Special Education Professionals and Assistive Technology: Requirements for Preparation in a Digital Age

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Abstract

This article presents contextual background for the preparation of teachers to effectively use assistive technology (AT) with students with disabilities. A brief description of student uses of technology is presented, noting how students have changed in their understanding and use of information technologies. The role of AT is then presented, linking the role of special education professionals in today's schools with current teacher preparation practices. Discrepancies are noted between what is needed to best serve Digital Age students in the schools, and the manner and extent to which teachers are prepared. Using existing standards and addressing emerging AT training needs, the authors propose three distinct levels of preparation: an AT (a) practitioner, (b) specialist, and (c) leader. Specific roles of each of these personnel are delineated. The instructional potential use of hybrid models of professional development classroom instruction combined with computer-based learning) is recommended as particularly promising approach.

Cultural, educational, and legal changes have dramatically increased the diversity of students served in the nation's schools (Rose & Myer, 2002). Today's classrooms welcome students from a wide variety of cultural, economic, and linguistic backgrounds, and with diverse levels of academic aptitude. While many students are experiencing success, others, especially those whose first language is not English, those with behavioral, attentional, and motivational challenges, and/or especially those with sensory, communication, cognitive, emotional or learning disabilities, are struggling (Rose & Meyer, 2002). Among the attempts to address these challenges has been Universal Design for Learning (UDL) which builds upon individual differences with inclusive, differentiated, and technology-supported instruction (Council for Exceptional Children, 2005). The recent Individuals with Disabilities Educational Improvement Act of 2004 (IDEIA, P.L. 108-446) defines and supports the use of universal design as a means to maximize access to the general education curriculum by students with disabilities.

Along with this changing school landscape, student outcomes have become a clear focus of national debate and action. Both the IDEIA and the No Child Left Behind Act of 2001 (NCLB, P.L. 107-110) have set academic success for all students, including those with disabilities, as the fundamental goal for the nation's schools (e.g., Turnbull, Huerta, & Stone, 2006).

Growing Expectations for Students with Disabilities

A primary goal of the NCLB is to have all students achieving at grade level by 2014 (Learning First Alliance, 2003). To achieve this, states set specific scores, known as proficiency levels, on their reading and math tests to indicate grade-level performance. States next set student performance goals based on test results from previous years. Student performance goals will be raised on a regular schedule until 2014 so that at that point all students, and all subgroups of students, will be performing at grade level (Learning First Alliance, 2003).

Perhaps most significantly for special education, test scores must be reported not just for overall student performance in a school, but also for specific groups within the schools. These subgroups include low-income students, those belonging to racial or ethnic minorities, students with limited English proficiency, and significantly for special educators, most students with disabilities. Schools and districts are required to demonstrate annually that all groups of students are meeting state goals for grade-level work. If this is reached, the school or district is confirmed as making Adequate Yearly Progress (AYP).

Schools and districts will not be counted as making AYP if any one (or more) of the specific student groups or subgroups fails to achieve the performance goal. Schools not making AYP for two years in row are considered "schools in need of improvement." If schools continue to fall short of AYP, they face more extensive changes, including possible restructuring, state takeover, or management by private firms (Learning First Alliance, 2003).

Certainly most school professionals would agree that setting high expectations for students, including those with disabilities, is associated with higher levels of student achievement. However, emerging data suggest that students with disabilities, especially those with learning and academic disabilities, to date may not be performing at grade level on state-wide tests of achievement.

For example, in 2005 the state of Ohio reported that 85.3% of eight graders without disabilities were proficient in reading, and 66.3% were proficient in math. For students with disabilities, the comparable figures were 39.8% and 27.7%, respectively (Ohio Department of Education, 2005).

Growth in Technology

Parallel with these increases in academic expectations for all students is the growth in the role of educational technology in the schools. Costs of these technologies are falling while greater potential educational benefits are emerging. Technology in general is increasingly woven into the fabrics of everyday life, in both home and school.

For example, by 2001, 90% of children and adolescents were using computers, with almost 60% regularly accessing the internet. This usage is beginning at younger and younger ages, as 75% of five year olds are presently using computers. In contrast to previous reports from the 1990s, there

are no longer significant differences in usage by boys and girls. More computer usage is occurring at school (81%) than at home (65%), especially for children from low income homes (National Center for Education Statistics, 2003). In 2002, the number of students per computer with internet access in public schools had declined from an average of 12:1 in 1998 to less than 5:1, a ratio that likely has dropped still more since (Mark, 2003).

More recent reports suggest that student access to all technologies continues to grow. In a 2005 study of middle school students, Peterson-Karlan, Wojcik and Parette reported that (a) 50% lived in homes with more than one computer; (b) 100% of these computers were connected to the Internet, with 58% equipped with high-speed Internet access; and (c) 31% had computers with Internet access in their bedrooms. Other related technologies also widely embraced by students include video games (79%), telephones (76%), Internet (59%), e-mail (43%), cell phones (32%), and electronic organizers (11%) (Friedman, 2004).

This explosion in technology use by students is clearly evident in schools as well. In the area of writing and literacy development, use of word processors incorporating such features such as spelling and grammar checkers are both accepted and promoted as tools for successful writing (Jankowski, 1998; Leibowitz, 1999). In math, the use of calculators increasingly is accepted as a standard tool permitting students to focus on problem-solving rather than computational issues (e.g., Gilliland, 2002). These and related technologies hold special promise for students with academic disabilities (e.g., Hetzroni & Shrieber, 2004), as they directly addresses challenges typically encountered by such students.

Changes in Students, Teachers, and Society

Parallel with the technology revolution are substantial cognitive and behavioral changes in today's students and youngest teachers. These children, adolescents, and young adults have greater comfort with technology, greater skills in technology use, and greater expectations for digital technologies than previous generations (Peterson-Karlan et al., 2005). A linguistic analogy may be useful here.

For example, it is common for immigrants to this country to develop only rudimentary skills in spoken English. However, their children, raised while surrounded and bombarded by spoken English, usually become very fluent at early ages. Similarly, contemporary young people might be conceptualized as "digital natives," while their parents (and often teachers) are "digital immigrants" (Grandgenett & Topp, 2005). As with their linguistic counterparts, while digital immigrants may master rudimentary skills, they are unlikely to achieve the overall levels of fluency that are typical of digital natives.

Unlike their predecessors 15 years ago, students beginning their studies at universities today usually arrive with a well-established foundation of technology skills. These changes have caused a shift in university technology course content, from an emphasis on personal or professional productivity to the use of technology to support curriculum implementation (i.e., technology integration; Smith, 2001).

The cumulative effects of the changes in the growth of technologies, as well as in the skill sets of the users of those technologies, are impacting legal mandates regarding the incorporation of technology in education. The NCLB, with its emphasis on student achievement, is forcing

educators to more carefully consider the potential contributions of educational technology as they seek to reach the AYP goals for all students (Trotter, 2003). For example, some school districts are exploring the distribution of laptop computers to all students in a district (e.g., Renwick, 2006). Since almost all students with disabilities are being held to the same academic achievement standards as are their nondisabled counterparts, the use of technology by these students may be especially critical.

Assistive Technology

Over the past two decades, many types of assistive technology (AT) have been developed for people with disabilities. These devices are designed to assist individuals in learning, make their environments more accessible, enable them to compete in the workplace, enhance their independence, and in short, improve their quality of life (Blackhurst, 2005). Typical examples designed to enhance learning and academic success include software that "reads" on-screen text out loud, and writing software that "predicts" the next word in student compositions. There are now more than 25,000 AT items, equipment and product services (Abledata, as cited in Edyburn, 2000) available for use with over 6 million students ages 6-21 with disabilities.

Recognition of the potential for AT to impact the educational and life success of students with disabilities led to specific AT requirements in the Individuals with Disabilities Education Act Amendments of 1997 (IDEA, P. L. 105-17), and the more recent IDEIA. These legislative acts required that AT must be considered in the development of any student's IEP (Turnbull, Huerta, & Stowe, 2006).

Early conceptualizations of the potential contributions that AT might offer individuals with disabilities focused on physical, sensory, and communication impairments. Examples of this sort of assistive technology include communication wallets (containing pictures so that non-verbal individuals might communicate with others), electronic communication devices, wheelchairs, prone standers, adapted eating utensils, large print or books-on tape, Braille watches, closed captioning televisions, hearing aids, sound field amplification systems, and alternatives to the typical computer interfaces of a mouse or keyboard. Since that time, professional thinking about the life enhancement possibilities of AT have dramatically expanded the horizons.

One practical organizational framework for AT proposed by Blackhurst (2005, as supplemented by Behrmann & Jerome, 2002) suggested that AT can enhance, improve, or maintain an individual's performance capabilities in the following seven areas:

- existence (activities of daily living)
- communication
- body support, protection, and positioning
- travel and mobility
- environmental interaction
- sports, fitness and recreation
- academics

These are further explained.

Existence, or activities of daily living, includes those basic responses needed to maintain everyday life, such as eating, dressing, bathing, grooming, and sleeping (Blackhurst, 2005). AT that can assist in these areas includes such nonmedical equipment as adapted eating utensils, dressing aids, specialized clothing or fasteners, personal hygiene and grooming aids.

Communication includes the abilities to receive and express communication in both oral and written or visual form or to engage in social interactions (Blackhurst, 2005). AT designed to assist with communication includes augmentative and alternative communication devices, hearing aids and assisted listening devices, telephone amplifiers, captioned video, and writing and drawing aids.

Body support, protection, and positioning refers to the needs for assistance that some students with disabilities have when they attempt to sit, stand, align or stabilize their bodies, or protect themselves when falling (Blackhurst, 2005). Technologies here that can help include braces, chair inserts, prone standers, furniture adaptations, or protective headgear.

Travel and mobility includes the ability of the person to navigate the environment by walking, driving, climbing stairs, or transferring position, e.g., from a sitting to a standing position, from lying prone to standing (Blackhurst, 2005). AT that can help with travel and mobility includes wheelchairs, walkers, crutches, canes for the visually impaired, adapted tricycles, scooters, car or bus lifts or adaptations to automobile steering, acceleration and braking controls.

Environmental interaction refers to the indoor and outdoor settings associated with daily living (e.g., food preparation, use of appliances, alterations to living spaces; operation of lighting controls) or access to community, school and workplace environments. AT here includes modified door or drawer handles, adjustable desks, or grabbers to reach items on high shelves (Blackhurst, 2005).

Sports, fitness and recreation includes those abilities and functions associated with individual participation in sports, physical fitness, hobbies or crafts and any other productive use of leisure time (Blackhurst, 2005). AT that can help here includes such things as balls that beep audibly for visually impaired ball players, skis for individuals with single leg amputations, adapted aquatics, Braille playing cards, and specialized wheelchairs for such activities as basketball or “off-road” travel.

Academics refers to the set of knowledge and skills required for success in such typical school activities as reading, writing, math, information acquisition, organization, and cognitive processing (Thompson, Bakken, Fulk, & Peterson-Karlan, 2005). Such devices as calculators or spell checkers in word processing programs are found in most contemporary classrooms.

So when does a commonly found device such as a calculator become AT? Most students without disabilities are able to master fundamental arithmetic calculations without a calculator, or basic spelling skills without a spell checkers. For these students, these technologies are simply supplementary tools. However, students with learning disabilities or cognitive impairments may not be able to do these skills at minimum competency levels without these devices, and thus in their absence would not be able to gain meaningful access to the general education curriculum. For these students, then, these devices would and should be considered AT.

Thus, some AT used with students who have disabilities is the same technology that might be used by anyone (e.g., a calculator or a book on CD). Other versions of AT use technology not typically used by nondisabled individuals (e.g., a voice output screen reader) to enhance the performance of individual students with disabilities (Blackhurst, 1997).

Special Educators and Assistive Technology

Increasingly, then, special education professionals must be knowledgeable about and proficient in, the use of AT to improve performance of students with disabilities. The ability of contemporary special educators to utilize appropriate AT directly and powerfully impacts the probability that their students will achieve meaningful educational outcomes. Unfortunately, there are indicators that the AT preparation of educational professionals to date may be less than adequate.

For example, as of 2002, less than half of teacher preparation programs had stringent technology requirements. Few preservice training programs included coursework or experiences specific to applications and issues in assistive technology (Lahm, 2003). Further evidence of this inadequate attention to AT was identified in a 2003 survey of university coordinators for graduate level special education programs. In that report, Michaels and McDermott found significant discrepancies between (a) the importance placed on understanding, using, and making decisions about AT; and (b) the degree to which AT knowledge, skills and dispositions were included in their curriculum. Overwhelmingly, the importance of AT was rated as greater than the rating of their curricular attainment.

Back in 1998, projections at the time suggested that AT might be used with up to 35% of students with learning or cognitive disabilities or health impairments; with up to 75% of students with autism or traumatic brain injuries; and with up to 100% of students with physical or multiple disabilities, students who are deaf or hearing impaired, or students who are blind or visually impaired (Golden, 1998). The projections for students with learning disabilities were relatively modest and probably low, since they were made prior to the widespread market availability of a variety of software tools to support writing and reading (e.g., portable keyboarding devices, scan-and-read text programs, e-text voice output reading programs, voice output word processors, and word prediction writing support programs).

However, in practice these projected levels of AT utilization (35% to 100%) have yet to emerge. For example, in a random sample of 1000 special education teachers in Kentucky, Hasselbring and Bausch (2004) found that only 22% of their students had AT documented in their IEPs. For 34% of their students, AT apparently had not even been considered, a clear violation of IDEA.

A reasonable conclusion is that to date teachers in general, and special educators in particular, have been inadequately prepared to consider, select, and implement assistive technology in their classrooms. The remainder of this article will address (a) the knowledge and skills necessary for special educators to competently assume appropriate professional responsibilities in the area of assistive technology, and (b) a proposed model for a comprehensive approach to preparing educational professionals to successfully incorporate assistive technology in their work with students with disabilities.

The Emerging Role of Technology Standards: Knowledge and Skills

Despite the obvious importance of technology skills for special educators in the 21st century, relatively few preservice training programs include substantial coursework or experiences on AT applications and issues for students with developmental disabilities (Wojcik, Peterson-Karlan, Watts, & Parette, 2004). As a result, special education professionals often are ill-prepared to effectively use and integrate AT (Ashton, 2004; Hasselbring & Bausch, 2004). The capacity of school systems to fully implement the IDEA mandate of AT consideration is significantly compromised (Hasselbring & Bottge, 2000), along with compromising the ability of schools to have their subgroups of students with disabilities meeting AYP goals.

To assist teacher preparation programs in preparing special educators with needed skills in assistive technology, the Council for Exceptional Children (CEC) is proposing a set of beginning Special Education Technology Specialist Standards (Council for Exceptional Children, in press). These technology standards, including both knowledge and skills competencies, are structured around the ten basic CEC standards as follows:

- Standard 1: Foundations
- Standard 2: Development and Characteristics of Learners
- Standard 3: Individual Learning Differences
- Standard 4: Instructional Strategies
- Standard 5:Learning Environments and Social Interactions
- Standard 6: Communication
- Standard 7: Instructional Planning
- Standard 8: Assessment
- Standard 9: Professional and Ethical Practice
- Standard 10: Collaboration

As used in the Special Education Technology Specialist Standards, each of these ten standards contains from one to twelve assistive technology-specific knowledge or skills competencies in that area. **Table 1** presents the complete list of these 48 competencies as broken out by CEC standards. Although these standards are referred to as the "Special Education Technology Specialist Standards," many would hold that these are basic AT skills needed by all special educators, given the IDEA mandate that AT must be considered in developing all IEPs for students with developmental disabilities (Peterson-Karlan & Parette, in press).

One criticism of the current state of AT service delivery in the U.S. is based on its reliance on an "expert" model, wherein school systems rely on a few highly trained AT specialists. This results in a "funneling effect," since only small portions of the expert's knowledge base can be passed on to others in the system (SEAT Center, 2004). As a result of this ongoing reliance on "experts," front line special educators may not develop needed levels of AT knowledge and skills.

One promising way to approach the development of an initial set of basic but critical AT knowledge and skills in beginning special educators is to first review the seven life areas to which AT can make substantive contributions (Behrmann & Jerome, 2002; Blackhurst, 2005) (existence, communication, body support, travel and mobility, environmental interaction, sports,

and academics), with perhaps special attention to the area of academics. Then the CEC Special Education Technology Specialists standards of knowledge and skills might be overlaid onto those seven life areas, generating AT knowledge and skills requirements specific to each area that special educators need to enhance student function and independence.

Table #1

CEC Knowledge and Skill Base for All Beginning Special Education Technology Specialists

Standard 1:	***Foundations***
Knowledge:	*Concepts and issues related to the use of technology in education and other aspects of our society.*
Skills:	*Articulate a personal philosophy and goals for using technology in special education.* *Use technology-related terminology in written and oral communication.* *Describe legislative mandates and governmental regulations and their implications for technology in special education.*
Standard 2:	***Development and Characteristics of Learners***
Knowledge:	*Impact of technology at all stages of development on individuals with exceptional learning needs.*
Skills:	*None*
Standard 3:	***Individual Learning Differences***
Knowledge:	*Issues in diversity and in the use of technology.*
Skills:	*None*
Standard 4:	***Instructional Strategies***
Knowledge:	*None*
Skills:	*Identify and operate instructional and assistive hardware, software and peripherals.* *Provide technology support to individuals with exceptional learning needs who are receiving instruction in general education settings.* *Arrange for demonstrations and trial periods with potential assistive or instructional technologies prior to making purchase decisions.*
Standard 5:	***Learning Environments and Social Interactions***
Knowledge:	*Procedures for the organization, management, and security of technology.* *Ergonomic principles to facilitate the use of technology.*
Skills:	*Evaluate features of technology systems.* *Use technology to foster social acceptance in inclusive settings.* *Identify the demands of technology on the individual with exceptional learning needs.*
Standard 6:	***Communication***
Knowledge:	*None*
Skills:	*Use communication technologies to access information and resources electronically.*
Standard 7:	***Instructional Planning***
Knowledge:	*Procedures for evaluation of computer software and other technology materials for their potential application in special education.* *Funding sources and processes of acquisition of assistive technology devices and services.* *National, state, or provincial PK-12 technology standards.*
Skills:	*Assist the individual with exceptional learning needs in clarifying and prioritizing functional intervention goals regarding technology-based evaluation results.*

	Identify elements of the curriculum for which technology applications are appropriate and ways they can be implemented. *Identify and operate software that meets educational objectives for individuals with exceptional learning needs in a variety of educational environments.* *Design, fabricate, and install assistive technology materials and devices to meet the needs of individuals with exceptional learning needs.* *Provide consistent, structured training to individuals with exceptional learning needs to operate instructional and adaptive equipment and software until they have achieved mastery.* *Verify proper implementation of mechanical and electrical safety practices in the assembly and integration of the technology to meet the needs of individuals with exceptional learning needs.* *Develop and implement contingency plans in the event that assistive or instructional technology devices fail.* *Develop specifications and/or drawings necessary for technology acquisitions.* *Write proposals to obtain technology funds.*
Standard 8:	***Assessment***
Knowledge:	*Use of technology in the assessment, diagnosis, and evaluation of individuals with exceptional learning needs.*
Skills:	*Match characteristics of individuals with exceptional learning needs with technology product or software features.* *Use technology to collect, analyze, summarize, and report student performance data to aid instructional decision-making.* *Identify functional needs, screen for functional limitations and identify if the need for a comprehensive assistive or instructional technology evaluation exists.* *Monitor outcomes of technology-based interventions and reevaluate and adjust the system as needed.* *Assist the individual with exceptional learning needs in clarifying and prioritizing functional intervention goals regarding technology-based evaluation results.* *Work with team members to identify assistive and instructional technologies that can help individuals meet the demands placed upon them in their environments.* *Identify placement of devices and positioning of the individual to optimize the use of assistive or instructional technology.* *Examine alternative solutions prior to making assistive or instructional technology decisions.* *Make technology decisions based on a continuum of options ranging from no technology to high technology.*
Standard 9:	***Professional and Ethical Practice***
Knowledge:	*Equity, ethical, legal, and human issues related to technology use in special education.* *Organizations and publications relevant to the field of technology.*

Skills:	*Maintain ongoing professional development to acquire knowledge and skills about new developments in technology.* *Adhere to copyright laws about duplication and distribution of software and other copyrighted technology materials.* *Advocate for assistive or instructional technology on individual and system change levels.* *Participate in activities of professional organizations relevant to the field of technology.*
Standard 10:	***Collaboration***
Knowledge:	*Roles that related services personnel fulfill in providing technology services.* *Guidelines for referring individuals with exceptional learning needs to another professional.*
Skills:	*Conduct in-service training in applications of technology in special education.* *Refer team members and families to assistive and instructional technology resources.* *Collaborate with other team members in planning and implementing the use of assistive and adaptive devices.* *Instruct others in the operation of technology, maintenance, warranties, and trouble-shooting techniques.*

A Proposed Model for Professional Development in AT

Such established teacher accreditation agencies as the National Council for the Accreditation of Teacher Education (NCATE) have long acknowledged the usefulness of offering multiple levels of recognition of teacher competence. In the NCATE accreditation system, these two levels include (a) Initial Teacher Preparation programs, and (b) Advanced Teacher Preparation programs.

Initial Teacher Preparation programs are programs at the baccalaureate or post-baccalaureate levels that prepare candidates for the first license to teach. They include five-year programs, master's programs, and other post-baccalaureate and alternate route programs that prepare individuals for their first license in teaching. Standards established for this level reflect the basic skills that all education professionals should possess prior to entering a classroom and assuming responsibility for the education of children (NCATE, 2006).

Advanced Preparation Programs are typically programs at post-baccalaureate levels for the continuing education of teachers who have already completed initial preparation programs. These advanced programs commonly award graduate credit and include master's, specialist, and doctoral degree programs as well as non-degree licensure programs offered at the post baccalaureate levels (NCATE, 2006). These higher advanced standards assume a comprehensive foundation of basic education knowledge and skills, and seek to recognize advanced levels of professional mastery.

In the area of assistive technology, similar proposals have emerged in which differing levels of knowledge of and skills might be recognized (SEAT Center, National Center for Technology Innovation, and the University of Kansas, 2006). One recent plan (Peterson-Karlan, Wojcik, & Parette, 2005) outlined three levels of professional competence in AT.

At the basic level, all special educators would have the basic knowledge and skills to serve as *AT Practitioners* within school systems, working directly with children in classrooms. As special educators, these individuals would have fundamental knowledge and skills in AT over and above the basic technology skills required of all teachers, including general educators. *AT Practitioners* would be able to function independently in most situations involving the identification, implementation, and evaluation of common AT for students with disabilities whom they serve in their classrooms.

At the next level, *AT Specialists* would support special educators and IEP teams in schools and districts, a structure earlier proposed by Lahm (2003). *AT Specialists* would possess specific expertise in an array of AT devices and services, and would be able to provide guidance and leadership to IEP teams and families in unusual or particularly challenging AT circumstances. They would also assist in the on-going education and professional development needed to assist families to use technology and teachers to keep current with technology updates and advances.

Lastly, *AT Leaders* would have skill sets enabling them to work within and across school systems, functioning at the district, state, regional, or national levels, to further policy and procedures and to lead systems to develop effective implementation of AT services within schools settings. These experienced individuals should possess truly cutting edge sets of knowledge and skills in AT and be knowledgeable about technologies appropriate for both students with high incidence and students with low incidence disabilities while understanding principles of program evaluation, development, and implementation.

Perhaps needless to say, these *AT Practitioners*, *AT Specialists*, and *AT Leaders* must additionally possess the skills necessary to collaborate with both families and with general education professionals, who themselves may possess critical technology skills as well as basic knowledge of AT (Peterson-Karlan et al., 2005). Given the increasingly shared responsibilities inherent in the contemporary delivery of special education services, including AT, these skills in collaboration are indispensable in contemporary schools (Hourcade & Bauwens, 2003).

Implementing Professional Development

The convergence of technology development and widespread familiarity with the technology has transformed the ways in which both teachers and students prepare and learn. This same convergence can transform the ways in which special educators are prepared and supported to use AT.

Hybrid models of teacher preparation and professional development refer to programs that combine face-to-face classroom instruction with computer-based learning. A number of hybrid models of assistive technology education have been developed, often using web-based multimedia learning and knowledge assessment activities combined with direct experiential, performance-based learning with AT tools and strategies (Puckett, 2004; Wojcik et al., 2004). This hybrid approach offers the potential to extend the reach of professional development from a few large, well-equipped teacher education programs and a hodge-podge of local and state professional development efforts to a comprehensive and sustainable system of professional preparation. As such programs are developed and implemented, they should be accompanied by research targeting the identification and validation of maximally effective e-learning constructs and service delivery models (Meyen et al., 2004).

Conclusions

Special educators today are facing unique challenges and opportunities caused by the convergence of two powerful societal forces: (a) the demands for accountability for learning by all students, including those with disabilities; and (b) the exponential growth in the potential of assistive technology to facilitate that learning. One might even argue that the former demand would be impossible without the latter resource.

AT-based solutions for the challenges experienced by students with disabilities hold great promise. However, this promise can only be realized when thoughtfully integrated into educational practices. Challenges to realizing this promise include continuing needs for (a) well-articulated models of standards and performance in technology and assistive technology at that build from those needed by all teachers to those needed by the AT practitioners, specialists and leaders (b) development of curriculum models and materials for AT curriculum implementation which are scalable to the needs of those who provide teacher preparation and professional development (c) integration of technology into the teaching of the use of technology (d) evidence of effectiveness of the efforts of technologically well-prepared teachers upon student outcomes.

As special educators gain more sophisticated theoretical and practical mastery of the tremendous potentials inherent in assistive technology, the success of their students with disabilities in academic programs, and the levels of post-school success in homes, jobs and communities, will be significantly enhanced.

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