

Defining Assistive Technology for Decision Making

Individuals who have special needs will use technology to perform a wide range of functions. Some of these will be to allow greater access or independence in everyday life. Others will provide greater opportunities for learning, for recreation and for communication and social interaction.

At times the technological tool chosen will be one that is especially developed to meet the needs of individuals with a specific disability. At other times, the technology is also used by those with no identified special needs. For the individual with special needs, there may then be problems of access that need to be solved using extra, assistive devices.

Review in general low-end and high-end technologies.
This information will be valuable during the decision-making process.

LOW-END TECHNOLOGY

A number of low-end technologies that help students with disabilities achieve independence in daily living, play/leisure as well as learning activities.

AUTOMATED LEARNING DEVICE SYSTEMS

An ALD (automated learning device) is a generic term describing various forms of simple technology that persons with disabilities can use to control electrical appliances and battery-operated devices. (Levin and Scherfenberg, 1990). ALDs are low-end technological tools that increase an individual's ability to actively participate in activities of daily life. For further information about this low-end technology refer to the following resources.

Levin, J. & Scherfenberg, L. (1987). *Selection and use of simple technology in home, school, work and community settings*. Minneapolis, MN: Ablenet inc.

Levin, J. & Scherfenberg L. (1990). *Breaking barriers, how children and adults with severe disabilities can access the world through simple technology*. Minneapolis, MN: Ablenet inc.

An automated learning device (ALD) may consist of the following:

- **Switch or Interface.** This is a device a person contacts to operate an object which is to be controlled. More information about switches is provided in the latter part of this chapter.
- **Control unit.** This is a device used to connect the switch to electrically powered appliances and devices. Some units offer timing and data collection functions.
- **Objects to control.** An ALD system centers around an object of control. Individuals can use ALDs to control electrical appliances (eg. radios, popcorn popper, mixer, toaster) and/or battery-operated devices (eg. tape recorder and toys).
- **Timer.** Once a switch is activated, the timer allows the object of control to stay "on". This is useful for individuals who cannot sustain pressure on a switch for any length of time.
- **Adapters.** Inexpensive adapters which can be purchased at electronic stores (eg. Radio Shack) link components of an ALD system to incompatible connectors.

An electrical ALD system consists of a switch, control unit and an electrical appliance. Caution: When using electrical systems, make sure the appliance does not exceed the total watt capacity of the control unit.

A battery ALD system consists of a switch, battery device adapter and a battery-operated device or toy. When ordering battery device adapters, make sure you specify the size you need (eg. AA, C, D, or 9 volt battery). Note: Alkaline batteries last longer than regular or rechargeable batteries.

Common vendors for switches, control units, battery adapters and switch-activated toys include Ablenet, Creative Switch Industries, Crestwood Company, Don Johnston and Toys for Special Children. See “Assistive Technology: Producers and Distributors” in Appendix E of the handbook for vendor addresses.

ADAPTIVE PLAY & LEISURE TECHNOLOGIES

Play

Play is the primary vehicle of learning for a young child. It is through play that a child learns about the environment. For children who have little or no physical means of interacting with their environment, the experience of learning to control the environment is minimal. Technology enables these children to play and facilitates the development of cognitive, language, motor, perceptual and social skills. When toys and computers are used in play, they become tools for learning. The following sections will describe how children with physical limitations can access toys and other leisure activities.

Toy Selection

When selecting toys and adaptive devices to enable toy interaction, it is important to consider the needs of an individual in the same way as when assessing for more complex technological interventions. An Occupational Therapist may be helpful in the assessment process. Young children with physical and/or cognitive disabilities can engage in active play and learning through battery operated toys controlled via switches. In choosing such toys, consider:

Adaptability

Among the easiest to adapt are the toys with an on/off switch and powered by batteries.

Physical Appeal

Is the toy colorful? Does it have textures? Is it of current interest to the child/peers?

Sound Effects

Ensure that the sound produced is pleasant, and not startling to the child. In addition to battery-operated toys that make sounds, there are also toys available that give sound effects by simply touching or squeezing.

Visual Effects

If a child responds well to visual effects, toys that produce effects such as lights, colors or pictures may be interesting to him/her. Ensure that the visual effects sustain interest.

Action Effects

Action toys may be either stationary or may move in one or more directions. Toys with stationary actions may be more appropriate for independent play, whereas toys that move from one place to another may facilitate interaction with other children.

There are many commercially available battery-operated toys that can provide visual, sound or action effects. Depending on the individual needs and interest of a child, he/she may prefer a toy that produces only one, or a combination of effects.

Adapting Play Things and Materials

Whether a child has physical, cognitive, sensory or a combination of disabilities, there are a number of steps to follow when choosing and adapting toys and other materials for play or leisure activities. According to Church and Glennen (1992), these steps are:

Step 1: Stabilize objects

For children who have difficulty controlling motor movements, make toys and materials stationary by attaching them to a desk, table or wheelchair tray. Do this by lining the surface where the child will be playing with velcro material, and attach velcro to some part of the toy. Dycem, a non-slip matting available through medical and rehabilitation supply outlets is also very useful. Standard C-clamps can stabilize certain toys such as wooden puzzles, activity centres, etc.

Step 2: Attach handles

Children with poor fine motor coordination may need parts added to toys so they are

easier to manipulate. Large foam grips can be added to crayons, markers or pencils for drawing and coloring. Puppets and miniature toys can be used during imaginary play by attaching them to velcro wrist bands.

Step 3: Use concrete play materials

Always try to use objects, toys or actions when playing games. If a child with a cognitive delay is using a computer game where basic concepts (open/closed, few/many, little/big, etc). are presented, using similar real objects in addition to playing the computer game may help the child relate to the activity. For example, when a child is playing “Sticky Bear Opposites” and you ask him/her to show you few or many marbles on the screen, it may help to also use real marbles.

Step 4: Add cues for focusing

When puzzles, board or computer games have very detailed and busy backgrounds you can help a child focus on certain parts of the game by adding cues; by blocking the busy backgrounds with cardboard; by lining the edges of the pathway with bright colored yarn or covering up everything on the board game except the pathway.

Step 5: Make material safe

Keep sandpaper handy to remove any sharp edging on play materials. Check for loose or removable parts and either completely remove the parts or fasten them permanently.

Step 6: Make toys accessible

For children who are unable to reach out and grab their own toys, a system should be put in place so that the selection is carried out by the child. This can be done by having the child point toward toys arranged in separate cubicles on shelves or by pointing to specific pictures of toys arranged on a simple picture symbol communication board.

Battery-Operated Toys

Many battery-operated toys have tiny on/off buttons attached to them for toy operation. These buttons are not functional for students with poor fine motor skills, low vision or for those with severe cognitive delay. However such toys can be adapted using a battery device

adaptor. This will allow the on/off function to be operated by a simple switch action. The particular switch chosen would suit the student's cognitive and motor abilities.

Why Use Battery-Operated Toys?

Switch-controlled battery-operated toys are used to:

- promote independent interaction with toys
- facilitate social interaction using non-stationary toys or battery-operated games with peers
- evaluate a student's ability to control a switch
- train in using a switch
- develop prerequisite skills needed for more complex technology use
- develop the concept of cause and effect
- provide the student with a sense of control over his/her environment

For further information about adapted leisure activities for children with special needs, refer to the following resource:

Levin, J. & Enselein, K. (1990). *Fun for everyone: A guide to adapted leisure activities for children with disabilities*. Minneapolis, MN: Ablenet

SWITCHES

As mentioned above, battery-operated toys are not usually accessible to students with physical disabilities unless connected to a switch. Individuals can use practically any part of their body where there is controlled motor movements to activate the switch (eg. head, arms, hands, knees, feet, eye blinks, eyebrow movements, or breath). A wide variety of adaptive switches are available both commercially or through homemade efforts.

Switches vary in size, color, shape, as well as the motor activity and degree of pressure required for activation. Table 5 lists the most common switch types. Careful perusal of

catalogues will help to inform of the specific features of a given switch. Appropriate switch selection is critical to successful use. Occupational Therapy assessment can be helpful in the selection process.

Appendix E, *Technology Related Books* lists three resources on assessment. For information about homemade battery devices, refer to the following two resources:

Wright, C. & Nomura, M. (1991). *From toys to computers*. San Jose, CA: Chris Wright

Burkhard, L. (1985). *More homemade battery devices for severely handicapped children, with suggested activities*. Eldersburg, MD: Linda Burkhardt

Ablenet inc. has published *The Books of Possibilities: Activities using simple technology* (1996). This resource presents curriculum based activities for students with severe disabilities.

SWITCH POSITIONING/MOUNTING

Positioning of a switch for optimal access is critical. The switch should be placed so that it is activated by intentional rather than accidental movement.

Switches frequently need to be mounted (e.g. on a slant board/or head rest) or stabilized. Pony clamps, C-Clamps, suction cups or non-slip matting are some options.

COMMON SWITCH TYPES

TABLE 5

TYPE	USES
Push (most common type) eg. plate switch [Don Johnston] Big Red [Ablenet] Minicup [Tash inc.]	• Can be activated by hand or any part of body • Some have sensitive push switches, useful for severely involved students
Pull (eg. String Switch [Ablenet])	• Student activates switch by pulling away from The switch. Very little tension is required to activate switch.
Leaf or Wobble (eg. Flex switch [Tash inc.])	• Activated with slight pressure using any part of body • Most often used with head movement or minimal hand movement
Squeeze (eg. Grasp Switch [Tash inc.])	• Student activates by grasp • Encourages grasp movement
Toggle or Joystick (eg. Wobble Switch [Prentke Romich])	• Student activates by hand movement push or pull
Mercury	• Primarily used for head control or with individuals who have minimal movement