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AUTHOR Williams, John M.
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ABSTRACT

This guide provides a brief introduction to several types of technological devices useful to individuals with disabilities and illustrates how some individuals are applying technology in the workplace and at home. Devices described include communication aids, low-vision products, voice-activated systems, environmental controls, and aids for recreation and travel. Potential sources of funding for technology aids are noted. The guide concludes with lists of organizational and printed resources, communication aids, low-vision products, and voice-activated systems. (JDD)

Center for Special Education Technology

Tech Use Guide

Using Computer Technology

Technology for Work, Home, and Leisure

Computers and other technologies are revolutionizing the workplace, home, and even the leisure activities of people with disabilities. Computer users with disabilities are often more competitive in the job market and are finding new opportunities for home-based employment and continuing education than those who lack computer skills. Computers and other technologies offer new options for people who are undereducated and underemployed.

Advances in technology are enabling people with disabilities to pursue careers as writers, librarians, scientists, engineers, teachers, researchers, computer programmers, system engineers, and lawyers. Other professions such as acting, managing, nursing, bookkeeping, and accounting may become more accessible. Still other individuals are performing jobs such as cooking, clerical tasks, bus and truck driving, and gardening. The varied possibilities for increased independence and productivity are encouraging.

There are many kinds of products revolutionizing the job and education market for people with disabilities. These include augmentative communication aids, low-vision devices, voice-activated and talking computers, and environmental control units. Beside using technology for employment and independent living, people with disabilities are exploring new recreational and travel adventures. This guide provides a brief introduction to several types of devices and illustrates how some individuals with disabilities are applying technology in the workplace and at home.

Communication Aids

There are several million people in the United States with nonvocal or nonverbal communication difficulties, including stuttering. Nonvocal speech is defined as the inability to make speech functional by pronouncing the word or words needed to communicate with another person. Nonverbal is defined as the inability to put one or two words together in an intelligible form when communicating to another person. Communication aids were developed to assist nonverbal or nonvocal people, and also those who stutter.

Often people with more than one disability are benefiting from two or more types of aids. For example, there is a senior engineer working for an aerospace company in the South. He stutters severely and is legally blind. He supervises five other engineers and several programmers. While working, he uses a host of communication aids and some low-vision products. When he is called on the telephone, his tape-recorded voice says, "Hello, this is . . . I am on the line and will speak to you using a communication aid. Please be patient because I am not a speed typist." He proceeds to talk to the caller through a speaker attached to his telephone and augmentative communication aid. He estimates he receives about 20 calls a day.

A visitor to his office sees the following products: a talking computer, several laptop augmentative communication aids that can be connected to a computer or taken to meetings, a talking calculator, tape recorders, and speakers connected to each of his talking aids, especially the telephone. These devices are in use most of the day.

Additionally, he has a variety of handheld and larger low-vision products. He uses the handheld devices for reading reports, letters, and memoranda. The larger device is used for bulk reading, writing, drafting, and designing, and, because it is mounted on a table with wheels, he takes it with him to staff meetings. His company purchased the large vision device, the augmentative communication aid, and the talking computer. He has purchased his other office products, as well as the products he uses when working at home. Because he frequently takes work home with him, he has many of the same products there.

A simple off-the-shelf device that he uses constantly is a memory telephone. He estimates he spends two-to-three hours a day on the telephone. Because he is legally blind, it is difficult for him to dial. His office and home telephones have 80 numbers stored in them. With the memory phone, he simply pushes a button and the number is automatically dialed. Memory telephones are being used by people with vision, memory,and hand-eye coordination disabilities.

This ardent technology-user learned about capabilities of speech technology and communication aids from his speech therapist. He sought out information on vision products from national organizations like the American Council for the Blind. There are many resources available to assist individuals with disabilities learn more about

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technology and how to use it effectively in the workplace or the home. Exploring these resources is often a first step in becoming an informed technology user.

Pursuing public and private resources paid off for an insurance claims adjuster in the Midwest who has been nonvocal for more than 20 years. In 1986, her company and the state vocational rehabilitation agency purchased an augmentative communication aid and some environmental controls for her. The company and the state each paid 50% of the cost of the products.

Every day she spends at least four hours on the telephone researching insurance claims. Her portable aid is connected to a speaker on her telephone. When she first began to use her aid, she had trouble adjusting to the voice as did her friends and clients. But after two months, she was using the device all the time. When she calls new people, she tells them she is using an aid. She says she has never been rudely treated by anyone over the telephone while using it.

Now she takes her device with her wherever she goes and reports that it has greatly improved her life. She knows of two other people whose use of portable communication aids has led to new employment opportunities.

Low-vision Products

Low-vision products provide millions of people with visual impairments, including legally blind individuals, with the opportunity to read and write. As vision declines, people often become frustrated and angry. With the assistance of low-vision devices, this frustration and the loss of independence can be reduced or even eliminated.

In general, low-vision products can magnify the size of print or writing from 1 to 60 times. There are many examples of employees using them on the job. A self-employed man in Alabama uses one when he sharpens industrial tools. A boy in Texas uses a handheld product to read to senior citizens six hours a week. A woman at a major university has a low-vision device connected to her desktop computer. A federal employee manages more than 100 projects with the aid of a magnifying device. A free-lance writer uses such a device for typing and writing and a cancer researcher uses a special low-vision device when working with a microscope.

Voice-activated Systems

Voice-activated systems are alternative computer input devices designed to respond to a person's voice instead of the conventional input from the computer keyboard. Disabled as well as nondisabled people use them. For the nation's estimated 250,000 quadriplegics and for people with arthritis in their hands, voice-activated systems are being used in business, government, and education by writers, programmers, accountants, teachers, and other professionals.

These systems are often expensive and require individual training ranging several hours to several days. Their recognition accuracy rate is usually in the 90th percentile. Voice-activated systems can be programmed to write, layout publications, check spelling, do spreadsheets, research documents, develop computer programs, and do other work-related tasks in a variety of areas. They can control a person with disabilities' environment by making telephone calls, turning appliances on and off, or opening and closing doors. Some of the newer systems have speech output capabilities, thus allowing the computer to talk back to the user. There are voice-activated systems available for most brands of computers.

Many large companies and government agencies recognize the importance of technological aids for their employees who are both disabled and nondisabled . For example, IBM and the National Institutes of Health both employ quadriplegic programmers who use voice-activated computer systems. When using the computers, these people speak one-or-two-word commands slowly and distinctly into a microphone. Upon hearing the voice commands, the computer system begins performing a series of actions, such as turning itself on, calling up a particular program, storing a file, or communicating with another computer. The employees can use these systems in the workplace or, if they choose, work in the home.

Equipment used in the workplace may be purchased by the employer, as in the case of IBM, or secured with the assistance of the state vocational rehabilitation agency.

Voice-activated systems are only one alternative input device used for computer access. There are many high and low technology devices that allow computer users to modify or even bypass the standard keyboard. They range from simple switches to alternative keyboards and scanning devices. These alternatives are seen with increasing frequency in the classroom and in the workplace.

Environmental Controls

Environmental controls are used by people with physical disabilities as well as individuals who are nondisabled to control their immediate environment. Common household items such as an intercom, door-lock release, telephone, radio, computer, tape recorder, power appliance, lamp, fan, and air conditioner can be operated electronically from a remote location.

An environmental control unit (ECU) has three basic components: an ability switch, a control unit, and the item or appliance to be controlled. The choice of a system is often highly individualized. The user should consider his or her needs, the items to be controlled, and their location in the environment. When selecting a switch for example, it must suit the user's physical capabilities and preferences. The mounting hardware should provide secure and convenient switch positioning. The controller itself should be capable of controlling all the functions the

user specifies. Other capabilities such as a battery back-up, remote control, or audio coordination may be considered when selecting a system.

An ability switch is a simple switch capable of establishing two different electrical states, on and off. Environmental control units can include ability switches, unicontrols, encoscans, kincontrols, and special purpose devices. Unicontrols perform a single function. Encoscans can be used to scan and control five functions or control additional functions by connecting unicontrols to it. Kincontrols allow control of up to ten functions.

Special purpose devices such as **Stove-Minder**, used with an electric range, has an interval timer and automatic shut-off control. The **Power Minder** is a 110 VAC power cord with a built-in timer and automatic power interrupt switch for small appliances, such as electric kettles, fry pans, or steam irons. **The Ultra-4 Remote System** allows the user to remotely control appliances in the immediate environment using an ultrasound transmitter.

Recreation & Travel

Recreation is becoming increasingly important to people with disabilities. Among the many sports people with disabilities are participating in are bowling, golfing, skiing, scuba diving, softball and basketball, bicycling, running, swimming, and shooting.

People with disabilities are also traveling more. Hotels are becoming accessible. Visitors will find that hotel bedroom and bathroom doors have been widened. Elevators floor numbers are brailled. Menus are being printed in large type and some are even brailled. Telephones have speakers attached to them for people with hearing impairments. Sign-language interpreters are being provided. Some tour buses are equipped with lifts. And travel agents are providing American, Canadian, and European tours for people with disabilities. In large part, increasing access to recreation and travel is a result of changing attitudes in the community and a growing awareness of how technology can make life easier for all people.

Funding For Technology Aids

Funding for technology can be obtained through a variety of sources. They include rehabilitation agencies, private companies, grants from foundations, and private insurance companies. Religious organizations, the Lions Club, Optimist Clubs, National Federation for the Blind, and other local organizations have histories of raising funds to buy computers and related technologies for people with disabilities.

Nationally, the Easter Seal Society and United Cerebral Palsy Associations in connection with IBM have an assistance project that allows eligible persons with disabilities to purchase discounted computer systems. There are some programs set up in some states and communities which loan equipment to disabled individuals. These possibilities should be explored when considering the purchase of computers and/or assistive devices.

Resources: Recreation

American Athletic Association of the Deaf (AAAD), 3916 Lantern Drive, Silver Spring, MD 20902.

American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD), 1900 Association Drive, Reston, VA 22091.

American Blind Bowling Association, Inc., 150 N. Bellaire Ave., Louisville, KY 40206.

American Wheelchair Bowling Association, N54 W. 15858 Larkspur Lane, Menomonee Falls, WI 53051.

Archery Sports Section, Sister Kenny Institute, 800 East 28th at Chicago Ave., Minneapolis, MN 55407.

Handicapped Scuba Association, 1104 El Prado, San Clemente, CA 92672.

National Handicapped Sports and Recreation Association (NHSRA), Farragut Station, P.O. Box 33141, Washington, DC 20033.

The Itinerary, P.O. Box 1084, Bayonne, NY 07002-1084.

Resources: Publications

Elizabeth Defay and Jerry D. Kelley, *GO FOR IT*. (A Book on Sport and Recreation for Persons with Disabilities) 1989, Harcourt Brance Jovanovich, Inc.

Worklife, a quarterly publication published by President's Committee on Employment of People with Disabilities, 1120 20th St., NW, Washington, DC 20036; 202-653-5051.

Special and Individual Needs Technology, a monthly newsletter informing people with disabilities of the benefits of technology. Published by SAINT, Inc., 21515 Ridgetop Circle, Suite 200, Sterling, VA 22170; 703-430-3819.

Maxiaids, 1989 Edition, Aids and Appliances for the Blind, Visually-Impaired, Physically Disabled and Senior Citizens with Special Needs; 800-522-6294.

Resources

Job Accommodations Network (JAN), Box 468, Morgantown, WV 26505; 1-800-526-7234.

National Clearinghouse on Technology and Aging, University Center on Aging, University of Massachusetts Medical Center, 55 Lake Avenue North, Worcester, MA 01655; 1-617-856-3662.

Center for Computer Assistance to the Disabled (C-CAD), 617 Seventh Avenue, Fort Worth, TX 76104; 1-817-870-9086.

TASH INC., (Technical Aids and Systems for the Handicapped, Inc.), 1989, 70 Gibson Dr., Unit 12, Markham, Ontario, Canada L3R 4C2.

IBM National Support Center for Persons with Disabilities, P.O. Box 2150, Atlanta, GA 30055; 800-IBM-2133 or 404-988-2733.

Communication Aids

Adaptive Communication Systems, Inc., 354 Hookstown Road, Clinton, PA 15026; 412-264-2288.

Prentke-Romich Co., 1022 Heyl Road, Wooster, OH 44691; 216-262- 1984 or 800-642-8255.

Luminaud, Inc., 8688 Tyler Blvd., Mentor, OH 44060; 216-255-9082.

American-Speech-Language-Hearing Association, 10801 Rockville Pike, Rockville, MD 20852; 301-897-5700.

HumanWare, Inc., 6140 Horseshoe Bar Road, Suite P, Loomis, CA 95650; 916-652-7296.

Low-vision Products

American Foundation for the Blind, National Technology Center, 15 West 16th Street, New York, New York 10011; 212-620-2020. Telesensory Systems, Inc., 455 N. Bernardo Ave., Mountain View, CA 94045; 415-960-0920.

Coburn Optical Industries, 4606 South Garrett Road, Suite 200, Tulsa, OK 74146; 918-667-1815.

Optelec, 325 Ayer Rd., Harvard, MA 01451; 508-772-4816.

Voice-activated Systems

Bartlett Systems, 11820 Parklawn Drive, Rockville, MD 20851; 301-231-9300.

Cherry Electrical Products, 3600 Sunset Ave., Waukegan, IL 60087; 312-360-3500.

Dragon Systems, 90 Bridge St., Newton, MA 01258; 617-965-5200.

Hy-Tek, 1980 Rt. 30, Sugar Grove, IL 60554; 312-466-7664.

IBM, 6705 Rockledge Drive, Bethesda, MD 20817; 301-564-2631.

Kurzweil AI, 411 Waverly Oaks Rd., Waltham, MA 02154; 617-893- 5151.

MTI Inc., NE 29th Pl., Suite 245, Bellevue, WA 98007; 206-881- 1789.

Texas Instruments, 2750 Prosperity Ave., Suite 100, Fairfax, VA 20031; 703-849-1900.

This Guide was developed by John M. Williams, President and Consultant of International Centers of Technology for Disabled Persons in Sterling, Virginia. John is also the editor and publisher of *SAINT* (Special and Individual Needs Technology), a monthly consumer newsletter for disabled people.

Tech Use Guides on the following topics are available from the Center upon request:

- Guide for Teachers
- Guide for Parents
- Technology for Work, Home and Leisure
- Computer Access
- Selecting Software
- Speech Technologies
- Preschool Children
- Hearing Impairments
- Computers and Writing
- Computers and Cooperative Learning
- Visual Impairments
- Learning Disabled
- Telecommunication Networks
- Augmentative and Alternative Communication
- Mildly Handicapped

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