
Assistive Technology Specialists

Bringing Knowledge of Assistive Technology to School Districts

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ABSTRACT

The 1997 Amendments to the Individuals with Disabilities Education Act mandate that assistive technology be considered for each student receiving special education services. Without knowledge of assistive technology, service providers will have difficulty meeting that mandate. It may not be reasonable to expect all special educators to have enough expertise in this area to meet the mandate for all of their students. An assistive technology specialist can bring to a district the expertise needed to comply with this mandate. This article presents the knowledge and skills determined by the Council for Exceptional Children to be necessary for assistive technology specialists. These competencies provide guidelines for districts as they seek to employ a specialist and guide individuals interested in serving as specialists in their professional development.

RECENT LEGISLATION MAKES EDUCATORS RESPONSIBLE for seeking assistive devices to help their students be successful in multiple settings. The 1997 Amendments to the Individuals with Disabilities Education Act (IDEA) require that assistive technology be considered for every student receiving special education services. With this legislation, lack of knowledge will no longer be accepted as a reason for not pursuing assistive technology. "Consideration" of assistive technology for every student must be documented.

It is difficult to remain current in the rapidly developing field of assistive technology (AT), especially for teachers who have so many other areas to keep abreast of. Employing assistive technology specialists is one way of bringing that expertise to teachers, similar to the way related service personnel

provide expertise to a school district. The role of the assistive technology specialist is to consult with teachers as they consider assistive technology; assess students to identify their specific needs; and teach the student, teachers, parents, and other service providers to use selected assistive technologies. Through the AT specialist, the intent of the consideration mandate can be better carried out.

In 1988, *assistive technology* was defined in the Technology-Related Assistance Act and has since been incorporated into several other laws, including the Americans with Disabilities Act (1990) and the Individuals with Disabilities Education Act (1990). The definition is extremely broad: "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" (§ 300.5). The definition of *assistive technology services* is equally as broad: "Any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology device" (§ 300.6). AT and AT services are required if needed as part of the student's specialized education, related services, or supplementary aids and services.

The growth of this field has occurred so rapidly that national competencies have only recently been developed to guide teacher preparation institutions in preparing professionals for the field of AT. All special educators should have a basic knowledge of AT. Several educational institutions have developed their own set of competencies for AT and offer AT certification programs, giving teachers the option of going beyond the basic knowledge. National standards for both basic knowledge and specialized skills, however, will

add consistency and credibility to assistive technology service delivery. This article describes the knowledge and skills validated by the Council for Exceptional Children (CEC) for assistive technology specialists and describes one university graduate program that is based on these competencies.

REVIEW OF LITERATURE

Need for Technology Training

In its annual report on technology use in education, *Education Week* (2001) reported that the national average of students per computer is now down to 4.9. Less than 20 years ago, the average was 125 students per computer. This dramatic change in the availability of technology in today's schools demands revised and additional training of teachers to harness the power of technology for teaching and learning. Though the number of computers per student is quite low, the use of those computers in schools varies greatly along many lines, including economic, racial, gender, academic, school community, and language (*Education Week*, 2001).

One of the reasons for varied use of technology is teachers' level of preparedness to use, and to teach the use of, technology (CEO Forum, 2000). Quality Education Data (1995) estimated that schools spend only 5% of their growing technology budgets on training. This represents a significant drop from the early 1990s, when schools were devoting 15% of their exceedingly limited budgets to training. This drop is even more alarming considering that the Office of Technology Assessment (U.S. Congress, Office of Technology Assessment, 1995) suggested that 30% of the nation's school technology expenditures should be devoted to teacher training. This report states,

Despite the importance of technology in teacher education, it is not central to the teacher preparation experience in most colleges of education in the United States today. Most new teachers graduate from teacher preparation institutions with limited knowledge of the ways technology can be used in their professional practice. (p. 2)

Less than half of today's institutions of higher education that prepare teachers have stringent technology requirements for student teaching and graduation. Citing three major studies, the CEO Forum (2000) reported that the biggest challenge to graduating technology-ready teachers is the faculty's level of technology expertise.

Assistive technology is an even smaller piece of the technology training big picture. IDEA guarantees students with disabilities the provision of AT devices and services if they are needed to fully participate in public education. Other legislative acts that support the provision of AT include Section 504 of the Rehabilitation Act of 1973 and Title II of the

Americans with Disabilities Act of 1990. Yet, even with so much legislative backing, special education teachers are unprepared to consider a range of assistive technologies that might meet the needs of their students. Training at both the pre- and inservice levels is not adequate.

IDEA's 1997 amendments place a strong emphasis on educating students with disabilities with their nondisabled peers in the general curriculum. Instructional technology, as used in the general curriculum, becomes assistive technology when it is customized for a specific individual with special learning needs. Thus, special educators not only need to be competent in AT but need to meet the same technology competencies as general educators. When special education professionals lack basic technology skills, they have even more difficulty meeting the mandates for AT specified in IDEA (Oregon Department of Education, 1996).

Teaching tools are useless without the knowledge of how to use them. The Oregon report listed five specific problems related to professional development:

1. lack of skills among many educators to access the AT needs of their children and youth with disabilities,
2. lack of skills among educators to employ AT for children and youth with disabilities,
3. lack of understanding regarding the best ways to address AT in IEPs,
4. lack of resources available to help educators learn to use technology as an instructional tool, and
5. lack of information available to educators on the best ways to teach technology skills to students.

Several statewide studies assessed educators' needs for AT training (Abner & Lahm, 2002; Derer, Polsgrove, & Rieth, 1996; Huting, Johanson, & Stoneburner, 1996; McGregor & Pachuski, 1996; Oregon Department of Education, 1996). They found that there were few preservice training programs for special education teachers that included courses or even class sessions on AT applications and issues. One study found that 41% of the special educators reported that they had received no AT training (Derer, Polsgrove, & Rieth, 1996). Without this background and knowledge, teachers face increased difficulty in acquiring useful and valid information on appropriate AT selection and application, making many special educators extremely resistant to introducing AT to their students.

A trend is noted in the AT field. The Office of Special Education Programs of the U.S. Department of Education has funded several special education technology graduate programs that have produced a small number of AT specialists (Edyburn & Gardner, 1999). An increasing number of other

institutions of higher education are developing AT certification programs. Though these programs carry little weight in the special education field because they are not tied to teacher licensure, more disability professionals are obtaining some level of AT expertise. Currently, only two states have state-endorsed AT certification programs: Wisconsin and Utah.

The impetus behind this flurry of certification programs is competition with the Rehabilitation Engineering and Assistive Technology Society of North America (RESNA). RESNA developed and validated a set of competencies and prepared an examination that leads to national certification as an Assistive Technology Practitioner (ATP) or Assistive Technology Service Provider (ATS). The certificate is gaining recognition in adult and clinical service arenas but has not been recognized by state education agencies. The Research Institute for Assistive and Training Technology developed a training and certification program at the University of New Mexico that is perhaps the most recognized by state education agencies because the National Association of State Directors of Special Education has endorsed it. Like most others, this program has not been validated and does not lead to licensure.

Development of Knowledge and Skills

The need for competencies is not unique to today's technologies. In 1981, a 3-year effort was conducted to develop a list of core competencies for instructional/training development of professionals (Berry et al., 1981). Their goals in developing these competencies are similar to the goals for developing competencies for the field of AT. Their goals were

1. to provide experienced developers with a tool for self-assessment and professional growth,
2. to provide a common set of concepts and vocabulary to improve communication among instructional/training developers and between developers and other professional groups,
3. to provide academic and professional preparation programs for instruction/training developers with information on program development,
4. to provide a basis for potential professional certification,
5. to aid employers in identifying qualified practitioners, and
6. to provide a basis for defining the emerging field of instructional development.

The National Council for Accreditation of Teacher Education is the accrediting agency for professional education units of U.S. colleges and universities. The standards used in the accreditation process are based on guidelines established

in the "learned societies" in each subject area (Thomas, 1991). In January of 1990, the International Society for Technology in Education (ISTE) initiated a 3-year effort to develop nationally accepted accreditation standards to ensure preparation in technology for all teachers. Their desire was to indicate a level of excellence that teacher preparation programs in educational computing and technology must meet. The standards they developed were approved in the fall of 1996 and were first used for the Fall 1998 NCATE evaluations (Ley, 1997).

In the field of AT, RESNA developed a set of competencies for ATPs and ATSs (Minkel, 1996). Their purpose for developing competencies was to ensure consumer safeguards and to increase consumer satisfaction. Building on their set of competencies, the American Occupational Therapy Association (AOTA) developed competencies for occupational therapists at three levels of practice: entry/basic, intermediate, and advanced (Hammel & Angelo, 1996).

CEC, in collaboration with the NCATE, published a set of professional standards to define the knowledge base for preparation programs and to specify a common set of competencies to inform certification requirements for special educators in each area of specialization (CEC, 2000). A subset of these competencies that address the technology-related knowledge and skills needed by all special educators has been described by Lahm and Nickels (1999) and Lahm (2000). National standards are used to promote the consistency in training across personnel preparation programs as well as in licensing across state educational agencies to enhance the future delivery of school services to students with special needs (Lombardi & Ludlow, 1997).

METHOD

The rapid change in educational and assistive technology has rendered it imperative that teachers have technology-related skills. This study was conducted to determine what those skills should be. It began by combining the competencies from RESNA, AOTA, ISTE, and the University of Kentucky—four organizations with published competency lists—and seeking input from the field via the Internet. Combined, these organizations' lists consisted of 154 competencies.

A Delphi method was used to validate the competencies because it is considered to be an efficient and effective group communication process that avoids many of the psychological distractions associated with roundtable discussions (Ono & Wedemeyer, 1994). It is designed to systematically elicit judgments from experts in their selected area of expertise (Cramer, 1991). Fifteen experts were nominated by members of the executive board of the Technology and Media Division of CEC. Each nominee held more than one of the following positions (Nickels, 1999): (a) RESNA-certified professional, (b) nationally known practitioner and trainer, (c) teacher educator, and (d) member of a professional organization (RESNA,

CEC, CEC/Council of Administrators of Special Education, and CEC/Technology and Media Division).

In three Delphi rounds, panelists rated each statement as essential, useful but not essential, or not important for AT specialists. *Assistive technology specialists* were defined as individuals who are formally responsible for providing assistive technology services, including assessment, procurement, and training. Between each round, the ratings and comments were compiled and sent back to the panelists to review and reconsider their ratings. After the final ratings were compiled, statements that were rated *essential* by at least 70% of the panelists were considered essential. Statements rated *not important* by 30% of the panelists were eliminated. Those that fell in between were flagged for future discussion.

A second round of validation was completed by the Knowledge and Skills subcommittee of CEC. This subcommittee consisted of one representative from each of CEC's 17 divisions and a chair, chosen by CEC's Professional Standards and Practices Committee. Two members of CEC's professional staff also participated. All statements were reviewed by the subcommittee for clarity and redundancy. Those flagged for discussion were considered for inclusion. Of the 154 original statements, 96 were mailed to a random sample of 200 CEC members for validation. One hundred eight surveys were returned (54%). Using the same criteria as in the first round of validation, the statements were discussed once more. At the conclusion of the process, 46 statements remained.

RESULTS

National Alignment

INTASC (Interstate New Teacher Assessment and Support Consortium) is a consortium of state education agencies, higher education institutions, and national educational organizations formed to promote educational reform. In an effort to promote standards-based reform, INTASC created a model set of competencies for beginning teachers. The CEC Professional Standards and Practices Committee decided to use that framework as a model and thus reorganized its statements. The 10 standards were redefined as they apply to special education (see Note). This article presents the technology specialist knowledge and skill statements using the 10 standards of the INTASC framework.

Foundation

The focus of the first standard is the foundation of the discipline. The Knowledge and Skills (K & S) subcommittee described this area of competency in the following manner: "The special educator has an understanding of models, theories, philosophies and issues of special education and the laws and policies that govern practice." The tenet behind this standard is the responsibility of special educators to understand and be involved in the changing discipline and its

philosophies, theories, and issues. This includes the impact of diversity on families, culture, and schools.

Within this standard, AT specialists should demonstrate their understanding of the foundations of using technology in special education in the following areas:

- concepts and issues related to the use of technology in education and other aspects of our society,
- articulation of a personal philosophy and goals for using technology in special education,
- technology-related terminology in written and oral communication, and
- legislative mandates and governmental regulations and their implications for technology in special education.

Development and Characteristics of Learners

The K & S subcommittee described the second standard as follows: "The special educator understands similarities and differences in development and characteristics between and among individuals with and without exceptional learning needs. The impact these differences may have on learning and development is also understood." This standard covers all the domains addressed through special education: cognitive, linguistic, physical, adaptive, behavioral, and social-emotional development. It stresses that the special educator must understand the impact of experiences, similarities, and differences on families and students and their participation in school.

To illustrate the importance of knowing the learner and the available technology, consider two fourth-grade students, one with a disability and one without. Their teacher assigned a computer-assisted instruction (CAI) program to both students to build proficiency in math skills. The student without a disability likes the assignment because it provides an approach other than worksheets to practicing math facts. Because of a motor problem, however, the student with a disability cannot do the worksheets. The CAI program, with preferences set to match his needs, is one of only a few ways he can practice these skills. In this situation, the CAI program is instructional technology for the first student and both assistive and instructional technology for the second. To match the educational task with the abilities of the learner and the available technology, AT specialists must demonstrate an understanding of the impact of technology at all stages of development on individuals with exceptional learning needs.

Individual Learning Differences

The third standard focuses on learning differences. As the K & S subcommittee described it, "The special educator un-

derstands the impact of exceptionalities, diversity, and individual differences on an individual's academic and social abilities, interactions, attitudes, interests, career options, and values." The impact of ways of learning, first language, beliefs, traditions, and values is emphasized. This standard calls for special educators to be proactive in seeking relevant information about their students and the effects of co-existing conditions. AT specialists demonstrate these tasks through their ability to consider issues related to diversity and to the use of technology.

Instructional Strategies

This standard is described as follows: "The special educator understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills." To demonstrate competence under this standard, special educators must use a variety of research-based instructional strategies for individualizing instruction for their students, promoting high but realistic expectations. This includes maintenance and generalization of knowledge and skills across many learning and implementation environments.

The role of the AT specialist is to assist other service providers in the use of technology to achieve the essence of this standard. To accomplish that, they must demonstrate their ability to

- 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; and
- arrange for demonstrations and trial periods with potential assistive or instructional technologies prior to making purchase decisions.

Learning Environments and Social Interactions

The fifth standard calls for special educators to have "the knowledge and the skills to establish and structure positive and safe learning environments that integrate and engage individuals with exceptional learning needs in meaningful learning activities, interactions, and settings." With the definition of assistive technology being so broad, the AT specialist's role includes assisting teachers in engineering physical and emotional environments to promote positive school success. To achieve this, the specialist must be able to demonstrate

- knowledge of procedures for the organization, management, and security of technology;

- knowledge of ergonomic principles to facilitate the use of technology;
- ability to evaluate features of technology systems;
- ability to use technology to foster social acceptance in inclusive settings; and
- ability to identify the demands of technology on the individual with exceptional learning needs.

Language

Assistive technology can play an integral role in the language and communicative successes of individuals with disabilities. The K & S subcommittee described this standard as follows:

Special educators understand language development and the ways in which exceptionalities, culture, and linguistic differences may impact the use and understanding of language. They also use strategies for enhancing language development and teaching communication skills appropriate to the needs of each individual with exceptional learning needs.

In IDEA 1997, two of the five statutory considerations specifically named relate to communication and a third to AT, Braille, and communication. Each child receiving special education services must be considered for assistive technologies that may meet their needs, including the use of Braille and communication devices. To achieve this standard, special educators need to understand both typical and atypical language development, methods of communication, and the impact of diversity on these.

The AT specialist is a major player in the development of language and communication skills, especially for students who do not have the ability to communicate verbally. To assist the IEP team in making technology decisions, the technology specialist must use communication technologies to access information and resources electronically.

Instructional Planning

To ensure access to the general curriculum, special educators need to be able to plan for the instruction of their students with disabilities. As the K & S subcommittee stated, "The special educator plans and implements instruction, and creates and selects materials which meet the individualized needs of individuals with exceptional learning needs and which promote learning and development of academic, social, and life skills." The standard includes the systematic translation of goals and objectives into individualized instructional sequences for both short-term and long-range plan-

ning. To achieve this, the special educator plans for structure, clarity, redundancy, and pace and engages in ongoing assessment to monitor the plans. The AT specialist engages in these activities as they relate to the use of technology within the student's plan. To accomplish this, the technology specialist must demonstrate an ability to

- use technology for planning and managing the teaching and learning environment;
- incorporate and implement instructional and assistive technology into the educational program;
- develop procedures for evaluation of computer software and other technology materials for their potential application in special education;
- find funding, sources, and processes of acquisition of AT devices and services;
- adhere to national, state, or provincial preK–12 technology standards;
- 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 AT 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; and
- write proposals to obtain technology funds.

Assessment

Assessment is essential to decision making and the teaching of a special educator. The special educator has the knowledge and skills to perform instructional assessments and use the results to plan and implement individualized instructional programs designed to meet the needs of individuals with exceptional learning needs.

As stated, assessment is the vision that holds the instructional plan together. Legal and ethical concerns as well as theory and strategies of assessment are basic knowledge and skills under this standard. Knowing the characteristics, uses, advantages, and limitations of a range of assessment tools is essential.

Similarly, technology specialists must have knowledge and skills in the area of assessment. Their knowledge must go beyond classroom teachers' and be geared to matching the abilities of children with disabilities to the features of existing assistive technologies. The previously mentioned student who used a CAI program to work math problems is one example of matching. Other, more subtle abilities and disabilities may require closer scrutiny before a match can be identified. Through assessment, the AT specialist examines the precise demands of a task or function on a student; measures his or her ability to meet those demands; and explores alternatives, such as assistive technology, that could assist the student in meeting those demands. This match is essential to avoid purchasing technologies that will not meet the needs of the student and thus waste monetary resources.

The AT specialist's use of technology during assessment goes beyond identifying a solution for a student. Assistive technology can be used in the assessment process itself, when appropriate. Used in this way, AT may provide a more accurate picture of the student's abilities. Technology can also be used to report the assessment, such as in the use of computerized Individualized Education Programs. The AT specialist needs to understand the issues related to the various uses of technology. It is essential that he or she demonstrate the ability to

- use technology to conduct assessments;
- use technology to assess, diagnose, and evaluate individuals with exceptional learning needs;
- 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 on 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; and
- make technology decisions based on a continuum of options ranging from no technology to high technology.

Professional and Ethical Practice

The ninth standard requires “the special educator [to practice] in a context requiring ongoing attention to legal, ethical, and professional considerations. The special educator reflectively practices within the Council for Exceptional Children Code of Ethics and standards of professionalism.” This requires an understanding of the laws and policies that affect the delivery of special education services and the commitment to upholding high standards of practice. Included in this standard is the commitment to providing best practices through reflection, professional development, sensitivity to the needs of individual students, and responsive adjustments to the learning environment.

One myth regarding technology is that it will replace traditional instructional strategies and allow the student access to higher levels of information without building the basis for understanding what has been learned. This has also been an issue in the debate over whether calculators should be used to aid math instruction. Best practice, however, suggests that the use of assistive technology for instruction supplements other, more standard teaching strategies. Just as parents’ reading to

their children before they are old enough to read themselves provides the children with rich language experiences, screen readers provide students with access to written materials while they are learning Braille or other methods for achieving literacy. Using a screen reader does not impede development of a student’s reading skills but helps him or her learn content in other domains while learning to read. This kind of technology can help decrease the learning gap between students with disabilities and their nondisabled peers.

The technology specialist is committed to providing best practices through the ethical and legal use of technology. The specialist should be able to demonstrate the following:

- knowledge of equity, ethical, legal, and human issues related to technology use in special education;
- knowledge of organizations and publications relevant to the field of technology;
- ability to maintain ongoing professional development to acquire knowledge and skills about new developments in technology;
- adherence to copyright laws about duplication and distribution of software and other copyrighted technology materials;
- ability to advocate for assistive or instructional technology on individual and system change levels; and
- participation in activities of professional organizations relevant to the field of technology.

Collaboration

The 10th and final standard for special educators directs the special educator to collaborate with families, other professionals, and stakeholders to ensure that the individual needs of children with exceptionalities are addressed and met throughout schooling and across their life span. Special educators promote the learning and well-being of their students with special needs. To achieve this, they need to collaborate and communicate with others to facilitate transitions between learning settings and environments.

Technology specialists function as members of a team to promote the learning and well-being of their students. This role requires an understanding of the following:

- roles that related services personnel fulfill in providing technology services;
- guidelines for referring individuals with exceptional learning needs to another professional;

- how to conduct inservice training in applications of technology in special education;
- how to refer team members and families to assistive and instructional technology resources;
- how to collaborate with other team members in planning and implementing the use of assistive and adaptive devices; and
- how to instruct others in the operation of technology, maintenance, warranties, and troubleshooting techniques.

DISCUSSION

The role of the AT specialist is emerging (Lahm, 2000). The number of school districts that employ persons with AT expertise who work with other special education service providers is increasing (Edyburn & Gardner, 1999). Individuals interested in working as AT specialists and in implementing AT to help individuals with disabilities need to demonstrate sufficient expertise to show school districts with limited resources the value of their service. National standards help define the role of the AT specialist and provide guidelines for professional development in the area of AT.

Considering AT for all students receiving special educational services is a tall order. If none of the IEP team members knows anything about AT, how can it be considered? For example, if you wanted to buy good walking shoes, you would probably go to an athletic store or a dedicated shoe store—someplace that could help you find a great fit and a shoe designed specifically for walking. However, if you lived in a rural area that had no specialty shoe stores nearby, you might not know that special walking shoes exist. You would most likely go to the nearest discount store and purchase a pair of tennis shoes off the rack, like the ones you wore when you were a child. Without personal knowledge or an expert to consult, you could not adequately consider walking shoes.

Employing an AT specialist brings expertise to those in the district who need it. Knowledge, however, is only as good as the training. National standards for AT serve as a measure of expertise. With an AT specialist on board, districts can be assured that their special educators can comply with the mandate and truly consider assistive technology.

In addition to hiring AT specialists, districts need to revise teacher education programs to address the changing needs of teachers. Programs must be reoriented to meet state standards set for students and teachers (National Commission on Teaching and America's Future, 1996). State standards and professional standards should reflect the standards set by professional organizations and the National Board for Professional Teaching Standards.

To meet the standards for special education teachers and AT specialists, teacher preparation programs need to infuse

the knowledge and skills set forth by CEC (2000, in press). Edyburn and Gardner (1999) provided guidelines for integrating technology into special education coursework. This is necessary to meet the needs of all future special educators, so they can meet the new state and national standards related to technology.

The training of AT specialists must go far beyond what is integrated into the typical training program for special educators. A special curriculum is necessary to teach skills that go beyond using technology for instruction. AT specialists must become experts not only at determining the appropriate technology for a given student based on needs but also at facilitating AT team collaboration, planning for AT implementation, planning for the implementation of AT across a district, and working with administrators to gain and maintain support for the use of AT. These skills cannot and need not be addressed in the typical special education program but, rather, should be addressed in a graduate program that allows specialization in AT.

The University of Kentucky offers master's degrees, an educational specialist degree, and doctorate degrees with an optional specialization in assistive technology. The program is built on recommendations by CEC (in press) for the knowledge and skills of technology specialists. Appendix A provides a description of the assistive technology core courses, and Appendix B indicates the types of knowledge or skills that are addressed in each of the courses. Most competencies are addressed to some degree in each course, but the expectation of achievement varies across these courses. At the conclusion of the degree program, students should be skilled in all knowledge and skill areas.

National AT standards serve as more than guidelines for graduate programs. The same standards can serve as an administrator's measure when hiring an AT specialist. The skills that the applicant needs to work on can become that person's professional development plan. In the same way, individuals can use the competencies to measure their own expertise and to identify gaps they need to pursue to gain nationally recognized levels of expertise.

Conclusions

Without AT knowledge, members of IEP teams cannot adequately consider AT as mandated. School districts can bring that expertise to their IEP teams by hiring an AT specialist. CEC's nationally validated technology specialist (CEC, in press) knowledge and skills can help administrators define the expertise they need to look for when seeking a job candidate. These standards can also be used to guide the development of graduate programs in assistive technology so there is a candidate pool to choose from. Because AT specialists are needed in districts at a higher rate than AT graduate programs can produce them, school districts and individuals can use the CEC knowledge and skills set as guidelines for professional development. ■

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AUTHOR'S NOTE

I would like to acknowledge and thank members of the Council for Exceptional Children's Knowledge and Skills subcommittee for their years of hard work validating what special educators need to know. CEC's and the subcommittee's leadership in this area will help us all become better service providers and, ultimately, create better educational programs for students with disabilities. I would also like to acknowledge Beverly Nickels and her research on the initial set of assistive technology knowledge and skills.

NOTE

Additional information about INTASC can be found on its Web site: <http://www.ccsso.org/intasc.html>.

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APPENDIX A

UNIVERSITY OF KENTUCKY'S ASSISTIVE TECHNOLOGY GRADUATE PROGRAM

EDS 514 Instructional Technology in Special Education

Students study ways technology can be used to enhance the education, employment, and personal lives of persons with disabilities. In-depth discussions focus on applied examples of how technology can be used in special education programs. Students learn to operate technology hardware and select and use software for persons with varying educational needs. They also learn to select and use software that may enhance their productivity as special education or related services professionals, such as word processing, database management, electronic spreadsheet, graphics, and telecommunications. Students explore emerging technologies, such as interactive video and other multimedia tools. Students design lesson plans incorporating technology into the curriculum. Students earning the grade of C or better in the course will also meet the Kentucky Department of Education computer literacy requirements for those seeking teacher certification.

EDS 640 Assistive Technology

An introduction to the techniques and devices that assist individuals with disabilities in performing functional tasks and achieving increased independence. Emphasis is placed on the functional use of technology by persons with disabilities and the integration of assistive technology into the home, community, school, and workplace. Topics include the transdisciplinary approach to service delivery, toy adaptation, switch construction and use, environmental control, alternate computer access, curricular adaptations, and augmentative communication.

EDS 641 Assistive Technology Assessment

The course covers topics related to the assessment of persons with disabilities to determine necessary access to computers and other instructional mediums. The course requires assessment, role-play, observation, and participation in conducting an assistive technology assessment.

EDS 648 Coordinating Special Education Technology Programs

Students study procedures for planning and implementing special education technology programs in schools. Topics include use of planning models, philosophy and mission development, generating program goals and objectives, procedures for preparing strategic plans, establishing policies and procedures, identifying resource requirements, managing program implementation, evaluation of program effectiveness, and preparation of proposals for funding.

EDS 612 & EDS 649 Practicum in Assistive Technology

The course provides supervised practicum activities associated with the delivery of technology services to individuals with disabilities. Practicum settings may include schools, rehabilitation agencies, clinics, hospitals, technology resource centers, administrative offices, and other facilities involved in the development or delivery of technology services.

APPENDIX B

COMPETENCIES ACROSS COURSES MATRIX

Item	CEC standard area & competency	EDS 514	EDS 640	EDS 641	EDS 648	EDS 612/649
Standard 1: Foundations						
1	Concepts and issues related to the use of technology in education and other aspects of our society	3	5	5	5	5
2	Articulate a personal philosophy and goals for using technology in special education	2	4	4	5	5
3	Use technology-related terminology in written and oral communication	3	4	5	5	5
4	Describe legislative mandates and governmental regulations and their implications for technology in special education	2	4	4	5	3
Standard 2: Development and characteristics of learners						
5	Impact of technology on individuals with exceptional learning needs at all stages of development	4	3	5	3	5
Standard 3: Individual learning differences						
6	Issues in diversity and in the use of technology	3	3	4	5	4
Standard 4: Instructional strategies						
7	Identify and operate instructional and assistive hardware, software, and peripherals	4	5	5	4	5
8	Provide technological support to individuals with exceptional learning needs who are receiving instruction in general education settings	2	3	3	4	5
9	Arrange for demonstrations and trial periods with potential assistive or instructional technologies prior to making purchase decisions	2	3	4	5	5
Standard 5: Learning environments/social interactions						
10	Procedures for the organization, management, and security of technology	2	3	3	5	4
11	Ergonomic principles to facilitate the use of technology	2	3	5	5	5
12	Evaluate features of technology systems	2	4	5	4	5
13	Use technology to foster social acceptance in inclusive settings	2	3	4	4	5
14	Identify the demands of technology on the individual with exceptional learning needs	3	4	5	4	5
Standard 6: Language						
15	Use communication technologies to access information and resources electronically	3	5	5	5	5
Standard 7: Instructional planning						
16	Technology for planning and managing the teaching and learning environment	3	4	5	4	5
17	Incorporate and implement instructional and assistive technology into the educational program	4	5	5	5	5
18	Procedures for evaluation of computer software and other technology materials for their potential application in special education	4	5	5	3	5
19	Funding sources and processes of acquisition of assistive technology devices and services	2	3	4	5	4

(Appendix continues)

Item	CEC standard area & competency	EDS 514	EDS 640	EDS 641	EDS 648	EDS 612/649
20	National, state, or provincial preK–12 technology standards	3	3	3	5	3
21	Assist the individual with exceptional learning needs in clarifying and prioritizing functional intervention goals regarding technology-based evaluation results	2	4	5	4	5
22	Identify elements of the curriculum for which technology applications are appropriate and ways they can be implemented	4	3	5	4	5
23	Identify and operate software that meets educational objectives for individuals with exceptional learning needs in a variety of educational environments	3	4	5	3	5
24	Design, fabricate, and install assistive technology materials and devices to meet the needs of individuals with exceptional learning needs	2	4	5	3	5
25	Provide consistent, structured training to individuals with exceptional learning needs to operate instructional and adaptive equipment and software until they have achieved mastery	3	3	4	3	5
26	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	1	5	4	4	5
27	Develop and implement contingency plans in the event that assistive or instructional technology devices fail	2	3	4	4	5
28	Develop specifications and/or drawings necessary for technology acquisitions	1	3	5	3	5
29	Write proposals to obtain technology funds	1	3	4	5	3
Standard 8: Assessment						
30	Use technology to conduct assessments	2	3	5	4	4
31	Use technology to assess, diagnose, and evaluate individuals with exceptional learning needs	2	3	5	4	4
32	Match characteristics of individuals with exceptional learning needs with technology product or software features	3	4	5	3	5
33	Use technology to collect, analyze, summarize, and report student performance data to aid instructional decision making	3	3	5	3	5
34	Identify functional needs, screen for functional limitations, and identify if the need for a comprehensive assistive or instructional technology evaluation exists	2	3	5	3	5
35	Monitor outcomes of technology-based interventions and reevaluate and adjust the system as needed	2	3	5	4	5
36	Assist the individual with exceptional learning needs in clarifying and prioritizing functional intervention goals regarding technology-based evaluation results	2	3	5	3	5
37	Work with team members to identify assistive and instructional technologies that can help individuals meet the demands placed upon them in their environments	2	3	5	5	5

(Appendix continues)

Item	CEC standard area & competency	EDS 514	EDS 640	EDS 641	EDS 648	EDS 612/649
38	Identify placement of devices and positioning of the individual to optimize the use of assistive or instructional technology	2	4	5	3	5
39	Examine alternative solutions prior to making assistive or instructional technology decisions	2	4	5	4	5
40	Make technology decisions based on a continuum of options ranging from no technology to high technology	2	4	5	4	5
Standard 9: Professional and Ethical Practice						
41	Equity, ethical, legal, and human issues related to technology use in special education	3	4	5	5	4
42	Organizations and publications relevant to the field of technology	3	4	3	5	4
43	Maintain ongoing professional development to acquire knowledge and skills about new developments in technology	2	3	3	5	5
44	Adhere to copyright laws about duplication and distribution of software and other copyrighted technology materials	4	4	4	5	5
45	Advocate for assistive or instructional technology on individual and system change levels	2	3	4	5	4
46	Participate in activities of professional organizations relevant to the field of technology	2	3	3	5	3
Standard 10: Collaboration						
47	Roles that related services personnel fulfill in providing technology services	2	3	5	5	4
48	Guidelines for referring individuals with exceptional learning needs to another professional	2	3	5	4	4
49	Conduct inservice training in applications of technology in special education	1	3	4	5	5
50	Refer team members and families to assistive and instructional technology resources	4	3	5	5	5
51	Collaborate with other team members in planning and implementing the use of assistive and adaptive devices	5	5	5	5	5
52	Instruct others in the operation of technology, maintenance, warranties, and troubleshooting techniques	3	4	4	5	5

Note. CEC = Council for Exceptional Children; 1 = no knowledge; 2 = limited awareness (may mention in class); 3 = aware but needs skills (talk about for part of a class); 4 = skilled but needs to expand (some hands-on or application practice in class or assignments); 5 = proficient.

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