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ASSISTIVE TECHNOLOGY

Raising a child with a disability presents families and professionals with many challenges. Today, one of the major challenges facing people who care for and about children and youth with disabilities is technology -- what to get, where to get it, how to use it, how to pay for it, how to evaluate its effectiveness, and where to put it. Technology is receiving the attention of families, advocates, legislators, and professionals due to its potential for enhancing the lives of individuals with disabilities. From computers to communication devices to environmental controls, the world of technology offers many children and adolescents with disabilities the tools necessary to be more successful in school, at work, and at achieving independence in daily living. Indeed, opportunities unthought of ten years ago are now becoming available to some children with disabilities with the assistance of new technology, and rumors of emerging technology are raising new hopes. Yet, the diversity of available technology, its ever changing nature, the lack of general sophistication regarding it, and the decisions to be made prior to purchase, prompt many and continuous questions. During the time this NEWS DIGEST was being developed, the staff of the National Information Center for Children and Youth with Disabilities (NICHCY) found that much information does exist on all issues related to the choice and purchase of any piece of technology; much of the information is, however, of varying degrees of readability, in many and disparate places, and often requires the skills of a super sleuth to uncover or decode.

The Council for Exceptional Children Reston, Virginia

Today, a nonverbal child speaks with the help of an electronic communication aid. A student with learning disabilities masters math facts using a computer game. A child with vision problems can benefit from an inexpensive device that enlarges printed words on the computer screen. And for more severe vision problems, there are speech synthesizers that can be used with computers to convert typewritten words or text into an electronic voice. For the child who has a physical disability, there are special devices that will allow him or her to input information into the computer without using the conventional keyboard. This can be done through the use of a single switch or some type of voice

recognition system. There are other alternative input devices that can be used simply by touching the computer screen or touching points on a touch-sensitive tablet that correspond to the points on the computer screen. Computer and other technologies have expanded and enriched lives and given many children with disabilities options not imagined a decade ago. As there is a wide array of assistive technology, so too are there many decisions, choices and options for families and professionals. Making informed decisions about technology is a challenge that many consumers will encounter in coming years. Resources are available to assist consumers such as: current periodicals; disability, parent, and professional organizations; national technology centers; and private companies. Walking the assistive technology maze can be made less complex and confusing by understanding the implications of technology in the lives of children and youth with disabilities, and by knowing where to go for help.

Then and Now

In the late 1800s, the population of the U.S. was growing rapidly. Census information, gathered by hand, resulted in long delays and inaccuracy in the information reported about the nation's population. In fact, the 1880 census took eight years to count. Estimates at that time indicated that if the census process continued in the same manner, the 1890 census would take twelve years to complete and the 1930 census would be available in 1985. Help arrived in the form of the 1890 Census Machine developed by John Shaw Billings and Herman Hollerith. The 1890 census took three years to complete and computerization was underway. Hollerith turned to big business to market the invention, now called the Tabulating Machine. He joined a company that eventually called itself International Business Machines (IBM). IBM joined with Harvard in 1938 to create the first electronic computer, the Mark I. The Mark I required 46,000 vacuum tubes to perform its operations. The ENIAC computer, completed in 1947, weighed 30 tons, stood nine feet tall, and took up 1,500 square feet. In 1951 the UNIVAC computer was completed. Weighing in at a mere 3 tons and occupying only 575 square feet, UNIVAC was the first computer to handle numbers and words. Commercially produced computers continued to evolve, with more power packed into less space at a lower price.

In 1973, the first computer chip, the 8080, was manufactured by Intel. Less than a square inch in area and thin as cardboard, this chip can perform a million calculations per second (like the ENIAC) but only costs about \$4 to purchase. These chips are expensive because their main ingredient is silicon, which is more common than sand, and they are produced in enormous quantities (Budoff, Thormann, and Gras, 1985). Computers were the beginning of the new information technology. Information (facts, knowledge, data, and news) technology (materials, tools, systems and techniques) is the key to economic growth. It is likely to bring about substantial changes in society and may change lives -- for better or worse -- in a very short time. It will improve the quality of life for many people by making information more accessible and providing more information at a low cost which will increase opportunities for all. The greatest gain will be to the educationally disadvantaged, among them, students with disabilities (Hawkrigde, Vincent, and Hales, 1985).

The interest in using computer technology with people with disabilities began in October 1981 with the Johns Hopkins First National Search for Applications of Personal

Computing to Aid the Handicapped. In November 1980, the Applied Physics Laboratory at The Johns Hopkins University began a national search for applications of personal computing to aid the handicapped. Enthusiastic responses from professionals, amateurs, and students resulted in introductory workshops and regional fairs, and culminated in an exhibit of the top national entries at the National Academy of Sciences, an awards ceremony in Washington, D.C., and a two-day workshop on computing for the handicapped at Johns Hopkins in October 1981.

In March 1983, The Council for Exceptional Children held its First National Conference on the Use of Microcomputers in Education. This conference reflected the need for basic workshops on microcomputer use and for information on practical applications of computers in special education. In 1983 CEC/ERIC published: *Microcomputers in Special Education* by Florence M. Tabor; The Exceptional Parent magazine published its first annual technology issue; and the IEEE held its first Computer Society Workshop on Computers in the Education and Employment of the Handicapped. 1984 saw the first U.S. Office of Special Education Programs (OSEP) document published by COSMOS Corporation: *Microcomputer Implementation in Schools* by Robert K. Yin and J. Lunne White. The document described and analyzed the use of microcomputers in the schools and district offices of 12 school districts. In September, 1984, *Closing The Gap* held its first conference on Computer Technology for the Handicapped. A 1985 OSEP publication, *Robotics, Artificial Intelligence, Computer Simulation: Future Applications in Special Education*, by Gwendolyn B. Moore, Robert K. Yin, and Elizabeth A. Lahm, identified ways in which technologies might be used to help special education students in the future.

The vehicle for introducing technological devices for educational use was put into place in 1975 with the passage of the Education of the Handicapped Act (EHA), P.L.94-142. Increased federal interest was demonstrated with the passage of the Amendments to the Education of the Handicapped Act of 1986, P.L. 99-457. These amendments created a new Part G designed to promote the use of new technology, media, and materials in the education of students with disabilities. Discretionary grants under this new authority were targeted to:

- assess usage and promote effectiveness;
- design and adapt new technology, media, and materials;
- assist public and private sectors in development and marketing; and
- disseminate information.

More recently, the Technology-Related Assistance for Individuals with Disabilities Act of 1988, P.L. 100-407, was signed into law. The primary purpose of the act is to assist states in developing and implementing statewide programs of technology-related assistance for meeting the needs of individuals with disabilities. The program will enable individuals with disabilities to acquire assistive technology devices and services. Over a three year period, all states will have the opportunity to get federal assistance for developing and establishing their statewide program. The legislation refers to technology-related assistance and allows each state to decide what is meant by technology-related assistance. The term does include, however, two separate components: services and

devices. Assistive devices are not a new area of interest created by the new law. As shown above, interest in the new higher technologies began shortly after the silicon chip invention. Prior to that, low technology assistive devices were being developed and used for centuries. Consequently, definitions of what an assistive device is are numerous, and are often based on the perspective of a specific agency or disability group.

The wide variety of assistive devices, and their applications to children and youth with disabilities, is currently receiving a great deal of attention from many disability-related fields. This flurry of activity stems from the potential that new and emerging technologies hold for individuals with disabilities to lead full and independent lives. The cases below provide only a few examples of the versatility and application of technology and their benefits.

Technology Applications

Case 1: A high school student with a visual impairment in a Current Events class has an assignment to follow a recent major event, present available facts about it, write a report, and complete a presentation about the event to his classmates. A major source of information for his sighted classmates is the newspaper, but unless someone reads it to him, he cannot use that source. The radio is an available option, but typically radio news coverage contains too little detail. With the available computer technologies, though, he can receive the newspaper on a computer disk and, using his personal computer equipped with synthesized speech, he can auditorily scan the newspaper, find relevant articles, and have the computer read them to him. Using the same computer, he can begin to write his paper, print it out in braille so he can check it and change it if necessary, and then print it in standard text to hand into his teacher.

Case 2: An adolescent with quadraparesis shows all the signs of becoming a teenager. She wants control of her own life: to decide which radio station to listen to, to decide when to turn the reading light off at night, to call her friends and have a private conversation, and to stay home alone when her parents go out. Without assistive devices she would be unable to be an independent teenager, but with a single switch connected to an environmental control unit and placed on her head, she can control her personal radio, turn the lights on and off, access the telephone for calling friends, and call for emergency help when her parents are out.

Case 3: A toddler with severe disabilities attends a special education preschool program. The teachers are unable to determine the child's cognitive abilities because the child has no verbal skills and very few motor skills. In the past, teachers had few ideas for appropriate educational programs for this type of child. As a result of available technologies, the child's educational program includes motor training, language and communication training, and teachers can more easily see the child's potential and can build on it. Now the teachers are working on training him to use a consistent motor response using switches and battery-operated toys. The child is learning to reach and touch a switch which turns on a battery-operated teddy bear. Other times the child has two or three switches to choose from and must decide which toy is preferable. The language therapist is using the same switches to teach the child to make consistent "yes" and "no" responses for communication.

Computers for Home Use

Many of the computers purchased each year are bought for use in the home. Well over 50% of home computer owners report that the major reason for buying a computer is for educational applications. Exactly how computers are used depends on the software

selected. Depending on the design and content, software can present new skills or concepts, reinforce previously learned skills, or require the learner to apply skills to a task or problem. Educational software generally falls into four categories: drill and practice, tutorial, simulations, and games. Tool software such as word processing are another option. Each type of software can be used for instruction at home.

Drill and Practice. These programs provide opportunities for the child to practice previously learned skills. The content of the drill and practice program is usually structured, focusing on a specific sequence or kind of skill-building. For many students with disabilities, drill and practice activities are very important for mastering skills, and using this kind of software at home can reinforce learning that takes place at school.

Tutorials. These programs introduce new skills or concepts. It is assumed that the learner has not been introduced to the material presented in the software. The child may have learned related skills, but the content of the software is essentially new. Because the content is new, the learner will need guidance and supervision which aids understanding and teaches correct use from the beginning.

Simulations. Simulations are a type of problem-solving software. The learner applies skills and information that they have mastered. Simulations place learners in real life situations. The learner applies rules, uses facts, and draws conclusions to solve a problem. In addition to academic skills, simulations require good coordination and keyboarding ability. The necessary academic and physical skills should be assessed when considering this type of program for a child with a disability.

Games. Computer-based games can be either drill and practice or problem-solving activities. Arcade-style games are usually drill and practice programs. The learner practices skills by competing with the program in which facts or problems are presented. The learner is timed and gets points for giving the correct answer within the time limit.

Tool Software. This software helps the user find, organize, and reorganize information. Word processing programs, database management systems, and music or graphics editors are all examples of tool software. No content is specified with tool software. Instead, the program provides a framework for writing, creating files, or drawing. To use a word processing program or a spreadsheet, the learner must become familiar with its features. Tool programs are more versatile for home use than drill and practice or tutorial programs and family members can use them for different purposes.

Many possibilities exist for computer learning at home. Yet, because of differences in age, skills, and interests, few products will appeal to all members of the family. Knowing how your child learns and thinks about his or her strengths or weaknesses is important for it can affect learning.

Selecting Assistive Technology Equipment: Becoming Informed

Technology is an investment. Therefore, consumers should become more informed and critical of the limitations of technology. Consumers should also be aware of alternate possibilities for achieving a specific goal.

In addition to standard considerations such as cost, available software, expandability, ease of use, and available peripherals, it is also important to consider how adaptable the hardware is. For students with special needs, adaptability in most types of materials is necessary. For example, students with physical disabilities might need to use switches which are operated by a head movement, a head wand, a foot switch, an eye blink, or a sip and puff method. Students with a visual impairment may need a speech synthesizer. For students with a moderate disability, a combination of speech synthesis and alternative inputs may be necessary. For students with behavioral or attention disabilities, timing is important. In addition, a special feature that is essential to these students is just how fast the computer can load programs from the disk.

Fortunately, there is a wealth of information that parents and professionals can access, thus allowing them to make informed choices about the products they purchase and the services they select.

1. Where to Begin. If you are interested in using computers or assistive technology with your child but do not know where to begin, start by reading general information on the subject. There are books available as well as publications, some of which are specific to special needs.
2. School and Community Services. Print information alone may not be enough to help you with your technology decisions. You may need to contact agencies and organizations that provide special services. To do this, first become aware of resources that exist in your community. Local resources can supply personalized assistance to fit technology to your child.

Perhaps the most important community resource is the school. Your child's teacher can often help you assess the potential of using technology at home given your child's needs. The teacher may also be able to guide you in selecting appropriate software for your child. Some districts allow parents to borrow computer equipment for home use.

Another local resource is a computer users' group. User groups can provide valuable information about the use of software and hardware. Technical questions can be answered by members who are experienced with both. Check with your local computer dealer or telephone directory to find a user group in your area. Computer manufacturers may also know of a local user group.

3. Specific Information. If you are looking for information about using technology with a child with a specific disability, try contacting the local chapter of the disability organization serving that population. For example, if your child has a learning disability, contact the local Learning Disabilities Association of America (LDAA).

Other organizations like the Easter Seal Society and the United Cerebral Palsy Association often provide direct services to families and to local schools in the use of technology.

Given the number and different types of computers that are available today, it is almost impossible to do a comparison. Generally, though, one or two factors tend to influence your decision to purchase particular equipment. These factors might include specific software compatibility, cost, or compatibility with other computers in the school.

Some questions to ask when considering a computer system are:

- Do the software programs you plan to use run on this computer?
- Is the amount of memory of the computer sufficient to operate the software you plan to use?
- Can the memory be expanded?
- Is a color monitor necessary?
- Does the software you plan to use work with the printer?
- Can the printer print graphics?
- How much will the total computer system cost (including monitor, printer, disk drives)?

While you may not be able to afford all the options you want initially, think of the future. You will want a computer that can be useful in a number of situations and can be adapted to suit different needs.

4. Hardware. Hardware information may be harder to find locally. Computer dealers that sell computer systems can usually be found in most cities. Companies that sell assistive or adaptive equipment may need to be contacted directly.

5. Software. Your local public library can be a gold mine for information on computer software. Some libraries set up mini computer labs for the public use.

Another source for software information is your local computer store. National chains such as B. Dalton and Egghead carry a good selection of instructional software for all ages. Some software companies cater to the home market. Scholastic and Broderbund issue home market catalogs so you can shop by mail.

Some parents may be able to contact special software preview centers, operated by school districts or universities. Since most of these preview centers cater to teachers, call first to make sure parents are welcome.

6. Assistive Technology. If you don't know what assistive equipment is needed, local hospitals and community rehabilitation or vocational centers may be active in designing and fitting assistive devices to complement your child's capabilities. Some states have established centers to provide information about particular devices.

7. Funding. Finding funding for technology devices requires an individualized approach. To begin your search, check out resources that are available to you locally, such as the Lions or Kiwanis Clubs, and religious organizations.

Nationally, the Easter Seal Society in connection with IBM has an assistance project that allows eligible persons with disabilities to purchase discounted computer systems. Additional funding sources may soon emerge with new federal legislation and more national interest in technology by insurance companies.

To really make technology work for you and your child, it is important to become an informed consumer. Use the abundant resources available; read about technology, talk to others who use it, and try out various technology options before you buy.

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ASSISTIVE TECHNOLOGY: A PARENT'S PERSPECTIVE

by Julie Fleisch, Seattle, Washington

Last year my son, Colin, lost a tooth at school as the speech therapist was feeding him his lunch. She told him he should take it home and put it under his pillow for the tooth fairy. The conversation continued with the therapist asking Colin about the tooth fairy. "Does the tooth fairy come to your house?" Colin pointed to YES on his wheelchair tray. "Does the tooth fairy come to visit your sister?" YES. "Has the tooth fairy ever come to see you?" NO. When the speech therapist related this conversation to me, I felt so neglectful. I know my son so well yet I had assumed he didn't understand the whole tooth fairy concept. Colin has surprised me many times with his understanding and observations of his world; a world he has trouble interacting with. His world is a little different than the one most children live in. Colin has cerebral palsy. He is unable to walk yet gets around on his knees, in his wheelchair, and on an adapted tricycle. He is also non-verbal and relies on an alphabet board -- both manual and programmed varieties -- to spell out messages. Through his spelling boards we are slowly unlocking some doors for him. He has so many limitations yet so many abilities, the conflict between the two being the biggest challenge for those who work with him. How do we deal with the limitations so that the abilities can be used? When Colin was born nine years ago, my husband and I had no idea how complicated our life was to become. Our resources have been stretched and our plans altered drastically. We started adapting things and purchasing special equipment for him when he was very young. Because we fall in an economic bracket that does not allow us financial assistance for Colin, we have learned to be very creative. I carry an Allen wrench in my purse and can do almost anything with velcro. There have been a long list of needs and a variety of ways we have tried to meet those needs. Our experiences have brought forth, for me, some major areas of concern for families who have children, like Colin, with high needs for assistive devices and technology. Where do families find the financial resources to meet their child's needs? Who do parents go to for help? And how do parents keep up with the ever-evolving technical knowledge so that they can make wise and appropriate decisions? The funding issues are very challenging for schools and programs that work with special kids. They are even more difficult for families. This is one of the stresses that affects families that already have enough stress to deal with. The paperwork that accompanies insurance claims and the type of coverage most families can afford is part of the problem. The other part is finding the funding

when insurance doesn't provide coverage. We have purchased many things for Colin and have constructed many more ourselves because we couldn't afford to purchase them.

I sometimes envy the lower income families because they actually have better funding with the state and federal assistance than families who don't qualify financially. We built Colin his early chairs and standers and did a lot with loaned equipment from other facilities and families. When we wanted to buy him a computer and the adaptations to run it, we chose to get community assistance. A letter was written and mailed out to local organizations. We received the funding and made some nice connections in the community. We did, however, have to put Colin on display at fund raisers, a concept that I didn't care for. When we ordered Colin's big mobility system and communication device four years ago, our choice was made with funding being an important factor. Our insurance would cover the power chair but not the communication system. So we put them together for ordering purposes and used the communication system to drive the chair. We ended up not getting the mobility system Colin could operate easily by doing this but how else could we fund a very expensive communication system, and who covers the cost of the ramp needed to get the chair into our home or the van and lift to transport him? Families need someone to go to for help in managing their funding concerns. A lot of time and energy is used up and compromises are sometimes made that are not in the best interest of the children. In their effort to find the right equipment, parents are often placed in a position of making decisions without knowing all the options. Relying on the equipment companies to provide information or using the expertise of a salesman only adds to their dilemma and confusion as they are obviously biased. Maintenance and repair of the equipment becomes a problem if a product is chosen that is not carried by the company that services the area in which the family lives. It is important for parents to find assistance from someone who can show them a variety of systems and can listen to their needs and concerns. I think a trial period on the equipment is a good idea. Some vendors will allow the family to try the equipment for a week or a month. This gives the families a chance to become familiar with the device and actually see if the child can learn to use it. Otherwise parents may spend thousands of dollars on equipment their child will never use.

The other issue is "how do we keep up?" Technology is moving ahead at such a rapid rate that it is overwhelming for non-professionals. Classes in computer technology that I took five years ago, are not valid anymore as the devices I learned about are almost obsolete. For teachers and therapists without access to major hospitals or treatment centers specializing in children with disabilities, it is very hard to be knowledgeable about current technology. Families may find it very difficult to keep up without major expenditures of time, energy and money. In a time when there is a lot of talk about case managers and family empowerment, these questions are important to ask. Is the concept of a technology advocate being addressed? This could be a person who has current knowledge of assistive technology and can help families to select systems by explaining all the options available. The advocate could also assist families in learning how to use the equipment and handle maintenance issues and routines for usage. Funding strategies could be explored by someone besides the parents thus decreasing stress and protecting the family's privacy and self-esteem. Maybe families could avoid some of the pitfalls that come with high-tech answers to very emotion-filled problems.

The whole idea of technology for kids, little kids, is an exciting yet emotional subject. So many things can be accomplished with computers. This can give children the power of speech, the ability to produce written materials, to manipulate pages, to control their environment in many different ways and to compete with their peers. How exciting this is for the parents of children with otherwise little ability to be involved. I remember how exciting this whole area was for me four years ago, as we prepared for and finally ordered the "big system" for Colin. I thought this would be the answer to all of our frustrations and limitations. Finally, Colin could feel some independence and things could be more normal. But technology is not the sole answer. Without it, Colin has little chance but with it the chance is only slightly better. The bottom line is that it takes a lot of commitment and follow-through on the part of parents, teachers, and everyone who works with a child. These assistive devices are only the beginning of a long road to independence, not the end. It takes a tremendous amount of work and coordinated effort to make it usable. Indeed, sometimes it seems like more work and hassle to use the technology than to use the more convenient manual boards and eye pointing strategies we were used to. These strategies are always available, do not need to be programmed, turned on, or have their batteries charged. It reminds me of an afternoon, recently, that we spent at a children's center nearby doing trials and assessment on communication systems with Colin. The therapists there had set out and programmed three different devices for us to try. They put them in front of Colin who was excited with all three and they worked and played for several hours. When, at last, they were finished and had removed the array of keyboards and monitors, exposing Colin's own manual alphabet on the wheelchair tray, Colin began to spell in earnest. The experts sat and watched intently as he very clearly and urgently spelled out P-O-T-T-Y. The message had not been programmed into any of the fancy systems that had been covering his tray. We need to work on both manual systems that offer convenience and tech systems that offer advancement and independence. Technology can't do the job alone. I have, thus, learned not to put all my eggs in one basket, so to speak. We need to work on many fronts if we are to get the success we want for our children. Technology is just one of those fronts. We need to spend as much time teaching our children to have self-esteem, to have appropriate social skills, to be survivors, to care about others, to be able to communicate basic wants on their own in case the system breaks down, to be able to protect themselves and to be happy with their lives. We also need to teach the rest of the world to be accepting and tolerant. We need to prepare a place for our children to live as adults. We taught Colin to make choices and the choice he made four years ago was not to use the "big system" we had chosen for him. In all our excitement to purchase the technology for him we had forgotten to look at how he wanted to operate such a system. We purchased him a head pointing system and he wanted to touch with his hands. He would just put his head down and tune us out. I still believe this was a good device for Colin's body. He had less tone in his whole body, less drooling, and the capacity for more speed in his responses. There must have been something about it that he couldn't deal with. All the assessments, videotapings, and discussions had dealt with the right components but not with the whole child. What about his need to directly visualize choicemaking and his growing need to manipulate things with his hands? I have learned that we need to look at factors other than the obvious, testable, measurable ones.

Maybe we need to include our children, even the children who do not seem to have the ability to understand the process, in our decision making and to respect whatever input they can give us. Another factor that makes technology especially difficult for young children is our inability to predict the future. I look at my son's growth and maturation as

being more of an evolution. His disabilities mask so much. As we slowly work our way through the things that limit what he can do, we discover more and more about what he is able to do. I am amazed, as well, at how many unpredictable factors are in his life. Just changing his medications or even the dosages, alters not only his body but, more subtly, his personality and his cognitive performance. How can we choose a very expensive piece of sophisticated equipment with the hope that it will last him ten years? I have no idea what Colin will be like in ten years or even next year. We can't wait to offer him the advantages of technology though. We have to deal with now and sort of bank on the the future. But I have confidence that he'll do everything we expect him to do and probably more. Every chance Colin has to do things on his own he takes. He taught himself to read and to tell time. Last week, he indicated on his alphabet board that he wanted to watch SCOOBY DOO on TV. We should know better than to question his memory but we looked in the TV directory to see if it was on. Sure enough, it was just starting. So, to let him know he was right, we showed him the directory. Now he wants to look at the directory every day to see what s on. We have done all we can think of to give him a sense of control in his life. Giving him the power to communicate his wants has been wonderful, but communicating at a higher level has been even better. The day he said SORRY after he had screamed uncontrollably about something, or the first MOMMY and I LOVE YOU are treasures for us. What a wonderful thing; to be able to express thoughts and feelings. He even tells jokes and laughs. Thank goodness we could unlock some of those doors for him. Last night, after several helpings of dinner, Colin looked up and grinned. M-M-M-DELICIOUS MR PIG ALL DONE. I'm afraid not, Mr. Colin you're not all done by a long way!

The legislation discussed below outlines the federal government's recognition "...that for all individuals, technology can provide important tools for making the performance of tasks quicker and easier, but for some individuals with disabilities, assistive technology is a necessity that enables them to engage in or perform many tasks." (OSERS NEWS In Print, 2(1), 1989). For more information about any of these laws, contact your State Education Agency, State Developmental Disability Council, State Protection and Advocacy Agency, parent or disability group, or write to NICHCY. In addition, single copies of these laws may be obtained, usually for about \$1, by writing to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Information may also be available by contacting your Congressional Representative.

I. 1986 Amendments to the Rehabilitation Act (P.L. 99-506)

Title I of the Rehabilitation Act authorizes over one billion dollars to the states to provide rehabilitation services including evaluation, counseling, training, placement and rehabilitative technology services to individuals who qualify for vocational rehabilitation services.

The 1986 Amendments require that states receiving funds available under this Act must "describe how rehabilitation engineering services will be provided to assist an increasing

number of individuals with handicaps." The Amendments also include a definition of rehabilitation technology services as "the systematic application of technology, engineering methodologies, or scientific principles to meet needs of individuals with handicaps in areas which include education, rehabilitation, employment, transportation, independent living, and recreation." The law requires that in assessing an individual's potential for rehabilitation services, rehabilitation engineering services should be explored. In addition, part of the Individual Written Rehabilitation Plan (IWRP) should include, where appropriate, a statement on the benefits of rehabilitation technology services for the individual's rehabilitation goals.

II. Developmental Disabilities Assistance and Bill of Rights Act Amendments of 1987 (P.L. 100-146)

The Developmental Disabilities Assistance and Bill of Rights Act requires that all funded services be aimed at providing opportunities and assistance for persons with developmental disabilities to allow them to "achieve their maximum potential through increased independence, productivity and integration into the community."

The 1987 Amendments require that each state submit an annual report including descriptions of the currently unavailable assistive technology services which could be of benefit to persons with developmental disabilities.

Funds authorized under this Act may be used for planning, advocacy, systems change, and direct services. These direct services may include assistive technology services.

III. Education of the Handicapped Act (P.L. 94-142) and the 1986 Amendments to the Act (P.L. 99-457)

The Education of the Handicapped Act (EHA) requires that states provide a free, appropriate, public education, including related services, for all children with disabilities from ages 5 to 21. The 1986 Amendments to the Act require that states provide special education and related services to children from 3 to 5 years of age no later than the 1991 school year, and establishes a new, voluntary state grant program for providing early intervention services for infants and toddlers with disabilities (ages birth to 2 years). The law requires that each child receiving special education and related services must have an Individualized Education Program (IEP) or an Individualized Family Services Plan (IFSP, for children birth to ages two), designed to meet their unique needs.

The IEP or IFSP should reflect the assistive technology needs of the child. Part G of the Act authorizes the Secretary of Education to make grants or enter into agreements with appropriate institutions to advance the use of new technologies, media and materials used in educating students with disabilities.

States differ on the issue of providing assistive technology under the Act. Some states do provide technology-related assistance as part of related services, while other states have made no such provisions.

IV. Elementary and Secondary School Improvement Act of 1987 (P.L. 100-297)

This Act is a consolidation of legislation on programs for elementary and secondary education. A number of the amendments are designed to conform the Act more closely with the Education of the Handicapped Act. This includes the P.L. 99-457 requirement for early intervention services to children between birth and age 2. The Act allows states to use authorized funds for programs which may include the acquisition of equipment and instructional materials. Funds may additionally be used for training in the use of assistive devices and other specialized equipment.

V. Social Security Act, Budget Reconciliation Act of 1986 (P.L. 99-509)

A. Medicaid. Medicaid funds provide medical services to qualifying individuals. States are required to provide certain basic medical services but can elect to cover other services as well. Assistive technology devices are covered only if they fit into the Medicaid definition of a prosthetic device. Prosthetic devices are defined as replacement, corrective, or supportive devices prescribed by a physician or other licensed practitioner. Additional covered services include "other diagnostic, screening, preventive and rehabilitative services." This language might be seen as including assistive technology devices and services. States differ greatly in what they will cover in this area. Some states allow Medicaid funds to be used for augmentative communication devices. Other states will not allow funds to be used for equipment they do not consider to be a prosthetic device. Individuals in active treatment in an Intermediate Care Facility for the Mentally Retarded and other related conditions may be eligible for assistive technology services under Medicaid regulations. Active treatment could include mechanical supports to achieve proper positioning, toilet and bathing facilities, communication aids, and other devices.

B. Maternal and Child Health Services Block Grant (Title V). Maternal and Child Health Services funds may be used by each state for its own priorities. Many services may be funded including: early identification and intervention services, diagnostic and evaluation services, family support services and "medical, surgical, and corrective services." Some states are currently using Maternal and Child Health Services funds for adaptive equipment and assistive devices including wheelchairs for children with disabilities.

VI. Technology-Related Assistance for Individuals with Disabilities Act of 1988 (P.L. 100-407)

Citing the inadequacies of available access, trained personnel, and financing in the area of assistive technology, Congress enacted P.L. 100-407 with the purpose of extending the availability of assistive technology to individuals with disabilities and their families.

"Assistive technology device" is defined by the bill as "any item, piece of equipment, or product system whether acquired off the shelf, modified or customized that is used to increase, maintain, or improve functional capabilities of individuals with disabilities."

The broad definition of devices and individuals included under this law gives states great flexibility in the programs to be developed.

Title I provides states with funds to develop a consumer responsive state system of assistive technology services. States receiving funds may develop or carry out any of the following: 1) model delivery systems; 2) state-wide needs assessment; 3) support groups; 4) public awareness programs; 5) training and technical assistance; 6) access to related information; 7) interagency agreements; and 8) other activities necessary for developing, implementing, or evaluating a state-wide service delivery system. Nine states have

successfully competed for funds. Twenty additional states could be added in 1990 with the remainder to be added in 1991.

Title II of P.L. 100-407 authorizes the federal government to perform various activities to assist the states in the development of their service delivery systems. These activities include: a study to be undertaken by the National Council on Disability to identify practices which facilitate or impede financing of assistive technology devices and services; and, a study of the need for a National Information and Programs Referral Network to assist states to respond to technology-related information needs. In the Fall of 1989, nine states were awarded funding to plan and establish statewide programs of technology-related assistance. These states included: Arkansas, Colorado, Illinois, Kentucky, Maine, Maryland, Minnesota, Nebraska, and Utah. For contact information about these programs in your state, contact the Center for Special Education Technology, or the Association for the Advancement of Rehabilitation Technology (RESNA).

In addition to the state awards, the National Institute on Disability and Rehabilitation Research (NIDRR) awarded a contract to RESNA, an interdisciplinary association for the advancement of rehabilitation and assistive technology, to provide technical assistance and information to States on the development and implementation of a consumer-responsive statewide program of technology-related assistance under this law. For more information, contact RESNA (703) 524-6686.

Understanding and becoming aware of the laws relating to assistive technology can make a significant difference in how, where, and when you gain access to these services. For a listing of any of the groups mentioned in your area, contact NICHCY and ask for a State Resource Sheet.

Computer technology for young children has only recently been recommended for use in the home and applied on a large-scale in early childhood special education programs. Available technology and information about its use with young children has lagged behind that available to other groups for a variety of reasons, such as: the high cost of hardware, a limited amount of developmentally appropriate software, limited funds to investigate the potential of computers as a teaching tool, lack of skill on the part of professionals in creating a range of response modes, lack of training and skill in computer use by early childhood special educators and parents, and the fear that technology would overshadow the human aspects of early intervention (Berhmann, 1988; Hutinger, 1986).

In the past several years, however, changes have occurred which have made computer technology more accessible to early childhood educators, therapists, parents, and children. Equipment is now more affordable, a wide range of developmentally appropriate software is available, and a variety of response modes have been developed which allow almost any child to access a computer (Burkhart, 1980; Charlebois-Marois, 1985; Goossens & Crain, 1987). Publications and training have made early childhood educators, therapists, and parents more aware of the potential impact computers can have on infants and young children. The appropriate application of technology can assist families and professionals in learning about a child's capabilities. As more educators and

therapists have successfully incorporated computer use in their early intervention and preschool programs and as parents begin using computers in their homes, there has been a growing acceptance of the belief that technology can serve to enhance, not supplant, one-to-one interaction with infants and toddlers (Lazzari & Wilds, 1989).

Skills for Interactive Use of Computers

Special educators and therapists using computers in their programs have learned that when some beginning skills are introduced, computers become less complex devices for preschoolers (Rettig, 1987). Introducing these skills can reduce the natural tendency for a young child positioned in front of the computer to bang on the keyboard and possibly become frustrated and lose interest in approaching the computer again or learning that the computer is a toy to react too, not interact with. With this awareness, parents and educators begin to think of the computer as more than a pacifier to keep children quiet. The primary aim should be to allow young children with disabilities access to the assistive technology which will be most appropriate to their needs and to provide for the maximum participation of the young child in social and educational environments. To reach this goal, many skills may be necessary for using this technology effectively. For families and programs with limited funds, these skills can be developed without access to expensive computers or technology devices. The following is a list of some of the beginning skills that should be considered. This list is intended to assist parents, educators, and therapists in adapting the computer's use to the child's current level of skills. Keep in mind that not all children will need total mastery of all of these skills. With some children, these skills can be developed simultaneously with the computer and adult intervention. Each child should be individually assessed to determine the potential benefits of technology.

Motor Skills

- range of motion
- press and release
- reliable and consistent motor movement

Visual/Perceptual Skills

- visual tracking and scanning
- figure ground
- form discrimination

Cognitive/Language skills

- cause and effect
- attention span (sustained or selective)
- object permanence
- means/end causality
- imitation
- one-to-one correspondence
- intentional behavior (desire to communicate)
- symbolic representation (recognize pictures)
- reliable yes/no response
- receptive understanding of commands
- making choices

Social/Emotional Skills

- initiating and terminating interactions
- turn taking and waiting for turn
- attending to an object or person
- following one-step directions

This list of skills may initially seem overwhelming, unrelated, or overly simple; yet these skills are included in most preschool checklists and taught using other materials. In addition, these skills can be introduced and taught by using simple and inexpensive toys and switches. Toys and switches are concrete objects that are naturally motivating to young children. Many battery operated toys can be used to teach a young child many of these skills, and any toy operated by batteries can be adapted for switch activation. By adapting toys for use to introduce and teach these beginning skills, teachers, therapists, and parents can help a young child prepare to use computers and other assistive technology. Once children have some experiences with toys and switches, they are better prepared to have successful interactions with the computer.

How to Select Battery Operated Toys and Switches

The importance of play for very young children cannot be overemphasized. For children who have a physical disability or who are generally uninterested in manipulative toys, battery operated toys that are adapted to work with single switches can be used. Battery operated toys and switches can be the tools for developing play skills with objects and with peers. They also provide children with physical disabilities increased control over the classroom and home environment (Musselwhite, 1986).

Selecting toys and switches for young preschool-aged children requires that parents, teachers, and therapists consider several important factors. The most important factor is to become an expert. Make a list of your young child's strengths and needs and choose toys which meet your child's requirements. Collect information from parent support groups, toy lending libraries, information centers, manufacturers, and through exchanges with other parents, teachers, therapists, and others. (Additional resources are listed at the end of this NEWS DIGEST.) When purchasing battery operated toys, it is important to remember that there are different kinds of toys. It is important to consider a variety of battery operated toys that reflect a range of sensory inputs. For example, toys with flashing and multicolored lights provide visual input; tape recorders, musical, and other noisy toys (e.g., animal sounds, sirens) stimulate a young child's auditory senses. Blowing fans and vibrating toys provide tactile and vibro-tactile input. Toys should also provide for a variety of movement patterns: stationary, horizontal, vertical, and circular movement. Examples include a drumming bear, a walking robot, a fireman going up and down a ladder, and small train or car track sets. Toys should be chosen that can be easily incorporated into play routines (Musselwhite, 1986), as well as for their motivation and age appropriateness to the individual child (Greszko, 1988).

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