

# **Meeting the Needs of Students**

## **Technology-Related and General Strategies**

### **ACKNOWLEDGEMENTS**

The Division of Student Support Services, Newfoundland and Labrador Department of Education  
Programming for Individual Needs: Using Technology to Enhance Students' Differing Abilities,  
1996

## **CLOSE-UP**

### ***MEETING THE NEEDS OF STUDENTS WITH COGNITIVE DELAYS***

*Jane is a first year high school student who requires an alternate program plan due to her level of cognitive functioning. She enjoys listening to books on tape, going to cooking class and helping out in the school office.*

*Jane has the physical development of a typical sixteen year old. Through verbal interaction with Jane it becomes apparent that her capability is below that of her peers. Social interaction is also awkward for her. For example during the opening school year assembly Jane had to be prompted to sit in an appropriate place. Confusion was quite apparent as she hesitated to respond. When the message was repeated with hand cues included, she responded immediately.*

*This semester Jane is working in the office three periods per week. A class peer assists her with stapling for the school by collating papers and placing them in a tray lying directly under an electric stapler. Jane then staples the paper by pressing a switch which is connected to the electric stapler. Jane always looks forward to working with her friend on these days.*

# MEETING THE NEEDS OF STUDENTS WITH COGNITIVE DELAY

## CHARACTERISTICS

- Weak problem-solving ability related to academics.
- Depending on degree of delay students experience mild to severe problems with learning, communication, social, academic, independent living, leisure and work skills
- Problems in adaptive behaviour (the ability to meet/adapt to the demands of one's environments)
- Pass through same phases of cognitive development but at a slower rate
- Attain lower levels of achievement
- Short attention span
- Difficulty with abstract concepts
- Acquisition, transfer and generalization of skills and knowledge is difficult
- Can have low self-esteem due to repeated failure both socially and academically.
- Achievement deficits in reading, comprehension, mathematical reasoning and problem solving
- Often behave inappropriately due to difficulty reading social situations
- Speech and language difficulties
- Tendency to experience difficulty in physical/motor areas ranging from mild to severe depending on degree of delay

## TECHNOLOGY-RELATED STRATEGIES

When teaching students to use various technologies, keep in mind individual learning styles, strengths, interests and needs.

- Teach a set of skills for operating and understanding technological devices using the task analysis method, as mentioned in general strategies section.
- Individualize instruction by using self-pacing, record keeping software to develop basic math, reading and language skills.
- Provide opportunities for student creativity and decision-making by using graphic software which allows changes to be made by using “undo” icons.
- Give students with reading and/or motor difficulties access to the computer keyboard by:
  - providing a keyguard (prevents unwanted keystrokes)
  - placing stickers with colours, pictures or larger print on certain target keys (helpful for programs requiring only few keys)
  - altering keyboard features (using Access Utilities-described in Section III)
- Use alternate input devices such as a mouse, trackball, touch screen or a single switch for specific software use.
- Use alternate keyboards when simple keyboard adaptations do not work. For example, use programmable expanded keyboards with overlays displaying pictures, symbols, and/or words customized to meet specific student needs.
  - \* Caution: Successfully using the computer depends upon finding and using the appropriate adaptive device (See Section III of Handbook *Computers: Hierarchy of Technology Access*)
- Use software with speech output to improve student’s ability to attend.
- Positioning is important when using computer technology. Student should be comfortably seated with monitor at eye level and input devices at easy reach to decrease fatigue.
- Use audio and videotape with students for instructional and record-keeping purposes.

- Teach students to use calculators for relevant daily living activities (eg. grocery shopping, restaurant)

## **Low and High - Technology Options**

Technological devices used by students with cognitive delays can range from daily low-tech items such as VCRs, calculators, tape recorders or telephones to high-tech computers. Some devices are necessary for developing life skills, independence or communication while others can assist in academic instruction. Technology application should be related to one or more of the student's educational goals.

## **Low and High Tech Devices for Daily Living**

There are numerous technologies which assist student's **daily living, employability, and leisure** skills (Copel, 1991). These are listed in alphabetical order.

answering machines  
automatic teller machines  
calculators  
camcorders  
clothes dryers  
clothes washers  
computer games and graphics software  
copy machines  
debit cards  
dishwashers  
environmental controls  
fax machines  
microwaves  
remote controls  
small appliances  
stereos  
tape recorders  
telephones  
televisions  
VCRs  
vending machines  
voice mail

## Low and High Tech Learning Tools

audio tapes  
battery/switch operated toys and appliances  
calculators  
camcorders  
cameras  
computers (standard and adapted systems)  
debit and credit cards  
educational software  
graphics programs  
slide programs  
software for enhancing speech and language  
videotapes

## Low and High-Tech Communication Systems

\* Refer to the chapter titled *Meeting Needs of Students with Communication Difficulties* for specific information concerning communication systems.

## GENERAL STRATEGIES

- Have a positive attitude! Know the student can learn, but at a slower rate.
- Encourage student assistants, peers, parents and other staff to allow the student to do as much as possible, as independently as possible. Doing too much, too often for a student can create a “passive” individual who becomes highly dependent upon others to meet his/her needs.
- Provide structure, routine and repetition to help the student become comfortable with his/her environment.
- Help a student to master concepts/skills through drill and repetition.
- Provide encouragement when student tries to back away from challenges and invites others to do his/her work.

- For a student with extensive cognitive delay, use the **task analysis method** (breaking down a complex concept/skill into its component parts arranged in a logical teaching sequence).

## **Task Analysis STEPS**

1. State skill/concept to be learned (eg. tell time to 1/2 hour).
2. List the prerequisite skills and all the steps to the skill/task.
3. Order steps in hierarchical order or logical teaching sequence.
4. Find a *baseline*: the level where student is functioning prior to instruction or one step below where a student is experiencing consistent success.
5. Begin teaching; teach steps to student with significant delay in classroom and natural settings as well.
6. Teach each step in a variety of ways until over learning occurs, e.g. student practices to the point where he/she can experience success on a number of occasions, over a period of time.
7. When skills are learned in one situation, provide specific transfer instruction for skills to be applied in other situations.

## CLOSE-UP

### ***MEETING THE NEEDS OF STUDENTS WITH COMMUNICATION DIFFICULTIES***

*Margaret is a seven year old girl who is just beginning grade two. Margaret particularly enjoys Math and is quick to do mental computations and hold up her fingers to indicate her answer. She is always eager to volunteer assistance and is the first one to put an arm around the shoulder of another child who is feeling sad or left out. She is always actively involved in playing games with her classmates during free time.*

*Like any typical seven year old, Margaret has lots of things she wants to say, however she experiences difficulty with oral language. In Kindergarten, Margaret began using an IntroTalker. Messages were recorded into the machine by her teacher and it became, in essence, Margaret's voice. When Margaret pressed a button which held a visual representation of her communication, the machine delivered her message orally. By the end of grade one, Margaret's oral language had developed to the point that she had outgrown the IntroTalker. She now delivers most of her messages orally. When a word is not clear to her listener, Margaret uses an alphabet board to spell the word. She clips the alphabet board to her walker and it accompanies her throughout the school.*

*Margaret is learning to use a computer, fitted with an Intellikeys keyboard, for written communication. The Intellikeys is larger than a standard keyboard, and works better for Margaret because of her fine motor difficulties. Like the other children in her class, Margaret keeps a daily journal. She types her entry on the computer, it is then printed out and posted in her notebook.*

*Margaret attends a Brownie Troop once a week and enjoys earning new badges; she is working on her fourth one. Her favourite winter activity is downhill skiing, a sport she is able to engage in by having total body support from an instructor. One of Margaret's goals is to someday ski in the Special Olympics.*

# MEETING THE NEEDS OF STUDENTS WITH COMMUNICATION DIFFICULTIES

*“Individuals with severe communication disorders are those who benefit from Alternative and Augmentative Communication (AAC), those for whom gesture, speech and/or written communication is temporarily or permanently inadequate to meet all of their communication needs. For these individuals, hearing impairment is not the primary cause for the communication impairment. Although some of these individuals may be able to produce a limited amount of speech, it is inadequate to meet their varied communication needs. “(ASHA, 1991, p.10)”*

Candidates for AAC may include individuals with cognitive/developmental delay, cerebral palsy, autism, specific language disabilities, multiple disabilities, sensory impairments, developmental apraxia, muscular dystrophy and traumatic brain injury.

## CHARACTERISTICS

Students with communication difficulties may demonstrate any number or combination of the following characteristics.

### Speech Disorders

- difficulty producing speech and/or problems with voice quality
- dysfluency, stuttering
- voice disorders (hoarseness, breathiness)
- inappropriate pitch and volume
- aphasia (difficulty using words, often due to brain injury)
- difficulty in syntax (word order in a sentence) and articulation

### Language Disorders

- difficulty comprehending and/or using written or spoken language
- inability to express ideas
- difficulty following directions
- difficulty using words and meanings in proper context
- poor vocabulary

Numerous technologies available for students experiencing speech/written communication

difficulties are presented below. Emphasis is placed on Augmentative or Alternate Communication systems which supplement or replace communicative skills for students whose speech is temporarily or permanently unable to meet their communication needs.

## TECHNOLOGY-RELATED STRATEGIES

### Augmentative and Alternative Communication (AAC)

AAC refers to techniques used by students who are non-verbal or have severe speech impairments. For a person with no speech, an AAC system acts as a *replacement* for vocal communication. For an individual who has difficulty with intelligibility of speech an AAC system *supplements or supports* the communication process.

### Basic Premises

The team should consider the following premises when developing and implementing an AAC system.

1. Augmentative and Alternative Communication enhances speech and language development.
2. Using multiple systems and communication techniques is more effective than using a single device or technique.
3. Appropriate training and supportive environments promote effective use of AAC's.
4. The teacher continues to speak when communicating with a student using an AAC.
5. A team consisting of any combination of the following members should be involved in **assessment, selection and evaluation**:

speech and language pathologist  
occupational therapist  
physiotherapist  
itinerant teacher for visually impaired  
special services teacher  
classroom/subject teacher  
computer or augmentative communication device specialist

parent  
student

6. Some students use aberrant behaviour as a form of communication. The team should not simply dismiss this as inappropriate, but determine if such behaviour is a communication attempt.
7. The AAC system should be a *functional* one. The student's interests and communication needs should determine system content.
8. The AAC system's vocabulary should be easy to supplement and modify as the child's communication environment expands and changes.
9. A communication function should not be replaced with a more abstract form of communication. For example, if a student is able to nod and shake his/her head for yes and no, he/she should not be directed to use a picture symbol for yes and no.
10. During the initial period, the student must have frequent opportunities to use the AAC.
11. A student will experience more success in learning to use a new AAC system if he/she associates using the system with achieving pleasant outcomes.
12. AAC systems should be used in interactive ways. Avoid drill and practice format.
13. The student's AAC system should be integrated into his school, home, community and work environments.
14. Commitment, time and energy is required by the team for successful implementation of AAC's.

Alternate and Augmentative Communication Systems rely on the use of symbols and signals, other than those used in speech, to send messages. Symbols can be divided into those which are aided ie. require some type of external device for production and those that are non-aided ie. which require no external device for production (Lloyd and Fuller, 1986). The external device used with an aided system may be either low-tech or high-tech.

Examples of some unaided systems are:

facial expressions  
gestures

Signed English  
American Sign Language

Examples of aided systems are:

real objects  
miniature objects  
photographs  
line drawings e.g.

- Picture Communication System (Mayer-Johnson. Co)
- Rebus Symbols
- Blissymbols
- Picsyms

abstract symbol systems

- Morse Code
- Braille

## Low Tech Devices

The above mentioned aided symbol systems can be used with the following low-tech devices:

- Communication boards (regular and folding)
- Communication wallets
- Communication binders
- Communication posters
- Clock scans (eg. DialScan by Don Johnson Inc.)
- Eye gaze boards
- Compartmentalized communication boxes

Another low-tech communication device is the **Talking Switch**. It consists of a loop tape (an audio tape with no end, capable of holding a message between 15 & 45 seconds in length) and a switch such as **BIG RED** [Ablenet inc.] or **Buddy Button** [Tash inc.] The student used the switch to turn the message on and off as needed. For example, a non-verbal student may participate in a reading group by using the talking switch to say lines which are repeated throughout a story. In **Just For You** by Mercer Mayer, a non-verbal student could use the switch and loop tape to say the line “just for you”.

## High Tech Devices

High Tech systems can be either stand alone voice output communication aids (VOCA's) or computer operated systems used for communication. High-technology devices are generally more expensive than low-tech devices but offer speech output, programming capabilities and can provide the student with a broader range of communication possibilities (though this is not necessarily the case).

They can be of two types. The systems that are for a single use ie. speech output are called **dedicated** systems. An example would be the Alpha Talker [Prentke Romich]. Computer systems which are used for a wide range of functions can also be used, with appropriate software, as AAC's (an example is Speaking Dynamically for Macintosh Computers, [Mayer Johnson]).

An electronic communication device can offer either digitized or synthesized speech. Digitized speech is human speech tape-recorded onto a computer chip. Synthesized speech is robotic and similar to the speech produced by synthesizers used in computers. Table 1 compares two major types of speech output.

**TABLE 1**

<b>Speech Output: A Comparison Chart</b>	
<b>Synthesized</b>	<b>Digitized</b>
<ul style="list-style-type: none"> <li>• speech produced by synthesizers used in computers</li> </ul>	<ul style="list-style-type: none"> <li>• tape-recorded human speech onto a computer chip</li> </ul>
<ul style="list-style-type: none"> <li>• expensive</li> </ul>	<ul style="list-style-type: none"> <li>• less expensive</li> </ul>
<ul style="list-style-type: none"> <li>• restricted selection of synthesized voices</li> </ul>	<ul style="list-style-type: none"> <li>• intelligible, realistic speech</li> </ul>
<ul style="list-style-type: none"> <li>• some types of synthesized speech is more intelligible than others. (* important to listen to speech before purchasing)</li> <li>• some devices offer both male and female voice (adult and child)</li> </ul>	<ul style="list-style-type: none"> <li>• unlimited voice selection (speech can match age, gender and language of student)</li> </ul>
<ul style="list-style-type: none"> <li>• programming more difficult</li> </ul>	<ul style="list-style-type: none"> <li>• easily programmed</li> </ul>
<ul style="list-style-type: none"> <li>• more powerful, offers more messages</li> </ul>	<ul style="list-style-type: none"> <li>• less powerful, limited number of messages can be stored</li> </ul>

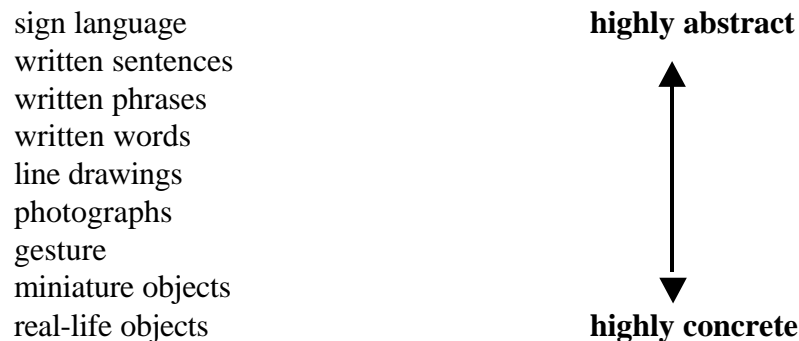
## SELECTING COMMUNICATION SYSTEMS

A transdisciplinary team would be involved in the selection of an AAC with the Speech Language Pathologist considered a critical member. Student's strengths and needs in the following areas are considered during the selection.

1. Fine motor skills
2. Sensori-motor integration
3. Cognitive functioning
4. Level of receptive communication
5. Current expressive communication including non-conventional behaviours
6. Motivation level for communication
7. Persons with whom student desires to communicate
8. Student interests

When this information has been gathered the team can begin considering various types of communication systems. Students who are functioning at a low cognitive level generally require communication systems which feature concrete representations of activities (eg. real-life objects or miniature objects). The table provided below lists various types of communication systems in hierarchial order ranging from concrete to abstract. Augmentative communication checklists designed to assist the team in system selection can be found in Appendices B-22 and B-23.

**TABLE 2**                      **Hierarchy of Communication Systems**



## **RELATED DISABILITY: AUTISM**

Most students with autism experience communication difficulties of varying degrees. Some autistic individuals do not speak and others have limited language. These students generally benefit from some type of Augmentative or Alternative Communication (AAC). Refer to section on AAC in this chapter.

### **CHARACTERISTICS**

Students with autism may display any combination of the following characteristics.

- insistence on sameness and routines
- communication difficulty (expressive and receptive)
- peculiar patterns of speech (eg. echoing words or phrases)
- repetitive body movements or behaviours
- perservation on topics and/or activities
- overly reactive to sensory stimuli
- poor eye contact
- difficulty imitating or developing social play
- lack of responsiveness to others
- impaired motor behaviour
- cognitive deficits or normal to superior cognitive skills
- difficulty generalizing learned behaviour to new situations
- behaviour problems
- self-injurious behaviour

## GENERAL STRATEGIES FOR STUDENTS WITH AUTISM

- Work in close cooperation with the Speech and Language Pathologist.
- Teach mastery of concepts then have student practice generalizing skills to new settings.
- Teach community living skills.
- Teach student how to interact with others.
- Be as concrete as possible when interacting with student.
- Break complex tasks into smaller steps. Follow task analysis method. (Refer to chapter titled *Meeting Needs of Students with Cognitive Delay*.)
- Prepare student for changes in routine and environment.
- Use short concise sentences when talking to student .
- Use behaviour modification techniques.
- Ensure teachers are consistent in daily interactions and expectations.
- Be aware of the effect of environmental stimuli (visual, auditory, tactile) upon student.
- Use Facilitated Communication (FC) to help student communicate. FC is a technique in which physical communication, and emotional support is provided by a facilitator to an individual. The facilitator gently holds/touches the student's arm at the elbow, wrist or hand to point to symbols (letters, pictures or objects) in an attempt to communicate.
- Inform fellow classmates about autism and give suggestions as to how they can be helpful to the student with autism.

## CLOSE-UP

### ***MEETING THE NEEDS OF STUDENTS WHO ARE DEAF AND HARD OF HEARING***

*Robert is a twelve year old boy in grade seven. Although this is his eighth year in school Robert is only reading at a grade one level. In Mathematics he has reached a mid-grade two level. He has not repeated a grade at school. He receives special education services daily for both Math and Reading. He is not a behaviour problem at school except for occasional stubbornness. At home he likes to work with his father in the garage and outdoors. He has several friends in his neighbourhood that he hangs out with in the evenings and on weekends.*

*Robert's life is affected by a major factor which contributes to his difficulties with school and school related activities. He is profoundly deaf in both ears. He wears hearing aids in both ears which allow him to hear the language spoken in the classroom. He occasionally turns off his hearing aids at school or forgets them at home.*

*Robert's language has been assessed at an age six to seven level. Consequently the language used in the grade seven subjects is at a level which is difficult for him to deal with. This causes him to tune out whenever and wherever possible. Robert receives one to one help for one period daily from an itinerant teacher for the hearing impaired.*

*He has a supportive family who want what is best for their son. They did send Robert to an institutional school for the deaf and hard of hearing for one year but the move caused significant problems for Robert and his family. However, he did make progress in language and academics that one year with all the special help he received. He became very adept at using ASL (American Sign Language).*

The itinerant programs to meet Robert's individual needs and works primarily on building his language skills.

Robert's dream is to become independent and self-sufficient in his community.

# MEETING THE NEEDS OF STUDENTS WHO ARE DEAF AND HARD OF HEARING

Deaf and Hard of Hearing are terms used by many professionals to describe the degree of hearing loss. Students who are deaf have such severe hearing loss they cannot receive and understand auditory language with or without amplification whereas those students who are hard of hearing can process auditory information with their remaining hearing.

An audiologist determines hearing loss by measuring in decibels (dB) across a range of frequencies from low to high pitched sounds. All degrees of hearing loss can affect a student's development and two students with similar audiograms do not necessarily have the same language skills or learning needs. Vocabulary development, idiomatic and grammatical English, abstract understanding and reasoning, as well as social skill development may be delayed depending on the severity of a student's hearing loss. Table 3 on the next page lists five categories of hearing loss and the educational implications of each. A discussion of the amplification and educational technologies, classroom strategies and adaptations is also provided on the following pages. This information should help educators to better meet the needs of students with hearing impairments.

## HEARING LOSS AND EDUCATIONAL IMPLICATIONS

**TABLE 3**

Range of Hearing Loss	Decibel Range	Educational Implications for Student
Normal	-10 to +15 decibels	<ul style="list-style-type: none"> <li>• can hear all speech sounds in good acoustic environment</li> </ul>
Minimal loss	16 - 25 decibels	<ul style="list-style-type: none"> <li>• difficulty hearing faint/distant speech</li> <li>• may require preferential seating</li> <li>• needs assistance with language development</li> </ul>
Mild loss	26 - 40 decibels	<ul style="list-style-type: none"> <li>• hearing aids or FM system may be recommended by an audiologist</li> <li>• requires preferential seating</li> <li>• will likely need assistance in area of speech, language, reading, writing and social skill development</li> <li>• staff and students would benefit from an inservice on hearing loss</li> </ul>
Moderate loss	41 - 55 decibels	<ul style="list-style-type: none"> <li>• hearing aid and FM system are necessary</li> <li>• should understand conversation in quiet environment within three to five feet of person</li> <li>• will need help in areas of speech, language, reading, writing and social skill development</li> <li>• staff and students would benefit from an inservice on hearing loss</li> </ul>
Moderate to severe loss	56 - 70 decibels	<ul style="list-style-type: none"> <li>• hearing aids and FM system are necessary</li> <li>• most speech information is missed unless student uses amplification on a full time basis</li> <li>• will need help in areas of speech, language, reading and writing</li> <li>• requires preferential seating</li> <li>• will need special training in area of social skills</li> <li>• staff and students would benefit from an inservice on hearing loss</li> </ul>

Range of Hearing Loss	Decibel Range	Educational Implications for Student
Severe loss	71 - 90 decibels	<ul style="list-style-type: none"> <li>• hearing aids and FM system are necessary</li> <li>• relies mostly on vision rather than hearing for processing information</li> <li>• cannot hear speech without amplification</li> <li>• may hear loud sounds when near the sound source</li> <li>• requires preferential seating</li> <li>• difficulty with intelligibility of speech and voice quality</li> <li>• may have language and social delays</li> <li>• signing and speech may need to be taught</li> <li>• specialized programming is required</li> <li>• staff and students would benefit from an inservice on hearing loss</li> </ul>
Profound	91 or more decibels	<ul style="list-style-type: none"> <li>• hearing aids and FM system may not benefit the student</li> <li>• cannot hear any sounds without amplification</li> <li>• difficulty with intelligibility of speech and voice quality</li> <li>• will likely have language and social delays</li> <li>• requires preferential seating</li> <li>• specialized programming is required</li> <li>• staff and students would benefit from an inservice on hearing loss</li> </ul>

## **TECHNOLOGY - RELATED STRATEGIES**

### **Amplification Technology**

Amplification devices are among the most common technologies for students with hearing impairments and are usually considered regardless of the severity of hearing loss.

#### **Hearing Aids**

They are miniature customized amplifiers worn by the students. These electronic devices amplify all sounds within close proximity of the student. Since all sound includes background noise, hearing aids function best in quiet environments. In noisier environments such as classrooms and outdoors, other amplification technology is required. (See personal FM system below) The region's itinerant teacher for the hearing impaired and/or an audiologist will recommend the most appropriate device(s) for the student and may teach the student, teacher and family members techniques for checking and troubleshooting hearing aids.

#### **Cochlear Implant**

An option for persons with profound hearing loss who have been unable to benefit from traditional hearing aids, the cochlear implant is partly surgically implanted into the cochlea.

#### **Personal FM System**

FM stands for frequency-modulated radio transmission. An FM system is an electronic device which transmits sound. The teacher wears a microphone to a student wearing a receiver which is connected by a cord to the his hearing aid(s). It allows the student to hear the teacher's voice in noisy environments where there is background noise. As with a student's hearing aid, the FM unit should be checked on a daily basis.

#### **Sound Field FM Equipment on Freefield Amplification**

These classroom systems send the speaker's/teacher's voice to four speakers mounted on the ceiling or wall. As with the personal FM system, the teacher wears a wireless FM microphone transmitter. This benefits students with minimal/mild hearing loss and tends to help students with auditory processing difficulties. For any students who have a personal FM unit, this can be connected to the freefield system.

#### **Hard-wired Devices**

These devices provide a small amount of amplification to a listener who is connected by wires to the speaker. The PockeTalker [Williams Sound] is an example of a hard-wired device appropriate for students who have difficulty focusing on auditory input and are easily distracted in one to one instructional situations

#### **Other Technologies**

The devices listed below can also help deaf and hard of hearing students gain access to curriculum and daily living experiences. The team should help determine the most beneficial technology.

### **Telecommunication Devices for the Deaf (TDD)**

The text telephone is a communication device which can be attached to the telephone to send typed messages back and forth over telephone lines to other individual with TDDs. If a deaf person communicates with a person who does not have a TDD, he/she must call the operator who will place the call to a hearing person with a TDD who acts as a relay.

### **Telephone Amplifiers**

A telephone with a built-in amplifier allows the user to adjust the volume using a volume control on the hand set. A battery-operated portable telephone amplifier is attached to the receiver of any telephone and enables the user to adjust the volume of pay phones, friend's and hotel phones.

### **Closed Caption Decoder**

New T.V.'s have closed caption decoders built in, enabling persons who are deaf or hard of hearing to read the spoken dialogue of a program which has captioning provided. A separate closed caption decoder can also be attached to a video cassette recorder so that videos with captioning provided can be accessed.

### **Laptop Computers or Stand Alone Wordprocessors**

These are often used by hearing impaired students who need to watch the teacher speak as they write.

### **Overhead Projectors: Traditional and/or Computer Overhead Pallets**

These allow the student to see the teacher while he or she is reading or explaining visual materials.

## GENERAL STRATEGIES

- Be flexible with preferential seating. Depending on the class activity and competing noise surrounding or near the activity, a student may need to change his/her position in class to achieve maximum information.
- Ensure the classroom has optimal natural lighting . Do not stand in front of windows or bright lights as they obstruct your face.
- Do not speak too loudly or over-enunciate. Always use a natural speaking voice.
- When introducing new topics and concepts in class provide vocabulary lists and definitions of new words beforehand.
- Help the student achieve a sense of purpose for the class by providing an outline at the start of the class.
- After class discussions or group work, ensure that what has been presented is summarized.
- Use plenty of visuals in class (diagrams, charts, written text etc.)
- In laboratory and demonstration situations, always face the student when providing explanations.
- Have a peer with good penmanship and note-taking skills use NCR (non-carbon) paper to take notes for the student who is deaf or hard of hearing.
- Rather than repeating the same words, rephrase a sentence when the student does not understand you the first time.
- Repeat questions and comments of other students in class since the hearing impaired students may have missed what was shared.
- Keep hands and other objects away from the mouth when speaking.

## CLOSE-UP

### **MEETING THE NEEDS OF STUDENTS WITH EMOTIONAL/BEHAVIOURAL DIFFICULTIES**

*Kevin is in junior high this year and is a member of the school track team. This year is going fairly well for Kevin. He placed first in the regional track meet and will be representing his school at the provincial track meet in the spring of next year. Kevin is a student with emotional-behaviour difficulties. In many respects, he is a typical grade seven student; however, he displays significant difficulty staying on-task and paying attention in class. He occasionally has severe emotional outbursts and must be removed from the classroom*

*Second term report is almost ready to go home and Kevin is showing progress both academically and socially since first term report. His junior high school is fully equipped with a computer lab and the teacher, as well as Kevin himself, attribute much of his improvement to increased computer assisted learning opportunities. Computer assisted learning is reducing Kevin's frustration level and inappropriate off-task behaviour. The computer provides Kevin a patient, non-critical, motivating teacher and tutor. He enjoys working in cooperative learning situations because it is easier to attend and he can ask his peers for assistance when needed. For Kevin, less self-discipline is needed to attend to two other students than to an entire class.*

*Kevin regularly attends a social skills group with a number of other students in the guidance counsellor's room. There social skills strategies for conflict resolution are taught. Kevin is putting great effort into practising these skills when engaged in the cooperative learning groups in the computer lab. The counsellor is allowing Kevin to take part in the peer tutoring program in the neighbouring elementary school's computer lab, but only if he demonstrates acceptable behaviours among his peers in the computer lab. Kevin is highly motivated to act appropriately as he strongly desires to participate in the peer tutoring program.*

*Kevin still has his off days, but they are fewer in number. His parents and teachers report that Kevin is a much more cooperative and productive student this year.*

# MEETING THE NEEDS OF STUDENTS WITH EMOTIONAL AND/OR BEHAVIOURAL DIFFICULTIES

Students with emotional difficulties may demonstrate some of the following characteristics during their development. Students with emotional/behavioural disorders show one or more of the following behaviours and characteristics to a *significantly different degree* than generally accepted age, ethnic or cultural norms *over a long period of time* and in a variety of settings.

## CHARACTERISTICS

- low self-esteem
- difficulty building/maintaining interpersonal relationships
- compulsive behaviour
- withdrawn behaviour
- verbal and/or physical aggression
- excessive fear or anxiety
- depression
- poor social skills
- academic problems
- inappropriate crying
- temper tantrums
- non-compliant behaviour
- low motivation
- inattention and impulsivity

- poor self-control
- difficulty solving social and academic problems
- difficulty categorizing and organizing information in a logical format

## **TECHNOLOGY - RELATED STRATEGIES**

### **Computers**

- When possible choose interactive computer-based activities over traditional instructional methods.
- Use computers as reinforcers for appropriate behaviour during free time, but not during instructional time. Note: Using computers as reinforcers should not be the primary use.
- Use computer games that do not have competitive, aggressive or destructive themes to provide opportunities for developing social interaction and intellectual skills as well as good work habits.
- Help students to build their social skills by placing them in dyads when working on computer activities. A working dyad is usually preferable to working alone or in small groups. \*Computer software used should have a high correlation to instruction.
- Try to use software with these features:
  - colorful graphics, animation and sound
  - step-by-step instruction
  - immediate reinforcement
  - neutral corrective feedback
  - low key reteaching methods that do not emphasize failure
  - interactive features
  - capability to adjust response rate
  - record keeping
- Use computerized record keeping programs to monitor student's behaviour. Daily and/or weekly records and progress graphs have positive effects on student's behaviour and can be used to communicate with other team members.

- Enhance students' self-esteem by allowing them to use word processing software (with speech feedback if needed) to produce polished written assignments.
- Train students interested in computers to become peer tutors to other students or teachers.
- Use simulation and various problem-solving software to help students strengthen their problem-solving skills. You may have to pre-teach problem-solving strategies before student can apply problem-solving skills in interactive computer programs.
- Use commercially available inter/intrapersonal problem solving and decision making software to help students become better prepared to deal with real life experiences.
- Allow students to use software packages such as time managers or daily schedulers with alarm reminders to help them manage upcoming activities and assignments.
- Use spreadsheets to help older students with scientific and mathematical problem-solving.
- Use databases to help students gather and organize data.
- Use virtual reality software. When the cost of virtual reality (VR) systems decreases virtual reality will be as popular as the VCR is in schools today. Interactive VR technology presents the perfect environment for students to learn and practice prosocial skills. A VR environment allows students to make good and bad decisions, and experience the consequences in a three dimensional simulated world which helps to prepare students to deal with situations of the real world.

## **Software for Social Skill Development**

There are many commercial software programs available to teach social skills, problem solving and decision making. Table 4 on the following page lists a number of these programs.

## SOCIAL SKILLS SOFTWARE

**TABLE 4**

<b>SOFTWARE</b>	<b>SKILL LEVEL</b>	<b>PUBLISHER</b>
• Choices, Choices: On the Playground	Preschool Elementary	Tom Snyder Productions
• Blueprint for Decision Making	Elementary Secondary Adult	Lawrence Productions
• Choices, Choices: Taking Responsibility	Preschool Elementary	Tom Snyder Productions
• Where in the World in Carmen Sandiego?	Elementary Secondary	Broderbund Software Inc.
• Following Directions: Life Skills Series (Set 1)	Secondary Adult	Hartley
• On the Job: Life Skills Series (Set 1)	Secondary Adult	Hartley
• The Mirror Inside Us: Life Skills Series (Set 1)	Secondary Adult	Hartley

## GENERAL STRATEGIES

Below is a list of general classroom management strategies to use with students having emotional/behavioural difficulties. For further information about school wide discipline, classroom management, problem solving and program planning refer to the document **Programming for Individual Needs: Behavioural Challenges, A Supportive Shared Approach (1996)**.

- Ensure student knows what is expected of him, establish expectations and rules.
- Post established rules in a location where student can easily see.
- Come to prior agreement with the student on consequences for broken rules and apply these consistently.
- Praise appropriate behaviour as it occurs.
- When using tangible reinforcers to improve student behaviour, ensure they are age appropriate and motivating for the student.
- Help student to develop social skills, self-control and self-esteem.

**CLOSE UP**

## ***MEETING THE NEEDS OF EXCEPTIONALLY ABLE STUDENTS***

*Lydia is an eleven year old exceptionally able student. She is presently in grade 6 and her reading level is at a high school level. Lydia is highly motivated and excels in all her academic subjects, maintaining an A+ average. She is a hard worker and completes all class assignments and projects with a unique flare. Lydia is a very pleasant and cooperative child; however, she sometimes prefers to be alone rather than with other children.*

*Lydia was recommended for an enrichment program being piloted in her elementary school. Lydia has a flare for writing and was able to express her talent through her stories and poems which she sent electronically to an author for feedback. Because of Lydia's skills in writing she was chosen to be editor of the school newspaper. Again her talent was greatly appreciated. Besides writing news stories, she edited many other students' work. Lydia also completed an in-depth novel study and participated in a math enrichment pullout class.*

*Lydia is the younger of two children in her family. Her older sister is also exceptionally able and is presently completing grade 12. Lydia is involved in many extra curricular activities. She plays the flute and piano and takes singing lessons. She is also a member of a swim team.*

## MEETING THE NEEDS OF EXCEPTIONALLY ABLE LEARNERS

An exceptionally able or gifted learner may demonstrate achievement or potential ability in general intellectual functioning, specific academic aptitude, creative thinking, leadership, visual and performing arts and psychomotor skills. The student may display any one or a combination of these abilities and may exhibit several of the following characteristics.

### CHARACTERISTICS

- above average intelligence, motivation, creativity and task commitment
- learns at a faster pace than peers
- good memory
- advanced ability to think abstractly
- superior ability to use words
- generalizes skillfully
- well developed attention span
- outstanding problem-solving ability
- high mathematical reasoning and ability to grasp math concepts
- persistent intellectual curiosity (forever asking “why?”)
- original/unique ideas
- wide range of interests
- risk taker
- independent, self-motivated in learning
- high energy level
- high sense of justice and fairness
- high degree of responsibility
- perseveres, doesn’t give up easily
- creative ability or expression in visual or performing arts (e.g. music, drama, art, dance)
- fluent in idea generation
- flexible thinker (approaches problems in many different ways)

### TECHNOLOGY RELATED STRATEGIES

Today’s information technologies hold great promise for all students, especially those who are exceptionally able. Acceleration and enrichment of the curriculum may have been somewhat limited to students in the past, but CD-ROMs and use of the Internet (eg. Stemnet’s School Rings Projects) enable students to explore topics beyond the regular

curriculum and to share their discoveries with students in classrooms around the globe. Schools should aim to expose high achieving students to as many technologies as possible. For those students who are “natural technical wizards” and have great interest in various technologies, schools may assign mentors to provide extended learning and communication opportunities.

## High Tech

**Multimedia programs.** Students can create hypermedia programs to support presentations, reports and curriculum in various subject areas.

**Scanners.** Scanners (flatbeds or handheld) are powerful tools which enable students to incorporate images (color/black & white photos, pictures) into presentations, newsletters and documents etc.

**Productivity tools.** Databases, spreadsheets, graphics programs and multimedia programs enable students to organize, create and evaluate their own work. These tools engage students in problem solving, where they test and retry various strategies.

**Technology-based artistic tools.** Video production, digital photography and computer-based animation encourage artistic expression among those students who are artistically inclined offering alternatives to traditional tools.

**CD-ROMS.** CD-ROM (compact disc-read only memory) is an efficient storage technology with a very high storage capacity. For example, a CD-ROM storing an entire set of encyclopedias such as Grolier Electronic Encyclopedia [Grolier Electronic Publishing] transforms a Personal Computer into a library allowing a student to investigate endless topics. Gifted students can also use interactive CD-ROM programs to study independently at their own pace.

**Distance Education Technologies.** These technologies bring important learning opportunities to students, especially to those in rural communities. Students meet at community sites where there are cable or satellite receivers, phone lines and video cameras providing one or two way audio/video links to the course instructor. For schools in remote areas this may be the only means for a student to take an advanced course.

**Integrated Learning Systems.** These systems individualize instruction by offering thousands of basic skills lessons at the student’s accelerated pace.

**Calculators (with plotting and graphic capabilities)** allow students to see the results of computations in graphic format.

**Interactive Videodisc** is a type of multimedia which stores sound, text, graphics and video and is used for high-quality still or motion pictures. It enables students to interact with huge amounts of information stored on the videodisc. For example, The National Gallery of Art Videodisc [Voyager] has a complete archive of the National Gallery's Collection of sculpture and painting.

**Video Integration Software** such as QuickTime for the Macintosh and PhotoMotion for the IBM allow students to insert video sequences into instructional software.

**Microcomputer-Based Labs.** These labs use computers and probes to determine information such as temperature, light intensity and pH levels.

**LCD displays or large-screen monitors** are powerful tools for students to use when giving presentations of multimedia creations. Accompanying sound, graphics and video will enhance presentations by students who are exceptionally able.

**Telecommunications Networks** such as the Internet allow students to access current information in an unlimited range of areas of interest. Students can use telecommunications to access publications, training materials and data. They can also communicate with others in far away places through electronic mail and bulletin boards.

**Virtual Reality (VR)** programs provide visual and kinesthetic experiences within the confines of the classroom that would not otherwise be available. Students strap on special goggles connected to a "data glove" which provide a three dimensional environment simulation of real life. \*These programs will become more accessible to students as the cost of VR programs decrease.

## **GENERAL STRATEGIES**

General strategies to use with exceptionally able students should include the following:

- Build programs upon mastered concepts and skills.
- Allow for in-depth exploration of topics.
- Incorporate higher level thinking and problem solving skills into content.

- Incorporate a wide range of resources and materials and new technologies.
- Make room in the program for self direction, planning and evaluation.
- Vary time and pace by compacting or shortening time required for learning concepts and skills and by providing more time for in-depth explorations.
- Provide opportunities for students to develop and/or practice leadership skills.
- Have students deal with topics of interest and concern.

## SPECIFIC STRATEGIES

The following alternate instructional strategies can lead to enriched and more fulfilling education for the exceptionally able learner.

- The accelerated pace at which highly able students learn requires flexible pacing strategies such as *skill grouping, curriculum compacting and contracting*.
- A thirst for in-depth exploration of topics requires program provisions for *primary or original research, independent studies, mentorships, or courses at another school through distance education or actually attending the school*.
- Individual and advanced interests may be met by offering *mini-courses, interest groups, clubs and science fairs*.

Several of these and other strategies are described below. They are designed to tap into the high motivation, broad range of interests, and early desire for independence found in these students before they become bored and tune out of school programs that do not meet their needs.

**Curriculum Compacting.** This is a strategy which allows a student who demonstrates mastery of a topic or skill area to spend less time on the regular curriculum and more time on advanced study and areas of interest. The teacher compacts a subject in the following manner:

1. The teacher must find out what the student knows in a particular area which appears to need compacting by pretesting, observing, interviewing and analyzing performances.

2. For those areas where student does not demonstrate a mastery level, (predetermined by the teacher) he or she joins the regular class for instruction.
3. For those areas where the student shows mastery, a learning plan or contract is developed.

**Contracts.** A contract may be used when a student reaches a specified criterion on a pre-test. The contract usually includes outcomes required by the whole class and a list of possible alternative or extension activities from which the student may choose. This list may include any number of options once a student's program has been compacted and extra time is available.

**Independent Study.** An independent project is a student directed study where a student investigates a "real life" problem, topic or interest. Usually with the teacher's assistance, the student learns to focus on an area he or she wishes to study and develops a plan of action. The student is required to monitor, share a product with an audience and participate in his or her own evaluation.

**Tiered Assignments.** Assignment choices are provided to meet the diverse needs of students in a classroom. Students work on the same unit in social studies for example, but may do questions and assignments at different complexity levels. Teachers (or enrichment students) create assignments at different levels of thinking often using Bloom's Taxonomy as a guideline.

**Problem Solving or Thinking Skills Classes.** The teacher meets regularly with a group of students identified as gifted to work through a number of scenarios/problems designed to develop the critical/creative problem solving abilities of the students. Such thinking skills are generally interdisciplinary in nature and usually beyond the objectives of the regular curriculum.

**Learning/Interest Centres.** Interest centres for younger students (interest groups for older students) provide enrichment for students who demonstrate early mastery/competence with required work. These centres allow students to explore in greater depth or breadth topics of interest introduced by the regular curriculum. In some cases, students themselves, may become involved in the development and production of the learning centre.

**Seminars.** When a topic of interest to a number of students has been delineated, the teacher (or one of the students) may invite a guest speaker into the school to meet with the group of students already interested in the topic. Here, the students may explore with the guest further involvement in the topic.

**Mentorships.** The student works with a resource teacher, media specialist, parent volunteer or community member to develop and carry out all or part of a project or task. This is a useful way to help students develop skills of production in a field and to develop career awareness.

**Advanced Level Courses, Advanced Placement.** For some exceptionally able students, the only appropriate way of enriching the school experience is by providing an accelerated program of study, either by full grade acceleration, or by subject acceleration. This may be done by moving the child into a higher grade with older children, by having the teacher teach multi-grades in the one room, or by arranging for a special teacher to teach an advanced program to a small group of students.

Through the use of distance education, gifted students in rural communities should be able to avail of the same opportunities as their urban counterparts to access advanced placement courses, thus giving these students a much needed challenge in their final years of high school.

## **Integrating Technology and Specific Instructional Strategies**

Specific examples of how technology can assist an exceptionally able student in his/her program are provided below:

*Thinking Skills Groups.* Critical/creative thinking software will allow students who have finished assigned work early, to work at their own pace through creative problem solving activities.

*Curriculum Compacting.* Technology can now be used to pre-test in any number of skills areas, so that student time can be spent only on those skills not already mastered.

*Seminars and Mini-Courses.* When a school takes the time to prepare and present a seminar by a guest lecturer to a special interest group in the school, the benefits of that effort can be magnified through the use of teleconferencing to other schools. This is particularly helpful for exceptionally able students in rural schools who can benefit from resources not located in that area. This also applies to mini-courses which can be taught through distance education.

*Independent Study.* As a major area of endeavour for the exceptionally able learner, the independent project has always posed some difficulty in terms of finding the

necessary resources to do the work, as well as arranging the personnel and time. With today's information technologies, independent study is more manageable for the student and the teacher facilitating such a study. Additionally, the methodological skills needed to complete the work, particularly in the areas of research skills, word processing and using the Internet, often come very easily to such students.

## **SOFTWARE FOR EXCEPTIONALLY ABLE STUDENTS**

### **Criteria for choosing software for high achieving students (based on Pattridge, 1994)**

Choose software that:

1. Accommodates a wide range of ability levels
2. Is challenging and teaches/supports educational curriculum.
3. Develops higher level thinking skills.
4. Encourages additional research using the library, other software programs and/or the Internet..
5. Provides feedback

Note: You may wish to have gifted students participate on an existing school committee or form a student committee to preview and evaluate software. Refer to *Software Evaluation Form* in Appendix B.

## CLOSE-UP

### ***MEETING THE NEEDS OF STUDENTS WITH LEARNING DISABILITIES***

*Nicole is a third year High School student with 23 credits. All subject areas are difficult for her, because she has a learning disability.*

*This year Nicole interacts more with her teachers and peers and she now speaks up in class more frequently. She is becoming a good self-advocate and is able to express the level of support she needs in order to be successful in school.*

*Because her reading disability makes access to texts very difficult, Nicole feels she is more successful when someone reads what is written in the text to her. When this is not possible, she becomes frustrated.*

*Nicole also has difficulty taking notes from lectures. Often a class peer with good penmanship uses NCR (non-carbon paper) so Nicole can have a copy of the notes for her binders.*

*Nicole has begun completing her written work using a word processor. The program has spell check and abbreviation expansion. During her leisure time, Nicole can be found listening to her walkman while drawing. She is quite a talented artist, and would like to pursue study at an Art College after high school.*

# MEETING THE NEEDS OF STUDENTS WITH LEARNING DISABILITIES

A student with a learning disability often displays a cluster of characteristics over time, in various intensities, which interfere with his/her overall development and achievement. This lifelong disability can interfere with the students' acquisition of academic and other basic skills necessary for survival as an independent adult. He/she may demonstrate many of the characteristics listed below on one day and none on another. This uneven performance pattern often continues through adolescence and adulthood and is not primarily the result of visual, hearing or motor impairments, cognitive delay, emotional disturbance or educational disadvantages.

## CHARACTERISTICS

- difficulty in listening, thinking, reading, reasoning and/or math.
- difficulty processing language completely and accurately when *receiving* (hearing, reading), *sending* (speaking, writing) and *elaborating* (integrating new and old information)
- an uneven and inconsistent school performance profile
- poor penmanship
- forgetful, needs constant reminders by teachers, family and friends
- easily loses or misplaces school items (eg. homework, textbooks, pencils/pens, notebooks etc.)
- trouble copying from the board or copying in general
- difficulty with note-taking
- slow worker, often doesn't finish work
- reverses letters, numbers or words
- difficulty following directions

- short or long term memory problems
- problems with time concept and sequence
- problems with spelling
- trouble concentrating and paying attention in class
- lack of coordination, appears clumsy
- poor study skills
- low self-esteem and inappropriate social skills

## **TECHNOLOGY - RELATED STRATEGIES**

Many technologies are available today that can help students to cope with their learning disabilities. To effectively use the technology, the teacher and programming team should understand the nature of the learning disability through assessment and diagnosis. Technological tools only assist a student if the tool matches the student's need.

### **Technological Tools**

- tape recorder for taking notes, recording lectures and assisting students to express themselves for writing activities
- NCR or non-carbon paper for making a copy of notes
- personal stand alone electronic wordprocessor (e.g. DreamWriter by NTS Computer Systems or Alpha Smart Pro by Intelligent Peripheral Devices Inc.)
- calculator for math calculations; use talking calculator if needed
- electronic spelling dictionary (talking or non-talking)
- talking textbooks and novels (see Appendix E, check local libraries)
- A television, VCR and video tapes used creatively can be good mediums for learning.

- computer-based learning as an instructional alternative
  - reading comprehension software
  - writing composition software - provides a structured environment to enhance ability to produce written material.
  - math software
- word processing software with spell check, grammar check, word prediction, and/or abbreviation expansion to assist with writing activities; talking word processor
- screen reading software with speech synthesizer to provide verbalization of everything on the screen including menus, text and punctuation.
- electronic reference tools - in addition to dictionaries and thesaurus, atlases, encyclopaedias, etc. are available in multimedia format.
- electronic organizers for schedules, reminders, lists etc.

## **Computer Related Compensation Tools for Students With Learning Disabilities**

A number of computer related tools which can help students with learning disabilities to perform reading or writing tasks are discussed below. The tools selected should be determined by individual needs.

**Standard keyboard modifications.** For students with fine motor difficulties releasing keys quickly enough to prevent unwanted key strokes is often a challenge. AccessDos or Access Utility for Windows (see Section IV of handbook) allow the auto repeat feature to be slowed down or deactivated.

**Menu management programs.** For students with memory and/or organizational difficulties, menu programs can make it easier to find specific software programs because DOS commands no longer need to be memorized and programs are listed in an orderly fashion. Icon displays allow menu access for a non-reader.

**Screen Reading Software and Speech Synthesizer.** Screen reading software used in combination with speech synthesizers can read back characters, words, lines, command prompts, menus and messages appearing on the screen. The speech feedback helps learning disabled students bypass reading requirements of the software. Many of the screen readers are designed specifically for blind users. These packages can be complex and provide too

much feedback. Soundproof [Humanware inc.] is a screenreader which has a less complex command structure than most others and it highlights text as it is being spoken.

**Word Processors.** Many students with learning disabilities find the writing and editing process to be an arduous, time-consuming task. Some students also experience great difficulty with the physical act of writing. Word processors provide these individuals the opportunity to write without being concerned about making errors during the writing stage. Errors can be easily corrected and information can be reorganized and edited before being printed. Relatively inexpensive stand-alone word processors can be purchased, (e.g. Dream Writer, AlphaSmart Pro) or various software options for a computer can be selected.

**Talking Word Processor.** A talking word processor is a software program that uses a speech synthesizer to provide auditory feedback of what has been entered. Feedback can be by letter (character), word or complete sentence. These programs can help students with their writing - e.g. notice omissions, dropped endings, etc. They also offer the multisensory experience of hearing the writing while seeing it on the screen. Examples are: Write Away [Boston Children's Institute] Write: Out Loud [Don Johnson Inc.] and Intellitalk [Intellitools] A talking word processor does not generally have all the capabilities of a screen reader.

**Word Prediction.** Word prediction programs reduce the time, effort and frustration for students with spelling difficulties to produce written work by providing an on-screen list of possible words to use in a piece of writing. The student types a letter or two and the program provides a list of words beginning with that letter(s). If one of the choices is a word the student wishes to use, he/she selects it. If not, the student enters another letter which produces a new set of choices.

**Abbreviation Expansion.** This software can be used to create abbreviated forms for frequently used words or phrases for students who are slow workers and poor spellers. For example, if a student consistently misspells "individuals" he/she could type "ind" and space bar in its place and the word "individuals" will automatically appear on the screen. Co: Writer [Don Johnson Inc.] is one program offering all of these supports.

**Voice Input.** Voice input software and hardware may be useful to students experiencing extreme difficulty producing written compositions by hand, but who have strong verbal expressive skills. It is appropriate for students who have poor spelling skills, but have the ability to read and recognize the correct word when presented. Voice input also frees student from remembering function command sequences because voice macros can be defined for a series of keystrokes. For example, the student has to only remember a voice command eg. "save document". Voice recognition is expensive software which requires training. It should only be used if the student has a severe learning disability and all other less expensive and less complex options have been tried.

## Word Processors: Factors to Consider

- Word processors allow students to enter, edit, format, save, retrieve and print text.
- Before purchasing/acquiring a word processor for a student, determine features needed in the software that will be used.
- Word processors requiring a sequence of function keys to execute functions may be frustrating for students with memory problems. Pull down menus, or windows are easier to use.
- The built-in spell checker found in most word processors helps students find and correct misspelled words within the document before printing the final product.  
**Note:** Student has to be able to at least recognize the correctly spelled word in a word list to use a spell checker successfully. The student's approximations of the word must also be close enough to generate the correct word.
- Some spellcheckers indicate spelling mistakes as they occur. This can be very distracting and thus interfere with writing. This feature can generally be de-activated if this is the case.
- Grammar checks are available in some programs. This should be carefully evaluated to determine whether it is helpful to the student.
- Outlining/brainstorming features can be a built-in or an add-on feature. It can help the student to organize written work.
- Some features that can provide additional support for students with learning disabilities include: word prediction, abbreviation expansion, voice output. These can be built-in to some programs or purchased as add-ons.
- Teach keyboarding. Word processing for students with learning disabilities is most useful when it becomes a kinaesthetic (motor) process. Hunting and pecking involves spelling (visual/auditory process), and is therefore much less effective.
- Dedicated access to a computer for all students with learning disabilities will be difficult to achieve. A low cost alternative, Alpha Smart Pro (Intelligent Peripheral Devices, Inc.) allows the student to enter and edit text, then transfer it later to the computer for formatting and printing.

- A scanner with OCR (optical character recognition) software can allow the student to do worksheets on the computer. (OmniForm by Caere Corporation is one software program that enables this). These tools can also be used to scan text into the computer, which can then be read to the student using screen reading program.

## **GENERAL STRATEGIES**

- Teach using student's strengths.
- Know the mode through which the student learns best; visual, auditory, tactile/kinesthetic.
- Make sure print material is at student's reading/level.
- Encourage student to develop his/her special talent. This will help the student experience success and thus improve self esteem.
- Provide repetition when teaching new concepts and skills.
- Design tasks/assignments to ensure success, then gradually increase difficulty. This is very important for students who have developed "learned helplessness" and have given up trying because of repeated failure.
- Break work/assignments into small segments.
- Be an empathetic and understanding instructor.
- Provide frequent feedback to keep student on task.
- Provide a consistent structured environment.
- Provide visual & graphic aids when teaching.
- Help student to sequence/organize assignments projects, homework and other independent work.
- Provide alternate materials (e.g tape recordings of text) to help student deal with print.

- Assist student with time management.
- Allow student to use aids (calculators, electronic dictionaries) to compensate for skills which the learning disabled student may never master.
- When necessary, use special seating or remove student to a resource room to minimize distractions in environment.
- Encourage the student to use a highlighter or highlighting tape to mark important information.
- Provide additional time to complete assignments, tests.
- Reduce amount of copying required when possible.
- Provide student with copy of peer's or teacher's notes.
- Provide study guides.
- Encourage student to use homework book/agenda to record homework.

## **SPECIFIC STRATEGIES**

### **Math**

- For an older student who has never mastered Math Facts (+,-,x,÷) paste a copy of multiplication table or add/subtract math facts table inside student's textbook or exercise
- Give permission to use a calculator for computations.

### **Reading**

- Adapt textbooks to meet needs of students by:
  - highlighting information in the book
  - tape record textbook chapters if student's reading level is well below classroom peers, but he/she has no difficulty with content. Tape recording can be done by parent volunteers, an older student or an efficient peer reader.
  - \*(When tape recording a book, the teacher, parent or peer volunteer should

provide an overview of selection, read text, then stop periodically to summarize important information and/or ask student to provide answers to questions)

scan material into computer to be read through screen reader.

- Provide alternative high interest , low vocabulary books and articles for students with very poor reading skills. Provide heavily illustrated materials.
- For a reluctant or very poor reader, use alternate materials (videotape and CD-ROM programs which parallel or complement subject matter).
- Provide plastic colored overlays to cover printed page for students with scotopic sensitivity.
- Concrete words such as nouns, verbs and certain adjectives/adverbs might be taught using flashcards with the word and picture/illustration of word on it.
- Abstract words like *it, to, of* etc. can be highlighted and taught as part of a phrase or sentence on flash cards.
- For students with history of speech and language difficulty:
  - rewrite articles, tests and questions in simpler language so he/she can understand content and answer questions.
  - introduce new vocabulary before giving reading assignments and/or asking student to answer questions.
  - frequently rephrase questions, directions.
- Have supplemental educational materials available:
  - condensed books, novel guides
  - books on tape (see Appendix E for ordering information; also contact Recordings for Blind and Dyslexic @ 1-800-221-4792
  - picture magazines
  - color coded maps with large lettering

## Writing

- If writing is illegible, fatiguing and/or time consuming, allow student to dictate answers to tests or written assignments (to teacher or on tape.)

- Allow student with **dsygraphia** (*an inability or severe difficulty in producing legible handwriting at an age appropriate speed*), to use a wordprocessor. Incorporate additional compensation tools as required.
- If student has difficulty copying from board because of trouble with continuous far and near-point gazing:
  - eliminate board copying
  - provide a xeroxed copy of assignment
  - provide copy of homework assignments or have designated spot on board where assignments are noted well before the end of school day
  - ask a fast writer to be student's homework assignment secretary

## Spelling

- If student has a severe spelling disability, give him/her half as many spelling words to learn for the weekly spelling test.
- Refrain from penalizing spelling error in writing compositions.
- Have student use a multisensory approach when learning to spell unfamiliar words.
- For a student who continually forgets letters or number shapes, attach a strip of paper to top of desk with alphabet and numbers from 1 to 10 (adhesive strips available from many educational material companies).

## POSSIBLE EVALUATION/TESTING MODIFICATIONS

- Permit oral examinations, taped responses or provide a reader or scribe.
- Allow student to use calculators, word processors, dictionaries and spell checkers during examinations.
- Give student option to write exam in quiet room if needed.
- Provide extra time for student to complete test.
- Vary test format (eg. Multiple choice or short answer questions versus long answer).
- Use larger print and or double space tests.

- Note modifications on report card.
- Refrain from making comments like “reading is still well below grade level” or “need to put more effort into learning spelling words” if student has genuine learning disability, is working hard and making progress.

## **RELATED - DISABILITY: ADD/ADHD**

Students with learning disabilities occasionally have a related disability - ADD/ADHD (Attention Deficit Disorder/Attention Deficit Hyperactivity Disorder). A learning disability can make it difficult for students to receive, process and communicate information creating problems in math, reading and/or writing. ADD/ADHD students are generally inattentive, impulsive and hyperactive. Over time, these characteristics cause students to experience academic achievement problems because of missing important chunks of information on a regular basis.

### **ADD/ADHD Characteristics**

- difficulty sustaining attention, frequently shifts activities
- difficulty focusing on one activity
- difficulty keeping still
- easily distracted by surrounding activity
- does not notice details, makes careless mistakes
- does not appear to listen
- often does not complete work assignments
- difficulty organizing work and activities
- often misplaces items needed for school activities
- difficulty staying seated, squirms and fidgets if required to sit for long time periods
- excessive running and climbing
- often acts before thinking

- blurts out answers in class, interrupts others conversation
- difficulty waiting turn

## **Using computers with students having ADD/ADHD**

The computer is a valuable educational tool for teachers and students with ADD/ADHD.

The computer in combination with appropriate software provides a student with:

- an individual, nonjudgemental learning environment
- immediate feedback
- repetitions as needed
- guiding questions
- an opportunity to focus attention on task
- undivided attention
- opportunity to work at own pace, whether it is faster or slower.

Research indicates that game-like software with limited animation affects students attending behaviours in a positive way (Ford, Poe & Cox, 1993 cited in Barkley, 1995). Schools should aim to use software with the following characteristics for students with ADD/ADHD.

- limited animation
- features which help student to focus his/her attention (eg. large print, color)
- multisensory format
- information presented in smaller chunks
- capability to monitor student's progress
- features to accommodate various rates of learning and skill levels.

## CLOSE-UP

### ***MEETING THE NEEDS OF STUDENTS WITH PHYSICAL DISABILITIES***

*Susan is a six year old girl in grade one. Susan loves to sing and has an impressive repertoire of Golden Oldies. One of her favourite songs is "You Are My Sunshine" which she has been heard singing as she wheels her wheelchair along the school corridor.*

*Susan uses her wheelchair to travel long distances within the school and to socialize with the other children on the playground. She uses an elevator to reach the gymnasium and cafeteria, thus the entire school is accessible to her. She is learning to use a Kaye-walker to travel short distances within the school - such as from her classroom to the library next door. The library is one of Susan's favourite places and choosing a book one of the highlights of her week. Susan has adapted seating for the library, as well as for her classroom.*

*The school bathroom has one large stall fitted with an extra-wide door to accommodate a wheelchair. It is also equipped with grab bars and a reducer ring to meet Susan's needs.*

*Susan's school bus is equipped with a wheelchair lift, and the Q-Straint system to secure her wheel chair.*

*To make fine-motor tasks easier for her, Susan uses a wrist splint, pencil grip, dycem to hold her notebook in place and adapted scissors. This year, Susan will begin learning to use a computer fitted with an expanded keyboard.*

# MEETING THE NEEDS OF STUDENTS WITH PHYSICAL DISABILITIES

A student with a physical disability may have any one of the following:

- orthopaedic impairment (acquired or congenital physical motor impairment)
- cerebral palsy
- spina bifida
- muscular dystrophy
- arthritis
- congenital anomalies
- osteogenesis imperfecta
- arthrogyrosis

## CHARACTERISTICS

Physical characteristics of students with physical disabilities may include any one or a combination of the following:

- paralysis
- altered muscle tone
- sensory disturbance
- unsteady gait
- non-ambulation requiring alternate means of mobility
- loss of, or inability to use one or more limbs
- poor gross/fine and/or oral-motor control

Often students with physical disabilities have additional disabilities such as visual or hearing impairments, learning disabilities or cognitive delay. A student with a physical impairment may require adapted materials/equipment as well as additional support from teachers/other professionals to modify and adapt the teaching/learning environment to meet his/her unique needs.

## **TECHNOLOGY-RELATED STRATEGIES**

When choosing a technological aid to compensate for or bypass a physical disability, the following factors should be considered:

- age
- developmental/cognitive status
- physical abilities
- present needs
- future needs of the student.

A transdisciplinary team should be in place for the decision-making process. In addition to parents, student, teachers, administrator, school psychologist and other educational personnel, other appropriate professionals might be a Speech Language Pathologist with expertise in Augmentative and Alternative Communication as well as Physical and/or Occupational Therapist.

Low-end technology can often provide sufficient support for the individual in a given area. Low-end devices are often more unobtrusive than high-tech devices, are generally less costly and more readily available and should not be overlooked in the decision making process.

### **Primary Areas for Technological Assistance:**

#### **1. Seating, Positioning and Mobility**

Students with physical disabilities will require well supported seating and positioning in order to obtain optimal functioning. Improper seating and positioning may actually cause functional limitations.. The optimal seated posture is one where the trunk is supported in an upright, centered position with head in midline, with as much freedom of movement as possible to encourage interaction with and visual regard for the environment. The hips should remain bent at 90° and the thighs should be supported comfortably. This will allow the hands to be free for functional use.

For students who cannot achieve this desired position independently, various aids are available such as:

- Custom contoured seating systems for wheelchairs or school chairs
- hip straps, foot boxes to keep hips bent at 90° angle
- various easels, slant boards to place on the lap tray or table to accommodate books, writing material, keyboards, switches, etc.

Depending on the nature and degree of physical disability, a student may require technological assistance for mobility. This can range from splints, a walker or crutches to manual or powered wheelchair. Decisions on equipment needs in the area of mobility generally are made outside the school environment. However, input on functionality of a device and consultation about functional difficulties should remain part of the team responsibility.

Other areas where mobility aids are considered is in providing a choice of access modes in the school and community, as well as opportunities for varied forms of mobility during Physical Education classes and outdoor play. Suggested options to be considered would be adapted tricycles, scooters, battery-powered cars (R.J. Cooper, Assoc) and other ride-on vehicles, and sledges for outings to the rink.

Input from the Occupational and Physical Therapist is always recommended as part of this decision making process.

Environment accessibility at home, in the school and throughout the community also often depends on technological solutions, ranging from ramps, to automated doors, elevators with accessible controls and so on. Hydraulic lifts can assist in moving into and out of vehicles as well from wheelchairs to another chair or surface. Low tech solutions can include transfer belts or boards, and grab bars. Local medical suppliers have a wide range of devices to assist in this area.

Extensive information is provided on technological assistance for seating, positioning and mobility in **Programming for Individual Needs: Physical Disabilities** (1996). Prior to making decisions in this area, the Individual Support Services Team should refer to that document.

## **2. Daily Living, Environmental Control and Leisure Activities**

Generally speaking, low end technology is used to assist individuals with physical disabilities in the areas of daily living and personal care. In the area of bathroom use, grab bars, alternate toilet seats, commodes and back supports are some of the common aids. Alternate commercial or customized plumbing fixtures can also provide for increased levels of independence in this area.

In the area of dressing, individuals with strength and coordination difficulties may need assistive devices to increase success. These can range from adapted fasteners to special devices for pulling up socks.

Students with physical disabilities can require assistive devices during mealtime because of fine motor as well as oral motor difficulties. These will assist the student towards independent, safe and socially acceptable eating and drinking. Plates with raised rims for easier scooping, utensils with built-up handles, cups with weighted bottoms, handles or cut-out rims are some of the range available. Medical supply stores and catalogues, as well as the Children's Rehabilitation Centre are good sources. Pictures of some of these items and additional information is contained in **Programming for Individual Needs: Physical Disabilities** (1996).

Technology can assist individuals to have some control over elements in the environment to promote independence as well as a sense of empowerment. An Environmental Control Unit (ECU), (also known as Automated Learning Device) is a simple technology that allows a person with a disability to control battery operated toys or electrical appliances using a switch. Through the ECU, the individual can turn on/off lights, TV's, stereos, fans, etc. For a child, this can allow access to battery operated toys and games.

### **3. Facilitate learning and academic success**

Low tech devices can range from a pencil grip, or adapted scissors, to a slant board to promote appropriate placement of reading material, or a tape recorder for class notes or completing assignments. See also **Programming for Individual Needs: Physical Disabilities** (1996).

#### **Computer Access**

Computer Technology offers students with physical disabilities expanded opportunities for educational success. Computers also will offer improved opportunities in vocational settings, for communication, and for art, music and leisure activities. Often, the problem solving/decision-making process must determine alternate ways for the student with a physical disability to access the computer technology that is available to all other students.

This can be done through specifically designed adaptations to, or features of, either hardware or software. As the whole field of technology expands, some of these adaptations are becoming standard and are being used equally by the non-disabled populations. For example, Touch Screens provide mouse access for people with fine motor difficulties through a simple touch of the screen. These screens are also becoming commonplace in information retrieval systems at tourist booths, book stores and so on. Many commonly used word processing programs have built in accessibility features. When adaptations are required, these may be to the input method, in processing features and/or to output method.

## **Adaptations to Input**

### **Modifications to the Standard Keyboard.**

A keyguard - a hard plastic cover with holes for each key, to prevent accidental striking of a key.

Moisture guard - to protect the keyboard from drooling.

Access Utilities/Control Panel settings

These are features which modify various aspects of the keyboard to simplify its operation. They can:

- change the layout of the keyboard
- eliminate the need to press two keys at once through a function called keylatch
- slow down or eliminate the auto repeat feature to eliminate the problem of accidental repetition of a character. Microsoft Word and WordPerfect 6.0 have Access utilities. They can be explored by searching "Accessibility" through the Help Menu.

### **Use an Alternate Keyboard**

Sometimes a substitute or replacement for the standard keyboard is needed. One of the following may be useful:

#### **Expanded keyboard.**

For those who can only target large areas expanded keyboards with larger keys are useful. Expanded keyboards can be used with the QWERTY configuration, and most can also be programmed for alternate layouts/functions (e.g. alphabetical order, numbers only, arrow keys only etc.)

#### **A miniature keyboard.**

Mini keyboards are useful for those students with very limited range of motion. Keyboards may also be tailored so that single keystrokes can produce frequently-used words or phrases.

#### **On-screen keyboards**

The keys are selected by a touch screen, a mouse, trackball or joystick, an electronic pointing device or through a scanning technique, by a switch.

## Use Alternate Input Methods

### **A switch**

- with an on-screen keyboard through scanning
- for various programs that require simple choice selection, through scanning or for cause and effect programs. See more detailed information on switches in Section III of this handbook.

### **Electronic pointing devices**

- these allow the student to operate the cursor on the screen using ultrasound or an infra-red beam; good head control is needed; can be used in lieu of a mouse or with an on-screen keyboard.

### **Mouse, Trackball, Joystick**

- mouse access can be provided for students with varying degrees of fine motor control.

### **Touch screens**

- a simple touch of a point on the screen operates in lieu of mouse control. Provides direct selection. Can be used with on-screen keyboard.

### **Morse Code**

- is considered a direct selection method and can be a reasonably fast input method.

### **Voice recognition**

- voice recognition is an alternative input method by which a computer responds to spoken commands. It can be used to input text/data for writing as well as to direct computer functions. Voice quality, pronunciation will need to be carefully evaluated. This option is still very costly.

## Adaptations to Processing Features

In addition to Access Utilities to modify the keyboard, described above, there are various other processing features that facilitate success for the student with physical disabilities. These include:

### **Menu Management Programs**

- The use of macros, hot keys can reduce the time it takes the student to manage the program.

### **Abbreviation Expansion**

- Abbreviations for commonly used words/phrases are programmed. Simply typing the abbreviation will produce the word/phrase eg. type ae and “abbreviation expansion” appears on the screen.

### **Word Prediction Programs**

- As the student types a letter or two, an on screen list develops from which the student selects the word he wants. Additional letters create a new list. Many programs automatically incorporate frequently and recently used words into the lists.

These options are also described in detail in the section *Meeting the Needs of Students with Learning Disabilities*. The primary purpose for incorporating them for the student with a physical disability is to reduce the numbers of key strokes required. With reduced physical effort, and fine motor demands, the student will be able to complete the writing with increased speed and efficiency.

## **Adaptions to Output**

Generally these will not be required for the student with a physical disability unless visual impairments or a learning disability present difficulties with screen access. In these cases, the relevant sections of the handbook will identify possible adaptations in output.

## **4. Communication**

See section on *Meeting the Needs of Students with Communication Difficulties* in this handbook.

## **GENERAL STRATEGIES**

Teachers can generally accommodate students with physical limitations by:

- ensuring that a student with a physical impairment feel accepted
- making allowances for a student’s high level of fatigue
- ensuring that the environment is physically accessible and safe

- providing for peer group understanding and interaction
- providing appropriate adaptive equipment and technology
- modifying demands for the volume of work produced. If a concept is understood, extra practise may take more time for this student than is warranted.
- providing time for re-teaching. Instruction may need to be paced differently for a student with a physical disability.
- providing instruction in the use of assistive technology. Ensure total support for use of technology.
- allowing alternate methods of evaluation to compensate for the physical limitations.
- engaging peers in support e.g. using NCR paper, have another student take notes for the student with a physical disability.
- ensuring that there is adequate opportunity for involvement in extra curricular activities.
- ensuring that field trip environments are fully accessible.

## CLOSE-UP

### ***MEETING THE NEEDS OF STUDENTS WITH SEVERE AND/OR MULTIPLE DISABILITIES***

Peter is an eight year old boy who is in Grade Three with Challenging Needs teacher support. Peter has Spastic Quadriplegic Cerebral Palsy, uses a wheelchair for mobility and is dependant for all his personal care needs (dressing, eating, toileting, etc.).

Peter smiles in response to familiar people, seems to enjoy playful interactions and on times vocalizes with pleasure. Peter can use pictures and symbols for communication, although accurate pointing is difficult for him. Recently, he began using an electronic communication device which displays pictures/ symbols for recorded messages (**Cheap Talk** [Enabling Devices, Inc.] through which up to eight messages can be recorded). Peter's father records his news from home under the symbol of a house so that Peter can share this with his classmates. Peter can also make choices of snacks and activities through his **Cheap Talk**.

A **Macintosh** computer with a variety of cause and effect and early learning software has been available for Peter's program for over two years. He uses a Jelly Bean switch, a Touch Screen, and is beginning to use the arrow keys on an **Intellikeys** enlarged keyboard ( Intellitools, Inc.) to interact with the programs.

There is also a range of non-tech and low-tech adaptive aids to assist in meeting Peter's personal care and learning needs . Examples are adapted eating utensils, a raised toilet seat and a Columbia High Back toilet support (Flaghouse, Inc.), a table top easel that his father made and non-slip matting.

# MEETING THE NEEDS OF STUDENTS WITH SEVERE AND/OR MULTIPLE DISABILITIES

## CHARACTERISTICS

Students with severe and/or multiple disabilities may exhibit any number or combination of the following characteristics depending on the severity of cognitive delay and/or additional disabilities such as vision and hearing impairments, communication difficulties and physical disabilities affecting mobility, coordination, and/or fine motor skills.

- language delay and/or speech problems
- limited or no verbal communication skills
- lack of basic physical mobility
- limited self-care skills and independent community living skills
- problems with attention, perception, memory and problem solving
- poor retention of skills
- slow rate of learning
- difficulty transferring or generalizing skills learned in one situation to another situation
- self-stimulation
- self-injurious behavior
- ritualistic behaviours
- inability to attend/relate to people
- medical problems (eg. seizures, cerebral palsy, sensory loss, hydrocephalus and scoliosis)

## TECHNOLOGY-RELATED STRATEGIES

Educational programming for a student with multiple disabilities will be determined by a transdisciplinary team, and should focus on developing means to allow and encourage the individual to become as active and vital a participant in daily life as possible.

It is critical that all team members, professionals, family and peers are cognizant of the unique educational and psychosocial needs of the student, to avoid planning and interactions based only on the complex physical and medical difficulties that present. The rights and dignity of each individual must be paramount in all programming decisions.

Technology can be incorporated as a tool in programming in the following areas:

### **Learning:**

Programs for students with multiple disabilities often focus on early concept development, such as object permanence and cause and effect. These concepts are integral to the later development of language functions and higher cognitive skills. Switch operated technology allows the student with significant physical limitations to become an active participant in learning activities and thus enhances learning opportunities.

A wide array of switch operated toys, as well as an ever expanding range of computer software is available. Some companies offer software that will foster development of basic concepts (eg. cause and effect, responding to simple commands), using activities at interest levels appropriate for older students. One example is **Teenage Switch Progressions** (R.J. Cooper, Inc.) The activities on the computer screen, activated by a press of a switch, range from popping popcorn to applying makeup. These programs also offer a valuable medium for interaction with non-disabled peers.

Most programs designed for this level of learning incorporate opportunities for development of more advanced skills as well. Many of them begin with simple cause and effect ( a switch press causes activity for a pre-set time period), advance to a sustained press being required for the activity to continue, and then incorporate simple commands (eg "press the switch now"), to develop deliberate response to oral commands.

The range of switch options is extensive and the particular switch chosen must suit the individual's particular physical abilities. See Section III for a further discussion of switch selection.

## **Positioning/ Mobility**

Good positioning/ handling of students with multiple disabilities is critical, both to reduce pain and prevent further physical complications, as well as to allow the individual to see, hear, reach and become engaged in persons and materials for optimal participation and learning.

Many students will also require aids for mobility both in general as well as during Physical Education classes. Assistive devices are instrumental in meeting these needs. Discussion of some of the available options is presented in the Section of the handbook on *Meeting the Needs of Students with Physical Disabilities* and, in more detail, in *Programming for Individual Needs: Physical Disabilities* (1996).

## **Communication**

Most students with multiple disabilities have limited verbal communication skills. Adults or peers often make choices for students with multiple disabilities because they cannot speak. There should always be direct instruction to encourage even very physically involved students to make choices independently. Various low and high-technology Alternative and Augmentative Communication systems can be used to supplement or replace verbal communication. The range of options can be from non-tech (eg. eye-pointing to the actual object) to high- tech (eg. switch selection of choices displayed on a computer screen as they are scanned by a screen pointer). Speech Language Pathology as well as Occupational Therapy consultation is advised when decision-making is this area. Refer also to the section of this handbook on *Meeting the Needs of Students with Communication Difficulties*.

## **Environmental Control**

Students with multiple disabilities can use Environmental Control Units to exercise control over the environment. ECU's allow the individual to turn on/off lights, electrical appliances (radio, TV, etc) and battery operated devices (tape recorders, games, and so on). Another similar piece of technology is an Automated Learning Device (ALD) (Ablenet, Inc).

## **Play/Leisure/Socialization**

Technological tools for these areas may include adapted puzzles/games, toys adapted for switch use, computer assisted drawing programs, as well as computer games with specialized

input and/or output devices. A **Switch-Adapted Mouse** (R.J. Cooper, Inc.) offers wonderful opportunities for co-operative play. A non-disabled peer moves the mouse, while the student with a disability "clicks" through a switch.

## **Sports/Recreation**

There is a range of adapted sports equipment that can assist in involving students with multiple disabilities in physical education and outdoor programming. Adapted bowling equipment, balls with sound, various supportive swings, hammocks, adapted tricycles, scooter boards and powered vehicles offer the student the opportunity to experience different positions, orientation and movement experiences that otherwise would not be available.

## **Daily Living/Personal Care**

Technology to assist the individual with multiple disabilities complete daily living tasks may include adapted eating utensils, bathroom aids, adapted clothing and dressing aids and so on. Many times, an individual with a Multiple Disability will always remain dependant , to some degree for personal care and daily living functions.

## **GENERAL STRATEGIES**

- Actively promote attention to and interest in the environment and other people.
- Engage regularly in oral language activity. Never assume that lack of response infers lack of comprehension.
- Monitor the student's response to stimuli. Some children will learn better with minimal verbal input, others may be hyper-sensitive to visual input or be tactile defensive and recoil from touch or certain textures.
- Use hand-over-hand as an instructional tool cautiously. There is some thought that this tool prevents kinaesthetic feedback and thus reduces learning opportunities.
- Always ensure appropriate and comfortable positioning for the student. Provide frequent changes of position and orientation.

- Actively program so that the student is an integral part of the total school environment
- Respect the dignity of choice. Do not always decide for the student , even if waiting for choice takes more time.
- In specific skill teaching, follow the Task Analysis method as outlined in *Meeting the Needs of Students who are Cognitively Delayed*.
- Arrange for teaching to occur in a variety of environments, both school and community.

## **CLOSE-UP**

### ***MEETING THE NEEDS OF STUDENTS WITH TRAUMATIC BRAIN INJURY***

*Joanne is a very likeable grade 6 student who has many friends and enjoys watching after-school sports.*

*Joanne is unsteady on her feet and uses a wheelchair to get around school. She uses a portable word processor called a Dream Writer to complete her school work because she has great difficulty with the task of handwriting.*

*Joanne did not always have these problems. Two years ago she had an accident on a four-wheel ATV (all terrain vehicle) and sustained a brain injury. As a result of the injury, Joanne no longer has the strength in her right hand to grasp a pen to write.*

*In addition, Joanne's visual-perceptual processing skills have also been affected. Because of this difficulty, she uses books on tape or large print books during novel study. When using the word processor to write, Joanne also chooses large fonts to make reading of her work easier.*

# MEETING THE NEEDS OF STUDENTS WITH TRAUMATIC BRAIN INJURY

A student who has sustained a head injury may experience problems in cognitive, social/emotional, sensori- motor and communication/ language areas. No two students with traumatic brain injury will display the same characteristics and any number or combination of characteristics provided below may be exhibited by a student with a head injury. Students with head injuries often evidence regular change during the first year or two of recovery, thus it is important to review individual support services plans (ISSPs) frequently during this time.

## CHARACTERISTICS

### *Physical*

- Balance problems
- Poor fine-motor coordination
- One-sided limb weakness
- Reduced motor speed
- Spatial disorientation
- Poor endurance for physical activity
- Visual/hearing deficits
- Headaches
- Dizziness

### *Cognitive*

#### *Difficulties with:*

- Memory, especially for learning new material
- Attention and concentration
- Perception - do not “see” things as others do
- Organization, planning and problem solving
- Thinking quickly
- Abstract thinking
- Comprehension
- Perseveration - (student has difficulty changing activities, he/she may repeat words or actions.)

## **Social/Emotional/Behavioural**

- Lack goal-directed behaviour and initiative
- Disinhibition, impulsivity
- Irritability, intolerance, anger, outbursts
- Depression
- Denial
- Difficulty in controlling emotions ( crying, laughing, etc.)
- Poor motivation
- Dependency
- Poor judgement, socially inappropriate behaviour
- Social withdrawal
- Self-centered, demanding
- Talk excessively

The sections below offer strategies and technologies appropriate for students with traumatic brain injury. Keep in mind that not all strategies will be appropriate for all students and only a few strategies at a time should be tried. Strategies should be matched and altered as needed to meet individual needs based on the characteristics displayed by the student. Teachers may need to consult professionals who have an understanding of impairments resulting from brain injury (eg. Psychologists, OT's) before deciding on implementation of various strategies.

## **TECHNOLOGY-RELATED STRATEGIES**

- Provide large print books or books on tape for students with visual - perceptual processing difficulties.
- Use computer assisted basic skills programs in reading and math.
- Use computer programs to help student re-develop cognitive skills.
- For students with fine motor difficulties who find it difficult to use the standard keyboard, use alternate methods to access the computer (Refer to Section II of the handbook for more detailed information about computers)
- Use adapted computer access technology (eg. screen enlargement software) to help students with limited vision to access information provided on the computer screen.
- Allow the student to tape lectures.

- Have a fellow classmate who is a skilled notetaker use NCR (non-carbon paper), when taking notes in class so he/she can give the student with traumatic brain injury a copy.
- Provide the student with access to a stand alone wordprocessor (eg. Dream Writer by NTS Computer Systems Ltd.) or a desktop/laptop computer for written assignments.
- Teach the student with specific memory problems to use one or more of the following **prosthetic memory aids** as cues to future events and activities:

datebooks for school and homework assignments  
 checklists of steps required to perform various tasks  
 electronic signalling devices to help student locate keys, wallets, purses etc.  
 telememo devices for storing personal information, phone numbers and appointment signalling  
 databank wrist watches for organizing phone numbers alphabetically  
 mini cassette recorders for recording important messages, instructions or appointment reminders  
 alarm watches for cuing student to listen to messages on mini cassette recorder  
 basic electronic organizers  
 personal directories for storing message alarms and appointment reminders

## GENERAL STRATEGIES

- Educate teachers and peers involved with student on the effects of traumatic brain injury.
- Provide instruction at home until student is ready to return to school.
- Prepare student for re-entry into school.
- Modify schedule as needed.
- Assist student to cope with physical environment of school.
- Use instructional materials which are age appropriate and suitable to student skill and interest.
- Employ various instructional strategies for students with head injuries.

- Provide adequate “response time” to compensate for slower processing skills.

## **SPECIFIC TEACHING STRATEGIES AND MODIFICATIONS**

1. **Provide modifications in scheduling for those students with chronic fatigue** (often experienced up to a year after a head injury).
  - shorten school day
  - provide academic instruction during student’s peak performance times.
  - provide rest periods to reduce fatigue.
  - reduce class/program load
  - provide a period of time at the beginning of each day where a student assistant, peer helper or teacher can discuss the day’s schedule and assist student to organize materials needed.
  - provide a time at the end of the day where homework assignments and materials are identified.
2. **Simplify verbal and written instructions:**
  - always provide both verbal and written instructions.
  - paraphrase instructions as needed.
  - repeat instructions more than once.
  - reduce rate of delivery
  - reduce length of instructions
  - allow student to check with a fellow classmate for clarification.
  - have student retell direction in own words to check comprehension.
3. **When introducing new concepts and vocabulary**
  - provide definitions of terms
  - provide visual cues
  - limit the number of new concepts presented at one time
  - question the student on new concept to ensure understanding
4. **Ensure the student has a “buddy” who can help with instructions, transitions and assignments.**
5. **When reading to the student**
  - decrease rate
  - decrease length
  - facilitate comprehension through questioning
  - point out important facts

6. **Help students cope with the physical school environment.**
  - provide student who has slower responses more time to get from one class to another.
  - if student has difficulty carrying books around school because of poor balance and coordination, allow him/her to have an extra set of textbooks at home or have a “buddy” help student move from class to class.
  
7. **Encourage communication ( written and verbal)**
  - provide ample time for written tasks and assist with organizational structure
  - inform student when verbal message is not understandable
  - model proper communication productions for student
  - introduce alternative communication systems when necessary ( low/high tech)
  
8. **Help student develop memory skills** by encouraging student to categorize, rehearse, visualize and chunk information and make associations.
  
9. **Assist students with socially acceptable behaviour**
  - reinforce appropriate behaviours
  - develop a cueing system to inform student when an appropriate behaviour is being displayed.
  - redirect behaviours
  - specifically teach the meaning of verbal/nonverbal social cues.

### **Support Services**

The brain-injured student may benefit from services provided by: student assistants, counsellors, special education teachers, Occupational and/or Physical Therapists, Speech and Language Pathologists.

## CLOSE-UP

### **MEETING THE NEEDS OF STUDENTS WITH VISUAL IMPAIRMENTS**

*Daniel, is a ten year old boy in grade four who attends an elementary school in the city. Daniel enjoys going to school and listening to music. He has recently started piano lessons and it appears he has a special musical talent.*

*Daniel has not always attended this school. Because he is blind, Daniel's early schooling took place in a residential school in another province, a school for the visually impaired. He suffers the effects of retinopathy of prematurity, failure of the retinal vascular system to develop.*

*Two years ago, Daniel's planning team decided that he should return to his home town and attend his neighbourhood school. A great deal of planning was done in order to make the transition. Daniel had to learn cane travel, orientation and mobility. Daniel has had to be carefully oriented to his home and his school. He travels to school on a special bus and is escorted from the bus to the school by a student assistant. Once inside, Daniel uses his cane and his orientation and mobility skills to get to his classroom door, remove his outdoor clothing and hang his coat on his hook, then find his way to his seat in the classroom. Daniel is now learning to move around his neighbourhood using his cane.*

*Daniel also has to learn skills to use the technology which will enable him to participate in his grade four class. He is learning braille and the class textbooks have been produced in braille for Daniel to use. His teachers can turn lessons into braille with the help of a brailler. Daniel is now learning to use a Braille-to-Print computer which will provide a printout of his writing to his teachers and others.*

*Daniel has many friends who care about him and who often take part in special planning to help him learn social skills.*

# MEETING THE NEEDS OF STUDENTS WITH VISUAL IMPAIRMENTS

Students with visual impairments may experience slight, significant or total vision loss. For functional education purposes the two main categories of visual impairment are Low Vision and Blind.

## **Blind**

Most students who are blind have light perception, but a small number have absolutely no vision.

## **Low Vision**

Students having low vision can learn from their residual (remaining) vision and other senses. They are essentially print users but require optimal lighting and the use of optical aids and devices.

It is important for a teacher to understand the nature and degree of the student's vision loss. The severity of vision loss, age of onset, intellectual ability and surrounding environmental conditions all affect how a student uses his/her residual vision. For example, reading is mostly a function of central vision and mobility of peripheral vision. A student with a central loss due to macular degeneration may not be able to read visually, but may have no difficulty with his/her mobility, whereas a student with tunnel vision may experience great difficulty with reading but little difficulty with mobility. Factors such as light glare, fatigue and insufficient lighting may cause vision to fluctuate. It is also not uncommon for students with vision loss to have additional impairments (eg. vision and hearing loss, vision loss and cerebral palsy).

Vision loss affects the following areas of development:

- acquisition of basic concepts
- life skills
- communication skills
- orientation and mobility skills
- academic development

Students with visual impairments should have access to itinerant teachers for the visually impaired who understand the educational implications of vision loss. This service can be delivered as direct teaching as well as consultation with regular class or special education teachers. Various learning resources and technologies available today can help students achieve success in learning, relationships and independence. A number of the most common technologies are presented below.

# TECHNOLOGY-RELATED STRATEGIES

## Low-Tech

- Use **photocopiers or word processing programs with large print options** to enlarge educational materials.
- Use **bold-lined paper** (darkened lines, enlarged spaces) for students who are unable to successfully use regular paper.
- Use **large print or braille textbooks and novels**. (Request help from the itinerant teacher for the visually impaired in your area.)
- Create optimum reading angles and lighting by bringing books closer to student through use of **tilted desk tops and book stands**.
- Use **reading windows/templates** and **line markers** (rulers) to help student keep his/her place on the page when reading.
- Use **low vision optical devices** such as magnifiers, telescopes. Magnifiers assist students with near-distance vision tasks like reading and writing but telescopes assist with far-distance vision tasks such as reading the chalkboard. Both telescopes and magnifiers can be hand-held or mounted on eye-glasses. \*Note: These devices are prescribed by a physician, low vision nurse or itinerant teacher for visually impaired students.
- Use **tape recorders** to help students take notes, do assignments, answer long essay questions and complete examinations.
- Use **brailers** (machines for writing Braille) for activities involving reading and writing.
- Use **various low tech aids** such as writing guides, tactile maps, raised line drawing kits, 4-track tape recorders to help student in the classroom.
- Use **mathematical aids** such as raised clock faces, geometric area and volume aids, Braille rulers and talking calculators.
- Use **textbooks and novels on tape/disk**. Sources for obtaining textbooks/novels on tape include:

Local Public Library

Learning Disabilities Association of Newfoundland and Labrador (LDANL). (See Agencies and Associations in Appendix E of handbook for address and phone number.)

Learning Distribution Resource Center. See Appendix E.

Local CNIB (Canadian National Institute for the Blind) district office.

Recordings for the Blind and Dyslexic @ 1 800-221-4792. For approximately one hundred dollars a school/district can register with the association to receive catalogues for both pre-kindergarten to 13 and adult level or pay approximately fifty dollars for the pre-kindergarten to 13 catalogue only. Once registered the school or district can borrow at no cost except shipping and handling.

## High Tech: Computer-Related Strategies

**Note: The technologies marked “\*APSEA Candidate Criteria” may be obtained from APSEA (Atlantic Provinces Special Education Authority) resource centre for the visually impaired. Consult with your itinerant teacher for the visually impaired or Student Support Services Coordinator.**

- **Magnification systems** enlarge text displayed on computer monitor screens and printed texts, making these accessible to students with low vision. Screen magnification can be provided through additional hardware or software magnification programs.
- **Braille printers** translate text into braille, thus providing access to computer screens and other types of information.
- **Optical Character Recognition Systems** scan the printed word or transmit the text into computers for storage and retrieval. Screen reading programs can then read the text aloud.
- **Portable Notetakers** such as the Braille ‘N’ Speak (voice output) and Braille Lite (voice and braille) from Blazie Engineering are lightweight electronic note taking devices with built in speech synthesizers. A student uses a **braille notetaker** to take

notes in class and uses its voice synthesizer to review notes. Device features usually include word processor, appointment calendar, calculator, terminal program and clock. Notes can be transferred to computers with braille printers. *\*APSEA Candidate Criteria*

- **Speech Synthesizers and Screen Reading Software** allow blind users to access printed text on the computer screen by hearing the information on the computer screen. Screen reading software enables the student to navigate the screen to hear what others see.
- **Laptop Computers with Large Print** provide students with word processing, dictionary, thesaurus and large print software. They are suited for note taking in the classroom, homework, studying and note review. *\*APSEA Candidate Criteria*
- **Braille to Print Device** is a small computer system used to convert braille, entered from a standard Perkins Braille into text. This system provides a print copy of work for the teacher and a braille copy for the student. *\*APSEA Candidate Criteria*
- **EUREKA A - 4 Braille Computer** is a non-IBM compatible computer designed to be used by the visually impaired. It offers braille input and speech output and has software built into memory. Features include a word processor, note taker and scientific calculator. *\*APSEA Candidate Criteria*
- **Laptop Computer with Speech (and headphones)** an IBM compatible laptop computer which includes features such as word processing, meaning dictionary, thesaurus, menu facilities for handling the disk operating system and speech output software. *\*APSEA Candidate Criteria*
- **The Personal Braille Embosser** is a small braille printer which uses standard sized form feed braille paper to produce a braille copy of work composed on the Laptop Computer with speech, Braille Mate or Braille 'N' Speak. Note: The Braille embosser can only provide Braille output using braille translation software. *\*APSEA Candidate Criteria*

## High Tech: Other

- Use an **Electronic Dictionary with Speech** with students who do not have a laptop computer with speech. This hand held, battery-operated dictionary and thesaurus has a standard QWERTY keyboard and information is outputted through the speech

synthesizer or large print. *\*APSEA Candidate Criteria*

- Use a **Scientific Calculator with Speech** with students in high school who are required to perform trigonometry or scientific calculations. When the help learn mode key is pressed all other keys speak when pressed without activating their function. This helps a totally blind person to learn the calculator. *\*APSEA Candidate Criteria*
- Use a **Closed Circuit Television (CCTV)**. This desktop visual aid electronically enlarges print materials on a large TV screen. Its magnification and contrast capabilities as well as adjustable illumination allow students to view various print sizes, handwriting, photos, diagrams, charts and maps. Most CCTVs also allow the polarity of the display from **positive** (black print on white background) to **negative** (white text on black background) *\*APSEA Candidate Criteria*
- Use a **Portable Closed Circuit Television (CCTV)** when necessary. It offers the same features as the desktop to CCTV, but is suitable for students who need access to a CCTV in several classes throughout the school day. *\*APSEA Candidate Criteria*
- Use **Home Key Indicators** such as dimples, dots and felt appliques and **key replacements** (large/unique keys) as input adaptations for often-used keys. They help improve accuracy and efficiency during data entry.
- Use **Enlarged Fonts** on computer screen for students needing moderate character enlargements. Most graphics-based programs allow one to select the font size to be used on-screen. Choose a computer with a large-size monitor whenever possible.
- Use **Screen Enlargement Utilities or Programs** to magnify images on the computer screen 4-16 times for students with low vision.

## GENERAL STRATEGIES

- Requests for taped, brailled or large print books should be submitted several weeks/months before student is required to use material in class. Consult itinerant for the visually impaired and/or Student Support Coordinator for further details.
- Preferential seating should be given to student so he or she can better hear/see what is happening in class.

- Adaptations for test taking should be arranged according to the student's needs, (e.g. extended time, taped exams, readers, scribes etc).
- Orientation to school building, classroom, grounds, etc. should be provided to student.
- For students with low vision consider the following for written materials:
  - use typed and not handwritten materials, use black lettering on non-gloss cream or white paper
  - do not crowd information on page
  - use only one side of paper
  - use white/yellow chalk on chalkboards