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Community Living Briefs

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“Community Living Briefs” is a resource for Systems Change grantees and their stakeholders, which provides practical tools and strategies to facilitate the full integration of people with disabilities into the mainstream community.

Achieving Independence and Interdependence Through Assistive Technology Applications

by Therese Willkomm, Ph.D.

Assistive technology often makes a critical difference in the lives of individuals with disabilities and chronic illnesses, yet it remains underutilized and poorly understood. This paper discusses the concept of assistive technology and offers suggestions for finding resources to assist individuals to make better use of assistive technology to achieve independence.

Introduction

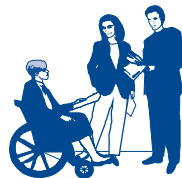
One critical element of successful community living for many individuals with disabilities and chronic illnesses is assistive technology. Yet the application of assistive technology to promote independence and interdependence continues to be largely unrealized. This paper provides a broad overview of assistive technology, describes challenging issues that require further attention and suggests resources for finding good assistive technology solutions.

The term “assistive technology device” means any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.¹ Assistive technology can be low-tech or high-tech and, in a real sense, simply means the use of any item to meet the

needs of individuals. Assistive technology is often confused with durable medical equipment. Durable medical equipment includes such items as prosthetics, orthotics, wheelchairs, communication devices and other devices that are deemed medically necessary. While assistive technology includes durable medical equipment it covers a far broader array of devices and equipment. The distinction between durable medical equipment and assistive technology devices is important because insurance carriers, including Medicare and Medicaid, typically cover only medically necessary services. The majority of assistive technology solutions needed by individuals to achieve their greatest level of independence at home, school, work, and play are not considered medically necessary. This means that alternative funding strategies often come into play. Individuals, families, communities and policy makers continue to be innovative in developing alternative funding sources for assistive technology that is not covered by health related insurances.

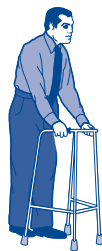
Overview of Assistive Technology Solutions Promoting Independence

Assistive technology solutions can benefit individuals with physical, sensory, or cognitive impairments. These solutions include mobility aids, grasping aids, back saving solutions, devices for blindness and low vision, assistive listening devices, electronic aids for daily living, alternative and augmentative communication devices, and memory and/or organizational aids. In addition to devices, modifications to transportation equipment, telecommunication equipment, computers and home, work, school, and community



environments also fall into the purview of assistive technology. While the majority of assistive technology solutions are commercially available, individuals with a disability frequently require custom modifications of the design and fabrication of a new solution to meet individual needs. We might design a custom wheelchair seating system to prevent a pressure ulcer or create a device to make fence repairs for someone with an arm amputation. Other examples of how assistive technology solutions can have a positive impact on everyday life include:

Wheelchair Seating and Mobility: Approximately 6.8 million individuals who live in the community in the United States use some form of a mobility aid including manual wheelchairs, power wheelchairs, power scooters, walkers or canes.² Funding for these aids typically comes from health insurance; however, President Bush recently assigned a task force to explore funding for mobility aids needed to pursue education and employment. Such aids, once in the hands of an individual, will also provide supports for other activities in the community. If a wheelchair is needed, then an assortment of other assistive technology solutions may be necessary to accommodate the full range of the needs of the wheelchair user. A proper seating system is often required to prevent a potential pressure ulcer. Transporting the wheelchair may require the use of a van with a wheelchair lift, tie-down system, and other modifications that will enable an individual to operate the van independently. If an individual is using a manual wheelchair she may need to replace her current automobile to allow for easier transport of the wheelchair.



Additional transfer aids or lifting devices such as a transfer board, a transfer bench, a shower chair, or an overhead lift will assist with transferring the wheelchair into the car, a bed, or bathtub. Home modifications, in addition to the assistive technology adaptations, are often required to accommodate a wheelchair in the home. These may include ramps, wider doors, wider turning areas, handrails, stair-lifts, porch-lifts, and roll-in showers. Funding for home modifications can include assistance through independent living centers, reverse mortgages for elderly persons, Medicaid home and community-based waivers that include funding for home modifications, some catastrophic injury insurance policies that cover home modifications, and community fund-raising events. Families can also choose to fund home modifications themselves.

Prevention or Reduction of Secondary Injuries: One important reason to employ assistive technology solutions is the prevention of injury. This is particularly true among elder

persons who are at risk of acquiring secondary injuries, illnesses and other conditions. Many of these injuries are preventable and assistive technology can play an important role in that prevention. Slips and falls are the most common events that result in these secondary injuries. In addition, slips and falls are the number one cause of emergency room visits for individuals with disabilities, mostly elder persons. The application of assistive technology in injury prevention continues to be problematic from an insurance perspective since an individual must convince an insurance company that an injury is imminent unless recommended assistive technology solutions are put into place. Insurers deny coverage on the grounds that such interventions are not medically necessary.

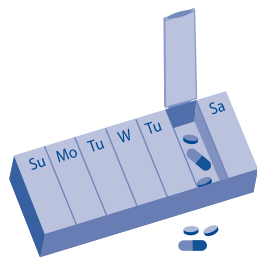
The aging process has an impact on slips and falls. While we all may slip on the ice or loose surfaces, our ability to recover from a slip diminishes as we age. As a result, falls are more likely and recovery is slower. Assistive technology solutions to reduce these types of slips include the use of traction tape on steps, ramps, and porches; ice grippers that can easily slide over one's shoes; ice gripper cane tips; broad based tips; indoor and outdoor rug-gripper tapes to prevent rugs or mats from slipping; and footwear that promotes anti-slippage. Since slips will occur, railings can be used to help prevent a fall. Walkers and broad based canes with different shaped handles can improve stability. These preventative measures are well established and provide relatively low-tech solutions to the prevention of injuries that may be debilitating to the individual and very costly to treat.

Slips and falls for users of wheelchairs often occur during transfers. To reduce transfer injuries when moving to or from a wheelchair several strategies are useful including reducing transfer distances, making level transfers, and using transfer aids. Individuals that are providing personal assistance can be at risk of back injuries when assisting during transfers. In addition to good training there are devices that can facilitate the transfer and prevent injury as well; portable transfer lifts, overhead lifts, transfer boards, and proper transfer techniques are useful in this regard.

Some non-ambulatory individuals require transfers and repositioning to prevent pressure ulcers. Pressure ulcers can be life threatening and can cost thousands of dollars to treat. These injuries can be prevented by using appropriate assistive technology solutions such as appropriate wheelchair cushions, customized wheelchair positioning solutions, specialized mattresses, and prompting devices to remind individuals and personal assistants of the need for repositioning to relieve

localized pressure. Cuts, scrapes and burns can be reduced with the use of padding, shielding, guards, warning detectors, temperature sensors and controls, and appliances with automatic shut-offs. Most of these solutions involve low-tech, low-cost interventions.

Assistive Technology and Memory: The ability to remember important events, tasks to be completed, and medications to take can be difficult for all individuals but particularly for those who have memory impairment. There are hundreds of electronic memory and prompting aids that are quite effective in compensating for memory loss. An electronic pill dispenser, voice organizer, alarm, and personal digital assistant are just a few of the devices available. The Brain Injury Association website at <http://www.biausa.org> lists assistive technologies that can benefit individuals with memory impairments. These devices are also quite useful for personal assistants and family members in prompting when to take medications and perform other tasks. The assistive technologies that the Brain Injury Association has espoused work equally well for individuals with similar functional impairments not attributable to a brain injury.



Assistive Technology and Mental Illness: Thousands of assistive technology solutions exist for individuals with physical, sensory, cognitive, or communication impairments. In many cases these solutions are useful to individuals with mental illness as well. Other approaches may also prove useful. Electronic memory/prompting aids are helpful for some individuals by improving the ability to stay on task. Changes in light, color, and sound in the individual's environment often prove helpful in furthering recovery for a person who experiences a mental illness. Other effective strategies include removing clutter, utilizing organizational aids and repositioning objects in the environment.

Electronic Aids for Daily Living: Increasing independence at home requires the ability to operate a variety of electronic appliances. These appliances include radios, television sets, thermostats, fans, washers, dryers, air conditioners, lights, security systems/door buzzers, automatic door openers, CD players, VCRs, dishwashers, garbage disposals, food processors, microwave ovens, DVD players and computers. Many of these items have remote control units that come with the appliance. In addition, several appliances have a series of buttons that need to be pushed. Existing controls can be

difficult to operate due to physical or cognitive limitations. Electronic aids for daily living can be obtained to compensate for these limitations. Personal digital assistants are now available to replace several controls. However the cognitive demands of existing personal digital assistants is a barrier to their use for some individuals.

In many respects this is not a disability issue at all but rather a fact of life for everyone in the current age of proliferating devices. The long-term goal of providing real time access to services and supports is likely to require that we train everyone in our society to be literate with digital devices and computers so each individual can access information on the interactive websites being developed in each of the states and territories.

Assistive Technology and Communication: The ability to call for help, ask for something, or tell the doctor where it hurts can be made simpler by using assistive technology interventions. Augmentative and alternative communication technologies can be used to communicate a single message or an infinite number of messages. Telecommunication is critical for individuals with disabilities. TTYs, TDDs, relay services, and emergency call systems have been in use for years. The use of video phones, and Internet computer-based systems for individuals with disabilities is less widespread because the technology is newer and still being perfected. Limited bandwidth that impacts the speed of transmission of communications is a barrier; new high speed and affordable transmission lines are eliminating this barrier to full and timely access.



Assistive Technology At Home, School, Work, and Play: Assistive technology can help individuals to perform essential tasks of daily life and all life functions. Thousands of solutions exist that are being marketed as assistive technology as well as labor saving devices. Tech Connections <http://www.techconnections.org>, Job Accommodation Network <http://janweb.icdi.wvu.edu>, and AgrAbility <http://www.agrabilityproject.org> are just a few organizations that track this equipment. Equipment can also be searched over the Internet using functional limitation keyword searches and activity searches. Databases and search engines can be used to locate commercially available products and new strategies of adaptations to the environment.

Selecting the best assistive technology solution to meet a particular need involves a decision making tree. First, can the task be performed safely and effectively without the purchase

of a commercially available device? Often individuals have resources and equipment in their homes, attics, and garages that can be used to overcome a particular challenge. Perhaps a task can be eliminated all together or maybe it's more cost effective and time-efficient to have someone else perform it.

There are a variety of consultants who are also available to help individuals and providers select the most appropriate solution when a commercial option is desired. Technology loan centers enable consumers to try out devices before they are purchased. These trial centers help to reduce technology abandonment. In approximately one-third of purchased assistive technology solutions the individual does not like the device and does not use it. Unless the individual donates this abandoned equipment so that someone else can use it, the expenditure is a total waste of dollars.



Frequently commercially available solutions need further modifications to work for an individual's specific needs. The person, family member, or professional who specializes in design and fabrication of assistive technology solutions can often make needed modifications. Individuals with disabilities frequently require one-of-a-kind solutions to perform a specific task. Since these solutions are not commercially available, a solution must be designed and fabricated from scratch. Due to the unique characteristics of a particular solution, the chance of the solution failing can be high but once a workable solution is found the reward to the individual is higher still.

Assistive Technology and Community Participation: The application of assistive technology must go beyond the need to be productive at home or in a workplace. Assistive technology should support individuals to participate fully as members of their communities. Communities, for their part, must make places and activities fully accessible. While communities support this concept, lack of economic resources is frequently cited as the primary reason why this has not yet been accomplished. In reality, the primary barriers are lack of knowledge, lack of awareness, and failure to plan. Model communities are attacking and removing these barriers with great success. They recognize that disability is a natural life experience that everyone will someday experience and they consciously strive for the inclusion of all their citizens.

Interested communities can contact Independent Living Centers and their governor's office on disabilities for

information on community accessibility; these resources frequently make accessibility audits available to communities.

Challenges to Assistive Technology Access

The examples provided give just a snapshot of how assistive technology can promote independence. The actual assistive technology product, device or modification is only one part of a good assistive technology solution. Other factors impact whether a successful outcome occurs.

Awareness and Knowledge: Our attitudes and perceptions are based upon our prior experiences and knowledge. When our knowledge and awareness are restricted, they can serve as a barrier to seeing new possibilities. We overcome these attitudinal barriers with new learning. Our awareness and knowledge about assistive technology can be broadened through training and awareness events, assistive technology expos, assistive technology exploration centers, and what we see in the media.

Fear of Complexity: To many, the word "technology" equates to the use of a computer or something that is electronic. High-tech devices may intimidate individuals who have not had experience with them. Yet most assistive technology is very low-tech and costs less than \$100. To the average person much of assistive technology would be better described as "gadgets that are useful." Choice of words when discussing assistive technology with the general public can make a large difference in understanding and acceptance. Frequently the solutions involve looking creatively at existing tools and equipment found in our everyday environment and exploring how these resources can be used for an assistive technology solution. Local hardware stores have hundreds of assistive technology solutions just waiting for creative people to identify them.

Funding Limitations: Funding mechanisms for assistive technology often pose issues for individuals. Where a payer exists for these devices and adaptations, each has its own limitations on what type of disability or functional limitation, age, type of technology and funding cap will be employed. Even when funding is available there is frequently a significant delay before the individual actually acquires the assistive device.



Timeliness of Assistive Technology Solutions: The reality is that both assistive technology solutions and durable medical

equipment can take a long time to acquire. All too often the process is one of “hurry up and wait.” While thousands of assistive technology solutions are available, there is often extensive time involved in identifying the best solution, securing funding, ordering an item, delivering the item, and correcting the fit of the selected assistive technology solution. It is not uncommon for this process to take six months to a year because of the steps needed to complete the acquisition process.

Training: Training in how to effectively use a device is critical. Thousands of dollars are spent on assistive technology that is not used due to insufficient training. We think nothing of extending a typing course over a whole semester yet we often give complex devices to individuals and expect them to master them instantly. Learning how to use assistive technology or computer software takes an investment of time in learning as well as time in teaching. Without this investment an assistive technology solution fails to achieve its potential and may actually be abandoned.



Serviceability and Equipment Maintenance: Assistive technology devices do break and it is not a question of if, but rather a question of when. Frequently assistive technology devices do not come with extended warranties or maintenance agreements. Products that do have maintenance agreements or dealerships available require the individual user to travel, often great distances, to get a product repaired.

Technology Abandonment: Many assistive technology devices end up abandoned to the clutter in the closet. Factors affecting whether or not assistive technology is abandoned include product serviceability, learnability, reparability, reliability, usability, aesthetics, and cost. Assistive technology can also be abandoned if the person’s condition improves or worsens such that the device is no longer appropriate. Changes in the overall home or work environment or changes in personal assistants will also affect technology abandonment. If assistive technology takes too much time, or is too physically or cognitively demanding, the individual may find it easier to have an assistant perform the task than to do it himself. Selecting the most appropriate assistive technology solution often involves trade-offs or sacrifices. Frequently the solution may not be all that the consumer hoped. It is worthwhile to assess the factors that impact abandonment before selecting the most appropriate solution.

This preventive approach conserves scarce resources while maximizing the likelihood that the individual gets a product that will actually serve to improve her quality of life.³

Innovative Approaches to Overcoming Challenges

Many of the challenges in the assistive technology marketplace are met successfully through innovation and the adoption of new approaches. Some of these solutions are described below.

No Cost/Low Cost Assistive Technology Solutions: When funding is tight, we must be creative in using existing resources in new ways. Our homes and communities are a gold mine for such solutions. Plastics, foams, adhesives, foils, fasteners, tapes, magnets, art supplies, and a variety of “dumpster digs” are just a few of the treasures that can be used to create solutions. Throw-away packaging such as AOL® boxes, Snapple® lids, and plastics can be used as switch effectors because of the spring load nature of these materials. A switch can be used to operate a call system, turn on a fan, call 911, or communicate a message to someone. Plastic trash bags can be used as a back saving solution when transferring someone in and out of bed. Big wheels and small wheels found at the local dump can be used for moving heavy objects. Assistive Technology Refurbishing Centers can be a great source for low cost or no cost assistive technology products such as wheelchairs, mobile carts, ramps, bathroom equipment, and grab bars. Duct tape and bailing wire are quick fasteners for almost anything that needs to be quickly attached or adapted.

Local Businesses as Suppliers of Assistive Technology Solutions: As assistive technology becomes more mainstreamed, access to such solutions that otherwise would take months to obtain, can be purchased immediately at local businesses. Wal-Mart, K-Mart, Target, Home Depot, Ace Hardware, True Value Hardware, and Lowe’s Home Improvement are just a few of the many retail businesses that are now carrying an assortment of assistive technology products for their customers. Local bicycle shops can become places for maintenance and repair of manual wheelchairs. When local businesses carry specific products or provide needed assistive technology solutions, wait time and distances that individuals must travel are reduced. And the ability to contribute to the local economy fosters further community inclusion for individuals.

Decreasing Wait Time: Service providers need to become more efficient in assistive technology service delivery. This is especially true for providers in rural areas. The traditional

assistive technology service delivery model involves someone doing intake or assistive technology screening, a site visit to perform an assistive technology evaluation, researching the most appropriate solutions, securing funding for the solution, ordering the solution, and fitting the solution to the individual once the item is obtained. This process can be very time consuming and paper intensive. Extensive paperwork and reports are developed and submitted to family members, service providers, and funding sources, yet the customer needs solutions and outcomes immediately. Individuals are unable to wait. Innovative solutions shave off months, weeks, days, and hours from the traditional process. It is possible in one home visit to conduct a quick mismatch analysis related to assessment. This analysis can lead to immediate assistive technology solution research via computerized/Internet databases that can be searched at the individual's home. Service providers can carry an assortment of the most frequently requested assistive technology items associated with specific functional limitations. Solution kits related to one-handed use, arthritis, back saving solutions, solutions for preventing slips and falls, electronic memory aids, electronic aids for daily living, are just a few of the kits that can be transported in the car. These solutions can be tried at the individual's home or place of business. An assortment of fabrication tools and materials can be transported in modular break down units that fit in the car's trunk. This enables quick and easy repairs, rapid prototyping, and fabrication of solutions. Preliminary screenings over the phone will help service providers in packing what will be the most useful resources to take with them on the road. Service providers can also use an assortment of time saving solutions to reduce paperwork.

Assistive Technology Transition Needs: When an individual leaves a hospital or nursing facility to return home or when she is at home and a critical piece of equipment requires repair, an immediate solution is needed. Loan pools of equipment must be available while the consumer's equipment is on order or equipment needs are still being evaluated. These loan programs must have the flexibility to be long term if needed. Assistive technology device trials may take longer than a standard 30-day loan.

Assistive Technology Loans and Trials: Many states have a variety of assistive technology loan programs. Financial loans are often available through a revolving loan fund or a guaranteed loan fund that have been set up by state Tech Act



projects <http://www.resna.org>. In addition to financial loans, there are assistive technology loan libraries, loan closets, and exploration centers that enable individuals to try out an assortment of devices before an item is purchased. Many of these programs are funded through local or state resources.

Refurbishing Centers: Many states have refurbished equipment programs in which used assistive technologies are donated, refurbished, and redistributed to individuals that are unable to afford new equipment. These centers can also use this equipment for evaluations and short-term loans. Medicaid, Medicare, and private insurance policies and rates for durable medical equipment and assistive technology can result in restricted access to state of the art equipment or back-up equipment. Many individuals' insurances have a \$3,500 cap on durable medical equipment or limitations on how many mobility aids a person can have. If an individual needs both a power wheelchair and a manual wheelchair health insurance will only pay for one wheelchair. Refurbishing centers can help to supplement this limited coverage by making equipment available to individuals at significant savings.

Service, Maintenance, Training, and Support Plans Must Be in Place: These plans should involve family members, co-workers, personal assistants, other providers, and paraprofessionals located at the community level. Local resources require the skills and knowledge to support the assistive technology user.

Assistive technology training must be incorporated into pre-service curricula. Community colleges offer an excellent local opportunity to provide education and training in assistive technology.



The Future of Assistive Technology and Service Delivery Practices

According to the World Health Organization,⁴ the number of individuals with disabilities will continue to rise; however, the available funding to meet the needs of this rising number of individuals will become stagnant. We will need to use these scarce resources efficiently to leverage what resources we have for the greatest benefit possible. The U.S. Department of Agriculture is currently supporting tele-rehabilitation for rural areas. As bandwidth and transmission speeds increase, service providers will be able to conduct assistive technology screenings, consultations, and follow-ups on-line. However, one-on-one assistive technology evaluations and fittings will continue to be necessary. New

products that are being developed will incorporate universal design principals. These products will benefit an increasingly aging population as well as individuals with and without disabilities. Paraprofessionals and family members will substitute for some assistive technology services that were previously provided by highly trained professionals like rehabilitation engineers, occupational therapists, speech and language pathologists, and physical therapists. Innovation will continue.

Summary

Assistive technology can play a critical role in injury prevention and in the creation of environmental adaptations that promote full participation of individuals in their communities. Since we all want easy and convenient access to tools that make everyday living easier, assistive technology works for everyone, not just for individuals with disabilities. While there are challenges before us to find new innovations and sources of funding, assistive technology will continue to be an

important support for individuals as we find new ways to meet individual challenges one solution at a time.

About the Author

Dr. Therese Willkomm is Executive Director of ATECH (An Alliance for Assistive Technology, Education, and Community Health Services) in New Hampshire, an Assistant Professor in the Occupational Therapy Department at the University of New Hampshire; and Co-Director of the New Hampshire Technology Partnership project. She holds a Ph.D. in Rehabilitation Technology from the University of Pittsburgh and has over 22 years experience in providing and managing assistive technology services. Over the past 20 years Dr. Willkomm has presented in 32 states and five foreign countries; authored 22 publications, and received 18 national awards including 4.5 million in competitive grants and foundation awards from CDC, NIDRR, USDA, RSA, Kellogg Foundation, and the Dole Foundation.



¹Public Law 100-407, *The Technology-Related Assistance to Individuals with Disabilities Act of 1988*.

²H. Stephen Kaye, Ph.D. et al, "Mobility Device Use in the United States," *Disability Statistics Center, Institute for Health and Aging, University of California, San Francisco, June 2000*.

³Osobel Ebner; OTR, *Michigan's Assistive Technology Resource*, "Abandonment of Assistive Technology," *Paper presented at the 1999 CSUN Conference ("...the rate of technology abandonment is as high as 75% to 80%.")*

⁴Unidentified speaker from WHO, *Statement made at the UN Conference on Rehabilitation Engineering, Prague Czech Republic, 1991*.

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For More Information

Sharon Finney, Project Associate
sfinney@ilru.org

Community Living Technical Assistance Exchange at ILRU

Independent Living Research Utilization

2323 South Shepherd, Suite 1000

Houston, Texas 77019

(713) 520-0232 (voice)

(713) 520-5136 (TTY)

(713) 520-5785 (fax)

http://www.hcbs.org/ilru_team.htm

Richard Petty, Project Director

repetty@compuserve.com

Darrell Jones, Project Coordinator

dljones@bcm.tmc.edu

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