laws: (1) disability support services which provide assistance to students and instructional faculty and (2) the 504/ADA compliance officer who is typically located in an office on campus devoted to ensuring equity and diversity in programs and hiring practices. This office is often called the Office of Equity and Diversity Services (OEDS).

Disability Resource Center

Students who choose to disclose their disability and are found eligible are supported through an office on campus often referred to as Disability Support Services (DSS). DSS is responsible for providing direct services to students and instructional faculty. Services include determining student's eligibility for services, collaboration with students to determine the nature of reasonable accommodations, developing institutional policies and procedures, and working closely with faculty to ensure the provision of academic adjustments and auxiliary aids for students with disabilities (Gamble, 2000).

The transition from K-12 to higher education can be challenging for students with disabilities. The framework of legal support significantly shifts from the responsibility of the educational agency to the responsibility of the individual with a disability. In K-12 education students are entitled to a free and appropriate public education. Services are recommended and guided by a team of educators and the student's parents. Once the student moves on to college they are no longer guaranteed services. Instead they must act as their own advocate and self identify themselves and their need for accommodations.

The fact that they received services in K-12 education does not automatically make them eligible for services at the postsecondary institution. At the postsecondary level, a person with a disability is one who: “(1) has a physical or mental impairment that substantially limits one or more major life activities, (2) has record of such an impairment, or (3) is regarded as having such an impairment. Major life activities include walking, seeing, hearing, speaking, breathing, learning, working, caring for oneself, and performing manual tasks.” (42 U.S.C. § 12102(2), 1990).

Students are entitled to reasonable accommodations under ADA. There are two basic types of accommodations available to qualified students – academic adjustments and auxiliary aids and services. Academic adjustments such as extended time for tests, exams administered in a separate room and course substitutions, modify the academic program to meet the needs of students with disabilities. Recorded and electronic books and lectures, sign language interpreters, and assistive technology devices such as Braille note takers are just some examples of auxiliary aids and services (Wolanin & Steele, 2004).

Accommodations are determined based on the student’s disability but they should not cause “substantial” changes and adjustments in the existing program and/or significant alterations of the course standards and expectations. (Thomas, 2000) There are times when faculty may refuse to provide prescribed accommodations if they believe the accommodation will significantly alter the academic integrity of the course.

Accommodation disputes are most often handled by disability support services staff who suggest the ways to accommodate the students, and/or find a compromise between a reasonable accommodation and the significant alteration to the program. If a compromise

can not be reached through a meeting with the professor the dispute would likely be elevated and handled by the 504/ADA Compliance Officer through the Office of Equity and Diversity Services.

Office of Equity and Diversity Services

All postsecondary institutions are required to have an office or an individual responsible for compliance of mandates specified under section 504 of the Rehabilitation Act and the American's with Disabilities Act (Friend, G. F., Judy, B. & Reilly, V., 2003). Small institutions may combine this position with the direct services offered through disability support services. Larger institutions like George Mason University house this position within an office that ensures equitable practices, affirmative action and protection from sexual harassment. At George Mason University this office is referred to as the Office of Equity and Diversity Services (OEDS). The main responsibilities of the Section 504/ADA Compliance Officer are diverse and wide-ranging. She is responsible for developing processes for compliance and overseeing the evaluation and implementation of those processes.

While the disability services office provides direct services to students with disabilities, the 504/ADA coordinator oversees the overall compliance for the university including student services, barrier removal provisions for accessible transportation, training and information dissemination, tracking and processing complaints and grievances related to compliance with disability law. In addition, the 504/ADA Compliance Officer works with Human Resources to ensure equitable hiring processes,

and determining eligibility and appropriate accommodations for employees with disabilities.

The Process for obtaining Assistive Technology Services: a Case Study

By 1998, 98% of two-year and four-year postsecondary educational institutions provided at least minimal support and accommodations to students with disabilities (NCES, 1999). Although the laws mandate these services at all postsecondary institution, the provisions of services vary from one institution to another. To provide an example, we will discuss the process at George Mason University. Disability Support Services are provided through the Disability Resource Center (DRC). The DRC currently serves slightly over 1,000 students with disabilities. The total student enrollment at the university is approximately 30,000. These students have a wide variety of disabling conditions. Students with learning disabilities are the largest group of students with disabilities on campus (35 %) of total number. Students with ADD/ADHD, students with emotional and psychological disorders and those with medical needs represent other relatively large groups. There are also students with head/brain injuries, visual, hearing and mobility impairments. The mission of DRC is “to facilitate equal access to university programs, events, activities, and services for students with students”

Once a student is deemed eligible for services they meet with a counselor who helps them to identify the need for accommodations in each course for which they are registered. If they require accommodations for a course, a faculty contact sheet is completed which lists each accommodation for the course. The student is then required to sign the form and take it to the professor for signature, preferably at the beginning of the

course. Accommodations listed on this form often include assistive technology such as: recorded lectures, electronic books, use of an assistive listening device, use of software such as screen reading, voice recognition, spelling and grammar checking and the like. The form may also explain that a sign language interpreter will be present in the class. Other types of accommodations may include extended time for projects or exams.

Assistive Technology Initiative

One of the most common forms of accommodation offered to students is in the form of computer-based assistive technology. Postsecondary institutions are required to provide these accommodations in a timely manner upon request. Advancements in this field have provided an unlimited array of software and devices to students with disabilities. Assistive technology services at the postsecondary level generally fall into four distinct areas: (1) consultation and screening for individual accommodations, (2) campus-wide access (3) creation of accessible text, and (4) web accessibility. Many universities have an individual who is primarily responsible for ensuring access to computer-based assistive devices and software on campus. In most cases this position is located in the disability resource center.

At George Mason University assistive technology services are provided through a separate office that works in partnership with both the Disability Resource Center and the Office of Equity and Diversity Services. The program resides at the Kellar Institute for Human disabilities which is part of the College of Education and Human Development (CEHD). Providing services through the CEHD has allowed the university to use equipment located in the Assistive Technology Lab which is primarily an instructional

lab for students enrolled in the Doctoral, Master's and Certificate Programs in Assistive Technology. The Assistive Technology Initiative is a model program designed to leverage resources in order to provide the most comprehensive services to students and employees.

Consultation and Screenings for Individual Accommodations

Students who are eligible for services through the Disability Resource Center are referred to the ATI for a screening to determine appropriate assistive technology accommodations. A wide range of assistive technology software and devices are available to students, ranging from simple graphic organizers for students with learning disabilities, screen reading and enlarging software for students with visual impairments to advanced technologies such as single switch access and eye-gaze technology for students with significant physical disabilities. Recommendations are sent back to the DRC to be added to the faculty contact form. Ongoing support is provided to the student in regard to training and technical support for recommended equipment and software. Employees with disabilities are afforded the same services but must be referred by the Office of Equity and Diversity Services.

Campus-wide Access

Campus-wide access to assistive technology also falls under the responsibility of the ATI. The ADA specifies that effective access to computers and services must be provided during the same hours they are available to all students (Friend, G. F., Judy, B. & Reilly, V., 2003). Therefore, it is essential that accessible computers are located in

academic computer labs, libraries and other areas open to students on weekends and overnight hours. The ATI provides technical support and training to individuals responsible for all areas where assistive technology is located.

Creation of Accessible Text

A large number of students served through the disability resource center have disabilities that affect their ability to read print materials (i.e., visual impairment, learning disabilities and physical disabilities). The ATI provides eligible students access to textbooks and other printed materials in an accessible format, such as electronic text that can be read by the computer through synthesized speech. Textbooks that cannot be purchased on CD from the publisher are scanned using a high speed scanner and Optical Character Recognition (OCR) software. In addition, short documents such as worksheets and exams can be translated and created in Braille through the services of the ATI.

Web Accessibility

Another important area of accommodation is web-based course materials and university resources. With the dramatic increase in online courses and resources such as online registration, assistive technology services extends to ensuring that university operated web sites are accessible according to guidelines specified in Section 508 of the Rehabilitation Act. Other universities may choose to follow guidelines developed by the World-Wide Web Consortium (W3C). Ensuring that web sites are accessible is a complicated and time consuming process due to the number of web sites constructed and the dynamic nature of information on the web. The ATI helps to develop and maintain

appropriate policies and provides direct consultation with the university web team as well as regular training sessions and awareness activities to webmasters, faculty and staff across all campuses.

With the advances in assistive technology it appears that there are limitless ways to accommodate students in the classroom and in university sponsored programs. However, it is important to remember that the purpose of accommodations whether assistive technology aids or modifications to programs are provided to level the playing field, not provide an advantage to the student with a qualifying disability.

Summary

There are several laws that have been developed to enable students with disabilities to participate in higher education. The number of students with disabilities pursuing degrees in higher education institution is steadily increasing although still lacking in comparison to the general student population. For students, the transition from a protected environment afforded through the K-12 education to the postsecondary environment can be difficult as they learn to advocate for themselves. However, several services and safeguards are in place through the disability support services and the Office of Equity and Diversity Services to help students and employees with disabilities obtain appropriate and reasonable accommodations. Access to assistive technology software and devices is mandated through provisions identified in Section 504 of the Rehabilitation Act and the American's with Disabilities Act. With the influx of online courses, the issue of web accessibility has come to the surface. Many universities have begun to develop policies and plans to ensure courses and resources are accessible

through the use of assistive technology. With continued commitment to compliance with established disability legislation and the continued advancement and promise of assistive technology, the future is bright for students with disabilities at postsecondary institutions.

Distance Education Technology in Higher Education

College campuses nationwide are embracing the integration of distance education technology into many of their undergraduate and graduate courses. Although often used as a generic term, distance education encompasses a variety of technologies including email, course websites, course management tools, and video and audio conferencing. Today, distance education can refer to the use of technology as an organizational and communication tool to enhance a traditional course where an instructor and students gather together in a physical location, to supersede the physical location so students and the instructor can meet virtually in real time instead of on campus, or to eliminate the need for a traditional class by designing self-paced student course modules that require little to no instructor interaction.

Both students and instructors have pushed the demand to incorporate more distance education technology in college courses. For students, the greatest benefits include the time and money saved in travel and parking and the flexibility to participate, interact, and complete assignments based around their busy family, work and social lives. Instructors appreciate the same flexibility; however, they also value the pedagogical benefits of utilizing distance education technology in their courses.

There are several benefits to teaching using distance education technology. Although initially time consuming, instructors who teach online or use technology

interactive elements must be extremely organized and prepared in advance of class.

Willis (1993) identifies that teaching with distance education has several other advantages including the ability reach a more diverse group of learners, inviting guest speakers who would otherwise not be available because of distance or time, and increasing interaction among students including from various social, cultural, economic, and experiential backgrounds.

Distance Education Technology for Students and Instructors with Disabilities

For college students with disabilities the trend to include more distance education options opens many new doors of opportunity. Depending on their disability, students may find it challenging to travel to campus and access the campus facilities, to access course lectures, materials, and handouts, and to be an active participant with other classmates and the instructor in a traditional face-to-face class. The ability to access course materials ahead of time via a course website, to participate in online discussions with classmates and the instructor, and/or to participate at home instead of traveling to campus afford many individuals with disabilities the chance to be productive and active learners when it was otherwise impossible or arduous. Furthermore, utilizing distance education creates new opportunities for faculty with disabilities, eliminating many of the same barriers that students with disabilities face in face to face courses. For example, an instructor who is hearing impaired or has a speech disorder may prefer to teach an online course because it is more efficient to communicate through email, asynchronous chats, and annotated lecture slides.

Unfortunately, the same technology that makes it easier and more efficient for some individuals to take college courses at the same time creates access barriers for many people, in particular those with disabilities. Many people are familiar with the term “digital divide”. To participate in online courses or use distance education technology components students need to have access to the required technology such as a reliable high speed internet connection. For individuals with disabilities there is often a “second digital divide” (Burgstahler, 2002). Although people with disabilities may have all the technology tools to participate in classes, because of accessibility barriers of the distance education technology they cannot make full use of the technology tools, services and information.

Accessibility Barriers

Accessibility barriers depend on disability and at times contradict each other; what may be beneficial for one disability is not for another. Burgstahler (2006) describes the access barriers for different disability groups.

Vision. Individuals who are blind use screen reader technology to access the computer. Screen readers use a synthesized voice to read the information on the computer to the user, including the Internet. Since screen readers cannot read graphics, complex tables, flash, and frames without proper accessible markup, individuals struggle with many online learning components. Students who are blind may have difficulty accessing course websites to download lectures and handouts and to participate in synchronous course components such as real time chat and electronic whiteboards because they are not screen reader accessible. Although companies such as Macromedia and Blackboard are

committed to developing accessible solutions (NCDAE, 2005), the barriers still exist today.

For individuals with low or limited vision the access barriers are not as severe, but they still they may have difficulty navigating websites and course materials if the materials are not available in large print or the page becomes cluttered or overwhelming with the use of screen magnification software. Although a screen magnifier will enlarge the font or graphics to an appropriate size for the individual to see and participate, the user also loses the ability to see the whole screen at the same time and must scroll from side to side and up and down to view all the content. The user inevitably is slowed down by the technology. Although the individual can physically participate in online chat and whiteboard discussions, the learning experience may not be beneficial to them because they cannot always be an active and effective participant in this medium.

Hearing. For individuals who are deaf and/or hard of hearing, audio and video components pose the greatest barrier. In face to face classes, deaf students often read lips and/or use an interpreter to acquire the information and participate in discussions. Yet, courses that utilize live audio and video conference components or web based media clips are difficult for students because they are often not captioned and the video quality is such that is difficult, if not impossible to read lips. Emerging technologies include real time voice recognition captioning and signing avatars that can be used in conjunction with live video and audio components. In the future these may increase accessibility for many individuals.

Motor. Individuals who have motor impairments with limited or no use of their hands utilize alternative keyboard and mouse technology to navigate the computer,

including the Internet. Similar to blind individuals who use screen readers, people with motor impairments rely on the use of keyboard shortcuts to access online course materials and communication tools. As discussed previously, the same technology that is inaccessible to screen readers is also inaccessible to individuals who use alternate access methods.

Cognition and Learning. Unlike other disability groups, individuals with cognitive and learning disabilities face few physical access issues but still often struggle in distance education courses. Online courses tend to include a lot of text and information, and if not properly organized on course website and management systems, students may be confused and feel overwhelmed. The organization strategies they use in face to face classes may be different in an online learning environment. Furthermore, because individuals with learning and cognitive disabilities often have difficulty with reading, writing, and spelling participating in fast paced real time components such as synchronous chats may not be conducive to their learning style.

Universal Design for Learning

Many universities are quick to develop online courses and incorporate distance education technology into their courses without considering the needs of those students with disabilities. Students with disabilities often find distance education components challenging and universities may need to go to great lengths to provide accommodations and accessibility options for students. Yet, in reality many students struggle with distance education technology components because for some it is a lack of access to the technology and materials while for others it is a new learning environment and requires

them to develop and embrace a new style of learning. Therefore, universities need to adopt principles of universal design when developing online courses and interactive components.

Universal design was initially used in architecture to reference accessible building design that could benefit all individuals such as automatic door openers and curb cuts. Universal design is the “design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design” (Mace, 1997). Principles of universal design are currently utilized for print materials for individuals with disabilities such as the availability of course textbooks in digital format. Digital format allows individuals who are blind or have print disabilities to fully access course materials using the computer or other mobile technology to have the text read aloud. These same principles should be applied when developing online courses and selecting distance education components prior to course instruction to ensure that all enrolled students can access the technology and participate as active learning.

Providing Alternatives

Unlike print media, developing accessible and universally designed distance education technology proves to be more challenging because the content is more dynamic. As stated previously, although many technology developers such as Macromedia and Blackboard strive to produce accessible tools for individuals with disabilities, the truth is that what is accessible for one student many still pose a barrier for another even if designed with accessibility in mind. The second issue is that even though the technology system may be accessible to individuals with disabilities, how the

instructor utilizes those tools within the course may still present barriers. For example, the instructor may use the Blackboard web based course management tool to post lecture notes and handouts in an online course. While Blackboard has improved their system to be accessible with screen readers, a student who is blind may still be unable to access the course materials because the instructor posted the files in a format that was not accessible to the student's screen reader.

One of the crucial components in making distance education technology accessible to individuals with disabilities is to provide options and alternatives.

Handouts and Resources. Most course materials are now designed electronically and are readily available to email students and to post on course websites. However, not all file formats including Microsoft PowerPoint, Adobe Acrobat, and Macromedia Flash are accessible for individuals with disabilities, especially individuals who are blind.

There are several online resources to assist instructors in designing and converting these files into an accessible format. However, the key strategy is to provide electronic materials in multiple formats to ensure access to all students including students who may not own a specific software program needed to access that file and also to ensure that assistive technology tools can access the file for individuals with disabilities. The same principle holds true for multimedia files such as video clips used during instruction. For instance, if the video clip cannot be closed-captioned for a student who is deaf, then the instructor can provide a transcript of the video for the student to read.

Interactive Tools. Maintaining interactivity is a key element in any quality distance education program. Currently, there are several strategies and tools available to increase interactivity between both the students and the instructor and among students.

These tools include both real time synchronous interaction such as live video and audio conferencing, chat rooms, and white boards and any time asynchronous interaction such as discussion boards and email. In general, there are more accessibility issues with synchronous components because many of the available technology tools are still inherently not accessible to assistive technology devices. Although developers are continually working to improve accessibility as they develop new products and updates, progress is still slow. Instructors must be mindful that synchronous course components may pose challenges to students in their courses and like resource materials, must provide alternatives and options to ensure meaningful participation. For instance, give students working in an online group the option to work in real time chat room or to participate in a phone or audio conference.

Summary

Distance education technology offers great flexibility and options for both students and instructors in higher education. For individuals with disabilities, the integration of distance education technology presents both new opportunities and hurdles in receiving a quality education. Universally designed distance education components should be selected to maximize accessibility and usability by all students. To ensure accessibility, instructors need to provide options and alternatives to students with disabilities including providing materials in multiple formats and providing options to participate in course instruction and activities as a active and engaged learner. Ultimately, students should not be penalized because of technology barriers.

With the Individuals with Disabilities Education Act of 1997 and its increased emphasis on age appropriateness and inclusion, increasing numbers of students with disabilities are completing high school with the expectation of attending a postsecondary institution. This expectation is not limited to students with learning, physical, or sensory disabilities. Students with intellectual disabilities share this expectation and thirteen percent attend postsecondary institutions (Wagner, Newman, Renee, & Levine, 2005). The Division on Developmental Disabilities of the Council for Exceptional Children released a position statement supporting the inclusion of young adults with mental retardation in age appropriate settings, in particular, those students ages 18-22 (Smith & Puccini, 1995). Students with intellectual disabilities have traditionally been excluded from higher education. While their siblings graduated high school and went on to college, they often remained in high school until the age of 22 when they would transition into a community day program or supported employment. A number of institutions of higher education now offer programs for young adults with intellectual disabilities to participate in the college experience while also furthering their functional academic and vocational skills.

Neubert, Moon, Grigal, and Redd (2001) define postsecondary programs as ones “that provide education or vocational training to individuals with [mental retardation] or other [severe disabilities] within two or four year colleges or universities, or adult education programs” (p.156). There are currently over 90 programs (University of Massachusetts, University of Hawaii, & Federation for Children with Special Needs, n.d.) incorporated into or affiliated with two and four year colleges and universities across the country for students with intellectual disabilities and severe learning disabilities. These

programs vary in their target audience and program design. They interpret the college experience in varying degrees of authenticity and inclusion. Programs range from self-contained to full inclusion in the college experience. Self-contained programs focus on life skills and functional employment skills, while partially integrated programs offer social opportunities for students to interact with non-disabled peers and occasionally enroll in college courses, though not necessarily for credit. In full inclusion programs students receive large amounts of individualized support and are fully integrated in classes, though again, not always for credit. Any of these programs may culminate in certificates of completion, college credit, and/or an associate's degree, depending on the program and the student's abilities. Some of these programs offer dual enrollment with public secondary schools to provide age appropriate placement while students continue to receive services under the Individuals with Disabilities Education Improvement Act of 2004. While the number of programs remains relatively small, research has shown that postsecondary education can improve employment chances for individuals with disabilities (Gilmore, Schuster, Zaft, & Hart, 2001; National Council on Disability and Social Security Administration, 2000; Zaft et al., 2004).

Technology Integration

Burgstahler (2003) explains instructional and assistive technologies have the potential to increase students' personal independence, employment options, and community participation. Consequently, the availability of technology in postsecondary settings is of critical importance, particularly considering many students with mental retardation who could benefit from assistive technology do not have access to it in K-12

settings (Wehmeyer, 1999). The independent nature of postsecondary environments supports the authentic inclusion of technology. It is also an environment better prepared to handle the inadequacies of available technology. For example, there are limited choices of age appropriate software to support adult acquisition of basic literacy skills (Wehmeyer et al., 2004). Unlike families and K-12 public schools, colleges and universities are often in a unique position in that they have the intellectual, temporal, and technological resources to develop appropriate software.

Burgstahler (2003) explains that much of the possible success for students with disabilities in postsecondary education will relate to their access to and use of technology in these experiences. Instructional technology is typically utilized in traditional postsecondary programs, as witnessed with the use of PowerPoint presentations and existence of computer labs. For students with intellectual disabilities, instructional technology functions as assistive technology, supporting them in activities that would not be possible otherwise. Postsecondary programs can incorporate instructional technology and assistive technology in numerous ways to support students' independence and employment aspirations.

Case Study: Learning into Future Environments

George Mason University's Learning into Future Environments (LIFE) Program is a postsecondary program for young adults with intellectual disabilities housed at a four year institution. The LIFE Program illustrates successful integration and the value of technology in programs for students with intellectual disabilities in a postsecondary education setting. It incorporates technology across content and courses, teaching

functional academic, employment, and independent living skills. In this program students e-mail mentors and friends, participate in Fantasy Football Leagues, and use Palm Pilots. As society becomes ever more technologically driven, the LIFE Program teaches its students basic skills to operate common technologies.

Employment Skills

Research has shown that postsecondary education experiences improve chances of competitive employment for individuals with disabilities (Wagner et al., 2005). Consequently, employment skills are interwoven throughout the program. Many of the activities and internships geared toward fostering these skills involve the use of technology. Students learn and apply e-mail and data entry skills. For example, students enter data for professors and maintain the technical assistance library database. In addition to data entry skills, the LIFE students learn social skills needed for employment. The use of video cameras, with their visual and auditory feedback, raises students' awareness of their behavior, promoting appropriate behavior and self regulation (Embregts, 2003). They learn to operate cell phones; checking messages, saving telephone numbers, and setting alarms. With cell phones, they practice leaving voicemail messages. The immediate feedback from the replay features supports students' efforts toward clarity in diction and word choice, both of which are important when contacting family, friends, and employers.

Similar to using cell phone alarms, some students have begun using Palm Pilots to help stay organized and timely. Preliminary research on the use of Palm Pilots to improve task completion with individuals with mental retardation has been promising. It

can provide visual and auditory prompts to walk individuals through tasks, reducing their reliance on others (Davies, Stock, & Wehmeyer, 2002). Palm Pilots allow for differentiated applications and supports. Davies et al. (2002) found Palm Pilots were perceived favorably by users, perhaps in part because of their widespread use by the general public. While Palm Pilots and computer programs support the independence of individuals with mental retardation, the software programs were specifically designed for this population (Davies et al., 2002; Davies, Stock, & Wehmeyer, 2003; Wehmeyer, Smith, Palmer, & Davies, 2004). Much of the commercially available software for these devices is too complex for successful use by individuals with intellectual disabilities. Consequently, LIFE faculty spend time adapting traditional software for student use.

The LIFE Program's expectations and curriculum facilitate authentic use of technology, promoting the attainment of employment skills. Traditional postsecondary education involves more freedom and responsibility than secondary education. These differences are replicated by the LIFE Program. Students are expected to schedule and manage travel across the university, attending classes and social events independently. They are expected to arrive on time to classes, internships, and appointments, as they would be in employment situations. The use of technology assists LIFE students in fulfilling their responsibilities. The LIFE Program uses technology to build social and task related skills needed for employment.

Academic Skills

The LIFE program works to further students' academic skills, which will also help improve their chances for future employment. There is a focus on functional

communication, reading, writing, and math. Complementing work on vocational skills, students learn to maintain a checkbook through the use of a spreadsheet template modeled after a checkbook register. Use of computer programs has been found effective in assisting individuals with intellectual disabilities in managing their money (Davies et al., 2003). Electronic books read with a talking word processor serve as resources for developing auditory comprehension, another valuable skill in employment and life. Some students utilize voice recognition programs as writing tools. Others develop communication, writing skills, and sight word vocabularies through the use of software such as Cloze Pro and Clicker 5. The LIFE Program in many cases introduces and/or reintroduces students to technology that will help them throughout their adult life. Technology serves as a tool, strengthening the academic skills fostered in the program.

Leisure Skills

Use of computers by individuals with intellectual disabilities is often limited to academic endeavors (Wehmeyer, 1999). However, in the LIFE Program students have the opportunity to develop technology based leisure skills. Surfing the web, a leisure activity for many individuals, is also enjoyed by the students. Unlike many individuals with mental retardation who have limited access to the Internet (Wehmeyer et al., 2004), LIFE students learn safe Internet practices with the benefit of supervised guidance. Furthermore, students have become proficient with the basic features of card making software, digital cameras, and graphics programs. They will soon add use of video cameras to this list.

LIFE students utilize the technology skills they acquire to participate in typical college activities. They will use the video cameras in conjunction with their theater production. They have access to all social activities at the university, from music groups, to basketball games, to lunch in the student union building. Students use the Internet to locate upcoming activities and digital cameras to document their experiences. The LIFE students often use their e-mail to arrange lunch engagements with other students. The LIFE Program utilizes technology to support student participation in age appropriate leisure activities.

Summary

Higher education now provides more opportunities for students with intellectual disabilities to live the “college experience.” Technology, integrated into these programs, assists students with further developing academic, social, employment, and leisure skills. Postsecondary institutions often place more responsibility on students and have the resources to develop technology, providing both the expectations and the tools to assist students with intellectual disabilities in living as independently as possible. As students with disabilities continue to attend postsecondary institutions in higher numbers, technology will play an increasing role in their college experience.

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