ABSTRACT
        This monograph provides an overview of critical policy and
practice issues facing educators in the area of assistive technology (AT) for
students with disabilities and discusses emerging policy directives and best
practices for service delivery in a way that is supportive of quality AT
programs in schools. Following an introduction, Section 2 addresses the legal
basis of assistive technology, including AT definitions, the mandate to
provide AT, definitional ambiguity, and mandate complexities. Section 3
explores critical issues in policy, including personal use devices and
medical exclusion, the Individualized Education Program (IEP) team
consideration of AT, specifying AT in the IEP, external funding and
repair/maintenance, home use, equipment ownership, and provision for private
school students. Section 4 highlights critical issues in practice and
provides information on staff training, staffing patterns and program
organization, traditional evaluation and IEP process, AT assessment options
and independent evaluations, short-term equipment loan, and educational and
AT interface. Section 5 provides an action plan for those interested in
becoming more proactive in responding to the AT needs of their students.
Appendices include AT special factor considerations for IEP teams, a list of
access questions, and the Telecommunications Act of 1996 proposed
requirements for accessibility. (CR)

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_I_ntroduction

I. INTRODUCTION

The increasing use of assistive technology (AT) to address the educational needs of students with disabilities has created a corresponding rise in AT policy questions:

> _Exactly what is a school's responsibility for providing AT under the Individuals with Disabilities Education Act (IDEA)?_
>
> _Did this obligation change with the reauthorization of the Act in 1997?_
>
> _Is school responsibility for AT different under the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act?_
>
> _How can a school determine if a student needs a device for an "appropriate" program? Who is qualified to decide what is "appropriate" AT for a student?_
>
> _Are there limitations in a district's responsibility for devices that seem to be medical, or those that are for personal use?_
>
> _Should the device go home? Who is responsible for maintenance and repair of devices?_

As with most areas of special education policy, few easy answers exist. However, based on current U.S. Department of Education Office of Special Education Programs policy letters, legal decisions, and other information sources, a number of guiding principles are emerging.

In addition to policy questions, a similar parade of programmatic issues have been raised regarding staff expertise, training, service delivery options, AT evaluation practices, and the interface of educational and AT. Based on successful and unsuccessful AT service delivery experiences, a number of best practices are also emerging.

The goal of this monograph is to provide an overview of the critical policy and practice issues facing educators in the area of AT and to discuss the emerging policy directives and best practices for service delivery in a way that is supportive of quality AT programs in schools.

Two cautions are prudent to keep in mind as one reads this monograph. The policy information presented is based on a national perspective and will always be subject to change. Readers are encouraged to seek out further policy information that is specific to their state and local area to supplement the national framework provided here. In addition, readers must remain vigilant for new legal decisions, new regulations, etc. that will continue to shape and reshape special education related AT policy.

II. LEGAL BASIS of ASSISTIVE TECHNOLOGY

AT Definitions

The Individuals with Disabilities Education Act (IDEA) defines Assistive Technology (AT) devices and services as follows:

§300.5 Assistive technology device

As used in this part, assistive technology device means 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 the functional capabilities of children with disabilities.

§300.6 Assistive technology service

As used in this part, assistive technology service means any service that directly assists a child with a disability in the selection, acquisition, or use of an assistive technology device. The term includes:

(a) *The evaluation of the needs of a child with a disability, including a functional evaluation of the child in the child's customary environment;*

(b) *Purchasing, leasing, or otherwise providing for the acquisition of assistive technology devices by children with disabilities;*

(c) *Selecting, designing, fitting, customizing, adapting, applying, retaining, repairing, or replacing of assistive technology devices;*

(d) *Coordinating and using other therapies, interventions, or services with assistive technology devices, such as those associated with existing education and rehabilitation plans and programs;*

(e) *Training or technical assistance for a child with a disability, or if appropriate, that child's family; and*

(f) *Training or technical assistance for professionals (including individuals providing education or rehabilitation service), employers, or other individuals who provide services to employ, or are otherwise substantially involved in the major life functions of children with disabilities.*

The IDEA definition of AT is very broad, and as a result, most any type of technology device or service used to support the education of students with disabilities could be considered to be "assistive technology."

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Title II of the Americans with Disabilities Act (ADA), which applies to schools as state or local entities, does not specifically define AT. It instead uses the term "auxiliary aids and services" which includes AT along with other services such as human supports. Title II of the ADA defines auxiliary aids and services as follows:

§35.104 Auxiliary aids and services

Auxiliary aids and services includes —

(1) Qualified interpreters, notetakers, transcription services, written materials, telephone handset amplifiers, assistive listening devices, assistive listening systems, telephones compatible with hearing aids, closed caption decoders, open and closed captioning, telecommunications devices for deaf persons, videotext displays, or other effective methods of making aurally delivered materials available to individuals with hearing impairments;

(2) Qualified readers, taped texts, audio recordings, Brailled materials, large print materials, or other effective methods of making visually delivered materials available to individuals with visual impairments;

(3) Acquisition or modification of equipment or devices; and

(4) Other similar services and actions.

Thus, AT is a subset of the ADA's "auxiliary aids and services" definition.

Section 504 of the Rehabilitation Act does not specifically define AT devices and services nor use the term auxiliary aids and services. Reference to AT in Section 504 is limited to referral to "special education and related aids and services" in the description of the delivery of an appropriate education and use of the term "supplementary aids and services" in the discussion of academic settings in which students with disabilities should be served. Since both of these references are similar to ones found in IDEA, Section 504 provides only duplicative definitional information for schools regarding AT.

Mandate to Provide

The IDEA requires schools to provide AT if it is needed for a student to receive a free appropriate public education (FAPE). FAPE can include a variety of services such as special education, related services, supplementary aids and services, program modifications or support for school personnel. AT, just like all other components of FAPE, must be provided at no cost to parents. The specific IDEA requirement for schools to provide AT is as follows:

§300.308 Assistive technology

Each public agency shall ensure that assistive technology devices or assistive technology services or both, as those terms are defined in 300.5 - 300.6 are made available to a child with a disability if required as a part of the child's

(a) Special education under 300.17;

(b) Related services under 300.16; or

(c) Supplementary aids and services under 300.550(b)(2).

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In addition to this broad mandate, the 1997 reauthorization of IDEA added a requirement for Individualized Education Program (IEP) teams to consider the assistive technology needs of students during the development of an IEP. This most recent requirement is as follows:

Section 614 (d)(3)(B) Consideration of Special Factors.—
The IEP Team shall — (v) consider whether the child requires assistive technology devices and services.

The ADA similarly requires the delivery of auxiliary aids and services as needed to assure equal access to programs and services offered by the school. Equal access includes the provision of auxiliary aids and services that are needed for effective communication with individuals with disabilities.

The specific ADA requirements are as follows:

§35.160 General
(a) A public entity shall take appropriate steps to ensure that communications with applicants, participants, and members of the public with disabilities are as effective as communications with others.

(b)(1) A public entity shall furnish appropriate auxiliary aids and services where necessary to afford an individual with a disability an equal opportunity to participate in, and enjoy the benefits of a service, program, or activity conducted by a public entity.

(b)(2) In determining what type of auxiliary aid and service is necessary, a public entity shall give primary consideration to the requests of the individual with disabilities.

Section 504 of the Rehabilitation Act, similar to IDEA, requires that schools provide AT if needed for an appropriate education. Similar to the ADA, Section 504 prohibits discrimination against individuals with disabilities and requires schools to provide equal access to their programs and services as follows:

§104.33 Free appropriate public education
(a) General. A recipient that operates a public elementary or secondary education program shall provide a free appropriate public education to each qualified handicapped person who is in the recipient's jurisdiction, regardless of the nature or severity of the person's handicap.

(b) Appropriate education. (1) For the purpose of this subpart, the provision of an appropriate education is the provision of regular or special education and related aids and services that are designed to meet individual educational needs of handicapped persons as adequately as the needs of nonhandicapped persons are met . . .

§104.4 Discrimination prohibited
(a) General. No qualified handicapped person shall, on the basis of handicap, be excluded from participation in, be denied the benefits of, or otherwise be subjected to discrimination under any program or activity which receives or benefits from Federal financial assistance.

Definitional Ambiguity

The IDEA definition of AT is broad and all inclusive. From a legal perspective the definition itself is not particularly helpful in making determinations about school responsibility to provide an AT device or service. Even more troubling, and a contributor to widespread educator confusion, is the overlap between the definition of AT and the multitude of other "technology" terms. Educators are bombarded with technology terms and frequently lack a common understanding of their meaning. Such terms include:

educational technology	instructional technology
rehabilitative technology	medical technology
assistive technology	information technology

Based on the legal definitions available in IDEA, the Rehabilitation Act, and extrapolations from other technology descriptors, most "technology terms" seem to have two distinguishing features:

1) the purpose for which the technology is primarily used and

2) the individuals who typically use the technology.

Comparing the commonly used technology terms from the perspective of purpose and user provides some insight into their differences and similarities (See Figure 1).

For the most part, these technology terms have fairly specific purposes, ones logically linked to the environment in which the technology is used, for example, information management, education/instruction, health care, and rehabilitation. It is easy to see that the purposes can overlap and the same technology can be used in a variety of settings. As a result, many technology items could appropriately be included within multiple terms. For example, a wheelchair might be considered assistive, rehabilitative, medical and/or educational technology.

Of all the terms, "assistive technology" has the broadest purpose and is actually defined almost entirely by its user description. With both assistive and rehabilitative technology, the defined users ("individuals with disabilities") have a legal definition that is related to protected rights and/or entitlement to program benefits. For the other terms, user description is much less specific.

This definitional ambiguity has fostered an atmosphere of confusion in the development and implementation of assistive technology policies in many settings, especially education. For school technology coordinators and others in general education administration, the terms "educational and instructional technology" usually evoke images of a computer, instructional software and other electronic technologies that are part of the media options available to support the teaching and learning process for all students. To acquire such technology, schools develop technology plans, usually spanning multiple years, that map out strategies to secure current educational and instructional technologies for their buildings, classrooms, teachers and students.
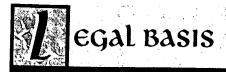
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Figure 1
Many terms have similar and overlapping definitions

Comparison of Definitions		
Technology Term	**Purpose**	**User**
assistive technology	increase, maintain or improve functional capabilities	individuals with disabilities
rehabilitation technology	meet needs and address barriers confronted	individuals with disabilities
medical technology	increase, maintain or improve health status & wellness	individuals with health needs
educational & instructional technology	increase, maintain or improve learning outcomes	individuals who are teaching or learning
information & administrative technology	increase, maintain or improve management of information	individuals who need to access & manage information

As a result of this imagery, educational and instructional technology is typically viewed as part of the overall school instructional program. Frequently special education, similar to other "areas" (such as art education, science education, vocational education, etc.), will provide input specific to their "area" for inclusion in the overall technology plan. Such input might include recommended priorities for Internet wiring of classrooms in which special education students are served or suggestions for instructional software packages that will best meet the instructional goals and objectives for students involved in special education.

However, these issues are very different once the technology is determined to be necessary for a free appropriate public education (FAPE) for a student with a disability. Once determined to be required as part of FAPE, typical educational and/or instructional technology can no longer be thought of as just a part of the overall school technology plan. Instead, such technology, if part of FAPE, becomes an entitlement and subsequently, a number of legal requirements are attached. Unfortunately, this ambiguity among terms makes it easy for educators to misunderstand the difference between the entitlement to assistive technology held for individual students and assistive technology as a subset, or the "special education" part of general educational and instructional technology.

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Mandate Complexities

One of the most difficult decisions faced by schools is determining what constitutes a Free Appropriate Public Education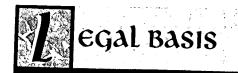 (FAPE.) Differentiating between when a device is absolutely required to meet the "appropriate" standard versus when the device is beyond the basic floor of "appropriate" can be extremely difficult. This situation frequently arises with the use of a computer for instruction. The computer may have no adaptations and is simply being used as a method of instruction. Is the use of the computer necessary for FAPE or would other instructional media meet the "appropriate" standard?

Moreover, schools may need to consider whether the "appropriate" standard of IDEA and the "effective communication, equal access, and consideration of consumer preference" standards of the ADA require delivery of the same or different assistive technologies. Schools tend to assume that once they have provided FAPE for a student, the requirements of ADA are also satisfied, however, that is because for most students FAPE is a higher standard than merely equal access or effective communication. Students who need special education, by definition, need more than merely "equal access" to the facilities and "effective communication" in instruction; they require specially designed instruction. However, some students, particularly those at the secondary level with only sensory or mobility disabilities, may be entitled to auxiliary aids and services under the ADA that are clearly not required by FAPE and may not be required by "equal access."

For example, FAPE for a student with significant motor disabilities, who is unable to write with pen and paper, may be met by providing peer notetakers and a paraprofessional to transcribe dictated written assignments rather than providing an alternative writing system (for example, notebook or adaptive computer). However, provision of peer notetakers and a transcriber would not likely meet the effective communication standard of the ADA. If the student is expected to produce a lengthy paper, he/she would need to be able to take notes as reference materials are reviewed in a fashion that would support drafting of the paper. Dictating such notes and waiting for transcription, or asking a peer to review the materials and take notes would not likely be considered communication that is as effective as that available for students who can review reference materials and independently write their notes. In addition, if all other students were able to use word processing to prepare their papers, dictating the paper, waiting for transcription, then editing through the transcriber would significantly limit the student's ability to review and revise the paper. In this situation, it could be argued, that communication as effective as that provided to others, requires the provision of a writing tool (and AT device) while neither FAPE nor equal access necessarily require such and could be met another way.

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This discussion has addressed the potential differences between the ADA standards of "equal access, effective communication, and consideration of consumer preference" and the IDEA standard of FAPE. It is important to understand that the requirements of Section 504 are not the same as the ADA. Section 504 requires schools to provide "equal access" as does the ADA and requires schools to provide FAPE, as does IDEA. However, the ADA goes beyond Section 504 in its requirements for "effective communication" and "consideration of consumer preference." Assuring FAPE and equal access under Section 504 may not satisfy the effective communication requirement of the ADA especially when examining the need for assistive technology.

A case in point is a recent OCR decision in which a tenth grade student with a hearing impairment was granted provision of real-time captioning to meet the ADA standard of effective communication. Such captioning services were not required as part of FAPE or equal access under Section 504. In a similar case, the effective communication standard of the ADA was used by OCR to require provision of assistive technology to allow a student with a visual impairment direct access to the Internet. The OCR specifically indicated that the issue was not simply equal access but rather the extent to which the communication available to the student (ability to communicate on-line) was as effective as that provided to others. (OCR, Region IX, Docket Number 09-95-1111, 1995 and Docket Number 09-95-2206, 1996). Because the effective communication standard of the ADA is not part of Section 504 or IDEA requirements, schools are well advised to watch for further legal direction in addressing this ADA requirement as applied to the delivery of assistive technology.

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III. CRITICAL ISSUES IN POLICY

In addition to issues surrounding the definition of Assistive Technology (AT) and the legal mandates to provide AT for students with disabilities, a number of specific policy areas have emerged that need clarification. Some have been addressed via policy letters from the U.S. Department of Education Office of Special Education Programs (OSEP); others have been addressed through due process or other administrative proceedings. While there are no seminal court cases on AT issues to date, the following discussion provides the most current synthesis of those policy issues that seem to be most confusing for educational staff.

Critical Policy Issue: ———————————————————————————

Personal Use Devices and Medical Exclusion

The IDEA requires that all students be provided with AT as needed for delivery of a FAPE. The only exception to this requirement is for those devices that are determined to be "medical." There is no exception for "personal use" devices unless they are determined to be medical. Conversely, the ADA includes a specific exemption for personal use devices as follows:

> ### §35.135 Personal devices and services
> *This part does not require a public entity to provide to individuals with disabilities personal devices, such as wheelchairs, individually prescribed devices, such as prescription eyeglasses or hearing aids; readers for personal use or study; or services of a personal nature including assistance in eating, toileting, or dressing.*

There are a number of groups who feel that IDEA should be amended to exclude "personal use devices" from school responsibility. However, even if such an amendment were to occur, the interpretation of what is and is not "personal use" would be very problematic. Frequently, it is difficult, if not impossible, to distinguish between a device that is "personal" versus one that can be readjusted and used by another student. While a custom seating system is not the same as the standard wheelchair on hand in most airports, both could be considered "personal mobility systems." Would the degree of customization be a factor in the device qualifying as personal use or would any wheelchair, no matter how generic, be considered personal use? A programmable hearing aid with an earmold made from an ear impression is much more custom fit than an assistive listening system with a volume control knob on the receiver and Walkman-type earphones. Would one be the responsibility of schools and the other not? As illustrated, even if an exemption for personal use devices were added to IDEA, it would likely raise as many questions as it would answer.

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The exemption that does currently exist in IDEA is for devices needed for medical treatment. However, in reality, many pieces of equipment are needed both for medical and educational purposes. The general guidelines established by case decisions distinguishing between medical and educational related services can be used to assist in understanding when assistive technology devices may be considered medical, and thus outside of the school's responsibility.

In general, the following factors are important to consider:

Expertise required — What is the level of expertise required to deliver the device or service? If a medical doctor typically delivers the AT, it is more likely to be considered medical than if delivered by non-M.D. professionals.

Intrusiveness — What is the level of intrusiveness of the device or service? The more intrusive, the more likely it is to be considered medical. Devices that are surgically implanted would be ones that are physically very intrusive and would likely be considered medical rather than educational.

Delivery environment — Within what environment is the device/service delivered? If it can only be delivered in a hospital, it is more apt to be determined medical than if it can be delivered at home, school or other settings.

Purpose — Is the device or service required to sustain life or needed to attain developmental or educational goals? The more life sustaining, the more likely the AT is to be determined to be medical.

Liability/Risk — What is the liability and risk assumed by the school in providing the AT? If, for example, the device breaks down or the service provider is ill and the AT cannot be delivered is the situation life threatening? The greater the liability and risk, the more likely the AT may be considered medical.

Burden — What is the burden on the school district if the AT is provided? Time and expense have both been included as factors in the consideration of burden. If the AT device or service is close to a level of "virtual constant care" it is likely to be considered medical.

As indicated previously, many devices are needed for both medical and educational purposes. In a perfect world, those that are medically necessary would be provided by an entity other than the school as a "payor of first resort." Unfortunately, not all children have access to coverage for medically necessary AT. Some students have no medical insurance and others are insured by private policies which do not include coverage of AT. Access to basic coverage for medically necessary AT is inconsistent at best for students through private health care plans at this time.

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For those students who are Medicaid eligible, medically necessary AT is currently covered under federal requirements for the Medicaid system. Schools are well advised to understand Medicaid procedures in their state and to assist families in accessing all Medicaid covered AT. Schools might also want to consider advocating for full medical coverage for all children. If all medically necessary AT were provided by other entities, schools could focus their attention on those devices that are educationally necessary. Currently, however, not all children have access to health care benefits. *As a result, when a device is both medically and educationally necessary, and cannot be excluded as medical treatment, special education is the system with the clear statutory requirement to provide.*

Critical Policy Issue:

IEP Team "Special Factor" Consideration of Assistive Technology

Consideration of a student's need for AT has always been required of IEP teams as part of the determination of services necessary for FAPE. However, the 1997 reauthorization of IDEA identified consideration of AT needs as a "special factor" that must be distinctly considered by every IEP team for all students. Until federal regulations and/or state policies are finalized, it is not known if IEP teams will be required to document their consideration of a student's need for AT in a prescribed form or if such documentation decisions will be left to state or local discretion.

Clearly, if a student requires AT for FAPE, the consideration will be documented by a statement to that effect in one or more of the IEP components. However, if the IEP team determines a student does not need AT, the consideration and determination of "no need" will not typically be documented by any of the required IEP components. The least helpful type of documentation would be the use of a check-box or pre-printed statement on the IEP indicating that AT has been considered and if needed, the devices and services are specified elsewhere. This type of documentation is simply not sufficient to describe the breadth or depth of consideration that should occur and even worse may encourage superficial consideration of AT needs.

Unlike the other special factors, the AT consideration is required for all students with IEP's, not just a specific group (for example, students who are blind or visually impaired, students who are deaf or hard of hearing, students with behavior disabilities, or students with limited English proficiency.) That does not mean that every IEP team must consider 20,000-plus AT devices for each student. Appropriate AT considerations should correspond to the areas of developmental and instructional need addressed by IEP goals and objectives. For example, if a student has reading difficulties that are addressed in the IEP, consideration of AT that supports reading development or compensates for reading difficulties would be appropriate.

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Appendix 1 provides additional examples of the types of AT that could be considered when particular developmental or instructional areas are addressed in an IEP, specifically the areas of reading, writing, math, study skills, speech/language, listening, orientation/mobility/ambulation, access to educational programs, and daily living/recreation/leisure.

While the information in Appendix 1 is not all-inclusive for each area, it does provide IEP teams with an idea of the range of AT that can and should be considered to address various needs. The lists do not include instructional software or other similar electronic media and materials that might be used to develop skills or remediate skill deficits in an area. Instructional technology is far too expansive to be included in a list and is typically considered to be part of general instructional media, like textbooks and other materials that all students use to learn. As a result, this type of technology is not frequently specified in an IEP; just as most IEP's do not specify textbooks or other non-electronic media and materials that a student will utilize for instruction. In some instances, however, a particular instructional software program may be required for FAPE. This usually occurs when the software is very specialized and is the only media that will reasonably support student accomplishment of IEP goals and objectives. If instructional software or other electronic media/materials are required to provide FAPE, then it must be specified in the IEP.

Critical Policy Issue: _____

Specifying AT in the IEP

Current IDEA regulations do not provide specific direction regarding how or where to specify AT in an IEP. As such, it would be possible to include AT in any of the required components of an IEP. With the 1997 reauthorization of IDEA, the required components of an IEP that might logically include AT are
- present level of performance
- annual goals including benchmarks or short term objectives
- special education services*
- related services*
- supplementary aids and services*
- program modifications or support for school personnel*
- modifications to assessments
- transition service needs.

* These items must have a projected beginning date, anticipated frequency, location, and duration specified.

Frequently, individual state policies provide form and structure detail regarding IEP content that is not found in federal statute or regulation. Without specific federal direction, some states may choose to address the issue of how and where to specify AT in an IEP while others will not. As a result, the options for specifying AT in an IEP may vary depending on applicable state regulations and policies.

Common sense would suggest that AT should be specified in the part or parts of the IEP that best fit with the type of AT to be provided. For students who are currently using a device, such as a hearing aid, that is required for FAPE, documenting such usage in a present level of performance might be appropriate as long as the reference clearly indicated if the device was required for FAPE. In those cases where a number of different devices are being used on a trial basis and data are being gathered about potential benefit, including AT in the goals and objectives may be most appropriate. An objective could describe trials with a number of devices and the measured outcomes would be documented as the evaluation of the objective.

When a specific device is known to be needed in order to implement any of the IEP benchmarks or objectives or allow the student to participate in the regular classroom, specifying that device as a service (special education, related service, supplementary aid or service, and/or program modification) has distinct advantages. These IEP components require a projected beginning date, anticipated frequency, location, and duration be specified. As a result when AT is specified as one of these services, there is a clear understanding that AT will be available to the student, within the time periods indicated, at the location specified. This approach can eliminate confusion and miscommunication between schools and parents about delivery of AT.

Figure 2 illustrates examples of how an IEP might include AT in a statement of special education services, related services, supplementary aids and services, and/or program modifications along with the projecting beginning and anticipated frequency, location and duration specified.

Regardless of where AT is specified in an IEP, those developing the IEP should carefully consider how the device is identified. The team may describe a type of AT, (for example, an "FM assistive listening system coupled to the student's hearing aid"), or may specify a name brand device (for example, "Phonic Ear System 4"). Usually describing the AT with enough specificity to assure delivery of the needed device without specifying a name brand is desirable. Doing so provides the IEP team with the flexibility to update equipment without reconvening the IEP team. For example, if the team specified the Phonic Ear System 4 and the classroom updates to a new Phonic Ear equipment with a new name, the IEP team must reconvene and revise the IEP specifying the new system. (This would not be an efficient use of resources.)

On the other hand, there are rational reasons to specify a particular brand device rather than using a broader description. If the school used all Phonic Ear equipment and wanted to assure compatibility across all of its programs, the IEP team might want to specify the name brand. In addition, sometimes a device has a particular feature that is so unique that there really is no comparable device on the market, which would make specifying the name brand appropriate.
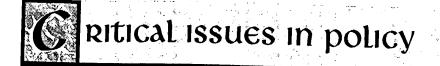
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Figure 2
Sample statements illustrating how assistive technology might be included in an IEP as a special education service, related service, or supplementary aid/service and/or program modification.

Student with a Visual Impairment

Special Education Services:	Frequency	Begin	End	Delivery Location
▢ Special Instruction	50 min/week	9/1/97	5/30/98	Regular Classroom
▢ Scanning/Screen Reading				
Assistive Technology System	250 min/week	10/1/97	5/30/98	Regular Classroom

Student with Multiple Disabilities

Special Education Services:	Frequency	Begin	End	Delivery Location
▢ Special Instruction	1000 min/week	9/1/97	5/30/98	Resource Room
Related Services:				
▢ Speech/Language Therapy	60 min/week	9/1/97	5/30/98	Regular Classroom
▢ Occupational Therapy	60 min/week	9/1/97	5/30/98	Resource Room
Supplementary Aids and Services:				
▢ Voice Output Augmentative				All Educational
Communication System	1400 min/week	11/1/97	5/30/98	Settings and Home
▢ Adapted Computer Access	30 min/week	10/1/97	5/30/98	Computer Lab

Student with Hearing Impairment

Special Education Services:	Frequency	Begin	End	Delivery Location
▢ Special Instruction	150 min/week	9/1/97	5/30/98	Regular Classroom
Related Services:				
▢ Audiology	as needed	9/1/97	5/30/98	Multi-district Program
▢ Speech Therapy	40 min/week	9/1/97	5/30/98	Speech Resource Room
Supplementary Aids/Services and Program Modifications:				
▢ Amplification System	1400 min/week	9/1/97	5/30/98	All Education Settings
▢ Captioning Access	as needed	9/1/97	5/30/98	All Education Settings

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Ultimately, the IEP team should decide which approach to take based on the student's needs. The team must understand that, if a specific name brand device is included in the IEP, the school is obligated to provide that device until the team meets again and the IEP is revised. If the IEP team indicates that the student will complete written assignments with the use of SoundProof (a brand name screen reading and highlighting system), the decision should be made purposefully based on the individual needs of the student, not because of limited information or misperceptions (for example, the IEP team thought all screen reading systems were called SoundProof.)

Critical Policy Issue: —————————————————————————

External Funding and Repair/Maintenance

If a device is specified in the IEP, then the device must be available and must be functioning properly. If it is not available, or is not working, the school is failing to implement the IEP as written. This is no different than specifying that a student will receive physical therapy and then not providing it.

IDEA clearly requires that a representative of the local educational agency (LEA) who is knowledgeable about the availability of LEA resources participate in the IEP meeting. One of the purposes of the LEA representative is to be able to commit school resources to implement the IEP as written. Thus, when AT is included in a properly developed IEP, the school has obligated itself to deliver the AT as specified without delay and without further review or approval by other school officials.

If AT is needed for FAPE, it should be specified in the IEP even if it might be funded by another agency (such as Medicaid or private insurance). Schools have the affirmative responsibility to assure delivery of all devices and services needed for FAPE even if external funding might be accessed. Thus, AT should be specified in the IEP to assure timely delivery regardless of the availability of external funding.

When AT is specified in an IEP, the school cannot legally delay implementation of that part of the IEP while they wait for external funding sources to procure the device. As IDEA requires, if it is in the IEP it must be provided as soon as possible after the IEP is developed. Most states have guidelines regarding what "as soon as possible" means, but in no case will waiting for an external funding source to finish its process, which can easily extend past six months, be acceptable. If the device is to be procured by Medicaid or other public benefit, the school must make arrangements for the student to have access to the needed device (rental, short-term loan program, etc.) while the procurement is in process.

Even with the caveat of not delaying a student's access to a device, schools can and should access public benefit programs, such as Medicaid, to assist in paying for AT. *In fact, the 1997 reauthorization of IDEA indicates that the financial responsibility of Medicaid and other public insurers precedes that of schools for devices and services that are both medically and educationally necessary.* Not accessing public health benefits for such devices increases the likelihood of "cost-shifting" from the medical system to special education. In other words, Medicaid or other public health funding system will escalate their rejections of requests for AT using the rationale that AT is the responsibility of the schools.

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Conversely, accessing private insurance or other "private medical benefits" is fraught with difficulty for schools. Private benefits can only be accessed with parental permission after parents have been fully informed of their right to decline and the fact that they may incur financial cost. Financial costs include out-of-pocket expenses (such as deductibles), a decrease in lifetime coverage, and an increase in premiums. Even if parents consent to the use of private insurance benefits with full knowledge of potential financial cost, a school can later be held accountable for that loss. As a result, most schools have not been very active in using private insurance as an external funding source for AT. Most often, if used to purchase AT, it has been done in those situations where a student acquired a disability and the AT, such as a custom wheelchair, was provided by the insurance carrier during the rehabilitative process prior to the student returning to school.

If AT is specified in an IEP, regardless of who owns the device or how it was funded, the device must be working properly for the IEP to be implemented as written. It is necessary for the IEP team to identify how a loaner or alternative system will be provided to assure that the IEP can continue to be implemented if and when the device needs repair. If the IEP specifies a device and it has been provided by the family, an insurance carrier, Medicaid, or other source, the district is responsible for assuring that the device is working properly even though it is not district owned. While the school should certainly work with the original funding source to encourage their continued support of device repair and maintenance, the bottom line responsibility for the device working properly rests with the school as the provider of FAPE. Depending on the device, it is sometimes in the school's best interest to purchase a duplicate device for school use rather than assume repair and maintenance responsibility for a device they do not own.

Critical Policy Issue:

Home Use

To achieve goals and objectives as specified on the IEP, schools must consider the student's need for assistive technology device use at home. If a student needs a device to produce homework assignments or to read assigned text, there is no question that the device must be available for home use, or that the district must have another alternative available to allow the student to accomplish the activities. Conversely, not every special education student who has access to a computer as an instructional media at school needs a computer at home for FAPE. While it is clear that schools cannot limit devices to in-school use only, it is also clear that all devices available at school do not have to be sent home. The decision must be made based on the educational and instructional activities to be completed outside the school setting.

Most often, home demands for AT include the need to complete homework and practice specific skills that will allow accomplishment of IEP goals and objectives. For example, a fifth grade student with a visual disability who uses a closed circuit television enlarging system (CCTV) to access print materials at school may need a similar enlarging system at home to complete home assignments. Prior to fifth grade the homework needs may have been met through the provision of large print books and maps for home use. However, as the amount of home assigned reading and graphical material review increased, the provision of all books in large print was no longer feasible, thus an enlarging system is now required at home.

The most problematic issue with home use usually centers on concerns about device damage or theft. Some schools have developed liability agreements with parents that indicate parental responsibility for replacement or repair of the device if damaged, destroyed, lost, or stolen due to negligence. Given the fact that access to the device at home was provided as part of FAPE (where the "F" stands for free), it seems unlikely that these agreements would be legally binding. Perhaps the best policy approach is for schools to treat AT similar to all other school property (library books, etc.) that are taken home. Safeguards are usually built in to schools insurance policies to minimize financial losses without hampering student access to the items needed off school grounds.

Critical Policy Issue: ──────────────────────────────

Equipment Ownership

Schools are bound by a number of inventory and accounting requirements that are fairly inflexible with regard to ownership of AT. In general, if the school purchases the device the school owns it. The device does not follow the student if they move to another LEA unless there was some unique funding involved in the purchase or if there is some methodology available to remove the item from the school's inventory. Some schools have entered into agreements with other LEA's in their area and have pooled dollars to cooperatively purchase equipment. In that case, the device may be owned by the "cooperative," and so long as the student moves between LEA's in the cooperative, the device can follow the student. Other states have purchased AT with intermediate unit funds or state funds given to a statewide AT provider which allows for equipment to move with a student more flexibly. However, in the vast majority of situations, an LEA purchases a device with public education money that is considered "local" for inventory purposes and, thus, the device is the sole property of the school and is governed by state and local inventory and accounting standards.

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In the case of devices purchased with federal IDEA dollars, the Education Department General Administrative Regulations (EDGAR) apply to ownership. Schools are expected to continue to use devices purchased with IDEA dollars so long as they are needed to carry out the purposes of IDEA. Most assistive technology devices, even when purchased to meet a specific student need, could be used to support other needs in the special education program. (For example, a scanning and screen-reading system originally used by a blind student might be re-configured to meet the needs of students with learning disabilities in reading.) Conversely, if a school wants to "give" equipment to another provider, they may be able to develop some type of justification that the device is no longer needed for the special education program that will satisfy their auditors. Whatever the decision, schools are well advised to be consistent in their application of the "no longer needed" standard with respect to all special education programs and funding sources.

To avoid the question of "no longer needed," AT devices can be sold between districts to meet the needs of students who move from one district to another. Typically the purchasing school pays fair market value for the device and the selling school returns those dollars to be used for the same the general purpose, usually special education. Vocational rehabilitation can also purchase devices (at fair market value) for students transitioning to employment if the devices are no longer needed by the school. Again the dollars received by the school from the device sale must usually return into the same general purpose fund.

Some interesting issues have developed relating to ownership in those cases where different public funding sources were mixed to purchase a device. This has occurred most frequently for students in transition between school and work where the school and vocational rehabilitation have mixed their dollars to purchase a device that the school will train the student to use with the understanding the device will move with the student to their next setting (post-secondary education, work, etc.). Schools are encouraged to explore such options with their respective state level programs, since clear agreements and guidance from state administrators are needed to prevent after-the-fact audit problems.

Critical Policy Issue:

Private School Students

Delivery of AT to students who are attending private or parochial schools is currently a policy area with many conflicting views. The IDEA clearly requires schools to offer special education services to students unilaterally enrolled by their parents in private or parochial schools. At question is whether those students have the right to the same array of services. Also at question is whether schools have an affirmative obligation to offer services and devices on private school grounds.

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With the 1997 IDEA reauthorization, the Department of Education and the Justice Department have taken the position that IDEA provides no individual right to special education and related services to children placed in private schools unilaterally by their parents (that is, with no involvement of the local school district.) According to these agencies, IDEA only requires schools to spend a proportionate share of their federal IDEA dollars on private school students. This would not mandate a full array of services since IDEA has historically provided less than ten percent of the total cost of special education services. It is also their position that schools may provide services and devices on private school property, without being in violation of the U.S. Constitution. The IDEA language upon which this position is based is as follows:

Section 612(a)(10) Children placed in private schools by their parents.—
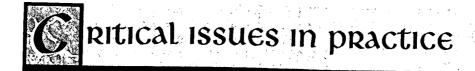> (A) Provision of special education and related services.—
>> (I) Amounts expended for the provision of those services by a local educational agency shall be equal to a proportionate amount of Federal funds made available under this part.
>> (II) Such services may be provided to children with disabilities on the premises of private, including parochial, schools to the extent consistent with law.

Some states question the legality of providing AT devices on private or parochial school property due to strict state constitutional constraints and past state litigation on similar issues (such as providing textbooks for private/parochial schools.) Some states require schools, through regulation and policy, to provide special education services on neutral property. As a result, AT is sometimes not included as part of the required array of services that must be offered to private school students and, when it is offered, it is frequently limited to delivery off private school property.

For some students, access to AT only "off-site" can pose a significant barrier to receiving an appropriate education. A student with a significant hearing loss who needs an assistive listening system (to amplify teacher's speech and reduce background noise) receive limited benefit from having access to the assistive listening system at a site remote from the classroom. The classroom is where they need to be able to hear and understand the teacher's speech. Print access technology is nearly useless when it cannot be used in the classroom in the private school where the student needs to access the materials. Conversely, other types of AT can be used effectively off-site such as equipment used to facilitate physical therapy or software used to support speech production.

With conflicting opinions on this issue, schools would be well advised to identify the constitutional issues, litigation decisions, and state policies that apply to their school and use that information to determine how they must or must not deliver AT to private/parochial students.

IV. CRITICAL ISSUES IN PRACTICE

Parallel to policy issues, a number of service delivery questions face school staff as they attempt to provide AT as required in IEP's. While schools are unique and no single service delivery approach will meet the needs of everyone, there are a number of basic issues that should be considered as the AT service delivery system develops.

Critical Practice Issue:

Expertise and Staff Training

One of the most difficult issues schools will face in meeting the AT needs of their students is developing and/or obtaining sufficient staff expertise. As with any specialized or low incidence area, schools can develop "in-house" expertise among their own personnel and/or can contract with outside individuals associated with another school or community provider. Since AT expertise can be needed a number of times during the special education process (screening, evaluation, IEP development and implementation) using "outside" expertise alone frequently creates discontinuity within the process. For example, an outside assessment may provide a device recommendation but may not include suggestions on how to integrate the device into IEP objectives, classroom training on the device use, training for the family, consideration of home use, and so on. Developing expertise within a school usually supports better oversight and coordination with outside contractors who can be used on an "as needed" basis. For most schools, to the extent feasible, development of "in-house" or at least "near-by" expertise is desirable.

Whether developing expertise within a school or contracting for outside expertise, it is important to remember there is no such thing as a state license or teaching certificate that allows an individual to "prescribe" AT. Given the vast array of devices, it is unlikely there ever will be one credential for all AT. Even trying to set up a system where certain types of equipment are "prescribed" by an individual with a specific credential is problem laden. With the exception of a very limited number of devices, most AT is not "prescribed." While it might make sense to require that an audiologist recommend and fit a hearing aid, it is not logical to extend that concept to the requirement that an audiologist must determine which text telephone (TTY) is appropriate for an individual. A physical therapist might be needed to design a custom seating system but would not be required to determine which walker was appropriate for an individual.

In the areas of computer access and augmentative communication, there simply is no such thing as a credential that qualifies an individual to provide a "prescription" for such devices. An individual who is knowledgeable about computer adaptations for individuals with visual impairments may have no expertise in adaptations for persons with mobility limitations.

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Some occupational therapists have training in computer adaptations, others do not. In the area of augmentative communication, speech language pathologists, occupational therapists, special educators and others may claim to be qualified to "prescribe" augmentative systems. As with other types of AT, certain types of augmentative communication systems may require a certain type of specialized expertise and others may require very little.

Development of expertise within a school may initially raise awareness of assistive technology and create an environment in which AT is considered more often for meeting student needs. As a result, AT purchasing may increase. This should not be viewed as a negative repercussion of in-house expertise. Regardless of expertise, AT purchasing will inevitably increase for schools in the future. It is much more costly to ignore the need for such expertise and wait for those outside a school to demand particular pieces of assistive technology for students. When staff are knowledgeable about the full range of AT, they can effectively evaluate the need for devices and can address misconceptions about AT, such as, "the most expensive device is always the best." Knowledgeable staff will be able to identify situations for which appropriate AT is actually more cost effective than alternatives, such as human supports, currently funded by a school.

Critical Practice Issue: —————————————————

Staffing Patterns and Program Organization

In general, organizing the delivery of AT parallels delivery of other low incidence special education services. Services and staff expertise can be centralized (one AT unit serves an entire school district, region, state, etc.) or decentralized (units at the lowest level such as individual school buildings provide their own AT services.) Centralized and decentralized organizational approaches have advantages and disadvantages. Both can provide a good structure for delivering AT services in variety of situations so long as environmental influences and other mitigating factors are considered.

Centralized services can maximize specialized AT expertise by allowing staff to focus on specific areas. Decentralized services cannot expect staff at all units to have in-depth expertise in every possible AT area. However, one of the dangers of using only centralized expertise is its unintentional message that AT is outside the ability and even responsibility of the implementing staff. If AT is to be used effectively within the classroom and building, staff in that classroom need to feel competent and responsible for assuring its use.

A summary of the assets and deficits of centralized and decentralized approaches to AT service delivery are summarized in Figure 3. The reader is cautioned to remember that centralization and decentralization fall along a continuum and advantages and disadvantages must be considered in conjunction with the contextual specifics of any school situation.

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Figure 3

Issues involved in centralized and decentralized delivery of assistive technology services.

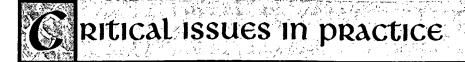| CENTRALIZED	DECENTRALIZED
AT evaluation and programming decisions...	
...are likely to be highly consistent. (With a small group of AT specialists leading the decision making, people tend to defer to these specialists and decisions are more consistent).	...may well be inconsistent. (A larger number of individuals at lower administrative levels are making AT decisions which will increase inconsistency.)
AT expertise...	
...is likely to be highly specialized and available across the full range of AT. (A specialist team can usually be created to address the full range of AT areas.)	...is likely to be less specialized and may not be available across the full range of AT. (Lower level "teams" at every building cannot be expected to have or develop a comparable level of expertise.)
AT data collection...	
...for administrative planning is usually easier. (Fewer number of people need to collect data to provide an accurate, overall picture.)	...is usually difficult. (Many people in many locations making AT decisions tends to make it difficult to gather accurate data.)
AT system response...	
...is likely to be more current and able to quickly change procedures to respond to new trends in the field. (It is easier to keep fewer staff current and changing their procedures can usually be done without difficulty.)	...is likely to be difficult to keep current and require more time to change procedures. (Getting information to more people increases the difficulty as does changing procedures in more locations.)
AT system structure...	
...is likely to be very rigid in its procedures. (To serve a number of schools, buildings, etc. the specialist unit usually has to create very rigid procedures to treat all requests for services equitably.)	...is likely to be more flexible and able to adapt procedures to meet unique situational needs. (Building level AT decision making is usually able to operate with fewer set procedures and can "bend" those to meet needs.)
AT system personnel...	
...is likely to be very costly in personnel. (Salaries for very specialized AT personnel can be high.)	...is less likely to be costly in personnel. (Costs tend to be for training and support of decentralized existing staff.)

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Figure 3, continued

Issues involved in centralized and decentralized delivery of assistive technology services.

CENTRALIZED	DECENTRALIZED
AT consideration...	
...is likely to respond to requests for consideration of AT in an untimely manner.(Fewer people to respond and usually more rigid procedures leads to slower response time.)	...is likely to respond to requests for consideration of AT in a timely manner. (More people at lower levels can usually respond more quickly and can be more flexible in their procedures.)
AT ownership...	
...and degree to which AT is used at student level may be low. (Those responsible for actually supporting AT use in the classroom are dis-empowered by the experts leading to low usage.)	...and AT use in the classroom is likely to be high. (Involvement in the AT decision making and supporting a feeling of competence usually leads to more actual AT usage.)

As illustrated by the comparison in Figure 3, neither a centralized nor decentralized approach is a panacea for AT staff organization and service delivery. Many would suggest that the goal is developing a system that uses some of both approaches given the resources and other influencing factors of the specific school situation. For example, a decentralized AT service delivery system could be developed with some degree of staff expertise in AT expected in every building. This decentralized system would hopefully provide training to building level staff to support their responsibility to carry out AT decision making at a building level. At the same time, a very small centralized team of AT specialists might be identified to provide back-up support to the building staff. These specialists might be existing centralized support staff who would develop additional expertise, could be new positions within the school, or could be contracted from outside entities. These specialists would most likely focus on highly technical, low incidence AT areas that would be unreasonable to expect the building level staff to address without support.

Many combinations and variations of centralized and decentralized service delivery systems are possible. None is right or wrong, good or bad. The resources of the school, community, region and state, the manner in which other services are delivered, and many other factors must all be considered to determine how to best meet the AT needs of students in a particular school.

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Critical Practice Issue:

Traditional Evaluation and IEP Process

Depending on individual student needs, AT decision making can and should occur at a number of times within the special education process. When gathering screening information, some students will be noted as already using AT such as glasses or hearing aids. In other cases, screening information may document a need to gather further information regarding a student's need for AT. Appropriate use of AT may need to be resolved prior to proceeding with portions of an evaluation, especially if the lack of access to or malfunction of the AT could invalidate evaluation results, for example, administering a cognitive test to a student without his/her hearing aid may significantly impact the results.

Formal assessment for AT can be conducted as part of the traditional comprehensive multi-disciplinary evaluation. When planning an evaluation, if screening information suggests limitations in areas such as vision, hearing, mobility, or communication, assessment questions about the need for AT should be built into the evaluation plan. For example, assessment of communication would not only include an evaluation of speech production, and receptive and expressive language skills, but also an assessment of the potential use of augmentative/alternative communication options; assessment of vision would not only include visual acuity but also the need for and use of AT to access print, produce "written" text or braille, and so on. In addition to these "high AT use" areas, other areas of assessment might also need to have AT questions added to their evaluation plan. The academic assessment portion might include standardized achievement testing along with a comparison of written language samples with and without AT use.

The following questions are particularly critical to address during a comprehensive evaluation. Lack of appropriate AT assessment in these areas of function may cause the assessment of other areas such as achievement, cognition, adaptive behavior, etc. to be invalid. These questions are not the only ones that should be addressed; others should be considered as necessary to address individual student needs and in all instances varying environments and task expectations should be considered.

Critical Questions for a Student with a Visual Limitation

☐ How does the student currently access print? Is this access effective? If not, can the student effectively access print materials through magnification or do print materials need to be converted to another form: auditory or tactile?

☐ How does the student currently produce written work (and take notes)? Is this effective? If not, can the student produce written work through adapted writing with enlargement or is an alternative system needed: auditory or tactile?

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Critical Questions for a Student with a Hearing Limitation

❏ How does the student currently access speech? Is this effective? If not, could the student access speech through amplification or does speech input need to be converted to another form: visual (sign language, text, etc.)?

Critical Questions for a Student with a Motor Limitation

❏ How does the student currently access the school environment? Is this effective? If not, could the student access the school environment through assisted ambulation or is alternative mobility needed?

❏ How does the student currently produce written work (and take notes)? Is this effective? If not, could the student produce written work with supported writing or is an alternative system needed: auditory or reduced motor (such as switch access for computer produced writing?)

❏ How does the student currently manipulate educational materials? Is this effective? If not, could the student manipulate educational materials with adaptations or are alternative materials needed (such as auditory and/or visual materials)?

Critical Questions for a Student with Limited Oral Communication

❏ How does the student currently communicate? Is this effective? If not, could the student communicate with amplified or clarified speech or does an alternative system need to be used, unaided (such as a sign system), aided (including systems with or without voice output)?

Following a comprehensive evaluation, if the student requires special education, an IEP is written and AT must be considered during this part of the process. For example, as an IEP team develops math objectives, use of a talking calculator might be considered; or as written expression objectives are developed, use of a talking dictionary might be considered. Even if the evaluation did not specifically include an assessment of AT, the IEP team must consider AT needs as the various components of the IEP are developed.

Critical Practice Issue: ———————————————————————

AT Assessment Options and Independent Evaluations

In addition to being part of a comprehensive evaluation, an AT "assessment" can also be done as a separate procedure. If done formally, such AT assessment is comparable to evaluating any other specific area of function apart from the comprehensive evaluation process. These stand-alone assessments usually occur because of a specific need (the student has developed a particular problem, is falling behind in a certain area, etc.) or a teacher or parent has requested consideration for specific use of AT.

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There are three distinct procedural ways in which such AT "evaluations," separate from a comprehensive evaluation, can occur:

1) A formal AT evaluation can be done, provided the area lends itself to formal evaluations. The evaluation could be done by a school or could be contracted to an outside source or combination of both. Such evaluation would be treated just as any other by following appropriate evaluation notice and consent procedures.

2) A structured programmatic evaluation could be designed as part of an IEP revision. This would consist of the development of IEP objectives that are implemented and reviewed to determine what AT might be appropriate for student use in various school environments. Typically, the IEP objectives are structured to allow AT types and features to be compared during student use in trial periods. The measurement of the objectives provides documentation for the outcomes of trial use and identification of AT appropriate to meet student needs.

3) A review/revision of existing IEP objectives could be completed if it appears the AT under consideration is already included to some extent. Sometimes the AT to be considered is a variation of that already addressed within the IEP objectives and can be addressed by minor adjustments in the objectives.

In general, formal AT evaluations are usually most appropriate when the AT is more personalized and prescriptive. For example, items such as custom seating and hearing aids involve more of a "fitting" and tend to have a more standardized assessment protocol associated with them than do other types of AT.

The typical comprehensive evaluation with standardized testing in areas such as cognition, visual acuity, auditory acuity, range of motion, fine and gross motor skills, receptive and expressive language, etc. is not sufficient to support most assistive technology device recommendations. While standardized testing in traditional areas may be a part of AT "assessment," it should not form the sole basis for a device recommendation, even when the device is rather "personal and prescriptive." Best practice in formal evaluations would include consideration of many other factors in the development of a device recommendation. These would include the environments in which the device is to be used, the expectations for the student in those environments, the supports needed for device use, and the student's preferences in device use. The features of a variety of devices should be compared to these factors to ascertain which device(s) might meet the student's needs.

By far the best assessment for determining if a device will work for an individual is actual use of the device, in a natural environment, to perform the activities desired. Careful documentation of the degree to which the device provides the desired outcomes provides almost irrefutable justification for the device recommendation. While some trial device usage data can be collected in a structured evaluation setting, typically the limited device usage time and the unnatural environment of a structured evaluation makes such trial data less than optimal.

Trial usage of a loaned or rented device over a longer time period, such as a few weeks, in the educational environments of actual use, provides powerful data to support device acquisition.

The previously described "best practice" assessment procedure of observing device use, in a natural environment, to perform the activities desired can be accomplished through any of the three alternatives of formal evaluation, structured programmatic evaluation or ongoing review. However, experience suggests that special efforts must be made to assure that formal evaluations do not revert to the familiar "administer standardized tests" methodology. Similar extra efforts are usually needed to implement structured programmatic evaluations because most schools are not familiar with such an approach. Examples of IEP goals and objectives that might be used as a structured programmatic evaluation are outlined in Figure 4.

Figure 4
Sample statements of IEP goals and objectives involving the use of assistive technology services and devices.

Example 1

Goal: Identify/utilize appropriate assistive technology to meet written expression needs.

Objective: The student will produce writing assignments utilizing a computer with
- □ a variety of input options including a regular keyboard and keyguard and an alternative keyboard, Intellikeys; and
- □ a variety of processing and output software including word processing with spell checking feature, synonym finder, and screen-reading voice output.

Evaluation Criteria:
Production of writing assignments at 80% of average student rate and 85% accuracy in form, structure and content as evaluated by teacher rating.

Example 2

Goal: Identify/utilize appropriate assistive technology to meet oral communication needs.

Objective: The student will communicate during classroom activities utilizing a speech output device with
- □ a variety of input options including multiple switch input, eight grid direct selection input, and scanning input with switch access;
- □ a variety of options used to cue access including picture representation for coding of grids or switches, color coding, and real object coding.

Evaluation Criteria:
Effective communication in 70% of trial uses as evaluated by teacher rating.

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Independent evaluation requests can pose some unique questions for schools. The regulatory requirements for schools to provide independent educational evaluations (IEE's) when parents disagree with the evaluation of the school, apply to AT comparable to any other area of special education. Most requests for IEE's arise from disagreement about the diagnosis of a student or disagreement about evaluation information that has been used to justify the services to be provided. In the case of IEE requests specific to AT, the disagreement is usually about what, if any, device is needed for FAPE. It is to everyone's benefit to assure that the individual conducting the IEE has appropriate expertise and utilizes quality evaluation procedures as previously described. The worst case scenario is contracting for an IEE only to find that the provider lacked adequate expertise and/or did nothing but re-administer a number of standardized tests.

Critical Practice Issue:

Short-Term Equipment Loan

Given the prior discussion regarding best practice in AT assessment, access to equipment for students to use in the classroom to support decision making about AT is critical. The most common way of delivering equipment for assessment purposes is through a short-term loan program. Short-term equipment loan programs can be administered by any entity so long as those served provide an adequate "critical mass" to support the full range of AT that might be needed for trial. Areas typically addressed through loan programs include computer access adaptations (both input and output with a majority targeted for students with mobility and vision disabilities), augmentative communication systems (wide range of input options with both tape recorded and computer generated voice output), print access technologies (scanning with speech and braille output and electronic enlarging), written expression supports (electronic notebooks, dictionaries, etc.) and amplification equipment.

In some states, a short-term equipment loan program has been developed to serve the entire state. In other cases, intermediate units or other multi-school cooperatives have joined together to develop short-term equipment loan programs. Individual schools and districts have also developed equipment loan programs which usually include a more limited range of devices designed to meet more high incidence needs such as basic computer access (alternative keyboards, switches, enlarging software, etc.), written expression supports, and lower-tech augmentative communication systems (tape recorded speech output). For many schools, some degree of multi-district cooperation will be necessary to assure access to a full range of devices in the loan program (for example, low incidence devices such as refreshable braille displays and high-tech augmentative communication devices) since these will be "tried out" by relatively few students.

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Critical Practice Issue:

Educational and AT Interface

As highlighted by the overlapping definitions of AT and educational technology, it is important for both special and general educators to work together to make sure that everyone has a clear understanding of how AT, as used in special education, and educational technology, used for general instructional purposes, interface. In the 1970s, it was common to see "special education instructional materials centers." Since then, most educators have come to realize that good instructional materials are good instructional materials and there is really no need to identify "special" education materials from "general" education materials. The same evolution of thought seems to be occurring with regard to instructional software, first identifying "special education" instructional software, then gradually moving to a more generic approach to selecting appropriate software based on student needs rather than a "special" or "general" education descriptor.

When infusing AT into general educational technology, three goals can be envisioned to assure appropriate consideration of the needs of students with disabilities.

Goal One - Equity of Distribution

Educational technology, with or without adaptations, will be equitably distributed between and among all of the programs of a school.

Equity of distribution would consider issues such as age and gender in addition to disability. Equity of distribution would also consider geographic distribution and building type.

Goal Two - Equal Physical Access

Technology will be physically housed in accessible buildings and classrooms.

In addition, the physical structures used to support technology, computer stations, etc., must be fully accessible for students with disabilities.

Goal Three - Equal Product Access

Technology products themselves will be fully accessible or be able to be made fully accessible.

Nothing will create greater educational barriers for students with disabilities than the development and procurement of technology (hardware, software and connectivity) that cannot be made fully accessible. This is by far the most difficult goal for schools to adequately address.

The following questions and answers are designed to help schools consider product accessibility as they develop and implement technology plans and strive to achieve goal three. The information should be helpful to administrators, general and special education staff, technology coordinators, media specialists and others involved in technology planning and procurement.

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How do barriers to educational technology access for students with disabilities differ from access barriers for all other students?

Common barriers to educational technology access for all students include costs associated with obtaining equipment, difficulty "connecting" rural locations, lack of funding to train personnel to utilize technology, and so on. For students with disabilities, more basic access barriers are encountered in interacting with the educational technology product. Motor disabilities may limit students ability to use a standard keyboard, the standard monitor display may not be usable by students with visual impairments, and the speech output of an instructional program may not be understood by a student with a hearing impairment. Alternative input and output features are frequently needed by students with disabilities to allow them to interact with the educational technology on equal basis with other students. Such features are critical for educational technology "product access" just as ramps and lever door handles are critical for facility access.

How can "product access" for students with disabilities be delivered?

Access for students with disabilities can either be accomplished through "built-in" features or ones that are "added-on" to the product. Built-in access features are usually more robust, stable, and cost-effective than add-on. Examples of a built-in access features would be keyboard adjustments that allow for sequential rather than simultaneous keystrokes and software that provides the capacity to adjust the size of the visual display output to a variety of enlargements. Unfortunately, not all access features are available built-in and as a result compatibility with add-on access products will also be necessary to assure full access. Examples of compatibility with an add-on access products would be the capacity to accept input from alternative keyboards and software that supports the stable operation of "screen-readers," products that transform visual display into speech with additional software and a speech synthesizer. Another illustrative comparison of built-in and add-on access can be seen with television captioning decoders. All recently manufactured televisions have a decoder chip built-in, thus eliminating the need for an expensive add-on device. As universal access becomes more and more accepted in the development of new products, built-in access should become more readily available.

Do these input and output alternatives help only students with disabilities?

No. Many access features provide benefits for individuals without disabilities. Just as curb cuts accommodate individuals pushing shopping carts, baby strollers, etc. in addition to providing access for individuals who use wheelchairs, many educational technology access features support students with a variety of learning needs. Alternative input options allow preschool children to use a computer effectively when they do not yet have the motor skills to use a standard keyboard.

Voice output systems not only provide access for individuals who cannot see text on a screen display, but also support effective technology use by individuals with limited reading skills. Text display of speech output can foster literacy development in addition to providing access for individuals who cannot hear.

What are a school's responsibilities to provide educational technology access for students with disabilities?

It is the school's responsibility, both legally and ethically, to assure that their educational technology can be accessed by all students, including those with disabilities. The ADA and Section 504 of the Rehabilitation Act require schools to provide equal access to educational technology for students with disabilities. Section 508 of the Rehabilitation Act requires that the federal government purchase only information technology that is or can be made fully accessible. The requirements of Section 508 also apply to state governments through provisions in the Technology Related Assistance for Individuals with Disabilities Act. While Section 508 does not directly apply to local schools at this time, the U.S. Department of Education and many state education agencies are encouraging schools to adhere to Section 508 as they spend federal and state education dollars on technology. Section 255 of the Telecommunications Act of 1996 also contains a new accessibility requirements for those who develop and manufacture telecommunications products. This includes many educational technology companies. Once effective, these new requirements should increase the number of products that come to the market fully accessible, reducing the need to purchase add-on access products and problems with product compatibility.

If technology is purchased that cannot be made accessible, it will have to be retro-fit, replaced, or some other adaptation will have to made so that a student with a disability can have equal access to the technology as needed. While all technology within a school does not need to be fully accessible to students with every type of disability, technology should be readily available that can provide access for all types of disabilities. A notable exception is in those instances where the technology is the "sole provider" of information or services, for example, an electronic library system or a single station that provides Internet access. If a system is a sole provider, it must either be fully accessible or be able to be made fully accessible to assure equal access.

How can schools fund educational technology access for students with disabilities?

Significant federal and state appropriations are currently available to support the purchase of educational technology. These general education technology dollars can and should be used to procure accessible educational technology, including technology with built-in access, technology that is compatible with add-on access products, and add-on access products themselves.

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These federal dollars should not be used to purchase inaccessible technology with the expectation that some "special" funding source has responsibility for making the products accessible. When expending federal educational technology funds, built-in access and compatibility with add-on access products should be considered as a condition for product purchase. In addition, federal dollars should be used to purchase add-on access products as needed to assure full accessibility for all students, including those with disabilities.

How does a school know if educational technology products are fully accessible?

Unfortunately, it is not as simple as looking for the "access seal" or access assurance statement in the product marketing material. Many educational technology products on the market today have not been designed to provide or support full access. There is currently no independent review entity that provides buyers with information regarding the accessibility of educational or other types of technologies. Thus schools need to add access considerations to the list of factors they use to make decisions about the purchase of educational technology. Best practice and common sense would recommend that schools procure only products that are or can be made fully accessible.

Are there standards that can be used to review educational technology products for accessibility?

Currently there are no mandated access standards that educational technology products must meet prior to becoming available for purchase. However, Appendix 2 and 3 are two examples of such standards. Appendix 2 is a set of basic questions that can be used by schools to review products for accessibility. Appendix 3 contains the proposed rules for Section 255 of the Telecommunications Act of 1996, which includes requirements for product accessibility and requirements for compatibility with add-on access products. Either of these standards could be used to conduct a review of educational technology products for accessibility.

How can schools review educational technology for access?

Once a set of access standards has been identified, a number of techniques can be used to review educational technology for adherence to those standards. Products and/or product specifications can be directly reviewed by school staff. This review can be done by staff who have familiarity with the access standards and may entail pooling the expertise of special educators and educational technology specialists. Community resources, individuals who are users of adaptive technology and are familiar with access features, can be asked to assist in product reviews. In addition, vendors can be asked to provide a review of their products in reference to the access standards, or vendors can be asked to demonstrate how their products conform to the access standards.

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Asking vendors to review or demonstrate the accessibility of their products provides an added benefit of increasing awareness to access issues that can be addressed by the manufacturer during future product development.

It is important to note that the considerations in these Appendices apply only to accessibility and are not all inclusive of the issues that should be considered prior to technology purchase. Additional, non-access issues should be considered when reviewing instructional software such as:

☐ How well does the instructional software match the curriculum and instructional objectives?

☐ How motivating and age appropriate is the instructional software?

☐ Can the instructional software be used independently or does it require substantial teacher support?

Best practice would recommend that access standards be paired with other review considerations that assist in selecting quality instructional software to meet the unique learning needs of their students.

Hopefully, as a result of consumer interest and implementation of Section 255 of the Telecommunications Act, access issues will become a higher priority for educational technology developers in the future. If full access is "built-in" to technology during product design and development, the burden on schools to scrutinize every purchase is lessened substantially. Just as a new building is expected to be designed with full access built-in, hopefully, in the future, educational technology will be fully accessible from the moment it is commercially available.

> "We know, purely and simply, that every single child must have *access* to a computer, must understand it, must have *access* to good software and good teachers and to the Internet, so that every person will have the opportunity to make the most of his or her own life."
> — President Clinton (emphasis added)

> " . . . commitment to free quality education for all has been a bedrock principle of our nation. The Internet, in time, will be the blackboard of the future. Knowledge of technology is increasingly essential for life and work. *How can we allow some children to have access and leave others out?*"
> — Secretary Riley (emphasis added)

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V. ACTION PLAN

As the year 2000 approaches, technology will continue to advance and offer more and more options for students with disabilities. It will be critical for special educators to become as informed as possible about Assistive Technology (AT) and the associated policy and practice issues previously described to not only adequately address the current needs of their students, but also to help prepare for the many new issues that will undoubtably arise. The following action steps are provided as a basis for creating an action plan for those interested in becoming more proactive in responding to the AT needs of their students.

1. Gather and Analyze Information

Identify existing AT devices, support services and expertise currently available within the school.
(What AT devices is the school currently using by type, location, and/or other critical factors? Who does staff go to for help when they have an AT question?)

Identify community resources and the services they provide.
(Who is currently used as an outside expert? How satisfied are staff and families with their services?)

Identify all policies and procedures currently used to address AT issues.
(Are there official policies and "unofficial" ones? Are the procedures the same across all buildings and programs or are they different and if so how?)

Identify current AT usage level by disability type, grade level, building, or other important factors.
(How many students with visual disabilities are using AT? How many students with hearing disabilities? How does this usage level compare with what is know about the need for AT for those types of disabilities?)

Critically analyze all gathered information about the current AT "system" to identify strengths and weaknesses and use this information to develop quality AT policies, procedures and practices.

2. Create Comprehensive AT Policies

Develop clear policies for addressing AT in screening and evaluation including formal evaluation procedures and independent educational evaluations.

Develop clear policies for addressing AT in IEP development and implementation including specifying AT in the IEP, determining the need for home use, accessing external funding sources, and providing repair and maintenance.

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3. Create a Quality AT Service System

Develop and implement an ongoing staff development program that will assure current knowledge and expertise in the AT policies and procedures of the school and general AT expertise in all staff.

Develop and implement a service delivery structure that meets school needs, capitalizes on and expands existing resources, and supports staff development necessary (specialized AT expertise) to effectively implement the system.

Develop and implement a mechanism for access to equipment on a short-term loan basis.

4. Create a Quality Monitoring System

Develop and implement integrated technology planning across regular and special education to assure equity of distribution of technology and to assure that all technology products are fully accessible to students with disabilities.

As complicated as the area of AT can be, little is as satisfying as seeing a previously non-verbal student communicating for the first time through the use of an augmentative communication system or seeing a student previously dependent on a human reader reading text independently through the use of AT. Assistive technology has literally been a miracle for some and has allowed many students with disabilities to achieve outcomes previously thought impossible. Hopefully, educators can become better informed about policy and service delivery issues and begin to proactively address AT in their schools for all the right reasons . . . because of its positive impact on student achievement.

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appendices

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If READING is addressed in the IEP, consider AT that:	
Enhances standard text and graphics	corrective lenses (eyeglasses)
	highlighting
	colored overlays
	manually or electronically changin spacing
	screen color/contrast adaptations
	pictures/graphics
	symbols/sign language cues
Enlarges text and graphics	large print books
	manual hand-held magnifiers
	closed circuit television (CCTV)
	screen magnifier (placed over computer screen)
	screen enlarging software
Converts text and graphics to speech	talking dictionary (to "pronounce" difficult words)
	talking word processor (to "read" specific words or all of text that is in electronic form)
	screen reading system (to "read" specific words or all of text that is in electronic form)
	screen reading system (to "read" text that is in electronic form - may need to be scanned in)
	video description (verbal description of visual information conveyed in videotapes, TV, etc.)
Converts text and graphics to braille or other tactile symbols	braille translation software and braille printer
	refreshable braille computer output
	tactile graphic display systems (NOMAD, etc.)

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If WRITING is addressed in the IEP, consider AT that:	
Enhances standard writing utensils and supports	adaptive grip, larger size, wide marking or other adapted writing utensil
	splints, wrist supports, etc.
	special paper (wider lines, raised lines, etc.)
	writing guides, signature guides, etc.
	slanted, larger, or no-slip writing surface
Replaces standard writing utensils and supports with alternative	typewriter
	electronic notetaker, portable word processor with standard keyboard (AlphaSmart, Type N Speak, etc.)
	electronic notetaker with braille input
	computer with standard keyboard/pointing device
	computer with keyboard enhancements or adjustments (keyguard, repeat rate adjustment, etc.)
	computer with alternative keyboard/pointing device (on-screen keyboards, keyboard emulation, etc.)
	computer with switch, scanning, code or other alternative direct selection input devices
	word prediction & macros to reduce keystroke input
	computer with voice dictation input
Enhances the composition of written expression	dictionary and thesaurus (print or electronic - electronic may be "talking")
	word processor with specll checker, grammar checker, etc. (may be "talking")
	abbreviation/expansion, word prediction, macros (to facilitate composition content and input speed)
	voice dictation input (to facilitate composition content and input speed)
	multi-media software (to facilitate expression through multiple sensory channels)

If MATH is addressed in the IEP, consider AT that:	
Replaces mental calculators with mechanical or electronic	abacus
	calculator with print output
	"talking" calculator
	calculator with large print LCD display
	calculator with large keypad
	"on screen" calculator with computer input and/or output adaptations
Adapts measuring devices (ruler, thermometer, clock, watches, etc.)	measuring devices with speech output
	measuring devices with large print or LCD display
	measuring deviceswith tactile output

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If STUDY SKILLS are addressed in the IEP, consider AT that:	
Enhances or supplements study and organizational skills	print or picture schedule
	visual organizers (color coded tabs and folders, color coded highlighters, etc.)
	electronic organizers
	speech output devices that provide verbal reminders for assignments, sequence or task, etc.
	software to support organization of ideas and studying

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If SPEECH/LANGUAGE is addressed in the IEP, consider AT that:	
Enhances speech production	speech amplifier
	speech "clarifier"
Supplements/ replaces speech production with text, and/or pictures and graphics that communicate	communication board/book
	typewriter
	text display or print output electronic notetaker, protable word processor, computer, or communication device
Supplements/ replaces speech production with alternative speech	artificial larynx
	tape recorded speech output communication devices with variable input options and range of number of messages that can be recorded, stored and retrieved
	computer generated speech output communication devices with variable input options and text to speech capacity

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If LISTENING is addressed in the IEP, consider AT that:	
Enhances sound and speech reception (amplifies and/or reduces background noise)	hearing aid
	cochlear implant
	assistive listening systems (FM, infrared, induction loop, etc.
Converts speech to text	captioning of videotapes and TV
	computer assisted real-time captioning (CART)
	computer assisted notetaking (CAN)
	computer generated speech output communication devices with variable input options and text to speech capacity

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If ORIENTATION, MOBILITY or AMBULATION is addressed in the IEP, consider AT that:	
Enhances orientation, mobility or ambulation function	corrective lenses (eyeglasses)
	white cane/electronic sensor cane devices
	auditory location signaler systems
	tactile signage
	grab bars, lever handles, etc.
	splints, canes, walkers, etc.
	speech output devices that provide verbal directions
Supplements /replaces orientation, mobility or ambulation function	remote environmental controls
	manual wheelchair
	power mobility device (scooter, toy car, etc.)
	power wheelchair

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If DAILY LIVING or RECREATION/LEISURE is addressed in the IEP, consider AT that:	
Enhances or supplements development of daily living skills or leisure activities	adapted eating utensils (built-up handles, plate guards, straws)
	adapted dressing aids (button holers, sock guides, velcro closure clothing and shoes, etc.)
	adaptive watches, adaptive clocks and alarms
	environmental control units
	adaptive driving equipment (hand controls, etc.)
	adapted toys, board games, playing cards, etc.
	"beeping" balls, bases, frisbees, etc.
	lane guides for track and swimming
	adjustable basketball hoops, wheelchair spoke guards, accessible weight training equipment, hand cycles, etc.
Replaces human function to allow daily living or leisure activities to be accomplished	feeding systems
	transfer systems

If ACCESS to educational programs (developmental, academic, functional, vocational, or transition) is addressed in the IEP, consider AT that:	
Provides equal access to visual information, media, educational equipment, and auditory communication	adaptive toys (switch activated, etc.)
	page turners, electronic format of print pages/books
	alternative format print materials (large print, braille, electronic form, etc.)
	adjusted or alternative input and output for computers, electronic, and on-line media
	telephone access (TTY, VCO, amplified phone, etc.)
	adjusted or alternative output for audio-visual media (captioning, video description, amplified audio output, magnified video output, etc.)
Provides equal access to the environment	physical accessibility of buildings, restrooms, classrooms, library, work space, desks, etc.
	emergency signaling systems (visual fire alarms, etc.)
	alternative signage (raised lettering, braille)

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Appendix 2: Access Questions

1.0   BASIC SYSTEM ACCESS

1.1   What is the memory capacity of the system to efficiently operate current and projected hardware and software including adaptations?   Substantial access would include memory needed to run standard applications plus additional memory needed to accommodate adaptations.

1.2   What is the processing capacity of the system to efficiently operate current and projected hardware and software adaptations? Substantial access would include processing speed needed to run standard applications plus additional memory needed to accommodate adaptations.

1.3   What is the capacity of the architecture of the system to allow for expansion, such as the addition of specialized cards, memory chips, and port connections? Substantial access would include the availability of open ports, slots, etc. to meet adaptation needs.

1.4   What is the capacity of the architecture of the system to allow for ease of physical access to features such as on/off switches, volume, contrast, brightness controls, and disk/CD-ROM drives? Substantial access would include controls on the front of the system or accessible from the control panel.

1.5   What is the capacity of the individual user station in a network system to provide adaptations, both built-in and add-on access features? Substantial access would include network ability to deliver adaptations from the server and independently through the end unit.

1.6   What is the capacity of the cabling system to transmit a variety of electronic information? Substantial access would include cabling able to deliver multiple types of electronic information, for example, adaptations of visual information to auditory and auditory to visual.

2.0   INPUT ACCESS

2.1 What is the capacity of the operating system, application and/or instructional software to deliver keyboard and mouse adjustments, internally or as an add-on? Substantial access would include:
- ☐ execution of multiple keystroke commands sequentially rather than simultaneously
- ☐ adjustment of acceptance rate for keystrokes and keyboard repeat feature
- ☐ adjustment of mouse features (click speed, latching)
- ☐ delivery of mouse or pointing device input via keyboard commands
- ☐ visual indication of system warning beep
- ☐ visual and auditory indication of toggle keys' status
- ☐ carryover of all operating system adjustments into applications/ instructional software.

2.2 What is the capacity of the operating system, user application, and/or instructional software to accept input from alternative keyboards and alternative pointing devices? Substantial access would be efficient utilization of alternative input devices to transmit any valid input available from the standard keyboard and mouse.

2.3 What is the capacity of the operating system, user application, and/or instructional software to accept input from a voice dictation system? Substantial access would be efficient utilization of speech input to transmit any valid input from the standard keyboard and mouse with effective user control.

3.0   OUTPUT ACCESS

3.1 What is the capacity of the operating system, user application and/or instructional software to deliver monitor display adjustments, internally or as an add-on? Substantial access would include:
- ☐ user definable font, size and screen elements such as menu titles, icons, and cursor track
- ☐ user definable color/contrast
- ☐ on and off toggle of adjustment features
- ☐ carryover of all operating system adjustments into applications/ instructional software.

3.2 What is the capacity of the operating system, user application, and/or instructional software to provide visual information, text and other visual images, through speech output? Substantial access would include:

❏ conversion of all critical visual information, text and other visual images, to speech

❏ support of and compatibility with user control features of speech output systems such as:
- user definable rate, volume and pronunciation of speech output, and
- user control of visual information to be "read" via pre-set and user defined parameters
- on and off toggle of speech.

3.3 What is the capacity of the operating system, user application, and/or instructional software to provide visual information, text and other visual images, through tactile output? Substantial access would include:

❏ conversion of all critical visual information, text and other visual images, to tactile

❏ user control of visual information converted to tactile output via pre-set and user defined parameters.

3.4 What is the capacity of the operating system, user application, and/or instructional software to provide auditory information, speech or other sound signals, through enhanced output and visual display? Substantial access would include:

❏ user definable volume and audio output options (direct input to personal amplification)

❏ conversion of critical auditory information to text/graphics, as needed per user literacy

❏ on and off toggle of visual display (such as text captioning).

3.5 What is the capacity of the application and/or instructional software to provide adjusted and alternative hard copy output such as enlarged, enhanced, and spatially manipulated print and images, and braille or other tactile imaging? Substantial access would include:

❏ adjustment mechanism (font type/size) enabling enlargement/ enhancment of hard copy

❏ capacity to manipulate layout of text and graphics to produce adapted hard copy

❏ capacity to save text in ASCII (text file) to support conversion of text to braille.

4.0 RELATED ACCESS

4.1   What is the capacity of the system to provide documentation or associated materials in accessible form? Substantial access would be the availability of all associated materials in alternative formats such as braille, text-file, audio-cassette, large print, etc.

4.2   What is the equity of distribution and the physical accessibility of buildings and rooms in which educational technology is placed, including buildings and rooms that are electronically "connected"? Substantial access would be placement of educational technology equitably across all program types, including programs serving students with disabilities, and placement of educational technology in fully accessible (ADAAG) facilities.

4.3   What is the physical accessibility of end user structures such as computer stations, desks, tables, etc. and the accessibility of adaptations that are not permanently fixed to a particular computer station? Substantial access would include availability of physical structures that can meet the needs of students with disabilities and ready access (within the general area rather than in another building) to the adaptations needed for a particular student.

4.4   What is the capacity of educational technology product vendors to provide initial and on-going technical support regarding system access for students with disabilities? Substantial access would be availability of vendor support to assist with operation of built-in access features specific to their product and to assist with operation of their product with add-on access systems.

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Appendix 3: Telecommunications Act of 1996
Proposed Requirements for Accessibility

REQUIREMENTS FOR PRODUCT ACCESSIBILITY

1193.33 Redundancy and selectability.
Telecommunications equipment and customer premises equipment shall provide redundancy such that input and output functions are available in more than one mode. Alternate input and output modes shall be selectable by the user.

1193.35 Input, controls, and mechanical functions.
Input, controls, and mechanical functions shall be locatable, identifiable, and operable through at least one mode that complies with the following:

(a) Operable without vision. Functions shall not require user vision.

(b) Operable with low vision. Functions shall not require user visual acuity better than 20/70, and shall not rely on audio output.

(c) Operable with little or no color perception. Functions shall not require user color perception.

(d) Operable without hearing. Functions shall not require user auditorypercep-tion.

(e) Operable with limited manual dexterity. Functions shall not require fine motor control or simultaneous actions.

(f) Operable with limited reach and strength. Functions shall be operable with limited reach and strength.

(g) Operable without time-dependent controls. Functions shall not require a sequential response less than three seconds. Alternatively, any response time may be selected or adjusted by the user over a wide range.

(h) Operable without speech. Functions shall not require speech.

(i) Operable with limited cognitive skills. Functions shall minimize the cognitive, memory, language, and learning skills required of the user.

1193.37 Output, displays, and control functions.

(a) Voice telecommunications shall comply with (b)(9) and (b)(10) of this section.

(b) All information necessary to operate and use the product, including text, static or dynamic images, icons, or incidental operating cues, shall be provided through at least one mode that complies with the following:

(1) Availability of visual information. Information which is presented visually shall also be available in auditory form.

(2) Availability of visual information for low vision users. Information which is provided through a visual display shall not require user visual acuity better than 20/70, and shall not rely on audio.

(3) Access to moving text. Text, other than text output of a TTY, which is presented in a moving fashion shall also be available in a static presentation mode at the option of the user.

(4) Availability of auditory information. Information which is provided in auditory form shall be available in visual form and, where appropriate, in tactile form.

(5) Availability of auditory information for people who are hard of hearing. Information which is provided in auditory form shall be available in enhanced auditory fashion (increased amplification or increased signal-to-noise ratio).

(6) Prevention of visually-induced seizures. Flashing visual displays and indicators shall not exceed a frequency of 3 Hz.

(7) Availability of audio cutoff. Products which use audio output modes shall have an industry standard connector for headphones or personal listening devices (e.g., phone-like handset or earcup) which cuts off speakers when used.

(8) Non-interference with hearing technologies. Products shall not cause interference to hearing technologies (including hearing aids, cochlear implants, and assistive listening devices) of the user or bystanders.

(9) Hearing aid coupling. Products providing auditory output by an audio transducer which is normally held up to the ear shall provide a means for effective wireless coupling to hearing aids.

(10) Availability of enhanced audio. Products shall be equipped with volume control that provides adjustable amplification ranging from 18-25 dB of gain.

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REQUIREMENTS FOR PRODUCT COMPATIBILITY

1193.41 Compatibility.

. . . telecommunications equipment and customer premises equipment shall be compatible with peripheral devices and specialized customer premises equipment commonly used by individuals with disabilities to achieve accessibility, and shall comply with the following provisions, as applicable:

(a) External electronic access to all information and control mechanisms. Information needed for the operation of products (including output, alerts, icons, on-line help, and documentation) shall be available in a standard electronic text format on a cross-industry standard port and all input to and control of a product shall allow for real time operation by electronic text input into a cross-industry standard external port and in cross-industry standard format. The cross-industry standard port shall not require manipulation of a connector by the user. Products shall also provide a cross-industry standard connector which may require manipulation.

(b) Connection point for external audio processing devices.
Products providing auditory output shall provide the auditory signal at a standard signal level through an industry standard connector.

(c) Non-interference with hearing technologies.
Products shall not cause interference to hearing technologies (including hearing aids, cochlear implants, and assistive listening devices) of the user or bystanders.

(d) Compatibility of controls with prosthetics.
Touchscreen and touch-operated controls shall be operable without requiring body contact or close body proximity.

(e) TTY connectability.
Products which provide a function allowing voice communication and which do not themselves provide a TTY functionality shall provide a standard non-acoustic connection point for TTYs. It shall also be possible for the user to easily turn any microphone on and off to allow the user to intermix speech with TTY use.

(f) TTY signal compatibility.
Products providing voice communication functionality shall be able to support use of all cross-manufacturer non-proprietary standard signals used by TTYs.

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EFF-089 (9/97)