Assessing Students' Needs for Assistive Technology

A Resource Manual for School District Teams

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Penny R. Reed, Editor
Elizabeth A. Lahm, Editor

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Overview of the Assessment and Planning Process

Penny Reed, Ph.D.

This chapter provides an overview of the assistive technology consideration, assessment and planning process that has been implemented throughout Wisconsin and in hundreds of school districts across the country. The term "assessment" is being used rather than "evaluation," except when specifically quoting IDEA. IDEA states that one of the assistive technology services that a school district must provide is an "assistive technology evaluation". However, throughout this manual, we will use the term "assessment" rather than "evaluation", unless directly quoting the law. This is based on the following definition from the Federal Register (July 10, 1993).

> **Evaluation:** A group of activities conducted to determine a child's *eligibility* for special education.
>
> **Assessment:** A group of activities conducted to determine a child's *specific needs.* (Italics added for emphasis.)

We believe that assessment is a more accurate and descriptive term for what needs to occur. It has long been our philosophical belief that there is no "eligibility" criterion for assistive technology. IDEA '97 supports that philosophy with its requirement that each IEP team "consider" the student's need for assistive technology.

The first page in this section contains the definition of Assistive Technology devices and Assistive Technology Services from IDEA.

Following that is an explanation of the forms and process developed by the Wisconsin Assistive Technology Initiative for both "Consideration" and "Assessment". There are descriptions of the steps for information gathering, decision making, and trial use. In addition, there are directions on how to use the specific forms for each step of the process.

All products mentioned in this chapter appear in a table at the end of the chapter along with the company that produces them. A complete list of products and company contact information for them is compiled in the Appendix.

Each of the forms contained in this chapter are included in the appendix as reproducible forms. These may be copied for your use if you maintain the credits as they appear on each page.

Assistive Technology Laws Affecting School Districts

As stated in 300.308, each school district is required to insure that assistive technology devices and services are provided if needed**.**

300.308 Assistive Technology
Each public agency shall ensure that assistive technology devices or assistive technology services or both, as those terms are defined in 300.5 - 300.6 are made available to a child with a disability if required as a part of the child's

(a) Special education under 300.17;
(b) Related services under 300.16; or
(c) Supplementary aids and services under 300.550(b)(2).

Assistive technology devices and services are also defined.

300.5 Assistive Technology Device
As used in this part, "assistive technology device" means any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of children with disabilities**.** 300.5 (Authority: 20 U.S.C. Chapter 33, Section 1401 (25))

300.6 Assistive technology services
Any service that directly assists a child with a disability in the selection, acquisition, or use of an assistive technology device**.** Such term includes:

(A) the evaluation of needs including a functional evaluation, in the child's customary environment;
(B) purchasing, leasing or otherwise providing for the acquisition of assistive technology devices;
(C) selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing, or replacing of assistive technology devices;
(D) coordinating with other therapies, interventions, or services with assistive technology devices, such as those associated with existing education and rehabilitation plans and programs;
(E) training or technical assistance for a child with disabilities, or where appropriate that child's family; and
(F) training or technical assistance for professionals (including individuals providing education and rehabilitation services), employers or others(s) who provide services to employ, or are otherwise, substantially involved in the major life functions of children with disabilities. [Authority 20 U.S.C., Chapter 33, Section 1401(26)]

Consideration
IDEA ’97 added the requirement that each IEP Team consider the need for assistive technology as part of the Consideration of Special Factors.

300.346 (a)(2) Consideration of Special Factors.

The IEP Team shall ....

(v) consider whether the child requires assistive technology devices and services.

Lack of Guidelines
Neither the law nor the regulations provided guidelines for school districts in the implementation of these requirements. This may be part of the reason that school districts still struggle to comply with the laws relating to assistive technology. One systematic approach to providing effective assistive technology services is Education Tech Points (Bowser & Reed, 1998). This approach uses key questions to help school district staff appropriately address assistive technology throughout the delivery of special education services. Education Tech Points provides questions about assistive technology to be addressed during: Initial Referral, Evaluation for Eligibility for Special Education, Extended Assessment, Plan Development, Implementation, and Periodic Review.

Assistive Technology Roles and Responsibilities

Although school districts have been required since 1990 to specifically provide assistive technology devices and services, we continue to find a range of situations across school districts from:

- No one responsible for AT
- One person responsible for AT struggling to find time because he or she has little or no reduction in other responsibilities
- One person responsible for AT with some reduction in other responsibilities
- A small team (often an SLP, an OT, and a teacher) at the district level responsible for AT with some reduction in other responsibilities.
- A larger, more complete team (usually adds vision and hearing as well at PT and some times different types of special education teachers) at district level with some building representation established.
- Well trained AT teams in each building with back up from a district level AT Resource team.

Looking at that list as a continuum, it is easy to understand that educators would struggle to comply with the law in those situations described first. It is nearly impossible to be in compliance in school districts where little or no effort has been made to assign responsibility, honor that responsibility by providing time to carry out duties, and providing training to all who require it.

However, even in the districts where effort has been made to assign responsibility and provide training, there can still be difficulties. What we really must have in every school district is:

A knowledgeable, supportive network of people working together to help every IEP Team choose and provide appropriate AT devices and services.

What does that mean? It means:

1. Every school district employee who works with children with disabilities (including general education teachers) has at least awareness level knowledge about what assistive technology is and what it does.
2. Every employee who works with children with disabilities and has contact with parents of those children, knows the law about assistive technology, knows district procedures for obtaining assistive technology and assistive technology evaluations, and how to initiate those procedures.
3. All administrators understand and comply with the laws related to assistive technology.
4. Specific individuals at both the building and district level have been designated with specific responsibilities related to assistive technology and provided the necessary training, resources, and support to carry out those responsibilities.

Even in a small school district, it is possible to identify and train at least one individual in each building to have basic knowledge about assistive technology. That individual can then participate in a network within the district so that he or she is aware of others who have knowledge. It also allows that network of people to collaborate to insure that someone develops greater expertise in specific areas (e.g. augmentative communication, voice recognition, or adapted computer access) and that all know who those individuals are and how to contact them for assistance.

Because IDEA '97 specifically requires each IEP Team to consider the student's need for assistive technology, each IEP Team must have at least one member with sufficient knowledge to appropriately consider that need. In addition to knowing about the assistive technology devices, that individual must also know where to turn for greater expertise when difficult questions arise. This can only happen when there is a district wide effort to create knowledgeable people who are interconnected with each other.

Action Steps

School districts that have not yet done so, must:

1. Provide awareness level training to all employees who work with children with disabilities in any capacity.
2. Provide training on the law to all administrators and monitor their compliance.
3. Designate individuals at the central office and building level to work together to gain more in-depth knowledge.
4. Provide resources to keep them knowledgeable including catalogs, print materials, equipment and software to use, training opportunities, and access to on line resources.
5. Designate specific responsibilities as needed so that everyone clearly understands their role.

It is not so important that a district follow a certain model, but rather that they undertake a systematic course of action, designed to meet the needs of their students with disabilities.

Considering the Need for Assistive Technology

Every IEP Team is now required to "consider" the child's need for assistive technology. When you do "consider" assistive technology, that process should involve some discussion and examination of potential assistive technology. It should not be ignored or skipped over. It should not be someone saying, "Assistive technology? No, he doesn't need that." with no real discussion. Consideration is defined in the American Heritage Dictionary as "to think carefully about, to form an opinion about, or to look at thoughtfully." We believe that Congress did not choose that word by accident, but clearly intended that there would be some thought about whether assistive technology may be needed by this child.

This "thoughtful look" should certainly include at least a brief discussion of which assistive technology might be useful and whether it is needed. In order to do that, someone on the IEP team will need to be sufficiently knowledgeable about assistive technology to help lead the discussion. That person may bring along specific resource information about assistive technology to help all team members focus on what assistive technology exists for the tasks that are challenging to the student. That information might be books, catalogs, printouts from a website, or actual hardware or software to see. Whether resources are brought along or not, there should be a brief discussion of assistive technology during which at least one person displays some knowledge about relevant assistive technology.

Because this discussion should be brief, it should last at least a minute or two, but no more than 15 to 20 minutes. Congress intended that we could do this within the confines of an IEP meeting, so it should not add appreciably to the length of that meeting. If understanding and agreement cannot be reached in twenty minutes, then it is possible that there are questions that need to be addressed in another forum such as an assistive technology evaluation.

In addition to talking about the assistive technology itself, there should be a discussion about assistive technology services. School districts are required to provide both the devices and the services, and the "consideration" requirement also includes assistive technology services. Specific assistive technology services may include: an evaluation of the student's need for assistive technology; training of the student, members of the family or staff on how to use the assistive technology; technical assistance about its operation or use; modification or customization of the assistive technology; and other supports to the school personnel that might be necessary for the assistive technology to be appropriately used. What these other supports might be is not specified in the law. It could include anything that is needed, for example, training on how to add new vocabulary to an augmentative communication device or scan new materials into a software program that reads the text, or time for planning about how and when these things will happen and who is responsible.

Using the AT Consideration Guide

- Consideration is a brief process, one that can take place within every IEP meeting without unduly extending it.
- It is more than someone saying, "Oh that doesn't apply to my students."
- At least one person on the IEP Team must have some knowledge about assistive technology, because you cannot "consider" something about which you know nothing.
- In order to think about whether assistive technology would be helpful or not, the IEP team would have to have already developed the bulk of the IEP in order for them to know what it is they expect the child to be able to do twelve months from now.
- The annual goals that the child is expected to accomplish will be the focus of the discussion about what assistive technology, if any, might assist or allow the child to accomplish them.

Some of the problems that a child might experience which would lead the IEP team to consider assistive technology as a solution include, but are not limited to:

- ✓ Print size is too small
- ✓ A student is unable to hear all that is being said
- ✓ Manipulatives are too difficult to utilize
- ✓ The child often needs text read to him in order to complete an assignment
- ✓ Handwriting is so illegible that the meaning is impossible to decipher
- ✓ The effort of writing is so slow or so exhausting that it is counterproductive
- ✓ Current modifications are not working
- ✓ The child is "stuck"
- ✓ The effort of decoding reading assignments is so difficult that the child loses track of the meaning

When considering a child's need for assistive technology, there are only four general types of conclusions that can be reached:

1. The first is that current interventions (whatever they may be) are working and nothing new is needed, including assistive technology. This might be true if the child's progress in the curriculum seems to commensurate with his abilities.
2. The second possibility is that assistive technology is already being used either permanently or as part of a trial to determine applicability, so that we know that it does work. In that case the IEP team should write the specific assistive technology into the IEP to insure that it continues to be available for the child.
3. The third possibility is that the IEP team may conclude that new assistive technology should be tried. In that case, the IEP team will need to describe in the IEP the type of assistive technology to be tried, including the features they think may help, such as "having the computer speak the text as the student writes". The IEP team may not know at this point a specific brand or model, and should not attempt to include a product by name, since they do not know if it will perform as expected. Describing the features is the key step for the IEP team in this situation.

4. Finally, the last possibility is that the IEP Team will find that they simply do not know enough to make a decision. In this case, they will need to gather more information. That could be a simple process of calling someone for help, or going to get some print, disk, or online resources to help them better "consider" what AT might be useful. It could also be an indication that they need to schedule (or refer for) an evaluation or assessment of the child's need for assistive technology.

Many state education agencies have developed a worksheet or form to help IEP Teams insure that they address all of the Special Factors during the IEP meeting. This Special Factors worksheet or form requires the IEP Team to respond to a series of questions, including this one about assistive technology:

Does the student need assistive technology services or devices? ☐ Yes ☐ No
If yes, specify particular device(s) that were considered.

Because some IEP teams need more guidance than that single question provides, the Wisconsin Assistive Technology Initiative has also developed a tool to further guide the IEP team at this point. It is called the AT Consideration Guide. The AT Consideration Guide leads the IEP Team through a series of questions designed to help them determine whether the student does or does not "need" assistive technology devices or services. Those questions are:

1. **What task is it that we want this student to do, that s/he is unable to do at a level that reflects his/her skills/abilities (writing, reading, communicating, seeing, hearing)?** On the AT Consideration Guide, document by checking each relevant task below. Tasks which are not relevant to the student's IEP are left blank.
2. **Is the student currently able to complete tasks with special strategies or accommodations?** If the answer is yes, strategies and accommodations are described in column A for each checked task.
3. **Is there currently assistive technology (either devices, tools, hardware, or software) used to address this task?** (If none are known, review WATI's AT Checklist.) If any assistive technology tools are currently being used (or were tried in the past, including recent assessment), they are described in column B.
4. **Would the use of assistive technology help the student perform this skill more easily or efficiently, in the least restrictive environment, or perform successfully with less personal assistance?** If yes, column C is completed.

Column C can also be used to explain briefly why something is not going to be tried, even though it is being considered. For instance, the child may recently have begun receiving new direct intervention through therapy services and the IEP team wants to wait and see what the outcome is or the student has made recent improvements and they feel nothing different is needed. Documenting what was discussed and why it is not being implemented is often important here for review in the future, if someone does not remember clearly what was "considered."

If it is decided to try assistive technology which has not previously been used by the student, column C provides the place to describe what will be tried. It is important here to plan one or more formal trials. Only a well designed trial will actually determine what assistive technology will work for a specific student. Only after successful trial use, should the permanent use of assistive technology be written into the IEP.

As noted earlier, one of the outcomes of "consideration" may be the determination that some kind of assessment or evaluation of the child's need for assistive technology is needed.

The Assistive Technology Consideration Guide can be used to document each of these situations for future reference.

WATI Assistive Technology Consideration Guide

Student's Name_____ School_____

1. What task is it that we want this student to do, that s/he is unable to do at a level that reflects his/her skills/abilities (writing, reading, communicating, seeing, hearing)? Document by checking each relevant task below. Please leave blank any tasks that are not relevant to the student's IEP.
2. Is the student currently able to complete tasks with special strategies or accommodations? If yes, describe in Column A for each checked task.
3. Is there available assistive technology (either devices, tools, hardware, of software) that could be used to address this task? (If none are known, review WATI's AT Checklist.) If any assistive technology tools are currently being used (or were tried in the past), describe in Column B.
4. Would the use of assistive technology help the student perform this skill more easily or efficiently, in the least restrictive environment, or perform successfully with less personal assistance? If yes, complete Column C.

Task	A. If currently completes task with special strategies / accommodations, describe.	B. If currently completes task with assistive technology tools, describe.	C. Describe new or additional assistive technology to be tried.
❒ Motor Aspects of Writing			
❒ Computer Access			
❒ Composing Written Material			
❒ Communication			
❒ Reading			
❒ Learning/ Studying			

Task	A. If currently completes task with special strategies / accommodations, describe.	B. If currently completes task with assistive technology tools, describe.	C. Describe new or additional assistive technology to be tried.
❒ Math			
❒ Recreation and Leisure			
❒ Activities of Daily Living ADLs)			
❒ Mobility			
❒ Environmental Control			
❒ Positioning and Seating			
❒ Vision			
❒ Hearing			

5. Are there assistive technology services (more specific evaluation of need for assistive technology, adapting or modifying the assistive technology, technical assistance on its operation or use, or training of student, staff, or family) that this student needs? If yes, describe what will be provided, the initiation and duration.

_____

_____

Persons Present:_____ Date:_____

ASSISTIVE TECHNOLOGY ASSESSMENT

Since the 1990 reauthorization of IDEA with its definition of assistive technology services, which included "the evaluation of needs including a functional evaluation, in the child's customary environment;" there has been a nationwide trend to identify and train staff within each school district to be more knowledgeable about assistive technology. This trend incorporates the following components:

- A Change in the **view** of assistive technology assessment: From a one shot, separate event to an **ongoing, continual part of educational planning**.
- A change in **who** conducts the assistive technology assessment: From an expert based at a center to the **local team in the natural setting**.
- Change in the **scheduling** of an assistive technology assessment: From an isolated, one time event to an **ongoing, continual process,** which includes trials with potential assistive technology.
- As a result, there are changes in **support and follow through**: From limited support and poor follow through to **meaningful follow through involving all team members**.

These changes are significant because the research on abandonment of assistive technology indicates that student's feelings about the assistive technology and the support of family, peers, and teachers are critical factors that determine successful use versus abandonment. Other factors that affect abandonment include having the training necessary to use the devices, being able to use it with little or no pain, fatigue, discomfort, or stress, and having it compatible with other tools and technologies used by the student (American Medical Association, 1996).

This change has created a tremendous need for inservice training for service providers in local school districts across the nation. The changes in the 1997 reauthorization of IDEA which require every IEP team to "consider" the need for assistive technology, has created an even greater need for training, so that all IEP teams will have the needed expertise.

What is the difference between "Consideration" and "Assessment"
The most obvious differences between Consideration and Assessment are those of depth and duration. Consideration is a short discussion that takes place during the IEP meeting using known information and results in the decision to continue something already being used or to try or not to try assistive technology. Assessment goes into much more detail, looking closely at the students abilities and difficulties and the demands of the environments and tasks. Assessment also includes the acquisition of new information

We believe that assessment has three parts:

- **Information Gathering**
- **Decision Making**
- **Trial Use**

Information gathering may require specific tests to determine a student's functional level on a given task, observation in customary environments to document performance as well as environmental demands, and careful review of what has already been tried. The decision making requires the use of a clearly defined decision making process understood by everyone. If assistive technology appears to be a viable tool, trials to determine exactly what will work are needed.

Who provides an Assistive Technology Assessment

When there is a specific request for an assistive technology assessment or the IEP Team determines that one is needed, an assessment of the student's need for assistive technology must be completed. While school districts may vary in their specific procedures, it is essential that a team of people be involved in any AT assessment.

There are **five basic components** that **must** be represented on every team making decisions about assistive technology. They are:

- A person knowledgeable about the student. That may be **the student** and/or **parents** or other family members.
- A person knowledgeable in the area of **curriculum**, usually a Special Education teacher.
- A person knowledgeable in the area of **language**, usually a Speech/Language Pathologist.
- A person knowledgeable in the area of **motor**, often an Occupational or Physical Therapist.
- A person who can commit the district's resources, not only for purchase of devices, but to authorize staff training and guarantee implementation in various educational settings, usually an **administrator**.

There can be any number of additional team members from such backgrounds as:

Audiologist	Computer Specialist
Counselor	Early Intervention Specialist
Instructional Assistant	Nurse
Physician	Rehabilitation Engineer
Social Worker	Teacher of Hearing Impaired
Teacher of Visually Impaired	Vocational Counselor

This is not an exhaustive list. Each student's team should be unique, customized to reflect the student's unique needs. **Anyone who has the potential to contribute to the decision making or implementation can be invited to participate on the team**.

Procedures Required
Each school district must have in place a procedure for providing assistive technology assessment. This procedure should include the identification of team members to provide the needed expertise to make an informed decision about assistive technology to meet the student's identified needs.

On the following pages information will be provided about the three step process of Information Gathering, Decision Making, and Trial Use that comprise the AT Assessment process developed by the Wisconsin Assistive Technology Initiative.

The need for an assistive technology (AT) assessment may occur at any time during the provision of services to children with disabilities. It may come up during the official "consideration" during the IEP meeting, or at any time while a child is receiving special education and related services. Generally the need for an AT assessment is brought up by either the parents or the service providers. (We'll use this term to mean any of the therapists, teachers, assistants, or other individuals paid to provide services in the school). It may be a formal request for an "Assistive Technology Evaluation" or more of a specific question and something more is needed.

The question may be broad such as, "Sally struggles with trying to do all of the required reading and writing in sixth grade. She understands the concepts, but decoding the printed word and trying to spell what she wants to write are so difficult that she is feeling overwhelmed and frustrated. Is there any assistive technology that could help with this?" Or it can be very specific, "Bob is not able to understand the graphics in the social studies book due to his vision."

In Sally's case there may be a whole range of hardware (from low tech to computer based) and software that will need to be tried for specific reading and writing tasks in her various classes. In Bob's case only one or two things may need to be tried before a workable solution will be found. In either situation, the team of service providers who work with that child need to have a systematic approach to begin to answer the question.

We have found that people who are new to assistive technology or teams new to the role of "assessing" a student's need for assistive technology often flounder. They struggle to figure out where to start, what questions to ask, what commercial tests, if any, they might need to use, etc. The Wisconsin Assistive Technology Initiative developed a set of forms to help the team through these difficulties and to help them focus on the specific issues that need to be addressed. The forms that we use include:

- The WATI Student Information Guide
- The WATI Environmental Observation Guide
- The WATI Assistive Technology Decision Making Guide
- The WATI Assistive Technology Checklist

Assessing A Child's Need for Assistive Technology, Where to Start?

When the question of a child's need for AT leads to an assessment, the first action is to identify a team of people to address that question. If the school district already has an identified team, then a request for their assistance is made. If no one is designated to function as an AT Assessment team, or only one person has been designated, then a team of people with sufficient knowledge to make an appropriate and useful decision must be assembled.

While the number of the team members and their specific expertise will vary with the magnitude and complexity of the question to be answered, there are some specific considerations in selecting the members of the team. It is important that someone on the team understands curriculum. This is often a special education teacher or the regular classroom teacher. If the question involves speech or language, then someone with expertise in language development is needed. This is most typically a Speech/Language Pathologist, but might also be a teacher of the hearing impaired, if that would be appropriate based upon the child's unique needs. Often there are questions about positioning or motor ability. In this case a Physical or Occupational Therapist is needed. And, of course, one or more of these individuals must have knowledge about specific assistive technology that might be appropriate to address the child's needs. There may be any number of other individuals, as needed. For instance if the child has a vision impairment, there would need to be a Vision Specialist involved. If the child has Autism, someone with a background in Autism will be needed. While there may be a core group of people in a school district who routinely address questions about assistive technology, the specific team working together to determine an assistive technology solution will be made up of individuals who collectively can address all of the child's unique needs.

Finally, one or both of the parents, and when appropriate, the child must be active participants in the information gathering and decision making. If the child can contribute and understand information, then he should participate in meetings along with his parent or parents. Typically a group of three to six or seven individuals will meet to begin the information gathering and decision making stages of the AT Assessment Process. The AT Assessment Directions/Procedure Guide is a basic outline of the steps that need to take place.

W.A.T.I.
Assistive Technology Assessment
Directions/Procedure Guide

School District/Agency_____School_____

Student_____Grade_____

Team Members_____

	Date Completed	Comments
Gathering Information: **Step 1: Team Members Gather Information** Review existing information regarding child's abilities, difficulties, environment, and tasks. If there is missing information, you will need to gather the information by completing formal tests, completing informal tests, and/or observing the child in various settings. The WATI Student Information Guide and Environmental Observation Guide are used to assist with gathering information. Remember, the team gathering this information should include parents, and if appropriate, the student. **Step 2: Schedule Meeting** Schedule a meeting with the team. Team includes: parents, student (if appropriate), service providers (e.g. spec. ed. teacher, general ed. teacher, SLP, OT, PT, administrator), and any others directly involved or with required knowledge and expertise. **Decision Making:** **Step 3: Team Completes Problem Identification Portion of AT Decision Making Guide at the Meeting.** **(Choose someone to write all topics where everyone participating can see them.)** The team should move quickly through: Listing the student's **abilities/difficulties** related to tasks (5-10 minutes). Listing key aspects of the **environment** in which the student functions and the student's location and positioning within the environment (5-10 minutes). Identifying the **tasks** the student needs to be able to do is important because the team cannot generate AT solutions until the tasks are identified (5-10 minutes). (Note: The emphasis in problem identification is identifying tasks the student needs to be able to do and the relationship of the student's abilities/difficulties and characteristics of the environment of the child's performance of the tasks.)		

	Date Completed	Comments

Step 4: Prioritize the List of Tasks for Solution Generation

Identify critical task for which the team will generate potential solutions. This may require a redefining or reframing of the original referral question, but is necessary so that you hone in on the most critical task

Step 5: Solution Generation

Brainstorm all possible solutions.

Note: The specificity of the solutions will vary depending on the knowledge and experience of the team members; some teams may generate names of specific devices with features that will meet the child's needs, other teams may simply talk about features that are important, e.g. "needs voice output," "needs to be portable," "needs few (or many) messages," "needs input method other than hands," etc. Teams may want to use specific resources to assist with solution generation. These resources include, but are not limited to: the AT Checklist, the ASNAT Manual, the Tool Box in *Computer and Web Resources for People with Disabilities*, *Closing the Gap Resource Directory*, and/or AT Consultant.

Step 6: Solution Selection

Discuss the solutions listed, thinking about which are most effective for the student. It may help to group solutions that can be implemented 1) immediately, 2) in the next few months, and 3) in the future. At this point list names of specific devices, hardware, software, etc. If the team does not know the names of devices, etc., use resources noted in Step 5 or schedule a consultation with a knowledgeable resource person (that is the part of the decision-making that should require the most time. Plan on 20-30 minutes here).

Step 7: Implementation Plan

Develop implementation plan (including trials with equipment) – being sure to assign specific names and dates, and determine meeting date to review progress (follow-up Plan).

Reminder: Steps 3-7 occur in a meeting with all topics written where all participants can see them. Use a flip chart, board or overhead during the meeting, because visual memory is an important supplement to auditory memory. Following the meeting, ensure that someone transfers the information to paper for the child's file for future reference.

Trial Use:

Step 8: Implement Planned Trials

Step 9: Follow Up on Planned Date

Review trial use. Make any needed decisions about permanent use. Plan for permanent use.

Gathering Information about the Student

The process for assistive technology assessment developed by the Wisconsin Assistive Technology Initiative incorporates the SETT framework (Zabala, 1994) to help organize the often complex task of assistive technology decision making. SETT stands for **S**tudent, **E**nvironment, **T**asks, **T**ools. By grouping the information into these categories, the task of selecting assistive technology becomes much more logical.

Without the SETT Framework, trying to gather and sort out all of the information necessary for assistive technology decision making can be an overwhelming task. With it, the simplicity of gathering and grouping information allows the team to effectively use that information for competent decision making.

Using the Student Information Guide

As you read through the Student Information Guide, the first thing you note is the questions about what assistive technology is currently being used and what has been used in the past. These are important questions. Unfortunately in our busy lives, it is possible for one service provider to be using assistive technology without others being aware of it. For example the Language Arts teacher may have discovered that Samantha writes much better with voice output on the computer. This may occur because all of the computers in her classroom are equipped with speech cards and talking word processing. Students can choose to use it or not. She observes over the course of several months that Samantha regularly chooses to work with talking word processing and that it has improved both the spelling and grammar in her written assignments. The other teachers and therapists may not be aware of this. Both the documenting and the sharing of that kind of information are essential.

The next section requires a file review to determine what assistive technology, if any, has been tried in the past and what the outcome of that use was. Turn over in staff can cause us to lose track of assistive technology use. Perhaps the most extreme example of this is the case of a team who spent several weeks trying to determine what augmentative communication device might work for a non speaking student. They were all new and neglected to thoroughly review the file until early October, when they were startled to learn that a $6000 dynamic display, voice output communication aide had been purchased for the student two years earlier. It was in a box, at the back of the classroom closet, safely stored away. Had someone not reviewed the file, they would have spent money on another device, when they already had a very powerful one available. The parent had told them on several occasions that there "used to be something that talked for him," but they had not tracked down the critical information.

Now at the bottom of page 21, the team selects the sections that they feel they will need to complete. It is recommended that a team new to assistive technology assessment concentrate on only one area of concern at a time. So if the child has a learning disability and they are most concerned about writing. They would proceed to the section on Writing and answer the questions in that section. If they are concerned about more than one task, they may decide to complete more than one section of the Student Information Guide. It is up to the team to determine how many and which sections of the Guide will be helpful to them.

Each of the 13 content sections of the Student Information Guide contain questions relevant to determining the type of assistive technology and the features that might be necessary for a child to utilize assistive technology in the completion of the task. On pages 22 and 23 there are a series of questions about the child's abilities related to computer access. These two pages are not necessary to complete if the child has normal fine motor ability, but are critical if the child has a physical disability that includes fine motor difficulties that would impact his ability to keyboard. In the Section on Writing, the first questions address the child's current writing ability. The next question is about any assistive technology currently used. Because much of the assistive technology used to address writing difficulties involves keyboarding, the next question is about the child's current keyboarding ability. Numbers four and five on pages 24 and 25 concern computer use and computer availability. At the bottom of page 25 there is a place to summarize the child's abilities and the concerns related to writing.

Once the desired sections of the Student Information Guide are completed, the team moves on to page 41. The questions on this page are general and apply to every child. They include questions about behaviors that might impact the child's use of assistive technology any other significant factors that should be noted such as learning style, coping strategies, or interest that the team should remember and consider as they move on with the assessment process.

Referral/Question Identification Guide

Student's Name_____ Date of Birth_____ Age__

School_____ Grade_____

School Contact Person_____ Phone_____

Persons Completing Guide_____

Date_____

Parent(s) Name_____ Phone_____

Address_____

Student's Primary Language_____ Family's Primary Language_____

Disability (Check all that apply.)

- ❒ Speech/Language
- ❒ Cognitive Disability
- ❒ Traumatic Brain Injury
- ❒ Emotional/Behavioral Disability
- ❒ Orthopedic Impairment – Type_____
- ❒ Significant Developmental Delay
- ❒ Other Health Impairment
- ❒ Autism
- ❒ Specific Learning Disability
- ❒ Hearing Impairment
- ❒ Vision Impairment

Current Age Group

- ❒ Birth to Three
- ❒ Middle School
- ❒ Early Childhood
- ❒ Secondary
- ❒ Elementary

Classroom Setting

- ❒ Regular Education Classroom
- ❒ Home
- ❒ Resource Room
- ❒ Other_____
- ❒ Self-contained

Current Service Providers

- ❒ Occupational Therapy
- ❒ Physical Therapy
- ❒ Speech Language
- ❒ Other(s)_____

Medical Considerations (Check all that apply.)

- ❒ History of seizures
- ❒ Has degenerative medical condition
- ❒ Has multiple health problems
- ❒ Has frequent ear infections
- ❒ Has allergies to_____
- ❒ Currently taking medication for_____
- ❒ Other – Describe briefly_____
- ❒ Fatigues easily
- ❒ Has frequent pain
- ❒ Has frequent upper respiratory infections
- ❒ Has digestive problems

_____

Other Issues of Concern_____

Assistive Technology Currently Used (Check all that apply.)

- ❒ None
- ❒ Manual Communication Board
- ❒ Low Tech Vision Aids
- ❒ Environmental Control Unit/EADL
- ❒ Power Wheelchair
- ❒ Voice Recognition
- ❒ Low Tech Writing Aids
- ❒ Augmentative Communication System
- ❒ Amplification System
- ❒ Manual Wheelchair
- ❒ Computer – Type (platform)_____
- ❒ Word Prediction
- ❒ Adaptive Input - Describe_____
- ❒ Adaptive Output - Describe_____
- ❒ Other_____

Assistive Technology Tried

Please describe any other assistive technology previously tried, length of trial, and outcome (how did it work or why didn't it work.)

_____ _____
Assistive Technology Number and Dates of Trial(s)

_____
Outcome

_____ _____
Assistive Technology Number and Dates of Trial(s)

_____
Outcome

_____ _____
Assistive Technology Number and Dates of Trial(s)

_____
Outcome

REFERRAL QUESTION

What task(s) does the student need to do that is currently difficult or impossible, and for which assistive technology may be an option? _____

_____

Based on the referral question, select the sections of the Student Information Guide to be completed. (Check all that apply.)

- ❒ Section 1 Fine Motor Related to Computer or Device Access
- ❒ Section 2 Motor Aspects of Writing
- ❒ Section 3 Composing Written Material
- ❒ Section 4 Communication
- ❒ Section 5 Reading
- ❒ Section 6 Learning and Studying
- ❒ Section 7 Math
- ❒ Section 8 Recreation and Leisure
- ❒ Section 9 Seating and Positioning
- ❒ Section 10 Mobility
- ❒ Section 11 Vision
- ❒ Section 12 Hearing
- ❒ Section 13 General

WATI Student Information Guide

SECTION 1

Fine Motor Related to Computer (or Device) Access

1. Current Fine Motor Abilities

Observe the student using paper and pencil, typewriter, computer, switch, etc. Look at the movements as well as the activities and situations. Does the student have voluntary, isolated, controlled movements using the following? (Check all that apply.)

❒ Left hand	❒ Right hand	❒ Eye(s)
❒ Left arm	❒ Right arm	❒ Head
❒ Left leg	❒ Right leg	❒ Mouth
❒ Left foot	❒ Right foot	❒ Tongue
❒ Finger(s)	❒ Eyebrows	❒ Other _____
		_____

Describe briefly the activities/situations observed_____

_____

_____

_____

2. Range of Motion

Student has specific limitations to range. ❒Yes ❒No

Describe the specific range in which the student has the most motor control._____

_____

_____

_____

3. Abnormal Reflexes and Muscle Tone

Student has abnormal reflexes or abnormal muscle tone. ❒Yes ❒No

Describe briefly any abnormal reflex patterns or patterns of low or high muscle tone that may interfere with the student's voluntary motor control._____

_____

_____

_____

4. Accuracy

Student has difficulty with accuracy. ❒Yes ❒No

Describe how accurate, reliable and consistent the student is in performing a particular fine motor task.

_____

5. Fatigue

Student fatigues easily. ❒Yes ❒No

Describe how easily the student becomes fatigued._____

_____

_____

_____

6. Assisted Direct Selection

What type of assistance for direct selection has been tried? (Check all that apply.)

❒ Keyguard ❒ Head pointer/head stick

❒ Pointers, hand grips, splints etc. ❒ Light beam/laser

Other:_____

Describe which seemed to work the best and why._____

_____

7. Size of Grid Student Is Able to Access

What is the smallest square the student can accurately access? ❒ 1" ❒ 2" ❒ 3" ❒ 4"

What is the optimal size grid? Size of square _____

Number of squares across _____

Number of squares down _____

8. Scanning

If student cannot direct select, does the student use scanning?

❒ No

❒ Yes, if yes ❒ Step ❒ Automatic ❒ Inverse ❒ Other_____

Preferred control site (body site)_____

Other possible control sites_____

9. Type of Switch

The following switches have been tried. (Check all that apply. **Circle the one or two** that seemed to work the best.)

❒ Touch (jellybean) ❒ Light touch ❒ Wobble ❒ Rocker

❒ Joystick ❒ Lever ❒ Head switch ❒ Mercury (tilt)

❒ Arm slot ❒ Eye brow ❒ Tongue ❒ Sip/puff

❒ Tread ❒ Other_____

Summary of Student's Abilities and Concerns Related to Computer/Device Access_____

_____

_____

WATI Student Information Guide

SECTION 2

Motor Aspects of Writing

1. Current Writing Ability (Check all that apply.)

- ❒ Holds pencil, but does not write
- ❒ Scribbles with a few recognizable letters
- ❒ Uses pencil adapted with_____
- ❒ Copies from book (near point)
- ❒ Prints a few words
- ❒ Prints name
- ❒ Writes cursive
- ❒ Writing is limited due to fatigue
- ❒ Writing is slow and arduous
- ❒ Pretend writes
- ❒ Uses regular pencil
- ❒ Copies simple shapes
- ❒ Copies from board (far point)
- ❒ Writes on 1" lines
- ❒ Writes on narrow lines
- ❒ Uses space correctly
- ❒ Sizes writing to fit spaces
- ❒ Writes independently and legibly

2. Assistive Technology Used (Check all that apply.)

- ❒ Paper with heavier lines
- ❒ Special pencil or marker
- ❒ Computer
- ❒ Paper with raised lines
- ❒ Splint or pencil holder
- ❒ Other _____
- ❒ Pencil grip
- ❒ Typewriter

3. Current Keyboarding Ability (Check all that apply.)

- ❒ Does not currently type
- ❒ Types slowly, with one finger
- ❒ Accidentally hits unwanted keys
- ❒ Requires arm or wrist support to type
- ❒ Uses mini keyboard to reduce fatigue
- ❒ Uses Touch Window
- ❒ Uses access software
- ❒ Activates desired key on command
- ❒ Types slowly, with more than one finger
- ❒ Performs 10 finger typing
- ❒ Accesses keyboard with head or mouth stick
- ❒ Uses switch to access computer
- ❒ Uses alternative keyboard
- ❒ Uses Morse code to access computer
- ❒ Uses adapted or alternate keyboard, such as_____
- ❒ Other_____

4. Computer Use (Check all that apply.)

- ❒ Has never used a computer
- ❒ Uses computer for games
- ❒ Uses computer at school
- ❒ Uses computer for word processing
- ❒ Uses computer at home
- ❒ Uses computer's spell checker
- ❒ Uses computer for a variety of purposes, such as_____
- ❒ Has potential to use computer but has not used a computer because_____

_____

_____

_____

_____

5. Computer Availability and Use

The student has access to the following computer(s)

❒ PC ❒ Macintosh ❒ Other_____

❒ Desktop ❒ Laptop

Location:_____

The student uses a computer

❒ Rarely ❒ Frequently ❒ Daily for one or more subjects or periods ❒ Every day, all day

Summary of Student's Abilities and Concerns Related to Writing _____

_____

_____

_____

_____

WATI Student Information Guide

SECTION 3

Composing Written Material

1. Typical of Student's Present Writing (Check all that apply.)

- ❒ Short words
- ❒ Short phrases
- ❒ Complex phrases
- ❒ Sentences
- ❒ Paragraphs of 2-5 sentences
- ❒ Longer paragraphs
- ❒ Multi-paragraph reports
- ❒ Other _____ _____

2. Difficulties Currently Experienced by Student (Check all that apply.)

- ❒ Answering questions
- ❒ Getting started on a sentence or story
- ❒ Adding information to a topic
- ❒ Sequencing information
- ❒ Integrating information from two or more sources
- ❒ Relating information to specific topics
- ❒ Determining when to begin a new paragraph
- ❒ Generating ideas
- ❒ Working w/peers to generate ideas and information
- ❒ Planning content
- ❒ Using a variety of vocabulary
- ❒ Summarizing information
- ❒ Other_____ _____

3. Strategies for Composing Written Materials Student Currently Utilizes (Check all that apply.)

- ❒ Story starters
- ❒ Preset choices or plot twists
- ❒ Templates to provide the format or structure (both paper and electronic)
- ❒ Webbing/concept mapping
- ❒ Outlines
- ❒ Other_____

4. Aids/Assistive Technology for Composing Written Materials Utilized by Student (Check all that apply.)

- ❒ Word cards
- ❒ Word book
- ❒ Word wall/word lists
- ❒ Prewritten words on cards or labels
- ❒ Dictionary
- ❒ Electronic dictionary/spell checker
- ❒ Whole words using software or hardware (e.g. IntelliKeys)
- ❒ Symbol-based software for writing (e.g. Writing with Symbols 2000 or Pix Writer)
- ❒ Word processing with spell checker/grammar checker
- ❒ Talking word processing
- ❒ Abbreviation/expansion
- ❒ Word processing with writing support
- ❒ Multimedia software
- ❒ Voice recognition software
- ❒ Other_____

Summary of Student's Abilities and Concerns Related to Computer/Device Access_____

_____

_____

WATI Student Information Guide

SECTION 4

Communication

1. Student's Present Means of Communication

(Check all that are used. **Circle the primary method** the student uses.)

❒ Changes in breathing patterns ❒ Body position changes ❒ Eye-gaze/eye movement

❒ Facial expressions ❒ Gestures ❒ Pointing

❒ Sign language approximations ❒ Sign language (Type_____ # signs_____

combinations _____ # signs in a combination _____)

❒ Vocalizations, list examples_____

❒ Vowels, vowel combinations, list examples_____

❒ Single words, list examples & approx. #_____

❒ Reliable no ❒ Reliable yes

❒ 2-word utterances ❒ 3-word utterances

❒ Semi intelligible speech, estimate % intelligible:_____

❒ Communication board ❒ Tangibles ❒ Pictures ❒ Combination pictures/words ❒ Words

❒ Voice output AC device (name of device)_____

❒ Intelligible speech ❒ Writing ❒ Other_____

2. Those Who Understand Student's Communication Attempts (Check best descriptor.)

	Most of the time	Part of the time	Rarely	Not Applicable
Strangers	❒	❒	❒	❒
Teachers/therapists	❒	❒	❒	❒
Peers	❒	❒	❒	❒
Siblings	❒	❒	❒	❒
Parent/Guardian	❒	❒	❒	❒

3. Current Level of Receptive Language

Age approximation _____

If formal tests used, name and scores_____

If formal testing is not used, please give an approximate age or developmental level of functioning. Explain your rationale for this estimate. _____

_____

4. Current Level of Expressive Language

Age approximation: _____

If formal tests used, name and scores_____

If formal testing is not used, please give an approximate age or developmental level of functioning. Explain your rationale for this estimate._____

5. Communication Interaction Skills

Desires to communicate ❒ Yes ❒ No

To indicate *yes* and *no* the student

❒ Shakes head ❒ Signs ❒ Vocalizes ❒ Gestures ❒ Eye gazes

❒ Points to board ❒ Uses word approximations ❒ Does not respond consistently

Can a person unfamiliar with the student understand the response? ❒ Yes ❒ No

	Always	Frequently	Occasionally	Seldom	Never
Turns toward speaker	❒	❒	❒	❒	❒
Interacts with peers	❒	❒	❒	❒	❒
Aware of listener's attention	❒	❒	❒	❒	❒
Initiates interaction	❒	❒	❒	❒	❒
Asks questions	❒	❒	❒	❒	❒
Responds to communication interaction	❒	❒	❒	❒	❒
Requests clarification from communication partner	❒	❒	❒	❒	❒
Repairs communication breakdown	❒	❒	❒	❒	❒
Requires frequent verbal prompts	❒	❒	❒	❒	❒
Requires frequent physical prompts	❒	❒	❒	❒	❒
Maintains communication exchange	❒	❒	❒	❒	❒
Terminates communication	❒	❒	❒	❒	❒

Describe techniques student uses for repair (e.g. keeps trying, changes message, points to first letter etc.).

_____

_____

_____

6. Student's Needs Related to Devices/Systems (Check all that apply.)

❒ Walks ❒ Uses wheelchair ❒ Carries device under 2 pounds

❒ Drops or throws things frequently ❒ Needs digitized (human) speech

❒ Needs device w/large number of words and phrases

❒ Other _____

7. Pre-Reading and Reading Skills Related to Communication (Check all that apply.)

❒ Yes ❒ No Object/picture recognition

❒ Yes ❒ No Symbol recognition (tactile, Mayer-Johnson, Rebus, etc.)

❒ Yes ❒ No Auditory discrimination of sounds

❒ Yes ❒ No Auditory discrimination of words, phrases

❒ Yes ❒ No Selecting initial letter of word

❒ Yes ❒ No Following simple directions

❒ Yes ❒ No Sight word recognition

❒ Yes ❒No Putting two symbols or words together to express an idea

8. Visual Abilities Related to Communication (Check all that apply.)

- ❒ Maintains fixation on stationary object
- ❒ Scans line of symbols left to right
- ❒ Visually recognizes people
- ❒ Visually recognizes photographs
- ❒ Needs additional space around symbol
- ❒ Visually shifts vertically
- ❒ Looks to right and left without moving head
- ❒ Scans matrix of symbols in a grid
- ❒ Visually recognizes common objects
- ❒ Visually recognizes symbols or pictures
- ❒ Visually shifts horizontally
- ❒ Recognizes line drawings

Is a specific type (brand) of symbols or pictures preferred?_____

What size symbols or pictures are preferred?_____

What line thickness of symbols is preferred? _____ inches

Does student seem to do better with black on white, or white on black, or a specific color combination for figure/ground discrimination?_____

Explain anything else you think is significant about the responses the student currently uses or his/her need for augmenting communication (Use an additional page if necessary)_____

_____

_____

_____

_____

_____

Summary of Student's Abilities and Concerns Related to Communication_____

_____

_____

_____

_____

_____

WATI Student Information Guide

SECTION 5

Reading

1. The Student Demonstrates the Following Literacy Skills. (Check all that apply.)

- ❒ Engages in joint attention with adult caregiver to activities (e.g. songs, stories, games and/or toys)
- ❒ Shows an interest in books and stories with adult
- ❒ Shows and interest in looking at books independently
- ❒ Associates pictures with spoken words when being read to
- ❒ Realizes text conveys meaning when being read to
- ❒ Recognizes connection between spoken words and specific text when being read to
- ❒ Pretend writes and "reads" what he or she has written, even if scribbles
- ❒ When asked to spell a word, gets first consonant correct, but not the rest of the word
- ❒ Demonstrates sound manipulation skills including:
  - ❒ Initial and final sounds in words
  - ❒ Initial letter names/sounds
- ❒ Recognizes, names and prints the alphabet (if motor skills are limited, may use alternative means rather than printing to demonstrate knowledge of the alphabet)
- ❒ When asked to spell a word, gets first and last sounds correct
- ❒ Applies phonics rules when attempting to decode printed words
- ❒ Sound blends words
- ❒ Reads and understands words in context
- ❒ Spells words using conventional spelling in situations other than memorized spelling tests
- ❒ Reads and understands sentences
- ❒ Composes sentences using nouns and verbs
- ❒ Reads fluently with expression
- ❒ Reads and understands paragraphs
- ❒ Composes meaningful paragraphs using correct syntax and punctuation

2. Student's Performance Is Improved by (Check all that apply.)

- ❒ Smaller amount of text on page
- ❒ Word wall to refer to
- ❒ Graphics to communicate ideas
- ❒ Bold type for main ideas
- ❒ Additional time
- ❒ Spoken text to accompany print
- ❒ Other_____
- ❒ Enlarged print
- ❒ Pre-teaching concepts
- ❒ Text rewritten at lower reading level
- ❒ Reduced length of assignment
- ❒ Being placed where there are few distractions
- ❒ Color overlay (List color_____)

3. Reading Assistance Used

Please describe the non-technology based strategies and accommodations that have been used with this student

_____

_____

4. Assistive Technology Used

The following have been tried. (Check all that apply.)

❒ Highlighter, marker, template, or other self-help aid in visual tracking
❒ Colored overlay to change contrast between text and background
❒ Tape recorder, taped text, or talking books to "read along" with text
❒ Talking dictionary or talking spell checker to pronounce single words
❒ Hand held scanner to pronounce difficult words or phrases
❒ Computer with text to speech software to
❒ Speak single words ❒ Speak sentences ❒ Speak paragraphs ❒ Read entire document

Explain what seemed to work about any of the above assistive technology that has been tried.

_____

_____

_____

5. Approximate Age or Grade Level of Reading Skills_____

6. Cognitive Ability in General

❒ Significantly below average ❒ Below average
❒ Average ❒ Above average

7. Difficulty

Student has difficulty decoding the following. (Check all that apply.)

❒ Worksheets ❒Reading Textbook ❒ Subject Area Textbooks ❒ Tests

Student has difficulty comprehending the following. (Check all that apply.)

❒ Worksheets ❒ Reading Textbook ❒ Subject Area Textbooks ❒ Tests

8. Computer Availability and Use

The student has access to the following computer(s):

❒ PC ❒ Macintosh

9. The Student Uses a Computer:

❒ Rarely ❒ Frequently ❒ Daily for one or more subjects or periods ❒ Every day, most of the day

For the following purposes_____

Summary of Student's Abilities and Concerns Related to Reading

_____

_____

_____

_____

WATI Student Information Guide

SECTION 6

Learning and Studying

1. Difficulties Student Has Learning New Material or Studying (Check all that apply.)

- ❒ Remembering assignments
- ❒ Remembering steps of tasks or assignments
- ❒ Finding place in textbooks
- ❒ Taking notes during lectures
- ❒ Reviewing notes from lectures
- ❒ Organizing information/notes
- ❒ Organizing materials for a report or paper
- ❒ Turning in assignments
- ❒ Other_____

_____

2. Assistive Technology Tried (Check all that apply.)

- ❒ Print or picture schedule
- ❒ Low tech aids to find materials (e.g. index tabs, color coded folders)
- ❒ Highlighting text (e.g. markers, highlight tape, ruler)
- ❒ Recorded material
- ❒ Voice output reminders for assignments, steps of task, etc.
- ❒ Electronic organizers
- ❒ Pagers/electronic reminders
- ❒ Hand held scanner to read words or phrases
- ❒ Software for manipulation of objects/concept development
- ❒ Software for organization of ideas and studying
- ❒ Palm computers
- ❒ Other_____

3. Strategies Used

Please describe any adaptations or strategies that have been used to help this student with learning and studying.

_____

_____

_____

_____

Summary of Student's Abilities and Concerns in the Area of Learning and Studying

_____

_____

_____

_____

WATI Student Information Guide

SECTION 7

Math

1. Difficulties Student Has with Math (Check all that apply.)

- ❒ Legibly writing numerals
- ❒ Understanding meaning of numbers
- ❒ Understanding money concepts
- ❒ Completing multiplication and division
- ❒ Understanding units of measurement
- ❒ Creating graphs and tables
- ❒ Understanding fractions
- ❒ Converting to mixed numbers
- ❒ Solving story problems
- ❒ Graphing
- ❒ Understanding and use of trigonometry functions
- ❒ Understanding math related language
- ❒ Understanding place values
- ❒ Completing simple addition and subtraction
- ❒ Completing complex addition and subtraction
- ❒ Understanding tables and graphs
- ❒ Understanding time concepts
- ❒ Working with fractions
- ❒ Understanding decimals /percents
- ❒ Understanding geometry
- ❒ Understanding the use of formulas
- ❒ Checking work
- ❒ Other_____

2. Assistive Technology Tried

- ❒ Abacus
- ❒ Math line
- ❒ Enlarged math worksheets
- ❒ Low-tech alternatives for answering
- ❒ Recorded material
- ❒ Voice output reminders for assignments, steps of task, etc.
- ❒ Pagers/electronic reminders
- ❒ Software for manipulation of objects/concept development
- ❒ Talking or Braille watch
- ❒ Palm computers
- ❒ Talking calculator
- ❒ Braille calculator
- ❒ Alternative keyboards (e.g., IntelliKeys)
- ❒ Math "Smart Chart"
- ❒ Tactile math devices (ruler, clock, etc.)
- ❒ Electronic organizers
- ❒ Single word scanners
- ❒ On screen scanning calculator
- ❒ Software for organization of ideas and studying
- ❒ Other_____

3. Strategies Used

Please describe any strategies that have been used to help._____

_____

_____

_____

Summary of Student's Abilities and Concerns Related to Math_____

_____

_____

WATI Student Information Guide

SECTION 8

Recreation and Leisure

1. Difficulties Student Experiences Participating in Recreation and Leisure (Check all that apply.)

- ❒ Understanding cause and effect
- ❒ Understanding turn taking
- ❒ Handing/manipulating objects
- ❒ Throwing/catching objects
- ❒ Understanding rules
- ❒ Waiting for his/her turn
- ❒ Following simple directions
- ❒ Following complex directions
- ❒ Communicating with others
- ❒ Hearing others
- ❒ Seeing equipment or materials
- ❒ Operating TV, VCR, etc.
- ❒ Operating computer
- ❒ Other _____

2. Activities Student Especially Enjoys_____

_____

_____

_____

3. Adaptations Tried to Enhance Participation in Recreation and Leisure_____

_____

_____

How did they help?_____

_____

_____

4. Assistive Technology Tried (Check all that apply.)

- ❒ Toys adapted with Velcro®, magnets, handles etc.
- ❒ Toys adapted for single switch operation
- ❒ Adaptive sporting equipment, such as lighted or beeping ball
- ❒ Universal cuff or strap to hold crayons, markers, etc.
- ❒ Modified utensils, e.g. rubber stamps, rollers, brushes
- ❒ Ergo Rest or other arm support
- ❒ Electronic aids to control/operate TV, VCR, CD player, etc.
- ❒ Software to complete art activities
- ❒ Other computer software
- ❒ Games on the computer
- ❒ Other _____

Summary of Student's Abilities and Concerns in the Area of Recreation and Leisure

_____

_____

WATI Student Information Guide

SECTION 9

Seating and Positioning

1. Current Seating and Positioning of Student (Check all that apply.)

❒ Sits in regular chair w/ feet on floor
❒ Sits in regular chair w/ pelvic belt or foot rest
❒ Sits in adapted chair
❒ Sits in seat with adaptive cushion that allows needed movement
❒ Sits in wheelchair part of day
❒ Sits comfortably in wheelchair most of day
❒ Wheelchair in process of being adapted to fit
❒ Spends part of day out of chair due to prescribed positions
❒ Spends part of day out of chair due to discomfort
❒ Enjoys many positions throughout the day, based on activity
❒ Has few opportunities for other positions
❒ Uses regular desk
❒ Uses desk with height adjusted
❒ Uses tray on wheelchair for desktop
❒ Uses adapted table

2. Description of Seating (Check all that apply.)

❒ Seating provides trunk stability

❒ Seating allows feet to be on floor or foot rest

❒ Seating facilitates readiness to perform task

❒ There are questions or concerns about the student[1]s seating

❒ Student dislikes some positions, often indicates discomfort in the following positions_____

_____

How is the discomfort communicated?_____

❒ Student has difficulty using table or desk

❒ There are concerns or questions about current wheelchair.

❒ Student has difficulty achieving and maintaining head control, best position for head control is_____

_____

Where are their hips?_____

❒ Can maintain head control for _____ minutes in this position.

Summary of Student's Abilities and Concerns Related to Seating and Positioning

_____

_____

WATI Student Information Guide

SECTION 10

Mobility

1. Mobility (Check all that apply.)

- ❒ Crawls, rolls, or creeps independently
- ❒ Is pushed in manual wheelchair
- ❒ Uses wheelchair for long distances only
- ❒ Uses manual wheelchair independently
- ❒ Is learning to use power wheelchair
- ❒ Uses power wheelchair
- ❒ Needs help to transfer in and out of wheelchair
- ❒ Transfers independently
- ❒ Has difficulty walking
- ❒ Walks with assistance
- ❒ Has difficulty walking up stairs
- ❒ Has difficulty walking down stairs
- ❒ Needs extra time to reach destination
- ❒ Walks independently
- ❒ Walks with appliance
- ❒ Uses elevator key independently

2. Concerns About Mobility (Check all that apply.)

- ❒ Student seems extremely tired after walking, requires a long time to recover
- ❒ Student seems to be having more difficulty than in the past
- ❒ Student complains about pain or discomfort
- ❒ Changes in schedule require more time for travel
- ❒ Changes in class location or building are making it more challenging to get around
- ❒ Transition to new school will require consideration of mobility needs
- ❒ Other_____

Summary of Student's Abilities and Concerns Related to Mobility_____

_____

_____

_____

_____

WATI Student Information Guide

Section 11

Vision

A vision specialist should be consulted to complete this section.

1. Date of Last Vision Report _____

Report indicates (please address any field loss, vision condition, etc.)_____

_____

_____

2. Visual Abilities (Check all that apply.)

❒ Read standard textbook print

❒ Read text if enlarged to (indicate size in inches)_____

❒ Requires specialized lighting such as_____

❒ Requires materials tilted at a certain angle (indicate angle)_____

❒ Can read using optical aids, list:_____

❒ Currently uses the following screen enlargement device_____

❒ Currently uses the following screen enlargement software_____

❒ Recognizes letters enlarged to _____ pt. type on computer screen

❒ Recognizes letters enlarged to _____ pt. type for _____minutes without eye fatigue.

❒ Prefers ❒ Black letters on white ❒ White on black ❒_____(color) on _____

❒ Tilts head when reading

❒ Uses only one eye: ❒ Right eye ❒ Left eye

❒ Uses screen reader:_____

❒ Requires recorded material, text to speech, or Braille materials

3 Alternative Output

Currently uses (Check all that apply.)

❒ Slate and stylus

❒ Talking calculator

❒ Braille calculator

❒ Braille notetaker

❒ Electric Brailler

❒ Refreshable Braille display

❒ Tactile images

❒ Screen reader

❒ Braille translation software:_____

Level of proficiency (Check the one that most closely describes the student.)

- ❒ Requires frequent physical prompts
- ❒ Requires frequent verbal cues
- ❒ Needs only intermittent cues
- ❒ Uses device to complete tasks independently
- ❒ Trouble-shoots problems related to device

4. Writing/Handwritten Materials (check all that apply)

- ❒ Writes using space correctly
- ❒ Writes on line
- ❒ Writes appropriate size
- ❒ Reads own handwriting
- ❒ Reads someone else's writing
- ❒ Reads hand printing
- ❒ Reads cursive
- ❒ Skips letters when copying
- ❒ Requires bold or raised-line paper
- ❒ Requires softer lead pencils
- ❒ Requires colored pencils, pens, or paper
- ❒ Requires felt tip pen ❒ Thin point ❒ Thick point

Summary of Student's Abilities and Concerns Related to Vision_____

_____

_____

_____

_____

WATI Student Information Guide

SECTION 12

Hearing

A hearing specialist should be consulted to complete this section.

1. Audiological Information

Date of last audiological exam_____

Hearing loss identified

Right Ear	❒ Mild	❒ Moderate	❒ Severe	❒ Profound
Left Ear	❒ Mild	❒ Moderate	❒ Severe	❒ Profound

Onset of hearing loss _____Etiology _____

2. Unaided Auditory Abilities (Check all that apply.)

❒ Attends to sounds ❒ High pitch ❒ Low pitch ❒ Voices ❒ Background noises
❒ Discriminates environmental vs. non-environmental sounds
❒ Turns toward sound
❒ Hears some speech sounds
❒ Understands synthesized speech

3. Student's Eye Contact and Attention to Communication (Check best descriptor.)

❒ Poor ❒ Inconsistent ❒ Limited ❒ Good ❒ Excellent

4. Communication Used by Others

Indicate the form of communication generally used by others in each of the following environments. (Check all that apply.)

	School	Home	Community
❒ Body language	❒	❒	❒
❒ Tangible symbols	❒	❒	❒
❒ Gestures	❒	❒	❒
❒ Speech	❒	❒	❒
❒ Cued speech	❒	❒	❒
❒ Picture cues	❒	❒	❒
❒ Written messages	❒	❒	❒
❒ Signs and speech together	❒	❒	❒
❒ Signed English	❒	❒	❒
❒ Contact (Pidgin) sign language	❒	❒	❒
❒ American Sign Language (ASL)	❒	❒	❒

5. Level of Receptive Proficiency in Each Environment

	School	Home	Community
❒ Understands single words	❒	❒	❒
❒ Understands short phrases	❒	❒	❒
❒ Understands majority of communications	❒	❒	❒

6. Student Communicates with Others Using (Check all that apply)

❒ Speech ❒ American Sign Language ❒ Body language
❒ Signs and speech together ❒ Gestures ❒ Written messages
❒ Signed English ❒ Picture cues ❒ Contact (Pidgin) sign language
❒ Other_____

Level of expressive communication:

❒ Single words ❒ Combination of words ❒ Proficient

7. Is There a Discrepancy Between Receptive and Expressive Abilities?

❒ Yes ❒ No

If yes, describe further._____

_____

8. Services Currently Used (Check all that apply)

❒ Audiology_____ ❒ Note taker
❒ Educational interpreter using:_____ ❒ ASL ❒ Transliterating ❒ PSE ❒ Oral

9. Equipment Currently Used (Check all that apply.)

❒ Hearing aids ❒ Cochlear implant ❒ Telecaption decoder
❒ Vibrotactile devices ❒ Classroom amplification system ❒ TTY/TDD
❒ FM system ❒ Other_____

10. Present Concerns for Communication, Writing, and/or Educational Materials

❒ Cannot hear teacher/other students ❒ Cannot respond to emergency alarm
❒ Cannot participate in class discussions ❒ Cannot benefit from educational videos/programs
❒ Displays rec./exp. language delays ❒ Cannot use telephone to communicate

11. Current communication functioning (Check all that apply)

❒ Desires to communicate
❒ Initiates interaction
❒ Responds to communication requests
❒ Reads lips
❒ Appears frustrated with current communication functioning
❒ Requests clarification from communication partners ("Would you please repeat that?")
❒ Repairs communication breakdown (Keeps trying, changes message)

12. Current Reading Level_____

Summary of Hearing Abilities and Concerns_____

_____

_____

WATI Student Information Guide

Section 13

General

Are there any behaviors (both positive and negative) that significantly impact the student's performance?

_____

_____

_____

_____

_____

_____

Are there significant factors about the student's strengths, learning style, coping strategies or interests that the team should consider?

_____

_____

_____

_____

_____

_____

Are there any other significant factors about the student that the team should consider?

_____

_____

_____

_____

Does student fatigue easily or experience a change in performance at different times of the day?

_____

_____

_____

_____

Gathering Information about Environments and Tasks

Effective, appropriate decisions about assistive technology can only be made when teams are well informed about the unique characteristics of the environments in which the student spends time and the tasks that are being done in those environments (Zabala, 1994). The Wisconsin Assistive Technology Initiative strongly encourages observing the student in several environments with a specific focus on describing the environment and the activities/tasks in which the target student and other students are engaged. The Environmental Observation Guide is a tool for that purpose.

Consider all customary environments, including the classroom and other school environments, such as the lunchroom, playground, assemblies, etc., the home, and any relevant community sites such as shopping malls, restaurants, church, scouts or other groups. Information to be gathered can be guided by specific questions such as these:

- What equipment and materials are available in each environment?
- Who are the primary people interacting with the student?
- How is instruction or direction delivered?
- What modifications are typically made in various environments?
- What is the student's position and location in room?
- Where are the things the student needs to see, such as chalkboard, overhead, etc.?
- What is the lighting and sound like in the setting?
- How are transitions accomplished? Are there concerns?

Teams may modify or add to these questions, they are provided only as a starting place.

Using the Environmental Observation Guide

The Environmental Observation Guide instructions was developed by the National Assistive Technology Research Institute (2001), modified and used with permission.

The Environmental Observation Guide forms draw the observer's attention to what is going on in the activity and setting. Teams may modify or add to these questions. They are provided only as a starting place.

Prior to the observation:

Clarify the purpose of the observation:

- Record successful assistive technology use in educational environments
- Observe a child using assistive technology in educational environments
- Record characteristics of the educational environments

Select a time and place:

- Review the student's IEP for specifics about the student's AT use
- First preference – Schedule the observation for the place and time indicated in the IEP as to when AT is supposed to be used during the day
- Second preference – If it is not specified in the IEP, talk to teacher to schedule a time and place when the student uses AT the most during the day

- Third preference – If the student uses the AT across the entire day, observe in the setting where he spends the most amount of his instructional day

Meet with the teacher(s), therapists, and assistants to determine:

- What will happen in the class that day; Is it a typical day?
- What the student using assistive technology will be doing that day
- Inform them what you will be doing during the observation

During the observation:

Record observations:

- Complete the environmental assessment checklist
- Record direct student observation field notes
- Record impressions and comments
- Record time markers in the observation notes to determine length of activities
- Participate in the class only if invited to do so

After the observation:

Thank the teacher for allowing you to observe.

If time allows in the teacher's schedule

- Probe for additional information directly related to your observations for clarity
- Share a brief summary of what you saw

Provide the teacher with a copy of the observation summary when completed.

Conduct the teacher interview at a mutually agreed upon time.

The observer's role is to capture what is occurring, not to make decisions or even formal recommendations, that comes later in the decision making part of the assessment process. During the observation(s), the observers are simply gathering information.

Environmental Observation Guide

Student's name:_____

School:_____

Observer:_____

Date of Observation: _____

Type of class: _____

Directions: Complete this Environmental Assessment Checklist before beginning

Describe the environment: Record short responses in the space provided.

Special or general education classroom?	
Specialty classroom (Specify: e.g., P.E., computer lab)	
Therapy room? (Specify)	
Number of teachers in class?	
Number of aides in class?	
Number of volunteers in class?	
Number of students in the class?	
How many days per week is the program?	
How many hours/day?	
Is the atmosphere busy or quiet?	
Are there large open areas or small divided sections?	
How are the desks arranged?	
Is the furniture sized for children?	
Are materials accessible, appropriate, varied, interesting?	
Is special equipment available (i.e., chairs with arm supports)?	
Where is the classroom located in relationship to the cafeteria, therapy, outdoor play areas, etc.?	
Are bathrooms located in or outside the classroom?	

Sensory Stimulation: Judge the level of sensory stimulation and record it with a check in the corresponding box. Enter comments or notes that clarify your responses if needed.

	Excessive	**Balanced**	**Reduced**	**N/A**	**Comments**
Auditory					
Hallway					
Street					
Other classrooms					
Other students					
Instructional media					
Teacher aides/volunteers					
Other (specify):					

Sensory Stimulation: continued

	Excessive	Balanced	Reduced	Comments
Visual				
Color				
Clutter/busy				
Art/decorations				
Visual information				
Lighting				
Other (specify):				

Persons Present During Observation: For each person on the list, put a check in the appropriate column indicating their level of participation.

Persons	Participating	Observing	Not Present
Student			
Special Educator			
General Educator			
Peer Tutors (How many? _____)			
Instructional Assistant #1			
Instructional Assistant #2			
Instructional Assistant #3			
Personal Attendant			
Speech-Language Pathologist			
Occupational Therapist			
Physical Therapist			
School Psychologist			
Parent			
Volunteer			
Administrator			
AT Specialist			
Other (specify):			

Notes:

Access to Assistive Technology: Record the presence or absence of **EACH TYPE** of assistive technology by placing a check in the corresponding box. Record the AT found in the classroom as a whole, not just the AT used by the target student.

Types	Present-Not Used	Present-Used	Not Present
Communication cards/boards			
Digitally recorded communication devices			
Electronic communication devices			
AT for activities of daily living			
Adjustable seating (not a wheelchair)			
Positioning equipment			
Amplification			
Visual signaling devices			
Brailler/brailled materials			
Magnifiers			
Notetaking devices/keyboards			
Speech output devices/computers			
Handwriting aids			
Alternate/adapted keyboards			
Alternate/adapted mouse			
Computer switch interface			
Touch window			
Talking word processor/word prediction/abbreviation & expansion			
Transfer aids - Hoists/lifts			
Mobility aids (not wheelchairs)			
Adapted environment (e.g., doors, fixtures, furniture)			
Electronic equipment for instruction (calculator, e-books)			
Adapted instructional materials			
Instructional software			
Computer stations			
Adapted art/craft materials			
Adapted sports/recreation equipment			
Adapted toys			
Other (specify):			

Environmental Observation Summary

Activity/Task(s) observed:
Ways that typical students participated:
Ways the target student participated:
Barriers to target student's participation:

Adapted from:

Wirkus-Pallaske, M., Reed, P., & Stokes, S. (2000). *Wisconsin Assistive Technology Initiative*. Oshkosh, WI: Wisconsin Assistive Technology Initiative.

Center for Instructional Development and Research. (1998). Classroom observation. *CIDR Teaching and Learning Bulletin, 1*(4), Available online: http://depts.washington.edu/ObsTools.htm

Pearson, L. (no date). *Apraxia guide: Classroom observation checklist*. Available online: http://hometown.aol.com/lynetteprs/myhomepage/profile.html

Using the AT Decision Making Guide

When the members of the team who have been assigned to gather information have completed their tasks, the team is ready to come together for the next step. The information gathering may have included reviewing the files, contacting previous service providers, completing a specific test that someone felt would provide important information, or observing. In decision making this information will be used to guide the direction and content of the decision.

Decision making takes place at a meeting. The tool to be used is the AT Decision Making Guide. This guide is a single page that leads the team through a five step decision making process. Using an effective decision making process requires team members to acquire and use a variety of skills that are separate from the technical skills they may have needed during the data gathering stage. These include communication skills and group process skills. The communication skills include, but are not limited to active listening, negotiation, providing non-threatening feedback, and accepting criticism without becoming defensive. The last skill area is group process. It includes following a schedule, reaching consensus, and a variety of tasks that become important when working as part of a team, one of the most important being the effective use of a formal group decision making process.

The key elements or steps of an effective decision making process include:

1. **Problem Identification:** The identification and definition of a specific problem
2. **Solution Generation:** The suggestion of possible solutions
3. **Solution Selection:** The evaluation of suggestions and choosing of a solution to create an action plan
4. **Implementation:** The carrying out of the plan
5. **Follow up:** Meeting again to evaluate the solution

It may sound strange to suggest that various members of the team might be on different steps of the process. However, it is not unusual for team meetings to be conducted in an informal manner with information presented verbally and with little attention paid to focusing on the specific steps of the decision making process. When this occurs, individual styles of thinking and communicating can lead to one team member seeking very specific and minute details of the problem. At the same time another team member may be thinking of great solutions and still another is wondering how soon the meeting will be over or what to serve for dinner that night. There are several very simple, but effective strategies for improving and formalizing the decision making process being used by a team when making assistive technology decisions. The AT Planning Guide provides a structure for doing so.

Throughout the Decision Making Process:

Present information in written as well as spoken format where everyone on the team can see it. This requires that the key facts be written on a board, flip chart, overhead projector or butcher paper in large print that is visible to all participants. Some team members may feel that this takes unnecessary effort to write every idea up on a board, but it is an extremely effective way to keep each person focused on which step the team is addressing. As information is shared, it is written on the board or chart visible to all. If one of the team members is distracted by something they have forgotten to do, or is called out

of the meeting for a telephone call, they can quickly "catch up" on what was said when they are able to refocus on the discussion. At the same time, if a group member contributes a solution before the team has finished contributing all the information necessary to identify the problem, the recorder can quickly note the "suggested solution" over under **Solution Generation**, and redirect the entire group back to completing **Problem Identification**.

Create a shared group memory. Recording what is being said where it is visible to all, adds visual memory to auditory memory and doubles the likelihood that everyone will remember, in the same way, the information that was discussed. This helps create a shared group memory, one that is very similar across all members of the group. It greatly increases the likelihood of follow through from team members.

Share roles and responsibilities. Team members may be hesitant to take a leadership role in conducting team meetings. Rotating roles from one meeting to the next is an effective way to share this responsibility. At each meeting one team member can serve as **facilitator**, while another is **recorder**, and still another acts as **timekeeper** to keep the group moving through the discussion. It is important that the team move at a pace that will allow the most time at the most important discussion points and keep the team from getting side tracked or bogged down (Fox & Williams, 1991). In addition, this rotation of roles helps insure that each team member recognizes and respects the contribution each of these participants makes to effective decision making.

During Problem Identification:

Address not only the characteristics of the student, but also of the environments in which the student functions, and the tasks that need to be done. Many times when technology is abandoned, it is because only the physical, psychological, and social characteristics of the child are addressed, with little or no attention paid to the settings which the device will be used or the specific tasks that the child really needs to address (Cook & Hussey, 1995). The SETT framework (Zabala, 1994) helps team members to focus on the **student** (his/her personal characteristics and interests), the **environment** (including physical characteristics of the setting as well as instructional activities and arrangements), and the **task** (which are the specific activities that the target student needs to be able to do in each environment). This focus is helpful in clearly identifying and defining the problem so that the team has a clear focus to guide them as they generate appropriate alternatives and solutions.

During Solution Generation:

When generating solutions, use brainstorming rules to create a climate of trust. An important factor in generating a variety of useful alternatives during Solution Generation is to create a climate of trust by following brain storming rules. This means that all suggestions are written on the board or chart, no comments are allowed and no judgments are passed. The goal is to generate as many ideas as possible. As the flow of ideas slows, it is a good idea to persevere a little longer. Often the second wave of ideas are the most innovative. If everyone is feeling sluggish and suggestions are few, energy may be increased by putting a two minute time limit in place to get things started. This short time limit combined with writing everything where it can be seen increases the creativity and allows the group to

explore as many options as possible. Additional time can be added if the group agrees, but the short time period helps bring that creative, right side of the brain into action.

If the solutions generated by the team do not include assistive technology, or include only a very few items, the team may need to utilize additional resources. Additional resources can provide an overview of the types of assistive technology solutions that would be appropriate for the child and task for which they are problem solving. Resources may include a person, as mentioned earlier or print, disk, or online resources. In the next section **Using the AT Checklist and other Resources**; several resources that might be helpful are discussed.

During Solution Selection:

During Solution Selection, encourage combining, sequencing and prioritizing. As alternatives are discussed and evaluated, it may become apparent that some items are the same thing in different words or that others make an excellent sequence of steps. New suggestions may be added at any time. This is the place for the team to really discuss the value and relationship of the many suggestions. As individual suggestions are discussed, it is often helpful to group them into "Things we can do tomorrow," "Things we can do in a month," and "Things we may want to consider later." The Action Plan is then created to include a time line and persons responsible for each of the solutions or steps that were selected.

Obtain consensus from all participants before adjourning meeting. When several people work together to reach a decision, there will be many different ideas presented. In ideal situations, the Solution Selection will result in a unanimous agreement about what specific suggestions should be selected for the action plan. However, life is far from ideal. When unanimous agreement is not reached, it is critical that the team arrive at consensus about the action plan that will be implemented. In order to assure consensus, the facilitator must poll individual team members, asking them if they will support this plan even though they may have personally preferred another solution. When the facilitator fails to poll members for consensus, they may believe they have unanimous agreement, but actually have **majority rule** (a few team members dominating the discussion, while others strongly disagree, but do not speak up), **minority rule** (one team member dominating the discussion, while others disagree and do not speak up), or **authority rule** (no one questioning what the administrator suggested, even though they disagree). When one of these occurs, the chances of successful implementation are decreased.

During Implementation:

When implementation takes place, follow the plan completely. For that to happen, everyone on the team needs to be aware of the plan and his/her role in it (Prentice & Spencer, 1985). Unfortunately this does not always happen if teams do not utilize the strategy of writing down important information during each step of the process. Without that "group memory" important details and key responsibilities are easily forgotten or overlooked while meeting the myriad demands of work in school districts. Implementation is the step of the decision making process that tells us whether the solutions we selected are good ones.

For Follow up:

Follow up on a planned schedule. At a set interval after implementation, follow-up or monitoring must take place. This is another area where school teams frequently fail. The school year can slip quickly by while one team member waits on another to do something or bad weather, illnesses, and absenteeism take their toll. If monitoring does not take place according to the original plan, a variety of problems can crop up and be overlooked as each team member focuses on their own assignment, but does not have the opportunity to get the "big picture" that comes from a team discussion.

Using AT Decision Making Guide will guide the team through the steps of the process. Following these simple, but effective steps can be extremely useful to teams in the schools as they strive to make appropriate and effective assistive technology decisions for the students they serve.

WATI Assistive Technology Decision Making Guide

Referral Question_____

_____

PROBLEM IDENTIFICATION

Student's Abilities/Difficulties	Environmental Considerations	Tasks
Writing/Use of Hands Communication Reading/Academics Mobility Vision Hearing Behavior Other	e.g. Classroom Playground Lunch Room Home, etc. In Each: Technology Equipment Available Room Arrangement, Lighting Sound Activities, etc.	e.g. Produce legible written material Produce audible speech Read text Complete math problems Participate in recreation/leisure Move independently in the school environment
		Reframed Question
		i.e. Specific task identified for solution generation
SOLUTION GENERATION	**Solution Selection**	**Implementation Plan**
Brainstorming Only No Decision	Discuss & Select Idea from Solution Generation	AT Trials/Services Needed: Date Length Person Responsible
		Follow-Up Plan
		Who & When Set specific date now.

Important: It is intended that you use this as a guide. Each topic should be written in large print where everyone can see them, i.e. on a flip chart or board. Information should then be transferred to paper for distribution, file, and future reference.

Using the AT Checklist

In some cases team members are not fully aware of all the assistive technology that might be available to assist with the task that is of concern. In that case there are several tools and resources that can be used to assist them. One of those tools is the AT Checklist. The AT Checklist is a concise two page listing of assistive technology arranged by the task for which it would be utilized. Categories are: Computer Access; Writing, including the Motor Aspects of Writing and Composing Written Material; Communication; Reading; Learning/Studying, Math; Recreation & Leisure; Activities of Daily Living, which also includes Mobility and Environmental Control; Positioning & Seating; Vision; and Hearing.

Within each of these categories suggested assistive technology is arranged in a hierarchy from the simplest, low tech alternatives to more complex or high tech items. They are arranged this way because the developers shared a belief that we want to select the simplest alternative that successfully assists the child. Many years ago we had a number of experiences where service providers immediately jumped to the most complex solution without first trying other alternatives. The hierarchical arrangement of the items in the AT Checklist is in response to this type of thinking. For example, just because a student has difficulty with writing, does not mean that the first thing we try would be voice recognition. While voice recognition is cool and very appealing, there are other, simpler tools that should be tried first to see if they work.

You will note that each section also includes a space to write in new assistive technology. Since many new products are introduced each year, it is important to be able to add new items. The final section of the AT Checklist is a place to write comments that the team has as they utilize the Checklist. These may include something that has been tried or a plan to try a sequence of items. It is always important to capture in writing the discussions that take place as team members works together to arrive at an assistive technology decision.

WATI Assistive Technology Assessment Checklist

COMPUTER ACCESS

ρ❒ Keyboard using accessibility options
ρ❒ Word prediction, abbreviation/expansion to reduce keystrokes
ρ❒ Keyguard
ρ❒ Arm support
ρ❒ Track ball/track pad/joystick with on-screen keyboard
ρ❒ Alternate keyboard
ρ❒ Mouth stick/head mouse with on-screen keyboard
ρ❒ Switch with Morse code
ρ❒ Switch with scanning
ρ❒ Voice recognition software
ρ❒ Other: _____

WRITING

Motor Aspects of Writing

ρ❒ Regular pencil/pen
ρ❒ Pencil/pen with adaptive grip
ρ❒ Adapted paper (e.g. raised line, highlighted lines)
ρ❒ Slantboard
ρ❒ Use of prewritten words/phrases
ρ❒ Portable word processor to keyboard instead of write
ρ❒ Computer with word processing software
ρ❒ Portable scanner with word processing software
ρ❒ Voice recognition software to word process
ρ❒ Other: _____

Composing Written Material

ρ❒ Word cards/word book/word wall
ρ❒ Pocket dictionary/thesaurus
ρ❒ Writing templates
ρ❒ Electronic/talking electronic dictionary/thesaurus/spell checker
ρ❒ Word processing with spell checker/grammar checker
ρ❒ Talking word processing
ρ❒ Abbreviation/expansion
ρ❒ Word processing with writing supports
ρ❒ Multimedia software
ρ❒ Voice recognition software
ρ❒ Other: _____

COMMUNICATION

ρ❒ Communication board/book with pictures/objects/ letters/words
ρ❒ Eye gaze board/frame communication system
ρ❒ Simple voice output device
ρ❒ Voice output device w/levels
ρ❒ Voice output device w/icon sequencing
ρ❒ Voice output device w/dynamic display
ρ❒ Device w/speech synthesis for typing
ρ❒ Other:

READING, STUDYING, AND MATH

Reading

ρ❒ Standard text
ρ❒ Predictable books
ρ❒ Changes in text size, spacing, color, background color
ρ❒ Book adapted for page turning (e.g. page fluffers, 3-ring binder)
ρ❒ Use of pictures/symbols with text
ρ❒ Talking electronic device/software to pronounce challenging words
ρ❒ Single word scanners
ρ❒ Scanner w/OCR and text to speech software
ρ❒ Software to read websites and emails
ρ❒ Other: _____

Learning/Studying

ρ❒ Print or picture schedule
ρ❒ Low tech aids to find materials (e.g. index tabs, color coded folders)
ρ❒ Highlight text (e.g. markers, highlight tape, ruler, etc.)
ρ❒ Recorded material (books on tape, taped lectures with number coded index, etc.)
ρ❒ Voice output reminders for assignments, steps of task, etc.
ρ❒ Electronic organizers
ρ❒ Pagers/electronic reminders
ρ❒ Single word scanners
ρ❒ Hand-held scanners
ρ❒ Software for concept development/manipulation of objects – may use alternate input device, e.g. switch, Touch Window
ρ❒ Software for organization of ideas and studying
ρ❒ Palm computers
ρ❒ Other: _____

Math

ρ❒ Abacus/Math Line
ρ❒ Enlarged math worksheets
ρ❒ Low tech alternatives for answering
ρ❒ Math "Smart Chart"
ρ❒ Money calculator and Coinulator
ρ❒ Tactile/voice output measuring devices
ρ❒ Talking watches/clocks
ρ❒ Calculator/calculator with printout
ρ❒ Calculator with large keys and/or large display
ρ❒ Talking calculator
ρ❒ Calculator with special features (e.g. fraction translation)
ρ❒ On-screen/scanning calculator
ρ❒ Alternative keyboard
ρ❒ Software with cueing for math computation (may use adapted input methods)
ρ❒ Voice recognition software

RECREATION AND LEISURE

ρ❒ Toys adapted with Velcro, magnets, handles, etc.
ρ❒ Toys adapted for single switch operation
ρ❒ Adaptive sporting equipment (e.g. lighted or beeping ball)
ρ❒ Universal cuff/strap to hold crayons, markers, etc.
ρ❒ Modified utensils (e.g. rubber stamps, brushes, etc.)
ρ❒ Ergo Rest or other arm support for drawing/painting
ρ❒ Electronic aids to control/operate TV, VCR, CD player, etc.
ρ❒ Software
ρ❒ Completion of art activities
ρ❒ Games on the computer
ρ❒ Other computer software
ρ❒ Other: _____

ACTIVITIES OF DAILY LIVING (ADLS)

ρ❒ Non slip materials to hold things in place
ρ❒ Universal cuff/strap to hold items in hand
ρ❒ Color coded items for easier locating and identifying
ρ❒ Adaptive eating utensils (e.g. foam handles, deep sides)
ρ❒ Adaptive drinking devices (e.g. cup with cut-out rim)
ρ❒ Adaptive dressing equipment (e.g. button hook, elastic shoelaces, Velcro instead of buttons, etc.)
ρ❒ Adaptive devices for hygiene (e.g. adapted toothbrush, raised toilet seat, etc.)
ρ❒ Adaptive bathing devices
ρ❒ Adaptive equipment for cooking
ρ❒ Other: _____

MOBILITY

ρ❒ Walker
ρ❒ Grab bars and rails
ρ❒ Manual wheelchair including sports chair
ρ❒ Powered mobility toy (e.g. Cooper Car, GoBot)
ρ❒ Powered scooter or cart
ρ❒ Powered wheelchair w/ joystick or other control
ρ❒ Adapted vehicle for driving
ρ❒ Other: _____

POSITIONING AND SEATING

ρ❒ Non-slip surface on chair to prevent slipping (e.g.

VISION

ρ❒ Eye glasses
ρ❒ Optical aids
ρ❒ Large print materials
ρ❒ Auditory materials
ρ❒ Dictation software (voice input)
ρ❒ CCTV (closed circuit television)
ρ❒ Screen magnifier (mounted over screen)
ρ❒ Screen magnification software
ρ❒ Screen color contrast
ρ❒ Screen reader, text reader
ρ❒ Braille notetaker
ρ❒ Braille translation software
ρ❒ Braille embosser
ρ❒ Enlarged or Braille/tactile labels for keyboard
ρ❒ Alternate keyboard
ρ❒ Other: _____

HEARING

ρ❒ Pen and paper
ρ❒ Computer/portable word processor
ρ❒ TDD for phone access with or without relay
ρ❒ Signaling device (e.g. flashing light or vibrating pager)
ρ❒ Closed captioning
ρ❒ Real Time captioning
ρ❒ Computer aided note taking
ρ❒ Screen flash for alert signals on computer
ρ❒ Phone amplifier
ρ❒ Personal amplification system/hearing aid
ρ❒ FM or loop system
ρ❒ Infrared system
ρ❒ Other: _____

COMMENTS

Additional Tools for the Team as They Select Appropriate Assistive Technology

Technology Toolbox
Another useful tool for school teams is the Technology Toolbox from the book *Computer and Web Resources for People with Disabilities (Third Edition)* (Alliance for Technology Access, 2000). The Technology Toolbox is especially useful for teams that are just getting started with assistive technology. It contains a series of charts that address the following questions,

- How Effectively Can I See the Computer Screen?
- How Effectively Can I Use the Keyboard?
- How Effectively Can I Use the Mouse?
- How Effectively Can I Interact with Information?
- How Effectively Can I Read (Comprehend)?
- How Effectively Can I Write (Compose)?
- How Effectively Can I Handle Computer Equipment?

Under each of these questions there is a chart is used to describe what assistive technology tools re available to assist students with different abilities and difficulties related to this task. Following the WATI AT Checklist, you can find a copy of the chart for "How Effectively Can I Read?" (and other pages from *Computer and Web Resources of People with Disabilities* which you can use to follow along with this example.) Look at it as it is now and read across the first row for ideas that can help if a student reads at a lower than expected level. You will see that one approach might be to "Have computer speak text". This has a symbol "●" next to it. Then by looking at the items listed under "Tool" that have the ● symbol, it states that the needed tools are a speech synthesizer and talking word processor. Each item listed under the "Tool" column has a page number in parentheses. The page number refers to the page in the next section of the book, the Product Descriptions.

In the Product Description Section there are descriptions of each of the items listed under the "Tool" column in the Technology Toolbox. Each description includes a list of potential users, features to consider, cost, and common vendors.

Closing the Gap Resource Directory
Once the common vendors are known, the next useful tool is the *Closing the Gap Resource Directory.* The Resource Directory is published each spring as the February/March issue of the Closing the Gap newsletter. It is an excellent tool for school teams. The first step in using the Directory is to go to the Producers Section, which is near the back of the directory. In the Producers Section, team members can look at each of the vendors obtained from the Product Description Section of Resource Directory.

In our example, Don Johnston Incorporated was one of the common vendors listed for talking word processors. Looking up Don Johnston Incorporated, reveals a long list of products. Scanning that list reveals *Write:OutLoud*®, which sounds like it might be a talking word processing. Turning to the Software section of the Resource Directory provides a description of this talking word processing software, including price, type of computer it runs on, system requirements, and other valuable information.

Closing the Gap also has a searchable database on its website http://www.closingthegap.com. Annual subscriptions are required to use the online version but it makes the search process so much easier. The same type of information is included there. So that once the name of a product or the type of product is known, more information can be obtained from the website.

ABLEDATA http://www.abledata.com
ABLEDATA's website is another excellent resource tool for teams. It houses the ABLEDATA database which lists over 20,000 currently available assistive technology devices from over 2000 different companies. Each record contains a detailed description of the product as well as price, manufacturer, and distributor information. It is updated frequently and also contains pictures of many of the products

Software Tools
There are two software programs that can be useful tools, *AAC Feature Match* http://www.dougdodgen.com is a software program that teams can use to help determine which augmentative communication devices might work for a specific child. It asks the team to enter specific information about the student's needs, such as size of button the student can activate, number of responses needed, whether the student needs to be able to create new messages, or can choose from preprogrammed ones, etc. It then provides a list of augmentative communication devices that have several of the features that would be necessary to meet the child's needs as described in the information entered. This information allows the team to consider devices that they do not currently own or that they have never tried. It greatly increases the likelihood that the team will, in fact, consider the full range of appropriate devices that are available. The tool is very empowering for school district teams.

Another product, *EvaluWare*™, is designed to make assessment easier for both AAC and computer access. This software leads the team through specific tasks that help determine the child's ability to look at objects, listen, use the keyboard and mouse, and other alternatives. After information is entered, it creates a model screen with the level of representation, target size and number of targets to try with the child to see if it will be effective. Information on *EvaluWare*™ is available at http://www.assistivetech.com.

Implementing Trials with Assistive Technology

In order to determine which assistive technology will work effectively for a student, that student must have an opportunity to try the assistive technology. In some cases, a brief trial during a short visit with one of the team members reveals an effective solution. More typically, a longer trial of several days, weeks, or in some cases, months is necessary. Whether the trial is short or long, documenting the student's performance while he or she tries the assistive technology is critical.

Included are two planning tools which can help the team as they prepare for a more extensive trial with one or more assistive technology devices. The Assistive Technology Trial Use Guide is a form that guides the team through a sequence of important questions that must be addressed prior to implementing trial use of assistive technology and after the trial.

WATI Assistive Technology Trial Use Guide

AT to be tried:_____

Student's Name: _____ DOB:_____ Age:__ Meeting Date:_____

School/Agency:_____Grade/Placement:_____

Contact Person(s):_____

School/Agency Phone: _____ Address: _____

Persons Completing Guide: _____

Parent(s) Name: _____ Phone: _____

Parent(s) Address: _____

Goal for AT use: _____

ACQUISITION

Source(s)	Person Responsible	Date(s) Available	Date Received	Date Returned

Person primarily responsible to learn to operate this AT:_____

Training

Person(s) to be trained	Training Required	Date Begun	Date Completed

MANAGEMENT/SUPPORT

Location(s)	Support to be provided (e.g. set up, trouble shoot, recharge, program, etc.)	Person Responsible

Student Use

Date	Time Used	Location	Task(s)	Outcome(s)

WATI Assistive Technology Trial Use Summary

Student's Name:_____Age:__
_____Date Completed:_____

Person(s) Completing Summary: _____

Task Being Addressed During Trial_____

Criteria for Success_____

AT Tried	Dates Used	Criteria Met?	Comments (e.g. advantages, disadvantages, preferences, performance)

Recommendations for IEP: _____

_____

_____

_____

_____

Products Mentioned in Chapter 1

Product	Vendor
AAC Feature Match	Doug Dodgen & Associates
EvaluWare	Assistive Technology Inc.
Write:OutLoud®	Don Johnston Incorporated

Notes:

Notes:

Computer Access

Elizabeth A. Lahm, Ph.D., ATP, Paula Walser, CCC-SLP, ATP, and Penny Reed, Ph.D.

This chapter will address computer access which includes access to other devices such as toys, electric appliances, and environmental control units. The focus is on access to other devices and not on the devices that are being accessed. This chapter precedes the remaining chapters that focus on specific content or disability areas because access crosses all of these areas. For many students the best system for access must be determined before any content applications can be discussed.

Topics included in this chapter are: an overview of access including techniques and technologies for direct selection, assisted direct selection, enhanced direction selection, indirect selection; assessment procedures; and progressions of switch use. Some of these topics are referred to in other chapters as they apply to specific content. This chapter will help you understand the wide variety of access devices that are available and the specific features that can be matched to an individual student's needs. A table is provided that overviews the advantages and disadvantages of the various types of switches available. Also here is a review of freeware and shareware for computer access which lists software that can be downloaded from the Internet.

All products mentioned in this chapter appear in a table at the end of the chapter along with the company that produces them. A complete list of products and company contact information for them is compiled in the Appendix.

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Computer Access

Keyboard with built in computer accessibility features

↓

Word prediction, abbreviation/expansion to reduce keystrokes

↓

Keyguard

↓

Arm support (e.g., Ergo Rest®)

↓

Track ball/track pad/joystick with on screen keyboard

↓

Alternate keyboard (e.g., IntelliKeys® Discover:Board®, TASH Mini keyboard)

↓

Pointing options/Head mouse

↓

Switch with Morse code

↓

Switch with scanning

↓

Voice recognition software

Access to Computers and Devices for Students with Physical Difficulties

A student with a physical disability may have difficulty handling the materials commonly used in the classroom such as books, pencils, crayons, and paper. While it is certainly possible to replace the need to access these simple materials by putting more things on the computer, that student may also have difficulty accessing the computer without adaptations or special peripheral devices.

Overview of Physical Access to Computers and AAC devices
There are a variety of things that can be done to make keyboarding easier for a student with a physical disability. Both Macintosh and PCs come with build in access features such as sticky keys, toggle keys, and the ability to adjust mouse controls.

- **Direct Selection-**The simplest and most efficient way to access a computer or device is through direct selection. This means that the student uses some body part or tool to directly activate a key on the standard keyboard, an alternative keyboard or an onscreen keyboard. A student can use any body part, e.g., hands, fingers, and toes.

- **Assisted Direct Selection-**Some individuals lack the fine motor skills to use direct selection techniques without assistance of some kind. There are a variety of low tech custom made sticks which can be strapped to the hand, held in the teeth, or worn on the head with a strap or cap. Occupational therapists are the best source of information on the various ones available. They can be used to activate a standard keyboard with a keyguard or an alternate keyboard to avoid hitting more than one key at a time. These devices include:

  - Hand-held pointer (e.g., dowel, stylus, or pencil)
  - Head controlled pointer mounted on the head, chin, or mouth
  - Light pointer worn on head or held in hand
  - Mouse or mouse emulator (e.g., *HeadMaster Plus, HeadMouse*®, trackball, track pad)
  - Proportional or video pointing devices (e.g., joystick) that are controlled by the hand, chin, or tongue
  - Voice input

  The second set of devices that assist in direct selection are those the help the individual stabilize the arm or hand in order to activate one key at a time. These include:

  - A keyguard placed over the keyboard to assist in directing key activation and hand stabilization by providing a frame to support the hand and reduce accidental key activations
  - A wrist rest or arm rest (e.g., *Ergo Rest*®) may provide needed support to increase control of movements, again reducing accidental key activations.

- **Enhanced Direct Selection-**An individual who types slowly due to physical impairment (e.g., a one fingered typist or individual using a mouth stick, head stick) may benefit from using a keystroke reduction strategy. Keystroke reduction cuts down the number of keys which must be activated in order to produce a word or phrase. Keystroke reduction strategies include:

- **Word Prediction**-This software which can be used on a computer which shows lists of words that the student may be trying to spell as the keyboarding takes place. Words can be selected from the list so that the student doesn't have to finish keying them. An example is *Co:Writer® 4000*. It may be integrated into a word processor as well, eliminating the need for a separate program, e.g., *Read and Write Gold*).

- **Abbreviation Expansion**-This software expands predetermined abbreviations into full words, phrase or sentences as the student types. (e.g., *Shorthand for Windows*) Most word processors can be set up to perform in a similar way through the use of macros, however they tend to be more complex to use.

♦ **Alternative Keyboards**-Many times a student has multiple needs that cannot be addressed with the adaptations mentioned above. An alternative keyboard is another option. These keyboards typically can be programmed to include a custom set of adaptations. A variety of alternative keyboards are available, including:

- Expanded keyboards (e.g., *IntelliKeys®, Discover:Board®*)-These are larger and are custom programmable so that location, function, and size of keys can be changed for individual users.
- Miniature keyboard (e.g., *TASH Mini keyboard*)-The keys are much smaller so the individual with limited range of motion can access the whole keyboard with one hand.
- Light pointer keyboards (e.g., Light Board.)-keys are activated by directing a beam of light from a head mounted pointer to an onscreen keyboard or special keyboard.
- Onscreen keyboards- Keyboarding can also be accomplished by selecting keys from a keyboard which is shown on the computer screen. Software that generates an image of a keyboard on the screen is referred to as an onscreen keyboard (e.g., *OnScreen, Discover:Screen®, ScreenDoors 2000*). The user makes selections using a mouse or mouse emulating device. When the student cannot use his or her hands to activate the onscreen keyboard, there are head-controlled mouse emulators (e.g., *Head Master Plus, HeadMouse®*, and *Tracker 2000*). The *Head Master Plus* uses a headset and control unit working together to measure the rotation of the user's head and translate it into cursor movements on the screen. A puff switch acts as a left mouse button and adding personal switches can access the center and right mouse button. The *HeadMouse®* is a wireless optical sensor that tracks a tiny and disposable dot that is placed on the user's forehead or glasses. The optical sensor then translates the movements into movements of the computer cursor. The *Tracker 2000* works very much like a *HeadMouse®*, using a small dot on the forehead or glasses.

♦ **Indirect Selection**

- **Morse Code**- In the last two decades Morse code has proven to be a fast and effective means of inputting information into the computer for some individuals with disabilities, especially those who use a single switch in order to produce written material. For example using a Sip and Puff switch, a user might enter words by spelling them out with puffs and sips, with a sip equaling a dot and a puff equaling a dash. A switch interface device is required to use a switch for this purpose. For more information the reader is referred to *Modern Morse code in rehabilitation and education: New applications in assistive technology* by Tom King (2000).

- **Scanning-**When an individual is not able to accurately use direct selection, scanning can be considered as an input method. Scanning is less efficient and more time consuming than direct selection. However, it is a viable means of computer input. The items that are scanned and available for computer input are dependent on the software interface. Programs can offer a few choices for targeted responses (e.g., *First Words* by Laureate Learning Systems, Inc.) or a full array of keyboard options through an onscreen keyboard. Many software programs offer preprogrammed scanning options. Items are scanned using a number of scanning modes which include:

  - Automatic - scanning proceeds automatically, and the individual activates a switch to stop scanning and make a selection
  - Step - scanning does not proceed automatically; the individual must repeatedly activate a switch to proceed to desired selection; to select an item the user must refrain from hitting the switch for a period of time
  - Inverse - scanning does not proceed automatically; individual maintains switch activation to cause scanning to proceed - releasing switch makes selection
  - Block - scanning selections are highlighted in groups (or blocks); the user first chooses a group, then makes individual selection within the group; can be used with automatic, inverse, or step methods
  - Directed - scanning proceeds by use of two or multiple switches or the use of a joystick; the individual chooses the direction of the scan

A variety of switches exist which can be used for scanning. Virtually any action that can be made reliably and consistently can be utilized to activate a switch for scanning. The following are switch categories (AbleNet, Inc., 1996):

- Pressure (e.g., *Jelly Bean*® or plate switch): momentarily activated by applying light pressure or touch to the switch using any body part
- Lever (also referred to as wobble or leaf): using any body part to move a lever from a vertical or horizontal position to activate
- Muscle sensor (e.g., *Twitch Switch*): sensitive electronic switch activated by any muscle movement
- Sound Sensitive (e.g., *Voice Activated Switch*): activated when a loud noise is made such as a clap or vocalization
- Pneumatic (e.g., *Sip and Puff Switch, Squeeze Switch*): activated by compressed air
- Tilt (e.g., *Tilt Switch)*: activated when the switch itself is rotated or tilted
- Pull (e.g., String Switch): activated by pulling a cord attached to the switch
- Photosensitive (e.g., *Photocell Switch*): activated when either light shines on or is prohibited from a photo cell

Switches come in all shapes, sizes, and forms. Consider the following switch characteristics when choosing a switch for an individual:

- Surface size: e.g. small, medium, large, circular, square, etc.
- Surface texture: e.g. option for mounting graphics or symbols on the switch
- Pressure: force required for activation
- Travel/excursion: distance switch must travel from resting position to activation

- Mountability: some switches don't work well if angled sharply, some are very hard to mount where needed
- Durability: e.g. sturdiness, lasting quality
- Cost
- Feedback: e.g. auditory, visual, tactile, kinesthetic (muscles/tendons), proprioceptive (hard surface)
- Play: amount of give
- Safety: e.g. exposed wires, sharp edges/corners

Switches are available from a variety of sources. You may want to review catalogs from several companies such as Enabling Devices/Toys for Special Children, AbleNet, Inc. or Access First. Many more are in the resource list in the Appendix. A switch can be positioned near any body part for activation by using a switch mounting arm. Switch mounting arms such as the *Universal Switch Mounting System* or *Slim Armstrong®* are available from AbleNet, Inc.

Assessment Procedure for Physical Access

To determine an access method for a student with a physical disability, it is helpful to follow a continuum approach. There are three continuums to consider. First is the amount of motor ability required. Second is the compatibility with standard computers. Third is the student's preference and willingness to use a device. The following list is a motor continuum of assistive technology for hand use. The devices require less fine motor skill moving down the list:

- Standard keyboard
- Standard keyboard with slow keys, sticky keys
- Standard keyboard with a keyguard
- Alternate keyboard: Expanded keyboard (e.g., *IntelliKeys®*), miniature keyboard (e.g., *TASH Mini keyboard*)
- Alternate or standard keyboard with dowel access
- Onscreen keyboard with mouse/alternative mouse; trackball, track pad, or joystick

Next one can consider using the head for access control. The following devices allow head access:

- Head mounted/worn wand or stick with standard or alternate keyboard (includes mouth stick)
- Mouse emulation with onscreen keyboard

It is important to consider that some students who are unable to use their hands may have use of their toes. In this case consider the use of toes to press keys on a standard or alternate keyboard.

A student who has motor difficulties, but adequate speech may utilize voice recognition software. Voice recognition technology is discussed in Chapter 3, as it applies to writing.

Typical Progressions of Switch Use

Switches are not used just for computer access. Most students who need to use a switch will start with a more simple activity. Once switch use is controlled, accurate, and consistent they will progress to the next more complex application. Five types of applications are described here.

- **Involuntary Movement/Activation**- Very young children learn through their experiences with their environment. Reflexive movement, involuntary movement, and/or movement without intention can lead to an effect or have resulted in an event. These events typically have no meaning when first caused. Eventually after repeated experiences children may begin to link their actions to outcomes of these actions, cause and effect. For example, a child might kick their legs and cause the bells on their shoes to ring. Or, while moving one's arm, a child might bump a toy and cause it to play a song.

- **Pre-Communication**- Cause and effect and choice making can be viewed as pre-communication as children are learning that their actions can bring about desired results. For example, a child can raise their arms up to indicate they wish to be picked up.

  - **Cause and Effect**- When children begin to realize that their actions have caused an event to happen they are beginning to establish cause and effect. They may then begin to recreate the movement or action intentionally and voluntarily in order to repeat the event. When children intentionally, voluntarily, and repeatedly tie their actions to the cause of a particular effect and can generalize this skill across varying activities, they have established cause and effect and can then move into choice-making.

    Cause and effect can be viewed in two levels. The first, where the action is directed to the object that responds. For example, by touching a switch, the switch lights, vibrates, and plays music. The second, is when the action takes place on an object and a different object is effected. For example, an individual activates a *Jelly Bean Switch* and a cow begins to moo.

  - **Choice Making**- Choice making begins with choosing between two objects, pictures, switches, etc., each tied to a specific outcome. In the beginning stages it is suggested that one selection be an activity which is desirable to the child and the second a neutral activity. Once an individual appears to cognitively understand that their selection brings the specific result to which it is tied, the number of selections available to the individual may increase gradually. This progression of choice making prepares the individual for the possible use of a pre-communication device or computer. For example, an individual may be given two *Jelly Bean Switches* organized in the switch holder, one red and one green. A picture symbol or object representing a fan is placed on the red switch and a symbol/object representing the tape player is placed on the green switch. The individual can then select the desire outcome based on the selection of either switch.

- **Communication/AAC**- Once an individual has established cause and effect, a simple device or communication system can be implemented. A switch with recordable voice output (single message) which operates on a basic cause/effect or on/off principle, can be used initially to establish some verbal control over one's environment. For example, a *BIGMack*® switch could be programmed to request more of an activity. After cause and effect is established using a single message, the individual can then move to the use of a multiple messaging switch for communications. For example, a *LITTLE Step-by-Step Communicator* system could be prerecorded to enable a child who is nonverbal to read eight lines of a story to the class, each activation initiating a new line. Or, a *Rocking Say It Play It* can enable an individual to make choices between two communications such as yes or no, or food or drink. Then they can move to more choices: 4, 6, 8 messages, and so on. As the number of messaging options available through an increased number of switches increase, the more the system becomes like an augmentative communication (AAC) device. And, if they are not already considered AAC devices, they are the transition to these devices which allow greater and greater options to the user to communicate their wants and needs. If possible, always provide a picture/symbol/word on the switch to represent the desired outcomes.

- **The Computer**- Cause and effect is the basic and underlying skill required for computer interaction due to the number of adaptations available to users today. The computer is accessible to individuals from the very young to the very old, with and without disabilities. The computer can be used to establish the above stages of switch use. Or it can empower the user who has established the above stages to engage in more diverse and complex tasks. The computer is a tool for individuals with disabilities to experience independence, control, immediate feedback, and successes, and to become active participants in the world around them.

A final thought as you leave this section, only if a child does not have adequate hand use, head control, or toe use or is unable to use voice recognition, should you consider switch access. A wide variety of switches is available to meet almost any student's needs but consider switches last because they are the least efficient method of accessing a computer, augmentative communication device, or other applications and devices. A table of switch categories and advantages and disadvantages is provided as a guide to selection.

Advantages and Disadvantages of Various Switch Types

Category	Advantages	Disadvantages
Pressure	• Large variety available covering most characteristics • Some also serve as a single message communication device • Inexpensive to make yourself	• Require some strength
Lever	• Ability to pass through – student movement not stopped by the switch • Very little strength required	• Less durable • Some safety concerns – projects • More travel required than most
Muscle sensor	• Minimal muscle movement required • Stays with student – mounted on body	• Very little feedback, if any • Less reliable • Might be invasive
Sound	• No strength required • Alternative to motor action • Mounting is not an issue	• Very little feedback, if any • Disruptive to others • Ability to make sound may be inconsistent from day to day
Pneumatic	• Sip & puff types do not require motor movement	• Requires more strength (except sip & puff types) • Less durable – more malfunctions
Tilt	• Can be used to reinforce good body positions • Stays with student – mounted on body	• Very little feedback, if any
Pull	• Minimal strength required • Alternative to pushing action	• May require more travel than most
Photosensitive	• No strength required	• Could be difficult to learn • Very little feedback, if any • Requires spatial concepts

Freeware/Shareware Toolkits from Trace Center

The Trace Center compiles a list of freeware and shareware available to help students access the computer. What follows is a list of their software categories. You will find explanations of these categories and links to programs at http://trace.wisc.edu/world/computer_access/multi/sharewar.htm. Listings are included for Macintosh, Windows, Unix, and Linux operating systems. Note, however, many of the programs listed do not work with the most current operating systems.

- Abbreviation / Expansion
- Application / Window Managers
- Braille and Sign Language Utilities
- Braille Utilities
- Keyboard Audio Feedback
- Keyboard Modifications
- Keyboard Shortcuts
- Magnification
- Miscellaneous
- Mouse Enhancers
- On-Screen Keyboards
- Optical Character Recognition (OCR)
- Related Information Sources
- Screen Readers
- Typing Assistance
- Visual Cursor Enhancers
- Voice Input Applications
- Voice Output Applications
- Word Completion / Prediction

Products Mentioned in Chapter 2

Product	Vendor
BIGMack®	AbleNet, Inc.
Co:Writer® 4000	Don Johnston Incorporated
Discover:Board®	Madentec Limited
Discover:Screen®	Madentec Limited
Ergo Rest®	Infogrip, Inc.
First Words	Laureate Learning Systems, Inc.
HeadMaster Plus	Prentke Romich Company
HeadMouse®	Origin Instruments Corporation
IntelliKeys®	IntelliTools, Inc.
Jelly Bean®	AbleNet, Inc.
LITTLE Step-by-Step Communicator	AbleNet, Inc.
OnScreen	RJ Cooper & Assoc.
Photocell Switch	Enabling Devices
Read and Write Gold	textHelp
Rocking Say It Play It	Enabling Devices
ScreenDoors 2000	Madentec Limited
Shorthand for Windows	OfficeSoft LLC
Sip and Puff Switch	Enabling Devices
Slim Armstrong®	AbleNet, Inc.
Squeeze Switch	ERI – Empowering Resources Inc.
TASH Mini keyboard	TASH Inc.
Tilt Switch	Enabling Devices
Tracker 2000	Madentec Limited
Twitch Switch	Enabling Devices
Universal Switch Mounting System	AbleNet, Inc.
Voice Activated Switch	Enabling Devices

Notes:

Assistive Technology for Writing including Motor Aspects of Writing and Composing

Paula Walser, CCC-SLP, ATP and Penny Reed, Ph.D.

Writing is a complex process that involves both the physical mechanics of handwriting and the cognitive component of creating or composing written material. In this section of the manual we have provided a series of resources and information related to both aspects of writing. We have divided the chapter into two sections **Motor Aspects of Writing** and **Composing Written Material.**

In Motor Aspects of Writing, you will find information on low tech adaptations and portable word processors. In Composing Written materials you will find a chart on voice recognition software that highlights some software that can be useful for both components of writing.

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for the Motor Aspects of Writing

Regular pencil or pen

↓

Pencil or pen with adaptive grip

↓

Adapted paper (e.g., raised lines, highlighted lines)

↓

Slantboard to create slanted writing surface

↓

Prewritten words/phrases

↓

Templates

↓

Portable word processor to keyboard instead of writing

↓

Computer with word processing software

↓

Voice recognition software to word process

Assistive Technology and Writing

Low Tech Adaptations to Improve Handwriting

Handwriting is the most frequently appearing concern on IEP's. Students with a variety of disabilities (and many without) experience difficulties with producing legible handwriting. Today there are many, very available items that can be used to help a student produce more legible, readable written output. Here are a few suggestions:

♦ **Try different pencils/pens**
Office supply stores now carry a multitude of different pens and pencils. There are some that are larger in diameter, triangular shape, and oval shape or covered with a rubber surface. Purchase a variety and try them out. Let the writer choose which one to use to increase motivation to write.

♦ **Use pencil grips**
Just as there are many different types of pencils and pens, there are also many types of pencil grips. There are soft, hard, smooth, sticky, round, triangular, square, etc. Collect a variety and keep them available. Let the writer choose what is most comfortable to them.

♦ **Try different paper**
There are a variety of papers that are available in school supply catalogs. There are wider lines; darker lines, red and green colored lines, even raised lines. Different colors of spiral bound paper have also become popular and may help increase the user's motivation to write.

♦ **Try a different medium**
Some students can write better with a dry erase marker on a small dry erase board. It takes less pressure to produce a mark and is easily erased to repair mistakes. You can purchase *Memo Board*™ dry erase removable paper made by Contact at department stores and create your own dry erase boards.

♦ **Rubber Stamps**
Use rubber stamps for stamping student's name on papers or for answering one-digit answers on worksheets. Sweeney (2000) suggests looking at the student's needs and environment when looking at stamps. In particular, pay attention to the size of the stamped image, the need for an inkpad, and the grip and pressure required to use the stamp. Some stamps are self-inking. This can reduce the need and mess of a stamp pad.

♦ **Make your own adaptations**
If you cannot order the special paper, try making your own raised line paper by carefully tracing the bottom lines with *Elmer's glue*. Then let it dry and you have a raised line to try. You can also make a quick and inexpensive pencil grip using *Adhesive Mounting Putty*. This is the material that you buy to hang posters instead of tape. It is easily shaped and will not dry out. Take one section of putty from package and shape around pencil, making finger grips to fit hand. *3M*™*Vetwrap*™ *Bandaging Tape* is also easily shaped around a writing utensil and comes in colors that are motivating for children.

Worksheets can be made accessible with some simple techniques. First try enlarging the worksheet on a copy machine so that the child does not need to make as small or precise a mark as the other students. Taping the worksheet to the desk or placing it on a clipboard may also make it easier for the student to write on. Magnets can also be used by students to indicate choices on worksheets mounted beneath plastic on a cookie sheet. Things like masking tape, *Velcro*™, *Dycem*®, gripping stuff, or non slip rubber mats from Rubbermaid to hold things in place can go a long way to help make materials more accessible.

♦ **Writing Guides**

A variety of plastic writing guides are available from independent living aids catalogs. Writing guides are pieces of plastic with cut out areas allowing for writing within cutout lines. They come in various sizes for writing checks, signatures, letters and envelopes. (Available from various vendors including Independent Living Aids, Inc. and Onion Mountain Technology, Inc.)

♦ **Make Guides with Wikki Stix™**

Wikki Stix™ (Wikki Stix) are colorful, flexible sticks about 8" long. They are tacky to touch and are bendable to mold, draw, trace and use to create 3D stand-up figures. They stick to any surface and peel off without a trace. You can place them on the bottom or top line as a guide. Children can form letters with *Wikki Stix* or use them as letter guides when writing. *Wikki Stix* are available from school supply catalogs.

♦ **Use of Prewritten Words/Phrases**

It is extremely important to provide students with the opportunity to produce written language even though they may not have the motor skills to adequately do so in the traditional method using a pencil and paper. One way to do this is to provide words already written that can be placed in sentences and paragraphs. This can be done with low tech tools. One example is using adhesive backed magnetic labels or strips. Words can be printed on paper or card stock and stuck to magnetic material. The student can then arrange them on a metal surface (e.g. a cookie sheet with an edge). It requires only a swiping motion to move the words into the desired arrangement. *Magnetic Poetry*® is a commercial product offering preprinted words in various sizes. This would require better motor skills, but still allows the student to produce written sentences without the struggle of handwriting.

In addition, there are software programs that facilitate writing with words and phrases before the student is ready to spell individual words or to keyboard. *IntelliKeys*® and *Overlay Maker* offer endless possibilities to create writing templates containing words and phrases. They allow the student to create written language by selecting and sequencing whole words. The *I Can Write* series which is available at the IntelliShare Activity Exchange site on the IntelliTools website, reinforces letters, basic vocabulary, and syntax. It can be customized with your own letters and words. This allows a student to retell a story, sequence events, create their own story, etc.

Two other programs, *Writing with Symbols 2000*™ (Mayer-Johnson) and *PixWriter* (Slater Software), provide symbols paired with words so that the student who does not yet recognize the whole words can also practice syntax and grammar in creating sentences, paragraphs, and stories. *Writing with Symbols 2000*™ uses the *Picture Communication Symbols* from Mayer-Johnson and *PixWriter* uses the *PictureIt* Symbols from Slater Software. Both *PixWriter* and *Writing with Symbols 2000* include numerous sample templates/environments for developing written language skills.

♦ **Alternative Keyboard**

Another means to provide access to a student who is experiencing difficulties with the motor aspects of writing is to use an alternative keyboard. A popular alternative keyboard used within schools is the *IntelliKeys*® from IntelliTools, Inc. The *IntelliKeys*® is a programmable alternative keyboard that plugs into any Macintosh or Windows computer. It enables students with physical, visual, or cognitive disabilities to easily type, enter numbers, navigate onscreen displays, and execute menu commands. The *IntelliKeys*® keyboard comes with six standard overlays plus a setup overlay, that are ready to use with any word processing program or software that has keyboard input. These overlays include an alphabetical overlay which is very useful for early writers. The *IntelliKeys*® keyboard can also be configured to almost any layout based on students need.

Discover:Board® an alternative keyboard from Madentec Limited comes with software for controlling the mouse and keyboard plus speech and customization software for customization for flexible computer access. The *Discover:Board*® has large widely spaced keys appropriate for users with limited motor control or those who use a fist to type.

Another popular alternative keyboard is the TASH *USB Mini keyboard*, a small size alternative keyboard that plugs directly into a computer with no special interface being needed. Membrane keys are less that one half inch square and are closely spaced for easy access.

♦ **Onscreen Keyboard**

Onscreen keyboards provide the typical keyboard layout on the computer screen. Moving the mouse over the screen/onscreen keyboard completes input. Most onscreen keyboards allow customization for specific physical or learning needs. Some young children benefit from introduction of an onscreen keyboard when beginning to write. Use of the onscreen keyboard decreases the physical space between the keyboard and the monitor, thus eliminating some distracters. Onscreen keyboards are now available through the latest operating systems, Windows XP and Mac OSX.

♦ **PDA's Personal Digital Assistants**

Personal Digital Assistants offer a small, portable tool for written language. PDA's allow input of text into various applications including memo pad, to do list, and word processing programs. Text can be inputted via a small onscreen keyboard/stylus or by writing on the PDA's LCD screen. The latest in PDA operating system software allow the student to write anywhere on the screen of the PDA and the written words are translated into text. Some varieties of PDA's have a small QWERTY keyboard on the front of the device to allow text input using the thumbs.

♦ **Keyboarding instead of writing by hand**

In addition to the low tech ideas described above, the computer can be an exceptionally effective tool to support students who are struggling with writing. Whether using portable word processors or a full functioning computer, they offer the opportunity to change letters, words, sentences, and paragraphs easily and quickly while allowing a clean, attractive and readable end product. There are a wide variety of word processors available that can be matched to the cognitive and perceptual abilities of the student as well. A number of them should be reviewed before purchasing one.

If you are not familiar with portable word processors, the review of these lightweight, inexpensive products on the next three pages will be of help to you. These are followed by several descriptions of computer-based word processors that represent the range of available programs.

Portable Word Processors

If you are looking for increased computer access for students with disabilities but need to keep costs down, you may want to consider purchasing some portable word processors that interface with a computer. These portable word processors are lightweight (2.2 lbs. or less) and extremely inexpensive (under $400) when compared to a laptop computer. There are many portable word processors available, however here is information on some of our favorites that you might want to consider. They are very similar, but each has slight differences in features that you will want to consider when purchasing.

AlphaSmart 3000

The *AlphaSmart 3000* is sold by AlphaSmart, Inc. It allows you to enter and edit text, then send it to any computer for formatting or directly to a printer. The *AlphaSmart 3000*'s SmartApplet architecture is capable of extending its functionality with the addition of applets for keyboarding, templates, word prediction and more. It stores approximately 100 pages of single-spaced text in 8 files, includes cut/copy/paste and a built-in 70,000 word spell checker. It saves your text, and your place in the text, even when you turn off the keyboard. You never have to worry about losing a file. It weighs less than 2 lbs and has the capacity to print directly to a variety of printers. It can export files directly to any computer (Mac – IIGS or later). It takes about 7 minutes to export each file. It is the easiest to use of the portable word processors we have tried and runs about 700 hours on 3 AA batteries. The *AlphaSmart 3000* has several features that are useful to students with disabilities, including sticky keys, show keys, auto-repeat control, and four keyboard layouts: QWERTY, left handed, right handed, and Dvorak.

The *AlphaSmart 3000* is now able to run *SmartApplets* (mini software applications that can be downloaded to extend the functionality). Applets now available for the *AlphaSmart 3000* include: Co:Writer® SmartApplet – which provides word-prediction, KeyWords SmartApplet – full-instructional keyboarding program and typing tutor, AlphaQuiz SmartApplet – used to design and store quizzes on a computer and administer the quizzes on a *AlphaSmart 3000* and the Inspiration Outliner SmartApplet – which allows creation of outlines. *SmartApplets* average around $40 for single user license.

Dreamwriter

The *DreamWriter* line of portable word processors are available from Branium Technologies, Inc. They currently are featuring 3 different models of portable word processors. The *DreamMax* by Brainium Technologies provides fast and portable word processing with a Windows CE 3.0 device that runs a multitude of applications including word processing, spreadsheets, and Internet browsing. The *DreamMax* is 802.11b wireless compatible with PS/2, serial and USB ports. It has an 8 inch color display and offers instant power-on capabilities. The *DreamWriter 450* is designed for younger students just beginning to learn keyboarding and features word processing, built-in dictionary and thesaurus capabilities. The *DreamWriter 500* is a full-featured work processor with a laptop design and a backlit screen adjustable for 8 or 16 line displays. This model also includes a floppy drive for easy transfer of work.

Laser PC-6
The *Laser PC-6* by Perfect Solutions offers the additional feature of text to speech capabilities to the portable word processor. Text can be viewed on a changeable 4 line by 40 or 8 line by 80 character screen. It comes with eight built-in programs including a word processor including word prediction, "Sticky Keys", spell checker, homework calendar, typing tutor, database, spreadsheets, and a scientific calculator. It weighs 2.75 lbs with battery and has a memory of 256K which allows for 45 named files and 14 pages max of text per file with 100 pages text overall.

Perfect Solutions also offers 2 add-on options. The text-to-speech cartridge provides talking work processing including talking spell checker and word prediction. The text-to-speech cartridge allows text to be spoken in letters, words, sentences or paragraphs.

Dana
Dana™ by AlphaSmart® is an alternative, lightweight keyboard/computer that provides portable access to a full-featured word processor in addition to the organization tools of the Palm™ operating system. It is an electronic notebook that you can synchronize with a computer or send files directly to a printer. The organization tools include a Data Book with calendar and alarms, an Address Book, and a To Do List for prioritizing tasks like assignments. Many other inexpensive software programs are also available that can help a student in many different ways.

CalcuScribe
CalcuScribe is a portable word processor that allows the student to create text files that can be used by any application once sent to a computer. It also houses an interactive calculator for arithmetic, algebra, and trigonometry that allows the student to do math problems in a word processing environment and save the calculations to send to a computer. Using the IR pods, files can be shared with other *CalcuScribes* or sent to a printer without going through a computer first.

On the following page is a chart that compares some of the features of the portable word processors. Any of these portable word processors can be a great tool for increasing computer access for students with disabilities who need to be able to type class notes, write papers, or do homework and print out a legible copy.

Portable Word Processors

Product	Ordering Info	Features	Advantages	Disadvantages
AlphaSmart 3000	AlphaSmart, Inc. 973 University Ave. Los Gatos, CA 95032	Direct Printing Spell Checking 100 pages 700 Hours 3AAA	Easy to use Long battery life Co:writer® Applet Inspiration Applet Sticky Keys, key rep Alternative keyboard layouts,	Limited features 8 file limit
CalcuScribe	CalcuScribe 98 Cervantes Blvd., Suite #1 San Francisco, CA 94123-1672	Word Processing, Calculator, 300 hours on 3 AA 50 page memory Full sized keyboard Infrared capabilities 2.7 lbs 50 pages of text	Sticky Keys Auto-repeat option Zoom feature – 8pt to 16 pt Unlimited files	Unable to download files from PC
Dana	AlphaSmart, Inc. 973 University Ave. Los Gatos, CA 95032	Runs Palm applications Datebook, Address book, Memo Pad, To do List, Infra-red capable	Lightweight Onscreen keyboard/graffiti Easy touch keyboard Larger LCD	Graffiti and onscreen input available only in Vertical setup
DreamMax	Brainium Technologies 11491 Kingston Street Maple Ridge, B.C. Canada, V2X 0Y6	Wireless – 802.11b Windows CE 3.0 Word Processing Spreadsheet Internet browsing	8 inch color display Built-in VGA and TV out Ability to install software Wireless data transfer	Weight – 5.5 lbs
Laser PC-6	Perfect Solutions Software, Inc 15950 Schweizer Court West Palm Beach, FL 33414-7128	Word Processing Spell Checking Spreadsheets	Adjustable size of text Typing Tutor Text – To – Speech	8 built in programs add to complexity

Walser, P. (2004)

Word Processing
All of the basic word processing programs and the student writing programs provide the opportunity to produce legible, neat looking written material, and significantly reduce copy time when editing previously typed work. The alternatives for different fonts and sizes can be a delight for students who have struggled to produce attractive written materials. The *School Font Collection* by Mountain Lake Software, Inc. offers three handwriting-style fonts commonly used on classroom materials.

♦ **Portable Scanner with word processing software**
Many companies are now producing portable handheld scanners that work like a digital highlighter. The handheld scanners read text from books, magazines, newspapers, and other printed documents; captures the text in its memory and allows the user to download the text to their PC via the serial cable at a later time. This tool would allow a student to capture important information from textbooks, glossaries, research materials, etc. and download it directly into a word processor.

- The *QuickLink Pen* from Wizcom Technologies, Inc., LTD is another handheld scanner. The *QuickLink Pen* can scan full lines of text from 6-22 point size, store it, and then transfer it to a computer, Palm Pilot or text enabled cellular phone.

- The *SuperPen Voice* from Wizcom Technologies, Inc., LTD is a hand held scanner and translator. The pen combined the functionalities of the *Quicktionary II* and the *QuickLink Pen*. This pen allows the user to scan full sentences of text and to receive instantaneous auditory word-by-word translation. The pen weighs 3 ounces and is capable of storing up to 3000 pages of data.

♦ **Voice Recognition Software to word process**
Voice recognition technology can benefit students who have learning disabilities that interfere with their ability to spell and write. While many such students benefit from standard word processing, the visual-motor demands of keyboarding can be a major stumbling block that compounds the writing process. Similarly students who are the poorest spellers are frequently unable to effectively use standard spell checkers. For whatever reason, if students' oral language skills far exceed their ability to generate text with pencil and paper or standard word processing, voice recognition may enable them to become successful writers.

Voice recognition is a computer application that lets people control a computer by speaking to it. In other words, rather than using a keyboard and mouse to communicate with the computer, the user speaks commands into a microphone that is connected to a computer. Students can write using speech recognition in conjunction with a standard word processing program. When users speak into the microphone their words can appear on a computer screen in a word processing format, ready for revision and editing.

There are two kinds of voice recognition software now available: discrete speech and continuous speech. The older technology, discrete speech recognition, requires the user to speak one - word - at - a - time. A newer technology, continuous speech recognition, allows the user to dictate by speaking (at a more or less normal rate). Both have their advantages and disadvantages for individuals with difficulties with the motor aspects of writing.

As the user trains and speaks to the system, the software creates a user-specific voice file that contains a lot of information about user voice qualities and pronunciations, and with continuous speech recognition, patterns of word usage. Both types of voice recognition software also capture the user's preferred vocabulary. The voice file in discrete speech recognition software is built primarily on the user's pronunciation of individual words. The voice file in continuous voice recognition also contains information about the user's grammar and word usage (i.e., which words/phrases tend to be used in what order). The software uses this acoustic and linguistic information to make its best guess at each word or phrase as it is dictated.

There is currently only one version of discrete voice recognition for sale, *Dragon Dictate 3.0 for Windows, Classic* and it will not operate on operating systems beginning with Windows 2000. It is available from several software resellers including New World Creations.

Voice recognition software now offers specific features that are crucial for our students with learning disabilities. One of these features is Playback. The playback feature records the student's voice as they are dictating and makes that recording available to the writer when editing their written document. Thus a student who has difficulty reading what they have dictated can just hit the playback button and hear the recording of their voice during dictation. Most voice recognition programs also offer text to speech capabilities, which allow the text that the program has typed to be read aloud to the student. Some voice recognition software will also automatically include punctuation as the students write with their voice. These features have significantly increased the potential for voice recognition to be used as a writing tool for students who have difficulty with reading and/or writing.

Microsoft Office XP has incorporated voice recognition within *Microsoft Word*. The voice recognition engine within Word is not designed with individuals with disabilities in mind, however it provides an excellent diagnostic tool to use to determine if voice recognition may indeed be a useful tool for the student. The voice recognition component does not install with the typical installation and requires custom installation.

The chart on the following page shows features of *Dragon Naturally Speaking 7.0, Dragon Dictate 3.0, Via Voice®* and *Microsoft Word XP* for your comparison. These applications are available in office supplies stores or via the Internet.

Voice Recognition Program Comparisons

	Dragon Naturally Speaking 7.0				Dragon Dictate 3.0	Microsoft Speech Recognition in Office XP	IBM ViaVoice Millennium			
	www.scansoft.com 1-978-977-2000					www.microsoft.com	http://www.scansoft.com/viavoice/ 1-978-977-2000			
Feature	**Essentials**	**Standard**	**Preferred**	**Professional**	**Classic**		**Standard**	**Advanced**	**Pro - USB**	**Mac**
Speech model	Continuous	Continuous	Continuous	Continuous	Discrete	Continuous	Continuous	Continuous	Continuous	Continuous
Estimated retail price	$60	$100	$200	$700	$150	w/in Office	$60	$80	$190	$125
Dictate into applications	Yes	Yes	Yes	Yes	Yes	XP apps.	No	Yes	Yes	Yes
Menu control	Yes	Yes	Yes	Yes	Yes	XP apps.	No	Yes	Yes	No
Mouse control	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No
Dictation playback	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Text-to-speech	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Command macros	No	No	Yes	Yes	Yes	No	No	Yes	Yes	No
Dictation macros	No	Limited	Limited	Yes	Yes	No	No	Yes	Yes	Yes
Text/graphics dictation shortcuts	No	No	Yes	Yes		No				
Transcribes from recorder	No	No	Yes	Yes	No	No	No	Yes	Yes	No
Multiple Users on one computer	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Comes with Word Processor	No	Yes	Yes	Yes	No	Yes	SpeakPad	SpeakPad	SpeakPad	SpeakPad
Nothing but Speech filter	Yes	Yes	Yes	Yes	No	No				
Type of Microphone						None				USB
Readability Requirements:										
Dale-Chall Formula		8.6							7.7	
Fry Readability Graph		8							7	

	Dragon Naturally Speaking 7.0				Dragon Dictate 3.0	Microsoft Speech Recognition in Office XP	IBM ViaVoice Millennium			
	www.scansoft.com 1-978-977-2000					www.microsoft.com	http://www.scansoft.com/viavoice/ 1-978-977-2000			
Feature	**Essentials**	**Standard**	**Preferred**	**Professional**	**Classic**		**Standard**	**Advanced**	**Pro - USB**	**Mac**
Application specific support										
"Microsoft Word 97,2000, XP"	No	Yes	Yes	Yes	No	Yes	No	No	Yes	No
Correl WordPerfect 10	No	Yes	Yes	Yes	No	No	No	No	No	No
"Microsoft Excel 97,2000 XP"	No	No	Yes	Yes	No	Yes	No	No	Yes	No
Lotus Notes	No	Yes	Yes	Yes	No	No	No	No	No	No
"Microsoft PowerPoint 97, 2000, XP"	No	No	Yes	Yes	No	Yes	No	No	No	No
Microsoft Outlook	No	No	Yes	Yes	No	Yes	No	No	Yes	No
"Microsoft Internet Explorer 5,6"	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No
"AOL 6,7,8"	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	No
Operating System Supported										
Windows 98	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Windows NT 4.0	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	N/A
"Windows 2000, XP"	Yes	Yes	Yes	Yes	No	Yes	No	No	No	N/A
Mac OS X	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/a	Yes
Minimum System Requirements:										
Processor	500 MHZ	500 MHZ	500 MHZ	500 MHZ	66MHZ	Pent. III	233 MHZ	300 Mhz	300 Mhz	300 MHZ G3
Personal Computer	PC	PC	PC	PC	PC		PC	PC	PC	"G3,G4,Imac"
Memory	128 MB	128 MB	256 MB	256 MB	16 MB	256 MB	256 MB	256 MB	256 MB	256 MB

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A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Composing Written Material

Word cards/word book/word wall

↓

Pocket dictionary/thesaurus

↓

Writing templates

↓

Electronic/talking electronic dictionary/thesaurus/spell checker

↓

Word processing with spell checker/grammar checker

↓

Talking word processor

↓

Abbreviation/expansion

↓

Word processing with writing supports

↓

Multimedia software for expression of ideas

↓

Voice recognition software

Assistive Technology for Composing Written Materials

There are a variety of tools that can help students as they compose written materials. Here is an overview.

♦ **Word Cards/Word Books/Word Wall**
The simplest tools to provide to students who struggle with producing written materials are word cards or personal word books that contain words they are familiar with and can compose with. Words can also be displayed around the classroom in Word Walls or charts that provide visual examples of words the student might need to utilize. These are commonly used in many elementary classrooms.

♦ **Pocket Dictionary/Thesaurus**
If a student is able to look up words in a dictionary or thesaurus, these can be helpful. Sometimes having one made just for the student with their "own" list of words can keep the task simple.

♦ **Writing Templates**
These may include "story starters" and other sentence builders that can help students by allowing them to fill in words or phrases to make complete sentences. Various templates can be created for main idea, supporting characters, developing plots, etc. Templates can be created of varying complexity depending upon the needs of the student. Some story writing computer programs have templates available and prompting systems to assist the student through the mechanics of writing a story (e.g., *The Amazing Writing Machine®*, *Storybook Weaver®*). *PixWriter* and *Writing with Symbols 2000™* have templates for emergent writers to use to help them compose sentences.

♦ **Electronic Spell Checkers/Talking Spell Checkers**
Franklin Electronic Publishers manufactures a variety of spelling, language, and reference aids. These are small calculator-like devices that can be used to look up words, definitions, and more. The non-speaking *Spelling Aces with Thesaurus* are readily available at discount department stores and office supply stores. Their speaking models must be ordered directly from Franklin Electronic Publishers. *Speaking Homework Wiz®* pronounces and correctly spells 40,000 words. It offers automatic spelling correction for nearly 50,000 words. It also displays the word correctly written in Zaner-Bloser cursive. It features animation that shows step by step the correct formation of the letter right on the screen. This is a real favorite. Franklin Electronic Publishers products cover the age span offering assistance from elementary through high school and into college preparation.

Many of the Franklin products are part of the *Bookman® Series* that will allow you to insert a variety of Snap-in Book Cards from their library. The newest of the Bookman line is the *Ultimate Reference Suite – pocket model*. It offers an all – in – one reference solution including the 11th Edition of Merriam-Webster Collegiate Dictionary, Franklin Thesaurus, Concise Columbia Encyclopedia and Bartlett's Familiar Quotations and more. It also includes a PC connectivity kit to allow for downloads from other reference or eBook titles.

♦ **Word Processing Software**

Word processing software contains numerous features that assist with composing a paper. Among the most beneficial are the editing features that allow for changing and rearranging what has been written without the physical effort of erasing and rewriting, and avoiding the emotional consequences of handing in a messy paper.

Virtually all word processing software now contains built in spell checking. However, they vary in their ability to "catch" some of the most common misspellings. For example, *AppleWorks 6* has a phonics based spell checker which is often more successful at figuring out the word that the student is trying to spell. *Microsoft Word*, on the other hand, has the concurrent spell checker and grammar checker, which alerts the writer that he or she has keyed in a word that does not make sense. One of these features may be more important than another for a specific student.

♦ **Talking Word Processing**

Perhaps the most exciting development in recent years has been the talking word processor. Talking word processing software allows the student to hear letters, words, sentences or paragraphs spoken by the computer. There are many talking word processing software programs on the market. Two examples that are available for both the Mac and the PC include *IntelliTalk II*® (IntelliTools) and *Write:OutLoud*® (Don Johnston Incorporated).

Talking word processing provides auditory feedback to the student as he or she writes at the computer. Often this feedback lets the student know whether the letter or word just typed is the one that was intended. In *Write:OutLoud*® the computer can be set to beep and blink when a word is typed that is not spelled correctly. This alert signal is useful to some students and bothersome to others.

♦ **Abbreviation/Expansion**

Abbreviation/expansion allows you to represent words or phrases with a much shorter abbreviation or keyword. Typically, you type in an abbreviation that is not a regular word and make it a macro, so that every time you type it, the full version appears. For example, to type "assistive technology" you might choose "aty" or some other unique combination. Typing 'aty' writes out "assistive technology" completely with three keystrokes instead of 20. You need to be careful when you choose your abbreviation. In this example, you cannot use "a" or "at" because they are each words by themselves. You must select a combination that you would not typically use.

Abbreviation/expansion is very useful for students with disabilities. It can save time for things like homework or papers where you nearly always need to put the name of the class, the hour it occurs, the teacher's name, the date, the student's name, etc. at the top of the paper. These could be set up so that two or three keystrokes produce all of that information. There are two shareware programs that we have found useful for abbreviation/expansion. *TypeIt4Me* is a shareware program for the Macintosh that offers abbreviation/expansion. It is a control panel that creates abbreviation/expansion capability. Just type a shortcut code and *TypeIt4Me* will expand the abbreviation into a full word, phrase, or a paragraph in any application. You can download this shareware from: http://trace.wisc.edu/world/computer_access/mac/macshare.html.

Shorthand for Windows is a similar tool for a Windows word processor or text editor application. *Shorthand for Windows* is not limited to word processing. It works just as well with most Windows dialog boxes. It can be used to enter names, logins, passwords, and Internet addresses directly into terminal windows.

Many of the word processing programs, such as *AppleWorks 6* and *Microsoft Word* also offer abbreviation/expansion through macros. Word prediction programs, such as *Co:Writer® 4000* and *KeyRep* also offer abbreviation/expansion.

♦ **Word Processing with Writing Support**

There are several software programs that provide support for the writing process. Word prediction software is useful in the composing process because it suggests a list of potential words. In many of the word prediction programs such as *Co:Writer® 4000* the teacher can enter a list of vocabulary words that would not otherwise appear so that the predicted word list will contain words related to the topic students are writing about.

Draft:Builder® (Don Johnston Incorporated) software provides a framework for organizing thoughts and information in order to develop detailed first drafts that are ready for editing and revising. It incorporates three steps- outlining/mapping, note-taking and drafting- enabling struggling writers to generate, manipulate, and connect ideas and information through a process that results in authentic writing. The outline and notes are integrated so that students can easily synthesize information and build a logically sequenced draft. *Draft:Builder®* has built in auditory feedback, and the Franklin spell checker, as well as teacher-made and standard templates to help students overcome the barriers that interfere with the writing process.

A key feature of *Draft:Builder®* that has proven very effective for students who experience difficulties with formatting of text is the bibliographer tool. This provides a visual example of correct formatting for different types of media including articles, artwork, books, electronic resources, interviews, letters and presentations.

Inspiration® and *Kidspiration®* are described in Chapter 5. They are excellent tools for developing an outline or web of ideas.

Research Assistant for Students (and Teachers!) with Bibliography Generator is a software program that allows students to gather information from any print or non-print source and store it in a searchable database right on the computer. With a click of a button, all sources are referenced in proper bibliographical format.

Read and Write Gold from textHELP offers a completely integrated software application that offers users speech feedback, word prediction and scanning functions in practically any Windows program – your word processor, spreadsheet, encyclopedia, web page, help file, or educational software program. Features include high-quality speech feedback, phonetic spell checker, word prediction, dictionary, talking scientific calculator and voice recognition. Also available within *Read and Write Gold* is one-click OCR scanning which allows you to convert paper documents into editable word files at the click of a button; speechmaker function that lets you convert text into audio files which can then be used on portable audio devices and advanced research and internet search functions.

♦ **Multimedia**

The term multimedia is usually used to describe a method of combining text, sound, and pictures to communicate information. This is done using the computer. There are a variety of software programs that have multimedia capabilities. These include, but are not limited to, *AppleWorks 6, Microsoft PowerPoint, HyperStudio®, Kid Pix® 2, Stanley's Sticker Stories®,* and *Storybook Weaver®*. Multimedia is particularly useful for students with disabilities because it allows them to learn new information through a variety of modalities and to demonstrate knowledge in a way that is not totally dependent upon their ability to write. Multimedia presentations can be done by individuals, or small or large groups, and lends itself to project based learning. Developing a multimedia presentation can be an excellent vehicle for a student to demonstrate a broad range of creativity and skill.

Many teachers are using project-based and web-supported learning in their instruction of students with disabilities. Project-based and web-supported learning can provide an ideal way to incorporate hands-on, visual activities which enhance the learning of students with disabilities. One popular tool that many general education teachers are using is WebQuests. For more information concerning WebQuest visit http://webquest.sdsu.edu.

Although traditional WebQuests can be used for all students and involve active participation, some elements of WebQuests need to be changed to increase full participation of students with disabilities including: webpage design format, the mode of introduction of the WebQuest, and the student input/output format. Ezell, Klein and Hines (2003) in their unpublished manuscript *Using WebQuests with Students with Disabilities* suggest a variety of ways to customize web pages for students with disabilities which include keeping backgrounds simple, using a consistent page layout, designing large buttons, and increasing the readability of items by leaving plenty of white space. Words within the WebQuest may need to be hyperlinked to simplified definitions to help students comprehend some of the terms used within the text. It is important when introducing WebQuest to students with disabilities the teacher first model the WebQuest process, detailing his/her expectations for the students. The teacher may need to use the "think aloud" process so students can hear out loud the thinking process of the teacher as he/she guides the students through the WebQuest example. The teacher may need to modify the format of the student's input. Templates should be designed to the individual level of the student. For students with lower cognitive abilities, the template may need to have more prompts and require less input from the student. Essential learning activities may need to be repeated in a variety of ways to reinforce the concept.

♦ **Voice Recognition**

Voice Recognition was described earlier in this chapter. It can be helpful for some students in enhancing their composition of written material by taking away some of the stress of keyboarding, spelling, or writing. Please refer to the section on Motor Aspects of Writing.

Products Mentioned in Chapter 3

Product	Vendor
3M™Vetwrap™ Bandaging Tape	Available locally
Adhesive Mounting Putty	Available locally
AlphaSmart 3000	AlphaSmart, Inc.
AppleWorks 6	Apple Computer, Inc.
TypeIt4Me	Availabale online
Bookman® Series	Franklin Electronic Publishers
Co:Writer® 4000	Don Johnston Incorporated
CalcuScribe	CalcuScribe
Dana™	AlphaSmart, Inc.
Discover:Board®	Madentec Limited
Draft:Builder®	Don Johnston Incorporated
Dragon Dictate 3.0 for Windows, Classic	New World Creations
Dragon Naturally Speaking 7.0	ScanSoft, Inc.
DreamMax	Branium Technologies, Inc.
DreamWriter 450 & 500	Branium Technologies, Inc.
Dycem®	Dycem Technologies
HyperStudio®	Sunburst Technology
I Can Write series	IntelliTools, Inc.
Inspiration®	Inspiration Software, Inc.
IntelliKeys®	IntelliTools, Inc.
IntelliTalk II®	IntelliTools, Inc.
KeyRep	Prentke Romich Company
Kid Pix® 2	Riverdeep Inc.
Kidspiration®	Inspiration Software, Inc.
Laser PC-6	Perfect Solutions
Magnetic Poetry®	Magnetic Poetry
Memo Board™ Contact Paper	Available locally
Microsoft Office XP	Microsoft
Microsoft PowerPoint	Microsoft
Microsoft Word	Microsoft
Overlay Maker	IntelliTools, Inc.
Picture Communication Symbols	Mayer-Johnson
PictureIt	Slater Software
PixWriter	Slater Software
QuickLink Pen	Wizcom Technologies, Inc.
Quicktionary II	Wizcom Technologies, Inc.
Read and Write Gold	textHELP
Research Assistant for Students (and Teachers)!) with Bibliography Generator	ESSDACK
School Font Collection	Mountain Lake Software, Inc.
Shorthand for Windows	OfficeSoft LLC
SmartApplets	AlphaSmart, Inc.
Product	**Vendor**

Speaking Homework Wiz®	Franklin Electronic Publishers
Spelling Aces with Thesaurus	Franklin Electronic Publishers
Stanley's Sticker Stories®	Riverdeep Inc.
Storybook Weaver®	Riverdeep Inc.
SuperPen Voice	Wizcom Technologies, Inc.
TASH USB Mini keyboard	TASH Inc.
The Amazing Writing Machine®	Riverdeep Inc.
Ultimate Reference Suite – pocket model	Franklin Electronic Publishers
Velcro™	Available locally
ViaVoice®	IBM North America
Wikki Stix™	Wikki Stix
Write:OutLoud®	Don Johnston Incorporated
Writing with Symbols 2000™	Mayer-Johnson

Assistive Technology for Communication

Paula Walser. CCC-SLP, ATP and Penny R. Reed, Ph.D.

Augmentative communication is one of the most complex areas of assistive technology with hundreds of devices now available. In addition, there is growing evidence that many young children with language delays can benefit from the availability of augmentative or alternative communication (AAC) systems to speed the development of their speech and language even though they will not be long term or permanent users of those systems. In making decisions about augmentative communication, the Speech/Language Pathologist will play a central role, but will need to work with a team that includes parents and the other service providers who work with the student. The Speech/Language Pathologist brings to the team a clear understanding of oral motor functioning, speech mechanics, syntax, pragmatics, and language development. The parents and other service providers bring experience in different environments, knowledge about the tasks and task requirements in those environments, as well as a unique relationship with the student.

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Communication

Communication board/book with pictures/objects/letters/words

↓

Eye gaze board/frame

↓

Simple voice output device

↓

Voice output device with levels

↓

Voice output device with icon sequencing

↓

Voice output device with dynamic display

↓

Device with speech synthesis for typing

Assistive Technology for Communication

The term augmentative alternative communication (AAC) or "aug. comm." is often used when referring to the use of some means other than natural speech to communicate. This is a complex area with many variables. In beginning to understand it, let us look first at the various systems and devices that can be used to augment communication.

Simple Communication Boards

- Communication boards consisting of objects or parts of objects, miniature objects, pictures, or graphic symbols,
- Communication boards may consist of one, a few, or many pictures.
- They may be of various sizes depending upon user ability.
- Various displays or arrangements may be used to increase "effectiveness" of communication interactions.
- They may be used as an AAC option for a young child or an individual with very limited vocabulary or as a back up to a more complex voice output device.
- Simple communication boards are also used for "aided language stimulation". Aided language stimulation is the process in which the partner points to picture symbols on a simple communication board in conjunction with ongoing verbal language stimulation.
- Often individual communication displays are made for specific activities or to use in the community or in congested or noisy environments where a voice output device may not be effective.
- Picture communication symbols are often generated using software like *Boardmaker* from Mayer-Johnston, Inc. Images and clip art from other sources may also be used for picture communication systems.

Examples: Object boards, communication wallets/books, displays created with single or multiple photos, symbols, etc.

Back up: Make additional copies of the communication boards and keep a record of the vocabulary which is used on those boards in case the original boards get destroyed or lost.

Eye Gaze Frame or Board

This is a system where objects, pictures, or symbols are placed in such a way that the student can communicate by looking at the desired item**.** A vertical frame is frequently made out of PVC or CPVC pipe with the pictures or other items placed several inches apart around the frame. This allows a communication partner to sit facing the student and see very accurately where the student is looking as he gazes at the desired object or picture to communicate a choice or interest. WATI has designed and sells a clear acrylic eye gaze frame that is free standing and folds when not in use.

Simple and/or Low Cost Voice Output Devices

- One set of messages (represented on one overlay) available to the user at a time.
- Pressing a key (or cell) produces one message.
- May have one, two, four, sixteen, forty, or more buttons with messages.
- Overlay must be physically changed, and device reprogrammed to change the messages.

Examples: *BIGmack® Communicator, Voice-in-a-Box, MicroVoice, Cheap Talk 4, Cheap Talk 8, TalkTrac™Plus, Tech Speak, Tech Talk, Tech Four, Superhawk Plus.*

Backup: Use simple communication boards to take the place of the simple or low cost voice output device if broken. Another type of backup would involve the use of a switch with a tape recorder/loop tape.

Devices with Leveling or Layering

- Capable of storing several layers of messages.
- Allows uses for multiple situations or settings, for example, Level 1 can be programmed with messages appropriate for circle time, Level 2 can hold messages for lunch or snack time, Level 3 could be vocabulary appropriate for social exchange about snack.
- Changing from level to level requires turning a button (or sliding a switch) and physically changing the picture overlay.

Examples: *Macaw, Turn n' Talk, Lighthawk, Go Talk, TalkTrac™Plus* with Levels,

Backup: Design simple communication boards that have the same set-up as the layering or leveling device and use in case of device breakdown.

Devices using Icon Sequencing or Semantic Compaction

- Icon Sequencing or Semantic Compaction is a way of organizing language, which uses an ordered array of pictures to code vocabulary.
- *Minspeak* is the primary example of semantic compaction and is used by Prentke-Romich Company in their devices.
- User presses two or three keys in sequence to produce one message.
- For example, using *Minspeak*, the user presses a button with a picture of a dog with a newspaper in its mouth followed by pushing a button with a picture of a question mark. The device produces the message, "What's new with you?". On the same device, pressing the picture of the clock followed by the picture of the question mark produces, "What time is it?".
- The user must be able to remember the message codes.

Examples**:** *Vanguard™ II, Vantage, Pathfinder, Chatbox®, SpringBoard*

Backup: Design a simple communication board with the same picture icons as the display used on the device with icon sequencing. The important thing to remember here is that the communication partner will need to know the vocabulary programmed behind each icon sequence, in order to interpret it correctly. To remedy this a "cheat sheet" may be provided which pairs the icon sequence with the message it represents.

Devices using Dynamic Display

- Pictures are represented on a screen, like a laptop computer monitor; the screen is capable of touch activation and pressing a picture on the screen produces a message.
- The device automatically changes the picture displays and corresponding messages.
- For example, to ask for a cheeseburger at McDonald's, the user selects a picture of food on the first page. The device automatically produces a new page of pictures, which includes a picture representing fast food. The user selects the fast food picture and the device produces a page with pictures representing several fast food restaurants. The user presses the picture for McDonald's and the device changes to a page that includes items on the McDonald's menu. The user selects the picture of the cheeseburger.
- A "user friendly" method of storing messages because the student only needs to "recognize" the message, not "recall" it.
- Dynamic Display devices are available in a variety of sizes from those weighing over 9 pounds to the handheld variety, which weigh less than 2 pounds.

Examples: *Dynavox 3100, Dynamyte 3100, Dynamo, Talking Screen™, Speaking Dynamically™ Pro, SpringBoard, Portable Impact Tablet, Portable Impact Handheld, Portable Impact Palmtop*

Backup: Use simple communication boards that reflect the same vocabulary as the dynamic display device. This can be accomplished by printing screens of individual overlays off of the device software.

Devices using Spelling with a Speech Synthesizer and Written Text

- Anything the user types can be spoken by the devices built in speech synthesizer.
- Requires good spelling skills.
- Often have abbreviation/expansion capabilities so that longer messages can be stored and activated with just a few keystrokes.

Examples: *Link, DynaWrite*

Backup: Simple communication board with words as messages located on individual cells on the board and/ or a basic letter board to spell messages.

Getting Started with AAC

- **When there is a question of whether or not to try AAC with a student, ask critical questions.**

Is the student's ability to speak keeping him or her from effectively interacting with others in various environments? Is the student's ability to speak limiting his or her opportunity to practice language? Could AAC provide new opportunities for the development of both speech and language ability? If the answer to any of these is yes, then AAC should be considered.

There has been a great deal of research conducted regarding the impact of augmentative communication interventions on speech development. In a review of 25 studies, Silverman (1995) found that in the overwhelming majority of cases, the use of augmentative communication actually increased natural speech production. In addition, Blischak (1999) specifically studied the effect of using voice output communication aids and found that there was a marked increase in production of natural speech by children following the use of the voice output devices. We include this information to point out that there is absolutely no basis to believe that it is an *either /or* choice. **The use of augmentative communication will promote the development of or increase in natural speech. In fact, it is highly unlikely to deter speech development.**

However, all children's need for augmentative communication is not the same. Martinsen & von Tetzchner (1996) identified three groups of children who require augmentative/ alternative communication. They called these the alternative language group, expressive language group, and supportive language group. Each of these groups is very different and requires AAC for different reasons.

- The **Alternative Language Group** is made up of children who use little or no speech to communicate and have a difficult time understanding spoken language. Children with autism and severe cognitive impairment fall into this group, as do children with auditory agnosia (problems recognizing sounds as meaningful linguistic elements.). Children in this group often use gesture as their primary means of understanding language. The primary goals of AAC with this group are to provide input to assist the student in the understanding of language, to develop interaction skills for that student and to increase the opportunities for expressive communication.

- The **Expressive Language Group** includes students who have severe motor involvement, thus severe speech motor dysfunction. As they mature, these children experience a widening gap between what they understand and what they are able to express using speech. Children with athetoid cerebral palsy and severe dysarthria of speech are examples. The main goal for AAC intervention with this group is to provide a means to express their interests, needs, and comments, provide opportunities to actively participate in the curriculum and focus on the development of literacy skills.

- The **Supportive Language Group** includes students with moderate motor speech dysfunction. These children often have problems with both speech and language. Speech is poorly articulated during the birth through preschool years, although many of these children will become intelligible speakers. This group may include children with: Down syndrome, apraxia of speech, severe oral-motor impairments, severe articulation disorders and developmental delay. The primary goal of

AAC intervention for this group is to provide a bridge for the development of speech and language and a means to enhance participation and increase communicative competence.

- **When a student does not have a means to communicate, create low tech opportunities using real objects, pictures, or symbols, while investigating voice output devices as part of a comprehensive augmentative communication assessment.**

One does not have to start with expensive or high tech augmentative communication devices. Low tech communication boards are not difficult to create and can begin to provide information on what effect augmentative communication might have. Simple communication boards with pictures of the people in a student's environment can be made using the *I-zone Instant Pocket Camera* from Polaroid. It produces small photographs that are 1" by 1 1/2" and have an adhesive backing. For students who may be ready to use symbols, *Boardmaker* is a wonderful tool for educators or parents to create communication boards about a variety of topics and activities.

If a student has not previously had any augmentative communication intervention, a comprehensive AAC assessment needs to take place. This may be part of the process of assessing a student's need for various assistive technologies or it may be the only area of concern. In either case, standardized tools to complete this type of assessment are few and seldom address all of the unique needs of the individual student. Therefore, an AAC assessment is often completed by combining information collected through standardized testing procedures, combined with interviews, observations, and a period of diagnostic intervention, which includes trial use. The period of diagnostic intervention itself is complex and may include trials with different devices or combination of devices. It is important to use all components of a planned system within all routine environments with the child before large purchases are completed. In fact, many funding sources require a trial period of use with the desired system before funding approval is given.

Fortunately there is increased recognition of the importance of conducting an assessment of the need for AAC as soon as it becomes apparent that a student's speech and/or language is not developing at a typical pace or is not meeting his/her communication needs. Many young children are now provided AAC options in Birth to Three and Early Childhood programs. In the past, that intervention often would have been delayed until mid elementary school. Beukelman and Mirenda (1992) suggest that if an AAC system is not in place by the time a child begins first grade, the child will not be an active participant in the regular education curriculum. We also recognize the fact that children who are unable to verbally communicate are likely to be significantly environmentally disadvantaged when learning language. Research in the areas of the brain, learning and language acquisition overwhelmingly emphasize the importance of addressing the language needs of children at a very early age.

The questions provided in the communication section of the WATI Student Information Guide can help the team begin to gather the necessary information in order to make an informed decision.

- **When there is a question of whether or not the student is intentionally activating a switch, consider using Every Move Counts.**

Every Move Counts (Korsten, Dunn, Foss, & Francke, 1993) is a comprehensive sensory based communication program. It includes assessment and intervention strategies to use with individuals who are unable to use formal language systems.

The program was developed for individuals perceived as unable to communicate due to severe multiple disabilities and who are functioning below the 18-month level in the area of communication. The manual includes a specific assessment strategy to identify what sensory experiences (e.g. auditory, visual, olfactory, tactile, gustatory, or vestibular) are affecting the individual, either positive or negative. The *Every Move Counts* manual includes all record keeping forms, activities, and carry over materials to then implement an intervention that begins at the student level. Almond, Boutilier, Frey, Korsten, Nettleton, and Van Dusen (1999) report dramatic changes in the performance of their students using the *Every Move Counts* program.

Korsten (1999) reports that infants under 4 months of age learn to associate their movements with a consequent event. In fact, normally developing 3-month olds remember response-consequence associations for at least one week and their learning can be reactivated for up to 3 weeks. However, infants quickly lose interest in an environment they can never hope to control. Infants as old as 9 months do not learn the connection between movement and consequence with a delay of more than 2 seconds. This means that co-occurrence is essential in developing the concept that the world is controllable. Infants and children with physical/sensory/multiple difficulties seldom, if ever, experience co-occurrences. Research shows that as many as 10,000 co-occurrences need to be detected, associated and remembered for a child to overcome early deprivation and learn that they can control their world.

- **When a student does not seem to understand or anticipate a routine schedule or steps of activities, use a concrete object or picture schedule**.

A schedule using objects, parts of objects, pictures or symbols can be a useful tool to help a student begin to understand and anticipate the events of the day or the steps of a specific activity. The items are presented in the order in which they will occur (or need to be completed). They may be crossed out, covered up, or put away as each one is completed. The *I-zone Instant Pocket Camera* is useful for making picture schedules of the various locations or activities of the day. *Boardmaker* is also great for creating schedules for a student who uses symbols.

- **When a student does not attend to or use pictures or picture symbols, use Aided Language Stimulation.**

Aided Language Stimulation is a technique of directing the student's attention to pictures or symbols (perhaps when using a small flash light) to model the use of communication boards and increase a student's understanding of messages receptively. As the teacher or parent gives directions or asks questions, she can model the use of the communication board shining the flashlight on the objects, pictures, or symbols as she speaks, which helps the student understand what is being communicated.

Aided Language Stimulation can also be used when a student needs to build receptive vocabulary. Students in the Alternative Language Group especially benefit from an environment where communication partners use alternative language forms on a regular basis. We utilize Aided Language Stimulation to accompany spoken language with graphic symbols when communicating with a child in this group.

- **When a student uses an augmentative communication board or device (or even their own voice) to respond to communication, but rarely or never initiates communication, increase communication opportunities through Environmental Communication Teaching.**

Creating Communication Environments is adapted from Environmental Communication Teaching (ECT), which was developed by Dr. George Karlan at Purdue University. Environmental Communication Teaching is based on eliciting communication within natural environments (McCloskey & Fonner, 1999). Creating Communication Environments (CCE) builds on the premise that communication requires three components: activity in which participation and communication initiation is required, an environment conducive to communication, and the utilization of effective communication partners. Within the ECT and CCE trainings, cues, prompts, and feedback strategies are used to encourage the use of age- and activity- appropriate communication. The prompt hierarchy listed below is employed when target students do not exhibit the level of communication expected or desired. The prompt hierarchy progresses from least (pause after environmental cue) to most directive (full model) and provides a structure for the adults that encourages communication.

Prompt Hierarchy:

1. Environmental cue occurs to signal communication. Pause and be engaged with the student to give him the opportunity to respond. If he responds, provide descriptive feedback.
2. If no response, ask the student an open-ended question, then pause. If he responds, provide descriptive feedback.
3. If no response, provide the student with a partial prompt, then pause. If he responds, provide descriptive feedback.
4. If no response, provide a prompt (e.g., a carrier phrase, the word's initial sound) or request for communication (e.g., "tell me what your need"). Pause. If he responds, provide descriptive feedback.
5. If no response, provide the student with a full model of an appropriate response.

There are four specific building blocks of Creating Communication Environments. They are:

1. Expect all students to communication and develop a means for each student to communicate.
2. Arrange the environment (including communication partners as a part of that environment) to increase the likelihood of communication.
3. Identify communication opportunities within natural routines through everyday activities.
4. Recognize and respond to the student's communication initiations.

♦ **When a student has limited access to vocabulary, increase the options for communication**.

More communication vocabulary can be provided through multiple boards, multiple voice output devices located strategically for specific activities, or the provision of a voice output device with levels, dynamic display, or semantic compaction. See the continuum of Augmentative Communication Devices and the section on Assistive Technology for Augmentative Communication earlier in this chapter. One single message devices such as a *BIGmack® Communicator* is not sufficient to meet the communication needs throughout every activity of the day. If more ideas are needed for beginning communication, *Making Connections* (Locke & Levin, 1999) is recommended.

♦ **When the student has only had access to low tech boards, try voice output**.

Even if a student is communicating effectively with low tech boards, he or she deserves the opportunity to experience the power of voice output. You can't call out to someone with a picture on a piece of

cardboard. There is power in having voice. Each student deserves the opportunity to experience that power. The student also deserves the right to reject it, if it has no appeal. Students with Autism Spectrum Disorder may prefer low tech communication techniques rather than voice output. That should be their choice.

Included in this chapter is a continuum of Augmentative Communication devices. Although the devices are listed in a continuum, this is really a continuum for consideration. Any given student may be using a system that is composed of items from more than one category of the continuum at the same time. In fact, that is the reason for using the term augmentative/alternative communication system. A single device does not a system make**.** The typical AAC user requires multiple components in a system to meet his/her communication needs throughout the day in various environments and in differing situations. The particular device used to participate in academic activities within a regular education class may differ from the device or low tech tool used to communicate at lunch, on the playground, or during swimming lessons.

c. When trying to determine exactly which device or devices will work best for a specific student use Feature Match.

The systematic matching of features on a device with the specific, unique needs of a given student is called feature match. Device issues include the following (Muller & Oberstein, 1995):

θ **Access** -How the student will activate and continue to operate the desired system:

θ **Direct Selection** with hands, head, or toes

θ **Switch Access/Scanning**-Access method where the user activates simple or multiple switches to choose among selection possibilities presented in groups or one at a time. Scanning requires less motor ability but higher cognitive and attending skills than direct selection. Typically a developmental level of four years is recommended for visual scanning and six years for auditory scanning.

θ **Scan Pattern-**This refers to the movement pattern of the scan indicator. Frequently used patterns include:

- **Linear**-indicates movement item by item in line fashion.
- **Circular**-scan indicator moves item by item using a circular movement.
- **Row-Column-**one row at a time is presented, when the row with desired item is indicated, the user activates the switch and each item in that row will be individually scanned.
- **Block-**is similar to Row-Column, but instead of a row, a particular group of items is presented, when that group is selected, the device presents a smaller group such as a row or individual items for selection.
- **Auditory**-used in conjunction with visual scan pattern, the user selects a message after listening to a verbal prompt.

♦ **Scan Mode** refers to the way the switch is used to start, stop, and maintain the scan and to select the target item.

- **Automatic Scanning-**The user activates and releases the switch to start the scan and then waits while each item is presented. When the desired item is indicated, the user activates a switch again to make a selection.

- **Inverse Scanning**-The user maintains switch activation while the items are presented and releases the switch when the desired item is reached.
- **Step Scanning-**The switch is activated and re-activated to indicate each target item.

♦ **Scan Rate** is the speed at which the scan indicator moves across the item choices. It is usually adjustable to accommodate the user's needs.

θ **System Process**-The communication functions performed by the system including the type of representation used for vocabulary (symbols, icons, text), user programmability, dynamic or static display, memory for storage of messages, and text-to-speech and coding systems to expand and accelerate vocabulary.

θ **System Output-**The means by which the message is transmitted or conveyed to the communication partner (digitized speech, synthesized speech, visual output, print).

θ **Portability/Interface Issues-**How a device will be transported and, if necessary, interfaced with other assistive technology used by the student, such computers, environmental control units, and seating systems.

θ **Special Considerations-**Cost, aesthetics, device flexibility, customer support and repair services, compatibility with current and future equipment, ability to upgrade, technical complexity.

As you can see, this is a complicated process. However, there are some exciting resources, which can make the process much easier. Each of them is a software program that assists you in making selections and matching the students' unique abilities and needs with features of various devices.

This first is a program called *Evaluware* which is designed to help you determine if the student can do direct selection and if so, what size area he might be able to activate accurately, etc. *Evaluwar*e is from Assistive Technology, Inc. and is designed to provide assessment activities for AAC and computer access. It helps determine the range of motion, the size of button that a student can activate, the volume setting needed, preferred type of voice, and more. It is divided into Listening Preferences, Looking Preferences, Input Settings and Preferences, and Access Skills.

The second program specifically provides a feature match for augmentative communication devices. *AAC Feature Match* from Doug Dodgen and Associates is available for either the PC or Macintosh. This software program identifies the specific features of an augmentative communication system and allows you to match the device with your student's specific abilities. The software then selects the devices that might meet the student's need. The program contains over 120 devices and contact information for vendors. In addition, annual updates to the database are available.

Products Mentioned in Chapter 4

Product	Vendor
AAC Feature Match	Doug Dodgen & Associates
BIGmack®	AbleNet, Inc.
Boardmaker	Mayer-Johnson
Chatbox®	Saltillo Corporation
Cheap Talk 4	Enabling Devices
Cheap Talk 8	Enabling Devices
Dynamo	Dynavox Systems, Inc.
Dynamyte	Dynavox Systems, Inc.
Dynavox	Dynavox Systems, Inc.
DynaWrite	Dynavox Systems, Inc.
Evaluware	Assistive Technology, Inc.
Go Talk	Attainment Company, Inc.
I-zone Instant Pocket Camera	Available locally
Lighthawk	AdamLab, LLC
Link	Assistive Technology, Inc.
Macaw	Zygo Industries, Inc.
Minspeak	Prentke Romich Company
MicroVoice	Frame Technologies
Pathfinder	Prentke Romich Company
Portable Impact	Enkidu Research Inc.
Speaking Dynamically™ Pro	Mayer-Johnson
SpringBoard	Prentke Romich Company
Superhawk Plus	AdamLab, LLC
Talking Screen™	Words +, Inc.
TalkTrac™ Plus	AbleNet, Inc.
TalkTrac™ Plus with levels	AbleNet, Inc.
Tech Four	Advanced Multimedia Devices (AMDI)
Tech Speak	Advanced Multimedia Devices (AMDI)
Tech Talk	Advanced Multimedia Devices (AMDI)
Turn n' Talk	Frame Technologies
Vanguard™	Prentke Romich Company
Vantage	Prentke Romich Company
Voice-in-a-Box	Frame Technologies

Assistive Technology for Reading, Studying, and Math

Penny R. Reed, Ph.D., Judi Cumley, and Paula Walser

This chapter focuses on assistive technology applications in the academic areas. It contains three separate continuums: Reading, the more generic area of Learning/Studying, and Math. Several things grouped into the Learning/Studying continuum can be used to help support students as they learn across many subject areas.

There are many students who have difficulties with reading regardless of the specific disability label they may have been given. While there are only a small number of assistive technology "devices" for this population, there has been a proliferation of software developed in the last few years that can be extremely beneficial.

Considering the number of students identified as having a disability which includes difficulties with reading, this area is one where school districts can impact a large number of students for relatively little money. Nearly all of the assistive technology described in this section can be obtained for $300 or less (assuming that the district already owns computers that could be utilized).

The first item in this section is the continuum of alternatives to be considered for students who are struggling with reading. Brief descriptions for each of the items in the continuum are included in this section. This is followed by a summary of an article from the Reading Teacher by Erickson and Koppenhaver (1995) that describes the development of a literacy program for students with severe disabilities. Immediately after that is a section that uses charts to organize a variety of assistive technology and children's literature to develop an effective, comprehensive literacy program for children at different stages of literacy development. The last item in the section on reading is a summary of an article by Heller, Fredrick, & Diggs (2000) on Teaching Reading to Students with Severe Speech and Physical Impairments using the Nonverbal Reading Approach.

The second continuum is a variety of items that can support students as they learn and study. This section contains a description of handheld computers and applications that could assist students with disabilities. The final continuum contains items that can assist students with math.

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Reading

Standard text

↓

Predictable books

↓

Changes in text size, spacing, color, background color

↓

Book adapted for page turning (e.g., page fluffers, 3-ring binder)

↓

Use of pictures/symbols with text

↓

Talking electronic device/software to "pronounce" challenging words

↓

Single word scanners (e.g., Quicktionary II Pen)

↓

Scanner w/OCR and talking word processor

↓

Electronic books

Assistive Technology and Reading

In this section we will try to address how assistive technology might be used to support students in developing literacy. In this first continuum we will focus on students with mild to moderate disabilities with reading difficulties. Later we will broaden our focus to the development of literacy for students with more severe disabilities.

♦ **Highlighting Important Words**

In the continuum one of the first suggested alternatives is to experiment with highlighting important words and phrases. You can, of course, do this with a highlighter pen. You can also use *Highlighting Tape* to make specific letters or words stand out. *Highlighting Tape* comes in six colors (orange, yellow, pink, blue, purple and green) and has a large number of uses. It is especially useful in library books or other books that you do not want to permanently mark. You might highlight new vocabulary, key words, dates, important people or facts, definitions, a sequence of steps or events, or concepts pointed out by the teacher as being important for a test. You could cover all new words with *Highlighting Tape* and then record those words on *EIKI Language Master* cards. If the student cannot pronounce the words, they can run the card through the *EIKI Language Master* to hear it pronounced. Different colors can be used on the same text for different things. Lee Products Company makes *Highlighting Tape.*

We have also found it helpful to place a strip of *Highlighting Tape* on a two inch strip of clear plastic transparency (the kind used for overhead projectors). The child can then use it to move down the page, highlighting the line being read.

♦ **Changes in Text, Spacing, Color**

One of the most powerful low tech adaptations is the use of colored overlays to change the color of the background. Many children experience a significant improvement in their ability to read when the white background is changed. Experts in the field recommend trying out different colors and combinations of colors to see if any of them make a difference. If you get two copies of the same page of text and place a different colored overlay on each, you can then ask the student to tell you which is better. Continue trying different colors until the student finds one that makes a difference. If this is going to work, it will work immediately. The student will often describe the effect as, “the letters don’t move”, “the words are bigger,” “the words are brighter,” “I can see the spaces,” etc. Different children are helped by different colors. Blue, pink, red, green, purple and other combinations have all been known to work. Some children benefit from two or more overlays being overlapped. Once the student finds a filter, have the student read 10 or more lines first without the filter and then with the selected filter. You should be able to tell the difference right then, if it is going to help (Sweeney, 2000). Once you have determined which color works best for a particular student, it is easy to adapt word processing programs to have a similar appearance by changing background and text colors. Be aware that the same color combinations may appear different on the computer monitor due to the fact that the illumination factor of the monitor might actually change how the brain and eye work together. It may actually be a different color combination that works on the computer screen. Color overlays are available from See It Right Corporation or from the National Reading Styles Institute. Colored reading strips sometimes called *Reading Helpers* or *EZC Readers*® are widely available. *Transparent PostIt Notes* can also be used to highlight specific words or chunks of text, or math problems.

To change the size of text it is often possible to simply enlarge the textbook pages using the copier. If that is not sufficient, a hand held magnifier may be helpful. Experimenting with different sizes of print is advantageous if you notice that a student reads better when the print is larger. Another strategy to try is changing the type of font. Some styles of font are easier to read for some students.

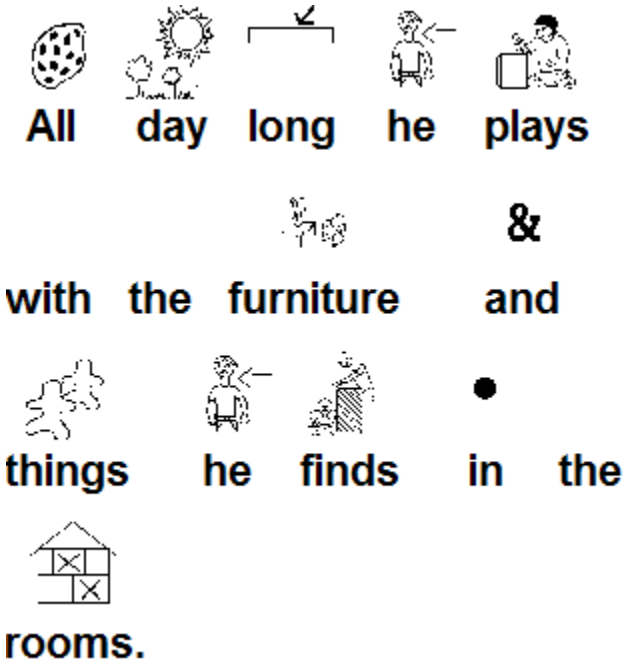
♦ **Physical Access**

If a child has a physical disability that makes it difficult to handle books and turn pages, pages can made easier to handle. Putting something in between pages to separate them makes it possible to slip a finger between the pages. These "page fluffers" can be anything that works well. An easy way to make page fluffers is by adhering pieces of lightweight foam or sponge to a piece of tag board. These can be cut in one inch squares and then paper clipped to each page. Or the soft side of Velcro™ can be stuck to the corner of each page. Any lightweight item that will sufficiently separate the pages will work. It is also important to consider the physical placement of the reading material. Often an easel or some type of device is necessary to hold the reading material in a position to allow the child to view it.

♦ **Supplementing text with Pictures**

Software programs that add pictures to text can be very helpful for students struggling with reading. One example of such software is *PictureIt*. *PictureIt* software from Slater Software allows the teacher or therapist to enter text and quickly add picture symbols. Picture symbols are added to the entire passage with just the click of one button. The picture supplemented text can be printed and adhered over the traditional text using removable adhesive. The software consists of a library of over 6000 pictures/symbols linked to words, including the 100 most commonly used words. It is ideal for the beginning reader.

A typical line might look like the following text from Jake's First Halloween by Jean Slater.



When students no longer need the help of the picture, they tend to stop looking up at it and naturally fade its use. *Clicker, Writing with Symbols 2000*™ and *PixWriter* software can also be used to supplement text with pictures.

♦ **Speaking Spell Checkers**

The various talking products from Franklin Electronic Publishers are especially helpful for students who stumble over new words or larger words. As you type in the word, the talking spell checker/dictionary/thesaurus will pronounce the word. There are a number of these products. Catalogs are available from Franklin Electronic Publishers. The *Speaking Homework Wiz*® also lets you enter a word list so that a student could scroll down through the word list, looking for the one they are not sure about and have it spoken by highlighting it. It clarifies homophones such as *too*, *two*, and *to*. And the phonetic spelling correction lets the student look up a word even if he doesn't know how to spell it.

♦ **Single Word Scanners**

A single word scanner can be of great help to an advanced reader who struggles with large, multisyllabic words. A device such as the *Quicktionary II Pen* from WizCom Technologies LTD. can be an excellent tool. It can be moved across the unknown word or line of text either from left to right or right to left. It scans the word or line of text and translates it with built in optical character recognition, then pronounces the word or reads the line of text with just the touch of a button. It also provides the definition if needed. This is not a tool for a young reader, one who struggles with many words in a passage, or has visual/motor difficulties. However, it is a fabulous tool for the right student.

♦ **Electronic Books**

Electronic books are exploding on the market. They can help the student struggling with reading by highlighting and reading the text. Many of these books are entertaining as well as educational. However, that may not be a plus! Lewis (1999) cautions that without direct supervision students with learning disabilities spend over 65% of their time "playing" with the non reading features of electronic books. While hearing fun sounds and seeing things move around the screen may be entertaining, they will not improve a child's ability to read.

A series that avoids these problems is the *Start-to-Finish Books* from Don Johnston Incorporated. All of the *Start-to-Finish Books* tell an excellent story without games, sounds, or gimmicks. Some of the stories in the series are classics that have been rewritten with high interest, controlled vocabulary, (e.g., Treasure Island, The Red Badge of Courage). Others are new stories that have been written specifically for the series. All are very well done and come with a hard copy, tape cassette, and CD. The CD includes the text in exactly the same arrangement as in the book itself. The Gold Library includes titles with grade 2-3 readability, syntax and vocabulary of conversational speech, easily decodable words and a limited number of ideas per sentence. The Blue Library includes titles with grade 4-5 readability, syntax and vocabulary of more formal English; more ideas introduced into longer sentences with varied sentence structures. All *Start-to-Finish Books* feature built –in scanning for single switch users. Each Start-to-Finish title includes teacher support materials, guided reading levels, lexile levels, PDF files of activities that include vocabulary and word study, plot and character development activities, cloze passage and multiple-choice quizzes and open ended question for each chapter. Titles cover history, literature, science and nature, mystery and sports.

IntelliTools Reading: Balanced Literacy program incorporates guided reading, phonics and writing through theme based stories including song, rime, and patterned language activities. The *Balanced Literacy* program includes nine full-color original storybooks, 142 lessons, 117 letter, pattern and decodable minibooks, 212 phonics activities, and 27 writing exercises. It also includes 46 colorful, durable *IntelliKeys*® overlays that support *IntelliKeys*® users.

Electronic books can also be created using many software programs. *Kid Pix®2, HyperStudio®, BuildAbility, IntelliPics Studio®, My Own Bookshelf* and *PowerPoint* are examples of commercial software that can be used to create electronic books for beginning readers. Another software program, which is free, is also an excellent tool for creating electronic books. *Scan 'n Read* can be downloaded from http://www.switchintime.com. It is a delightful, easy to use program for the Macintosh operating system. Check it out. (You will also find several other free programs on the website.)

Several excellent websites also provide access to electronic books. The Starfall Learn to Read website http://www.starfall.com/ is a free website featuring a multitude of stories appropriate for Early Childhood through second grade. Stories are categorized according to early emergent reader and advanced emergent reader. The website allows the user to highlight words and have the words sounded out for the reader. The International Children's Digital Library (ICDL) is a five-year project funded by the National Science Foundation (NSF) and the Institute for Museum and Library Services (IMLS) to create a digital library of international children's books at http://www.icdlbooks.org. One goal of this project is to create a collection of more than 10,000 books in at least 100 languages that is freely available to children, teachers, librarians, parents, and scholars throughout the world via the Internet. This website provides scanned images of the books and does not actually read the book aloud for the student.

♦ **Using the Computer to Read Text**

In the area of reading one of the most exciting development in recent years has been the use of Optical Character Recognition to allow a computer to translate scanned text into spoken words. Talking word processing, text reading, and screen reading software all allow the user to highlight letters, words, or phrases and have them spoken by the computer.

Some talking word processing programs such as *IntelliTalk II®* or *Write:OutLoud®* can be used for this. However, these are primarily designed to assist with the writing process rather than reading. *CAST eReader* is a program designed to assist with reading. It is available for either Macintosh or Windows. Both *eReader* and the talking word processing programs listed above, provide single word pronunciation to help the student who 'stumbles' over only some of the words or reading tracking and reading pacing support for the student who needs to have whole blocks of text read. *CAST eReader* is also useful to low vision and blind users. *CAST eReader* works well for reading digitized text, HTML, and Daisy files that use human voice on MP3 files. All of these programs allow the student to change the background color and text color as well as size of text and type of font.

Another is textHelp's *Read and Write Gold* for the PC and *Read & Writ*e for Mac. These provide dyslexic spell checking, screen reading, context enabled word prediction, speaking phonetic spell checker, homophone support, pronunciation tutor, voice recognition, fact finder and more. *ReadPlease* is a free text-to-speech software program. *ReadPlease* will read any web page, MP3,Wav, or text file. It also includes a ReadingBar for Internet Explorer that lets your browser speak with AT & T *Natural Voices.*

Still other programs are even more sophisticated and allow the student to change the spacing between words, spacing between lines, add voice notes and typed notes. Two examples of these are *WYNN (What You Need Now)* from Freedom Scientific and L & H *Kurzweil 3000* from Lernout & Hauspie. *WYNN* has a very user friendly interface that many students with learning disabilities find easy to use. *Kurzweil 3000* has its own Optical Character Recognition program along with powerful word attack tools. Both of these programs are worth considering if you need to scan large amounts of text for

secondary students in general education classes. *TestTalker*™ is a new program from Freedom Scientific designed to assist with test taking, worksheet completion, and study of written materials. *TestTalker*™ maintains the integrity of the written test by not modifying the test, but providing the accommodation of a bimodal presentation of the unmodified written information. *TestTalker*™ supports true/false, multiple choice, fill-in, and extended answer tests. It includes a PDF converter so teachers can simply open a PDF file in *TestTalker*™ without needing to scan.

Text-to-Audio© by Premier Assistive Technology, Inc. is an easy to use tool that converts documents to files. *Text-to-Audio*© can create 10 different types of audio output files including MP3 and Wav. It compresses files as it creates them. *Text-to-Audio*© uses AT & T's Natural Voices to produce high fidelity digital speech audio. The Wav or MP3 files that are created can be played back using an MP3 player.

♦ **Scanners**

In order to use software to help in reading, the text to be "read" must be entered into the computer. It can either be typed in or scanned in using a scanner. Scanners come in many sizes, types and prices these days. Flat bed scanners are usually the best choice. They have come down in price in recent years and a very good one can be purchased for $60 to $400. Look in computer stores or mail order catalogs for an idea of what is available. When you consider purchasing a scanner, be sure that it comes with Optical Character Recognition (OCR) software. The OCR software is what allows the scanner to "read" the marks as text. With OCR software, text can be recognized as text and moved into word processing or talking word processing programs.

Thinking about Literacy

Our understanding of the development of literacy has changed dramatically in the last few years. It was previously thought that language developed first and reading and writing skills did not develop until a child entered school. We now know that it is a much more simultaneous process and that early literacy experiences provide the foundation for later reading and writing. We are not suggesting that young children be pushed to read and write before they are ready, but rather that they have literacy rich experiences throughout their early years. As the following chronological breakdown of the development of literacy shows, the early components of attending and listening are critical in later making reading and writing possible.

The Development of Literacy

Demonstrate joint attention with adult caregiver to activities, books, games, and songs (3-12 months)
Develop an interest in books and stories (1-2 years)
Associate pictures with spoken word (1-2 years)
Realize text conveys meaning (3-5 years)
Recognize speech to text boundaries (4-5 years)
Develop sound manipulation skills (4-6 years)

- Initial + final sounds
- Initial letter names/sounds

Recognize, name, and write the alphabet (4-6 years)
Apply phonics (5-6 years)
Sound blend words (5-6 years)
Read and spell words (5-6 years)

Read sentences (6-8 years)
Read paragraphs and write fluently (7-9 years)
Use strategies to gain meaning from text, and use writing to explore and enhance learning (9 years +)
Comprehend and respond to ideas in content area texts (9 years +)

For more information on early literacy visit these websites:
http://www.aacintervention.com – This website has a wealth of ideas about augmentative communication for children of all ages. Check under "read" for a list of books with repeated lines.

http://www.naeys.org – This website of the National Association of Educators of Young Children has many excellent sources of information. Some of these include articles on early learning including a list of good books for young children, including: books to prop up for very young babies, rhyming verses and songs, cardboard, cloth and vinyl books, books with easy to turn pages, books for introducing babies to names of things, books with simple stories, and more.

Summary of:
Developing a Literacy Program for Children with Severe Disabilities, from Reading Teacher, 1995

Erickson and Koppenhaver describe a program for children with severe disabilities that incorporates technology and child-centered activities to teach literacy skills across the school day. The need for this programmatic change stemmed from their observation that children with severe disabilities were not provided the same type or number of literacy opportunities as their nondisabled peers. They are viewed as unable to learn reading and writing so they are not afforded the opportunity to learn. However, they point out, these children have "unprecedented legal and educational rights" (Erickson & Koppenhaver, 1995, p. 676) that entitle them to be educated in the least restrictive environment. The growing knowledge of and support for assistive technology helps promote successful placement in mainstream classrooms.

A literacy program was developed in a separate classroom for children with severe disabilities to see if it could better prepare these students for inclusion in mainstream classrooms. The focus was on increasing reading and writing skills in order for them to participate in typical classroom activities. The program was implemented in a rural classroom with eight students ranging in age from 5 to 11 years. Seven of the eight were wheelchair bound. Seven were also considered untestable. Three had no formal means of communication; four could talk but were unintelligible to unfamiliar listeners.

One of the keys to their success was administrative support. Funds were provided to purchase both high and light technology to support the program. This included computers, software, materials for communication boards and talking switches. The other key factor was the commitment of the team of professionals working in the classroom. This included the teacher, speech therapist, physical therapist, teacher assistants, and an aide. Language-rich and meaningful activities as well as therapy goals were implemented throughout the day. Lesson plans were developed that included academic goals along with positioning considerations that matched activities.

After the first year the team resolved to "emphasize reading and writing activities that were child directed and constructive rather than teacher directed and reactive." (Erickson & Koppenhaver, 1995, p. 680) They arrived at four basic program components: "(a) writing during calendar time each morning; (b) directed reading in small groups or individually with the teacher; (c) use of computer software; and (d) group activities." (Erickson & Koppenhaver, 1995, p. 680).

Two students are highlighted in the article. Erica is a 6-year-old with cerebral palsy. She could walk but not talk. She could use several modified signs and could type on the standard keyboard with some success. After a few weeks in the program she began using the keyboard independently for many activities. She began using a Touch Talker communication device and was able to handle icons with multiple meanings. In less than 6 months she was an emerging reader and writer.

The second student, Casey, was 5-years-old. She also had cerebral palsy but needed many more adaptations than Erica. She had no speech but used eye pointing quite dependably and had a consistent yes-no response system. She demonstrated awareness of initial consonant sounds and could communicate via eye pointing to the correct consonant that was being finger spelled by a teacher. Casey assisted in programming a talking switch each day to report to her parents what had occurred at school each day and vice versa. By using eye pointing boards, the staff determined that she could read a few words.

The authors reported what they had learned as a result of implementing this literacy program. It provided a wide range of literacy opportunities and the tools to participate in them. They fostered the means to ask and answer questions, and comment on daily events. Four of the eight students were placed in their neighborhood schools, although one was unsuccessful and was returned to the special classroom.

One of the most compelling reasons to place students in regular education classes is that regular education teachers have the expertise in literacy to contribute to the programming for students with special needs. To be successful, the authors suggest:

- Work closely with the special education team and the parents; get their assistance in developing light technology communication boards.
- Understand that physical and communication disabilities do not mean cognitive disabilities.
- Provide additional wait time for students to respond or provide them with advance notice on what questions will be asked.
- Balance teacher-directed activities with child-centered activities.
- Encourage interactions between all students and teachers.
- Update technology skills by taking a class.
- Contact the Center of Literacy and Disability Studies for assistance and ideas.

Identifying Stages of Literacy

Of course we all know that children do not change overnight from being a non-reader to being a fluent reader. But what are the steps or stages? Can we predict a progression of specific skills? To answer those questions we undertook a review of the literature looking for a clear explanation. What we found was a great variety of different descriptions, criteria and labels for stages in the development of literacy. After reviewing them, we found that none felt exactly right. It was especially frustrating that different authors used the terms “Beginning,” “Transitional,” and “Novice” in very different ways and often they just didn’t seem to “fit”. So, we develop our own description, which is included here. The states we have identified are: Pre-literate, Novice, Beginner, Transitional, and Functional. Following the description of the five stages of literacy that we are using, there is a chart that compares our names of the five stages with some of those from the literature review. Following that is an article on Reading that looks at selecting and using various assistive technology for students who are in each of the five stages of literacy we have identified.

Pre-literate

- focuses on pictures
- does pretend reading
- begins to write and name letters
- scribble writing
- beginning to orient to text (left to right, top to bottom, right side up)
- reads environmental print by remembering visual cues, not print
- unable to read text independently or to decode
- reads some sight words by remembering physical cues (read yellow by remembering two tall posts in the middle)
- book reading is more social interaction between reader and listener
- spelling--random letters RE (back) A (mail) TTT (peeked)

Novice Reader

- begins to recognize some sight words
- uses pictures and some initial consonants to figure out words
- still relies on memorization of story
- predicts from pictures
- realizes printed text carries the message and conveys information
- pays attention to individual letters
- strings letters together to signify words
- aware of environmental print and can identify signs and letters in and out of context
- becomes aware of sound symbol relationships
- spelling-initial consonants BET (back) MM (mail) PF (peeked)

Beginning Reader

- focuses on meaning cues
- focuses on letter/sound cues
- begins to use several cues at a time
- begins to cues to self correct
- develops ability to hear sound segments in words
- expands sight word knowledge
- knows most alphabetic letters
- invents semi-phonetic spelling of words
- has difficulty remembering correct spelling of words
- mistakes similarly spelled words in reading them
- reads text of composed of familiar words independently
- uses context to read unfamiliar words in text
- composes simple experience stories using inventive spelling
- increases writing vocabulary
- reads and rereads trade books/library books
- reads sight words by remembering a few salient letters in words
- spelling--consonant frame BC (back) MOL (mail) PT (peeked)

Transitional Reader

- develops chunking strategies, reading more words together (becoming fluent reading)
- uses more than one strategy (fix-it, checking for meaning, decoding, etc.)
- refines self-monitoring and self-correction
- realizes spelling includes visual coding as well as spelling by sound
- invents fully phonetic spelling of words
- remembers spelling of shorter, regularly spelled words
- decodes unfamiliar words
- uses known words to read unknown words
- reads practiced words automatically and accurately
- spelling-phonetic tends to over generalize BAK (back) MAL (mail) PECT (peeked)
- can read text independently
- skill in reading and writing depend on complexity and meaningfulness of task at hand
- shares thoughts and feelings in writing
- silent reading starts to exceed oral reading
- beginning to use conventions of print (capitalization, punctuation)

Functionally Literate

- begins to use basic paragraph structure
- metacognitive about using strategies
- develops strategies for comprehending a variety of text structures (cause-effect, sequence, main idea-detail)
- decodes multi syllabic words by chunking letters
- decodes unfamiliar words rapidly
- remembers the spelling of words
- knows spelling patterns as they symbolize blends of sounds (igh, tious)
- edits, revises and prepares final draft
- uses critical thinking sills to organize thoughts in writing
- uses conventional spelling

It is critical that children with disabilities are read to on a regular basis with an opportunity to see and touch the books as much as possible. Talking to the child about the story, pointing out various aspects of the pictures, labeling items and actions are all helpful in developing these early emergent literacy skills. For students who are non-speaking, provide some form of communication alternative for the child to label objects and actions, to request more or to comment about the content of the reading material. *BookWorm*™ Literacy Tool from Ablenet, Inc. provides a device that makes almost any book a "talking book." Simply record a book into the *BookWorm*™ literacy tool and press the keypad or an external switch. Now all students can enjoy their favorite book. Using the headphone jack makes independent reading easy.

Cumley, Reed, & Wildes	**Ehri, 1997**	**McGee & Richgels (n.d.)**	**Wisconsin DPI Guide (Cook, 1986)**	**McGee & Richgels (2000)**	**DeCoste & Jacobs (1996)**
Pre-Literate	Pre-Alphabetic	Emergent Readers		Literacy Beginners	Pre-Literate
Novice Reader	Partial Alphabetic	Transitional Readers	Emergent Readers	Novice Readers & Writers	Initial Consonant
					Consonant Frame
Beginning Reader	Full Alphabetic	Beginning Readers	Beginning Readers	Experimenting Readers & Writers	
					Phonetic
Transitional Reader	Consolidated Alphabetic	Advanced Beginning Readers	Reading for Consolidation	Transitional Readers & Writers	
		Consolidated Readers			Transitional Spellers
Functionally Literate Reader		Accomplished Readers	Reading to Learn the New	Conventional Readers & Writers	Conventional Spellers
			Reading for Independence		
			Mature Reading		

Strategies for Use During Reading with Students who are Minimally Verbal

These three strategies can be very helpful to determine what a student understands when s/he cannot "read aloud" a passage or make a clearly understood verbal response.

Adapted Concepts About Print
Adapting a simple commercial book (Grover Counts to 10) by cutting it apart, simplifying the text, and inserting simple concepts about print within the book and text allows the teacher to assess a student's knowledge about print concepts. *Concepts About Print* (Clay, 1985) assess students' knowledge about various aspects of printed materials (e.g., message carried by print vs. pictures, left/ right and top/down sequence in single and connected words, basic grammatical markers such as capital letters, periods, etc.).

By purchasing multiple copies of the same book, a "Concepts About Print" assessment can be further adapted for students who cannot verbally or physically indicate responses. These additional copies were left as single pages or enlarged versions of the book text and placed on an eye gaze board. The student could then indicate through eye gaze responses their knowledge about books and printed text (Musselwhite, Erickson, & Koppenhaver, 1996). This is especially useful with a child who is in the Pre-literate or Novice stages of literacy development.

Silent Response Strategies
Teachers can elicit student responses to their questions that include all students in their room. By giving students 2-3 possible answers, teachers can poll student knowledge by asking students to look at different locations for each answer (i.e., If you think the answer is George Washington, look up at the ceiling; if you think the answer is Thomas Jefferson, look at the door). Polling silent responses from all students not only includes the minimally verbal student, it is an effective strategy to monitor the learning of all students. (Beukelman, 1995). This works well with students at any level of literacy.

Reading with Nonspeaking Students
Reading passages, consisting of 1-2 paragraphs, are copied and enlarged and placed where a student can easily read the text. Initially the teacher slowly reads the passage aloud pointing to each word. During the second reading, the teacher and student assign a picture or gesture to target words in the sentences (i.e., for the word "out" the student looks out the window; for the word "people", he looks at others in the room; for the word "big" he gestures with a large movement).

During the third reading, the teacher <u>silently</u> points to each word while the student moves his jaw slightly to indicate that he has read that word and is ready to move on. When the teacher points to a designated target word, the student makes the agreed upon gesture or eye gazes to the appropriate picture or referent for that word (DeCoste & Jacobs, 1996). Thus the teacher can tell that the student recognized and understands that particular word or phrase even though the student cannot speak it. This works well with students at the Transitional and Functional stages of literacy.

Five Components of Reading Instruction

The information in this section is a synthesis and summary of Adler, C. R. (2001). *Put Reading First: The Research Building Blocks for Teaching Children to Read*. Free copies of that publication are available from their website.

Phonemic Awareness – sub category of a much bigger group of skills, phonological awareness. It is the ability to hear, think about, and work with the individual sounds in spoken words.

Phonics – an understanding of the relationship between phonemes (the sound of spoken language) and graphemes (the letters and spellings that represent those sounds in written language). Most students require about two years of systematic phonics instruction.

Fluency – the ability to read text quickly and accurately. Fluency provides the bridge between decoding and comprehension.

Vocabulary - the words we know and use effectively in communication. Vocabulary is important in learning to read because young readers use the words they have heard to help them make sense out of the words they are trying to read.

Text Comprehension – Students must comprehend what is read.

These five components of reading instruction: phonemic awareness, phonics, fluency, vocabulary, and text comprehension are critical in learning how to read and write. They must be part of a child's instruction during the primary grades. If the child about whom you are concerned is not going to be an active participant in the academic curriculum, but will be included in the regular classroom, you may wish to look at *A Book of Possibilities*, from AbleNet, Inc. This is an excellent resource for ideas for including children in academic activities even though they are learning a more functional curriculum.

Simon S.I.O.™ is a software program from Don Johnston Incorporated that provides instruction and skill-building activities to assist with learning sounds, building words, increase word recognition and fluency. *Simon S.I.O*. stage 1 consists of 33 levels and 300 words emphasizing single consonants and common blends. *Simon S.I.O*. stage 2 includes an additional 33 levels while the focus is on more complex blends and diagraphs. SoftTouch Software has developed a series of software called *Teach Me Phonemics* that gives students experiences with words, sounds and letters while they are mastering cause and effect and choice making. *Teach Me Phonemics* helps students hear the sounds they are working on. The teacher chooses the presentation - the word, the phoneme and the word or the onset and rime, in the case of initial sounds. The pupil chooses an image and sees a large photo accompanied by text, movement and music. The photo magically changes (morphs) to the Mayer-Johnson symbol. *Simon S.I.O*™ .includes options for single- or two-switch scanning.*Simon S.I.O*™. is appropriate for all pupils learning to make choices, practicing speech articulation, engaging in literacy experiences and developing language.

Selecting Assistive Technology for Use in Reading Instruction with Consideration of the Child's Stage of Literacy

Basics of Good Reading Instruction

A comprehensive, effective program of reading instructions does the following:

- Provides a variety of instructional activities because no one instructional strategy is effective for all students.
- Provides a balanced approach that includes components of reading, writing, and spelling, such as the Four Block approach: Guided Reading, Writing, Self-Selected Silent Reading, and Working with Words (Cunningham, Moore, Cunningham, & Moore, 1995).
- Provides equal amounts of time for each of the four components each day.
- Does not wait for "readiness" to develop. Readiness to read has more to do with experience with books and reading than any subset of skills or mental age.

Using the four components of reading instruction as developed by Cunningham et. al. (1995), this article will suggest the use of assistive technology for each component and for each of the five stages of literacy previously identified.

Guided Reading

This is the place that the teacher provides primary instruction in reading, introducing new words, setting a purpose for reading a selection (such as finding out the sequence of events or the answer to specific questions), providing feedback on completion of the task. It should begin with shared reading and later move to separate reading of a passage. The teacher selects a variety of materials (including basal readers, magazines, poetry, content area books or trade books), at the instructional level of the students. The teacher may alternate between grade level and below grade level books. One of the things that the teacher does during instruction is to activate or build background knowledge that relates to the passage to be read. The teacher also helps the students create predictions and expectations about what they will be reading to help students begin to understand the meaning of print.

Part of Guided Reading instruction involves many opportunities for repeated reading of the text, including the teacher reading to the students, the students reading individually, and choral reading where small groups of children or the entire group read new material aloud together. Once the student is at the Novice level, where he or she understands that the meaning comes from the text and can begin to identify the first letters of words, there are a variety of ways to use assistive technology. It can help the child who has difficulty speaking to participate in these repeated reading activities. Recording lines from the text, or the entire text on a voice output device or tape recorder can allow the child to participate. Other ideas include placing words from the story on an alternate keyboard such as the *IntelliKeys*® and allowing the student to 'read' by correctly sequencing those words (with or without pictures as needed by the individual student).

In addition, the selection of the books to be used in the Guided Reading instruction can be instrumental in making it possible for students to progress in reading. Books with repeated lines, pattern books, predictable books, and songbooks are all excellent choices for use with students with disabilities. Here are examples of each.

- **Repeated Text**-These books and stories have sentences or phrases that are repeated throughout the text. The advantage of the repeated text is that it becomes familiar to the student much more quickly. In addition, it lends itself to be recorded on a voice output communication device so that the nonspeaking or minimally speaking child can use it to participate in oral reading, which is a big part of classroom instruction. An example of repeated text is the line, “I’ll do it myself,” said the little red hen in *The Little Red Hen* or "Run, Run, as fast as you can. You can't catch me. I'm the Gingerbread Man" in *The Gingerbread Man*.

  There are many texts that have repeated lines. In selecting texts for instruction, the first concern is to match the difficulty of the text to the student's level of literacy development. (See examples of repeated text at various levels in the chart on Guided Reading at the end of this article.)

- **Pattern Books**-These books are usually very simple. They may also have repeated lines, but what makes them unique is that they have a specific pattern that runs throughout the book. Teachers can create pattern books for their use, (e.g. "I see a red one. I see a blue one. I see a yellow one too. I see a purple one. I see a green one. I see an orange one. How about you?") This pattern supports the child as they learn that there is meaning in words. It can be used to make a variety of different 'books' with a slight variation on the theme. The pattern usually has a definite cadence to it that also helps the child. These very basic, teacher made texts are very effective with children at the beginning stages of literacy (see chart). For higher stages poems are excellent choices that incorporate patterns that can support the developing reader. Many of the works by Silverstein or Prelutsky can work well for students at the Transitional or Functional Levels.

- **Predictable Books**-These again, have repeated text, and often a pattern, but have a better developed story line. Examples are Eric Carle books, such as the *Very Hungry Caterpillar* or Bill Martin books, such as *Brown Bear, Brown Bear*. These predictable books allow the student to use contextual cues and pictures to help them anticipate and understand the story line.

- **Song Books**-Books that use songs once again provide a pattern and predictability that provide extra support to beginning readers. The cadence and rhyme help students remember the words as they read. Books by Raffi are excellent for this purpose. In addition teachers can make song 'books' for older students who are still learning to read by adapting songs and printing them. Many country and popular songs have limited vocabulary with repeated lines and are familiar to students. Additionally, the tapes of the songs themselves can be used to support the students and add motivation.

- **Adapted Books**-Books can be adapted for students at all reading levels. Trade (commercial children's) books can be adapted by editing and simplifying the text, adding graphic support by using *PictureIt* (Slater Software), or using *Highlighting Tape* to cue students to key words. Comic books can be used as an alternative to ‘traditional’ reading materials because of the picture support and shortened text that they generally use. Teachers can create their own adapted books for older students by making books about celebrities such as Oprah Winfrey or sports figures.

- **Story Boards**-Story boards (a piece of foam core with a *Velcro*™ strip, a carpet strip, etc.) are low tech assistive technology that can be used to support students reading of individual words or single sentences at any level.

Self-Selected Silent Reading

During this time students have an opportunity to read easy books that they choose. Students must be able to read the material with 97% accuracy in order to understand what they are reading, learn the new words, and become more fluent readers. So it is appropriate for students to select books from a lower reading level. Research shows that even 10 minutes a day produces better readers. It is fine for the students to choose the same book over and over again; this builds their confidence and allows them to practice specific things. Students enjoy reading more when they can talk about and share the books they read. When engaged in Self-Selected Silent Reading, students will use most of the same books that were used in Guided Reading. Students choose books that they have 'read' before and that they enjoy. Assistive technology plays an important role here because books that have been adapted to be accessible to students with physical limitations are assistive technology. So, for students with physical disabilities, it will become important for the teacher to adapt all of the books that have been used in Guided Reading so that the student can access them. That might mean using one or more of the following:

- **Giant paper clips**-There are many different types of paper clips available these days. A trip to the office supply store can provide you with many possibilities. The very large decorative plastic clips and the various sizes of bulldog clips are two of the most useful for adapting books. They can be clipped to the pages of the book at intervals starting near the bottom of the first page and placing them an inch or two higher on each page as you progress through the book.

- **Page Fluffers**-This is an idea that we believe originally came from Patti King DeBaun. (It has gone through several changes in Wisconsin.) Page fluffers are anything that separates pages so that they are easier to turn. Materials needed include: jumbo paper clips, tag board (or a discarded manila folder), foam of any type to give you volume (try upholstery foam or camper foam which has adhesive on one side), hot glue, and clear mailing tape. Cut tag board and foam into 1 1/4" squares. Place a jumbo paper clip over each piece of tag board. Then glue the foam to the side of the tag board with the small half of the paper clip. Next place clear tape around the whole thing with the exception of the large half of the paper clip, which will need to remain free to be slipped over the book page. You can make these thicker by using thicker foam or more than one layer of foam. You can create these with a variety of materials; so don't feel limited to these.

- **Hot Glue Separators**-You can separate pages quickly and inexpensively by putting a dollop of hot glue on the lower right hand corner of each page. Caution: be sure the glue is dry before you turn the page. You don't want the pages to become glued together.

- **Window shade pulls**-Plastic window shade pulls are another useful way to "fluff" or separate pages. They work nicely for the child that can slip his/her fingers between the pages and lift the page to turn it. They are also useful on books that have pages that slide out to reveal further pictures. (Thanks to Sue Hasz, Kaukauna, WI for that idea.)

- **Laminating**-You can laminate book pages using sheets of plastic laminate (*Cleer Adheer,* made by C-Line, available at Sam's Club or office supply stores, about $10 per box of 50). You can also cut the book apart and actually put the pages through the laminating machine, then tape the book back together again using 2" clear mailing tape. Laminated pages can be written on with dry erase pens, which is a nice added feature.

- **Page Protectors (floppy pages)-**Another way to protect the pages is to cut the book apart, slip the pages into page protectors and put them in a 3 ring binder. This works well if the child will be "pushing" or "sliding" the page from right to left rather than "lifting" each page to turn it.

- **Page Protectors (rigid pages)-**If you want to use the page protectors and 3 ring binder, but need rigid pages that will be "lifted" to turn, you will need to buy two copies of the book. You once again cut the book apart and insert two copies of each page in the same page protector. Next put one or more sheets of tag board or pieces of manila file folders in between the two identical book pages to create a more rigid page and still see both "sides" of the storybook page. Once this is done these new pages can be further adapted with the page fluffers, window shade pulls, or giant paper clips described in the previous section.

- **Adapting Pages for Interaction-**You can also adapt books so that a child can interact more specifically with the content. For instance, if a child was learning short vowels in consonant-vowel-consonant patterns, you might adhere a small piece of loop *Velcro*™ to a place on the pages of a picture book and then provide little laminated word cards with a piece of hook *Velcro*™ on the back. The child could remove and replace the word that goes on each page (or fix them after you got them "wrong").

- **Electronic books-**eBooks are another way to allow students with physical disabilities to interact with text. These well designed books offer a way for students to be very interactive with the text. Many of them come with songs, games, and other extension activities to save teachers work. They are especially useful for students with physical disabilities who may not be able to hold or turn the pages of the regular text version. But they are a good choice for all children with disabilities. Generally these programs read stories aloud to students in digitized (recorded) speech. They have colorful graphics, music and sound effects. The students can interact with both text and graphics. Here are just a few of those available.

  - *Living Books*® (Riverdeep, Inc.)-There are currently more than a dozen titles in this series. Several of them can be purchased in *Living Books*® *Frameworks* that include thematic units related to each story, bibliographies and other materials for implementation in the classroom.

  - *WiggleWorks* (Scholastic)-This is a complete instructional program that features electronic versions of several excellent children's books. Students can click on unfamiliar words to hear them read aloud, record themselves as they read the soft cover copy of the book, and write or dictate their own books, which they can then hear read aloud. The full program is expensive, but you can buy the classroom library packs and reading packs separately.

  - *UKanDu Little Books*® (Don Johnston Incorporated)-These and the other CD Rom books from Don Johnston Incorporated offer interactive books with first and second grade reading levels. Students can choose words to complete the sentences and create their own stories. All of these work great with a single switch interface.

  - *PJTs Reading Adventures* (Microsoft)-Students can read the text, listen to the story as they read, or have the story told to them. Click on any word to hear its pronunciation or definition.

- *My Own Bookshelf* (Softtouch Software) A program that allows the teacher to create, store books on personalized bookshelf, and select books for students to read. It collects data on each child's reading experience. Students are able to select books from their own bookshelf and read them as often as they wish.

There are many others available also, including releases by nearly every major publisher of elementary reading series. If you would like to know names of more electronic books you can visit the website of Project LITT: Literacy Instruction through Technology which conducted a three year study of the effectiveness of hypermedia based children's literature in improving reading skills of students with learning disabilities. http://edweb.sdsu.edu/SPED/ProjectLITT/LITT

In addition, texts that were written more than 50 years ago are now in the public domain and can be downloaded from the Internet by going to the Project Gutenberg site. These wonderful stories and novels can be adapted for use with older students who are still struggling with reading but would enjoy a more complex story line. These texts are available from http://www.promo.net/pg/

Working with Words

Because lots of reading and writing are crucial for the development of decoding and spelling skills, it is crucial that children have a lot of experiences working with words. Analogic phonics are critical to the processes of reading and writing. We must teach students what to do when they encounter a word they do not know. There are many instructional strategies that can be used to increase student's experience with words. Two of them are the Word Wall and Making Words.

Word Walls can be used for more than one purpose and a classroom may have more than one word wall on display. One type of Word Wall contains only words to be decoded or "sounded out" by analogies. This is based upon the Benchmark Program (Downer, 1986). Because the words are always visible, the student can say to himself "if a-n-d is 'and', then h-a-n-d is 'hand'". During spelling tests, students can look at the word wall as a resource so that they do not practice the wrong spelling of words. During instruction the teacher will use the words to make sentences, do word sorts, review rhymes and endings and clap and chant the letters as words are reviewed or added to the wall. Students who are not able to speak can participate with recorded messages on a voice output communication device. Students can also use a spinner activated with a switch to contribute rhyming words to the class discussion.

Another Word Wall might contain curriculum-based vocabulary (i.e., carbon dioxide, community, addend, etc.). During class the teacher instructs the students in a vocabulary lesson, uses the word in context of the subject area, and adds the word to the Word Wall (often color coded, e.g. green for science, pink for language arts, orange for math, etc.). Four or five new words can be added to the wall each week. They are placed in alphabetic order and shape and color cues are added to highlight differences between words and help students remember which words are which. Making Words is another part of Working with Words. It is a multilevel, developmental spelling activity focused on discovering how the alphabet system works. It is based on spelling patterns and word family instruction.

The teacher gives students six to eight individual letters (on cards, magnets, tiles, etc.) that make up a single target vocabulary word. Then the students study and rearrange letters to create smaller one-, two-, three-, and four-letter words. The selection of words is systematic and intended to highlight the relationship between the words and word parts. Making words is similar to the game of making as many small words out of a larger word as possible (e.g. spring includes sing, ring, rings, pin, pins, grin, grins, etc.).

Students with physical disabilities may more easily manipulate foam or magnetic letters to make words, or use *Intellikeys*® overlays with the individual letters and *IntelliTalk*, or use a voice output communication device such as one with dynamic screens (e.g. *Speaking Dynamically*™ *Pro* or *Dynavox*). Another quick and easy way to allow a student with a severe physical disability to participate in word making is to put possible word choices (along with some distracters that are not correct) on an eye gaze frame and ask the student to indicate words by looking at them.

There are a variety of software programs that can be used to give students experience with making words. For instance *Bailey's Bookhouse* and *Reader Rabbit*® both contain segments that ask the child to indicate whether the letters they have put together are "words." *WordMaker* software by Don Johnston Incorporated, is a program that offers activities to reinforce phonics instruction, phonemic awareness and spelling. It was created based on Dr. Patricia Cunningham's work, *The Four Blocks Literacy Model*. (Cunningham & Hall, 2001). Students can manipulate letters to make words (guided discovery), sort words into rhymes and use the rhymes to decode and spell new words (knowledge transfer). It also includes a word wall of the words that the students have mastered.

Writing

Writing is an important part of 'reading' because literacy develops from a combination of reading and writing activities. It is a multilevel activity by nature (i.e. students automatically write at their own level). It is an important aspect of literacy and provides many opportunities for students to have fun and create products of which they are proud. The teacher should model the writing process by writing short pieces and allowing children to watch and edit. Students who write become better readers. Students learn to write by experiencing writing themselves. They need standards and feedback about their progress in the process of composition and the opportunity to see others write on a daily basis.

Students with physical disabilities may need low or high tech adaptations such as those described in the section on writing in this manual. They will also be addressed here briefly, to highlight the match of many of these assistive technology devices with the literacy level of the student. Some computer programs such as *Kid Pix*® 2 (Riverdeep, Inc.), or *Kid's Time Deluxe* (Great Wave) offer the opportunity for students at the Novice Stage to interact with individual letters and become more familiar with them and their sounds. At the Beginning Literacy Stage students can use computer authoring programs such as *Kid's Time Deluxe*, *Amazing Writing Machine*® (Broderbund), *Stanley's Sticker Stories*® (Riverdeep, Inc.), and *UKanDu Little Books*® (Don Johnston Incorporated) to begin to choose single words to create stories and have them read. As the student moves into the Transitional Stage, word processing programs such as *AppleWorks 6* and talking word processing such as *Write:OutLoud*® (Don Johnston Incorporated), *IntelliTalk II*®, (IntelliTools, Inc.), and The *Talking Word Processor*© (Premier Assistive Technology) can be used to provide auditory feedback as the student begins to write with more words. Students at the Functional Level can use many more aids as they write. Word prediction (e.g. *Co:Writer 4000* from Don Johnston Incorporated) or voice recognition may be able to be utilized at this level as well as low tech aids such as talking spell checkers, and portable word processors.

Guided Reading

Pre Literate	Novice	Beginning	Transitional	Functional
Repeated Text (simple text with multiple repetitions and voice output)		.....	.....	
(e.g., *Have You Seen My Cat?*	*Do You Want to be my Friend?*	*Farmer Duck*	*Alexander and the .....)*	
Pattern Books				
	Bugs		Poems by Silverstein & Prelutsky	
Predictable Books	.....	.....	.....	
Eric Carle books	*That's Bad, That's Good*			
Song Books	.....	.....	.....	
(e.g., "Raffi" books		Popular country songs such as "Mercury Blues"		
	Reduce book pages, put on AAC device so student can "read" whan it is his/her turn			.....
Adapted Books	.....	.....	.....	
			Trade books (celebrities, sports)	
			Comic books	
			Books adapted with *Picture It*	
			Books adapted by simplifying text	
			Books adapted w/*Highlighting Tape* with color coded	
			Language Master® Cards with new vocabulary recorded	
Story Boards	.....	.....	.....	.....
Repeated Readings (books read by adults)		.....	.....	.....
	Reading recorded on tapes to accompany books	Text entered in talking word processing or text reading		
		Software (e.g., *Write:OutLoud*®, *CAST eReader*, etc.		.....

Self-Selected Silent Reading

Pre Literate	Novice	Beginning	Transitional	Functional
Wordless books *Good Day Carl* Carl Series by A. Day	Pattern Books *Brown Bear* , Bill Marten Very Hungry Catepillar, Eric Carle	List Books *The Napping House* , Audrey Wood	Alphabet Books	eBooks Public domain books from "Project Guttenberg", possibly adaptec to lower reading level
Field Trip Photo Books ……	……..	Student Authored Books ……	……	……..
Book w/*Taction Pads* on prop & *Voice Pal Plus* to speak story			Scanned book w/talking word processing	
Adapted books (page fluffers, page turners, books on slide, books on computers, reduced book on AAC device) ……				……

Working with Words

Pre Literate	Novice	Beginning	Transitional	Functional
Light cueing to look at individual words				
	Initial sound word wall			
			Lakeshore Word Wall/Magnetic Poetry Really Big Words	
		Bailey's Book House, Reader Rabbit		
		Making Words (with *IntelliKeys*® overlays, magnetic & foam letters, *Speaking Dynamically* ™ *Pro* , coice output device)		
		IntelliKeys® for physical access		
	Benchmark word wall w/ S*peaking Dynamically* ™ *Pro*			
	Language Master® word wall			
	Benchmark word sorting (using *IntelliKeys*®)			
	Rhyming words using a spinner			
	Benchmark context lesson (*Speaking Dynamically*™ *Pro*)			
	Spell & chant on AAC device			
	Eye gaze, whole group responses			
		Simon S.I.O™		

Writing				
Pre Literate	**Novice**	**Beginning**	**Transitional**	**Functional**
Universal cuffs w/markers				
	Computer based/not necessarily keyboard			
	KidPix, Kid's Time Deluxe……	……	……..	
	Playing with software which combines pictures & letters (*Blocks in Motions*)			
Bailey's Bookhouse……..	……	……		
		Kids authoring programs ……	……..	
		(Stanley's Sticker Stories, Amazing Writing Machine		
		Ukandu Little Books, Read, Write & Type		*Hollywood*
				Secret Writer's Society
				Inspiration
			AppleWorks	Spell checkers
			Write:OutLoud ®	Franklin *Bookman*
			IntelliTalk	*Co:Writer*
			Picture It	Voice Recognition
				Portable word processors
	Adapted Peripherals			(*Dana* , etc.)
	(*IntelliKeys* ® overlays that are phrase based, adapted keybaords, etc…..			
	On-screen keyboard (*Discover:Ke:nx, OnScreen*) ……		……..	
	Eye gaze stories ……		……..	
		"Story Boards", words w/*Velcro* ® magnetic words, letters)		
		Templates of started sentences (I like …, At the beach I see …)		
		Langauge Master ®*Cards* w/ personal, class & theme words		
		Magnetic Poetry& Lakeshore Writing Materials…. *Simon Spells*		

Using the Nonverbal Reading Approach to Teach Reading to Students with Severe Speech and Physical Impairments (SSPI)

Teaching reading to students who are unable to speak is possibly the most challenging of all instructional tasks. Reading is essentially a process where students decode letters and words. They demonstrate that decoding process by speaking those words aloud. When the student cannot speak due to a severe physical disability it is very difficult both to identify current level of performance and to monitor progress. Consequently students with severe speech and physical impairments (SSPI) often experience significant reading and writing difficulties.

Many factors may contribute to the literacy difficulties of students with SSPI, including:

- Lack of experience with literacy activities
- Difficulty holding or manipulating books and other materials
- Limited language experiences due to the lack of speech
- Reduced expectations for the development of literacy skills by both teachers and parents
- Restricted participation in "typical" literacy activities in school and home
- High levels of absenteeism from school due to health issues

Heller, Fredrick, and Diggs (2000) demonstrated the effectiveness of the Nonverbal Reading Approach to teach reading to three students with severe speech and physical impairments (SSPI). The Nonverbal Reading Approach uses internal speech, diagnostic distractor arrays, and error analysis in conjunction with individualized adaptations including assistive technology. Part of that study will be summarized here. For more information on the nonverbal reading approach go to http://education.gsu.edu/PhysicalDis then choose monographs or newsletter.

Internal Speech–When students are unable to verbalize phonemes when sounding out a word, they can be taught to use internal speech (Bigge, 2001). Internal speech is the process of silently speaking to oneself.

Distractor Arrays–Because these students are not able to verbalize an answer, they must be provided with an array of choices from which to indicate an answer. Heller et al. (2000) describe the importance of the distractor array.

> "A distractor array is a list of alternative choices provided to the student, either orally, or in writing (on paper, computer or AAC device). Distractor arrays are diagnostic when the alternative choices are carefully selected to include the correct answer and two or more additional items that can indicate a student's misunderstanding. For example, if the student is learning the word, "ball" and the choices are 'bill," "ball," "doll," and "bat" and the student chooses "bill," the error indicates that the student knows the first and last consonant, but not the vowel. If the student chooses the word "bat", it indicates that the student knows the initial sound and/or consonant, but not the ending. If the student chooses "doll" it indicates that the student does not know the beginning sound or vowel (p. 7).

Error Analysis–The ability to analyze the student's responses in order to determine the need for specific instruction is dependent upon a well-constructed distractor array.

> A well constructed diagnostic distractor array will target the errors the student has been found to make. These diagnostic distractor arrays will help determine if the student is really reading the word. Analysis of the errors will enable the teacher to determine the student's specific problems and provide appropriate remediation, Poorly constructed distractor arrays provide little information and can give the impression that the student knows the word, when, in fact, the student does not. For example, if the student is learning the word, 'ball" and the choices are "cat," "ball," "dog," and "tree," the selection of the word "ball" only tells us that the student can accurately select the correct first letter (b) of the word, but may not know the word "ball" from the word "big" (Heller, et al., 2000, p. 7).

Assistive technology–A variety of assistive technology may be needed to present the content and to allow the student to respond. Students with SSPI who already use voice output AAC devices may be able to utilize these devices to indicate their responses if the vocabulary is appropriate and the student's level of competency with the device does not interfere. Some students may be able to respond when the material is presented on a computer. Others may need to have letters and words displayed on cards so that they use eye gaze to look at their choice. Some students with SSPI will be able to direct select an answer either by gazing at it, pointing to it or activating a computer or AAC device. Others will need to utilize scanning techniques. Scanning may be done with low tech materials by having the teacher point to each item in the array and wait for the student to indicate his choice. It may also be accomplished with a single switch to select a choice on a computer or AAC device.

The Study

The study by Heller, et.al., (2000) involved three students with SSPI. One of those students, Mary, was 15 years old and had cerebral palsy. She was placed in a self- contained classroom for students with orthopedic impairments. She was unable to speak except for an "aahh" sound and had recently begun using a *Dynavox* for communication. She activated the *Dynavox* by directly touching the desired cell.

Before beginning instruction, the authors used the SSPI Literacy Profile (http://education.gsu.edu/PhysicalDis) to describe the student's functioning in all areas related to reading and reading instruction. There are four parts to the Literacy Profile: Communicating Responses, Physical Efficiency Areas, Literacy Function Areas, and Individual Considerations.

Mary's SSPI Literacy Profile revealed the following information:

- Communication Responses: Mary nods yes/no, finger points with a 3 second delay, can make large movement gestures, can select from an array of 4-6 choices, and is just learning to use a *Dynavox*.
- Physical Efficiency Areas: Mary is best positioned in a wheelchair, has a fairly good range of motion, can point to words in sentences if the words are large and there is a double space between words. She can physically finger point to any word in an array of four words.
- Literacy Functioning Areas: Mary knows book orientation. She can visually track across the page. She identifies consonants and vowels with 85% accuracy. She does not know consonant blends, digraphs, diphthongs, vowel digraphs, or prefixes or suffixes. Mary identifies some sight words, but

cannot phonetically decode. Her Reading Recognition is K.8 and Reading Comprehension K.0 (as tested by the Peabody Individual Achievement Test-Revised).

- Individual Considerations: Mary requires 30-45 point font to allow for accurate pointing. She is very distractible. Mary had previously received instruction in a functional literacy program that used sight words and no phonics. When observing Mary, it was clear that she did not look at the entire word, although at times it was difficult to determine where she was looking due to her physical disability.

Using the Nonverbal Reading approach

When teaching a word, the instructor first showed the word, then pointed to each letter or used a card to move across the word showing which letter was being sounded out. The student was instructed to say the sound 'in your head" while the teacher said the sound aloud. The student was then asked to "say the sound aloud" no matter what approximation of the sound the student was able to make. This helped ensure active participation on the part of the student.

The next step was to ask the student to "sound out the word in your head without stopping between sounds" as the instructor verbally blended the sounds aloud. Finally, the student was instructed to "say the word fast in your head."

When the student was initially assessed on a word, the instructor showed the word and pointed to each letter (or used a card) as before. The same steps were followed when a word was first introduced, except that the instructor did not say the sounds or word aloud. Three or four choices were then provided, either written or oral, from which to choose the correct response. The diagnostic distractor array was carefully selected to provide possible alternatives that were close in pronunciation or visual appearance to the correct word to determine if the student really knew the word.

Student errors were documented and later analyzed to determine any patterns or types of errors being made. Identified errors led to additional instruction and practice or adaptations, depending upon the type of error. Diagnostic distractor arrays were specifically designed to include the words with letters that the student had previously confused so that it was possible to assess whether or not the student had learned the correct response.

Mary's Results

Mary was introduced to 296 words during the study and could correctly identify 261 (88%) by the end of the school year. At the beginning of the student she could not consistently identify consonant blends (e.g. br, pr, st) consonant digraphs (e.g., ch, sh, th) or diphthong sounds (e.g. ow, oi, oy, ou). She did not demonstrate the ability to phonetically identify common suffixes or prefixes or to blend phonemes into words. At the end of the school year, she could phonetically identify targeted consonant blends, consonant digraphs, and diphthongs. She could also identify common suffixes and blend phonemes into words. At the beginning of the study she was primarily identifying individual sight words, but by the end of the school year she could read short stories that included words she had been taught with 95% accuracy.

Early in the year the error analysis showed that Mary sometimes reversed letters (ma/am). To help her learn where to start reading, a red dot was placed under the beginning letter. During the first two months this was gradually faded. Over the course of the year, Mary became very adept at the nonverbal method. She learned to take the card and move it along the word as she quietly looked at the letters. (She

told the teacher that she was "saying it in her head" when she did this.) Finally, she made a noise to "say" the word aloud. Later in the year when presented with a word, she was asked if she knew what the word was or needed to sound it out.

Mary's receptive vocabulary was good and she was able to comprehend most words once she was able to sound them out. She demonstrated this by matching pictures to words and by pointing to the correct word when given a definition or shown the meaning of the word. She was able to make her selection from the array by pointing to one item with her finger. When pointing to printed words, the font needed to be at least 30 point.

Mary's reading recognition and reading comprehension were again assessed one year after the pretest using the PIAT. She scored at the 1.5 grade equivalent in both areas. Because her pretest scores were K.8 and K.0 respectively, she made seven months academic gain in reading recognition and one and a half years academic gain in reading comprehension. That is very impressive when you think about the fact that during the previous 11years of school, she had made only eight months gain in reading recognition and no gain in reading comprehension.

Discussion

All three students in this study made significant gains. These data indicate that the combination of internal speech, diagnostic distractor arrays, error analysis and assistive technology are an effective approach for teaching reading to students with SSPI. One of the keys to using this technique effectively is to attend carefully to the words and pictures used as distractors. They must be carefully selected to test the student's ability to discriminate between very similar letters, sounds, letter combinations, or meanings. Highly dissimilar words or pictures would not be effective in assessing specific knowledge.

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Learning/Studying

Print or picture schedule

↓

Low tech aids to find materials (e.g., index tabs, colored folders)

↓

Highlight text (e.g., markers, Highlight Tape, ruler)

↓

Recorded material (e.g., books on tape, taped lectures with number coded index)

↓

Voice output reminders for assignments, steps of task, etc.

↓

Electronic organizers

↓

Pagers/electronic reminders

↓

Single word scanners

↓

Hand-held scanners

↓

Hand-held computer

↓

Software for concept development/manipulation of objects

↓

Software for organization of ideas and studying (e.g., Inspiration®, Draft Builder, PowerPoint)

Learning and Studying

There are a variety of tools that can help a student who struggles with the basic tasks of learning and studying. Things like organizing time, organizing information, and retrieving information can be critical to a student's success. Here are several suggestions that can help the student who struggles with these problems.

♦ **Print or Picture Schedule**

For the student who doesn't read or doesn't read well, a picture schedule that uses symbols to remind him of the activities of his day can be very helpful. This is especially true of students with Autism Spectrum Disorder. If the student can read, then a printed schedule can be used. For the student with short term memory problems, such as those resulting from Traumatic Brain Injury, checking off or crossing out each activity as it is completed may be necessary.

♦ **Low Tech Aids to Identify Materials**

Items such as color coded folders, index tabs, color coded notebooks and other low tech aids can make a real difference for some students. We have had great success with *Hefty* tabs from Lee Products Company. They come in five different colors and are removable, so they do not damage textbooks. Textbooks can be coded by placing one color of hefty tab in the Table of Contents of each text, another tab for the index, another for the glossary and another floater tab to mark place in text.

♦ **Highlighting Text**

As described earlier in this chapter under Reading, the use of highlighters and Highlighting Tape can be very helpful in identifying important information for later study. Different colors can be used for different information, color coding information about specific dates in green and about specific people in orange for example.

♦ **Recording Material**

Sometimes it helps to record important information such as dates, key facts, or questions that have been identified as being on the coming test. If material is recorded, especially whole lectures, it is important to identify the location of the information. Wanderman (2000) suggests using a digital tape recorder and making at least minimal notes on a piece of paper which identify the location of significant information by noting the digital number which was showing when that fact was recorded. Digital recorders can also be used to record voice notes. The voice notes can then be downloaded into a computer and transcribed into text using voice recognition software. Many cell phones and handheld computers offer a voice note feature.

♦ **Voice output reminders**

There are a variety of voice output devices that can be used to record reminders, steps of a task, complex directions, etc. There are many types of small voice message reminders available at places like Wal-Mart and Target. They range in price from $6-$25. Some have better voice quality than others, so it pays to check them out.

Slightly more expensive items can be useful for a student at a lower cognitive level. The *Little Step-by-Step Communicator* from AbleNet, Inc. has a total of 75 seconds of recording time which can be spread over several levels. Recording one step on each level allows the student to hear only one step at a time.

♦ **Electronic Organizers**
These great new tools are relatively inexpensive and can be helpful for the mature student who doesn't lose or drop things! There are a variety of brands available at places like Radio Shack.

♦ **Pagers and Electronic Reminders**
Again there are numerous products appearing on the market. The *Watchminder*® is a tool that looks like a watch. It can be set with a short vibration to remind the wearer to pay attention or modify a specific behavior and a long vibration to remind the wearer to do a specific task or activity. Multiple messages from a list of over 75 preprogrammed messages regarding school and life in general can be activated at specific times during the day. When activated, a continuous vibration for three seconds accompanies the displayed message. The wearer can set up to 16 alarms each day with an eight character display for each message.

♦ **Single Word Scanners**
For studying, the single word scanners such as the *Quicktionary II Pen* can be useful to hear the pronunciation of a key word or to get the definition without needing to look it up in a dictionary.

♦ **Hand Held Scanners**
When students are studying or looking up material in a reference book and need to copy that information to another source, a hand held scanner such as the *QuickLink Pen* from WizCom Technologies LTD or the Siemens *PocketReader* can be a wonderful tool. The *IRISPen*™ *express* is a pen scanner that works with any Windows or Mac application. It is small, lightweight, USB, 8 to 22 point font recognition and recognizes up to 1000 characters per second.

♦ **Software for Concept Development and Manipulation of Objects**
For students who struggle to understand difficult concepts, there are many instructional software programs that can make the complicated more understandable. This is especially true for visual learners or for learners whose ability to read is well below their ability to understand. This category is included here to remind the reader that software that allows a student to increase or improve a functional capability such as studying is indeed assistive, even though it may have been designed to be instructional.

♦ **Software for the Organization of Ideas**
There are several software programs that can be used to help organize information. The outlining feature in word processing programs such as *AppleWorks 6* and *Microsoft Word* are examples. Another exciting product for older students who are struggling with comprehension of material is *Inspiration*® from Inspiration Software. *Inspiration*® is an outlining tool that can help students organize or map information. The research conducted by Anderson-Inman, Knox-Quinn, & Horney, (1996), found that it is not enough to just give computers to students. You must also teach them strategies to use to manipulate and utilize information. This software can help them do that. *Inspiration*® has now been adapted for younger learners in *Kidspiration*®. *Kidspiration*® has been designed for students in grades K-5. *Kidspiration*® includes audio playback of the written words. *Draft:Builder*® from Don Johnston Incorporated leads students through the three key steps in creating a first draft: organizing ideas, taking notes and writing the draft. It models the logical, progressive steps of draft-writing and displays a visual representation of the process. The display gives students a framework to generate, manipulate and connect ideas and information.

♦ **Hand held Computers**

These small devices which have become popular in the business world and also can be a great help to many students with disabilities. More powerful than the first Mac or Windows computer now propping open the supply closet door, more functionally agile than a graphing calculator, and less expensive than a laptop, the handheld computer may be the technology that revolutionizes the face of learning for students with mild disabilities. Handheld computers are small, light weight, have a long battery life and are instant on. There are two basic operating systems on handheld computers. Similar to Mac and PC for traditional computers on the handheld side we have Windows based devices and Palm based devices. Software applications are downloaded to a computer and then transferred to the handheld using the sync utility provided. The operating system of the hand held computer allows students to record a schedule with alarm features, take notes, keep addresses and phone numbers, keep reminders, beam documents to other handhelds, and receive assignments or vocabulary words via beam from instructor. They have potential for students with disabilities because of their portability, flexibility and low cost.

Data can be entered into the handheld computer in a variety of fashions. Many of the current handhelds have a built-in keyboard that is accessed by use of the thumbs. Middle school aged children are accustomed to using handheld devices with their thumb due to the popularity of the Game Boy and handheld video games, thus they are natural keyboarders with their thumbs. Windows based handhelds have built-in software called Transcriber that allows the student to write on the handheld's LCD using the stylus and then converting the handwriting to text with the tap of the screen. There are also a significant number of keyboards available to use with the handhelds.

There are thousands of applications that can be added to a handheld to increase the functionality for our students with mild disabilities. In the area of word processing, *FreeWrite* is an application that has been developed by the University of Michigan. *FreeWrite* allows input of over 25 letter size pages of text and offers spell checking and auto-capitalization. *Word to Go* is the equivalent of Microsoft's Word on a traditional computer. It is part of *Documents to Go* and allows a user to create, view and edit word processing files. *QuickWrite* is an application from Mobile Systems that includes word prediction that collects frequently used words and allows the user to add or delete words. *Teal Script* is an application that is available for Palm handhelds. It is a text recognition system for data entry and replaces the traditional graffiti.

For organizational and study skills, *Agenda 6.0* is an application that provides multiple calendar views and allows icons or photos to be associated with certain calendar events. This would allow a non-reading student to be able to identify calendar entries by the photo/icon. *PiCo Map* is a concept mapping program for the handheld. The student can create colorful concept maps or receive the beamed concept map from a teacher. *Thought Manager for Education* is an application that allows teachers and students the ability to create and organize lessons, lectures, and learning activities. It has student templates for topics like research paper development, word study, proofreading checklists etc. It allows development of concept maps and outlines of information. *WordTutor* by Ants Technologies is an application designed to improve memory and word study skills. *Easy Talk* is a foreign language tool that translates common phrases and words and is available for English, French, German, Italian, Polish and Spanish.

In the area of math, Toysoft has developed a talking calculator called *KidzTalk Calc*. This application turns the handheld's calculator into a talking calculator. *Converter* is a free conversion tool that converts over 215 types of measurements. *BeSmart* is a math program that generates problems randomly, including negative numbers, and allows the student to complete the problem on the screen, then checks

the answers. *Sheet To Go* is the handheld equivalent of *Microsoft Excel*. It is a spreadsheet program that allows the user to create, view and synchronize spreadsheets. Sheet To Go is part of the Documents to Go Suite. *ArithmeFish* by AcroDesign Technologies develops ability to memorize basic math facts. *Nipcalc Plus* by Nipsys Technologies provides both a standard and scientific calculator, fractional calculator and a unit and city time converter.

Shortcutter is an application very similar to *Overlaymaker* for the PC. It allows the user to create and design onscreen buttons on the handheld to control the computer functions like mouse movements, page up and page down and the enter key. *Remote Commander* allows the handheld to be used as a touch screen to control the PC's cursor and keyboard and now includes word prediction. *TealMagnify* doubles the onscreen display to provide magnification for visually impaired.

Many of the handhelds can be used as a tool for reading text. *Children's Illustrated eTales* is an application of short stories with colorful illustrations for Kindergarten through Grade 2 readers. On the Palm OS handhelds, *Palm eBook Studio* allows ebooks to be created, formatted, and converted for reading on a handheld. Websites that offer eBooks for handheld computers include:

http://etext.virginia.edu/ebooks/ - University of Virginia eText Library
http://www.memoware.com - memoware – Palm
http://www.dotlit.com - Dotlit – for Pocket PC
http://esspc-ebooks.com/default.htm - Elegant Solutions Software and Publishing Company - PC platform

Handheld computers also have a wide variety of accessories to increase their functionality including digital cameras, keyboards, screen magnifiers and smartpads. The *Magnifico*™ is a screen magnifier that is lightweight and fits on any handheld magnifying the LCD of the handheld.

The following tables list the applications, source and cost of the applications. You will note that most applications are under $20 or free! Applications are usually purchased via the Internet and downloaded to the handheld computer from a desktop or laptop computer.

Participation in a Modified Curriculum

All of the previous examples have been designed to help a student with a disability be a more active participant in the general education curriculum. However, there are also a number of ways to use assistive technology to assist the student with severe disabilities who is working to acquire skills that are significantly different from those of the other students in the classroom. Two excellent resources for ideas that are practical, affordable and valuable are *A Book of Possibilities: Elementary Edition* and *A Book of Possibilities: Secondary Edition* (AbleNet, Inc.). Each of these focuses on the use of simple technology to include a student with severe disabilities in meaningful classroom activities. A student might give directions using a voice output device, start a blender with an environmental control device, select the next person to read aloud by using a spinner operated with a switch, etc. There are hundreds of suggestions in these two books, categorized by curriculum areas.

Several vendors have developed commercial software designed to provide access to the regular educational curriculum for those students who are significantly disabled in the area of cognition. The *I KNOW*™ *Series* from SoftTouch Software provides standards based, age appropriate curriculum in the areas of science and history for students working at the cause-and-effect and choice making levels.

Assistive Technology Applications					
Title	Source	Cost	Handheld OS	Computer OS	Description
Shortcutter	http://www-2.cs.cmu.edu/~pebbles/shortcutter/index.html	Free	Palm/Win	Win/Mac	Similar to Overlaymaker Custom design on-screen buttons
Remote Commander	www-2.cs.cmu.edu/~pebbles/remotecmd/index/html	Free	Palm/Win	Win/Mac	Allows PDA to be used as a touch screen to control PC cursor and keyboard
Agenda 6.0	Softrends Software Pvt. Ltd. www.handango.com	$10	Win/Palm	Win	Allows multiple calendar views Allows icons/colors to calendar
OmniRemote Pro	www.palmgear.com/software	$25	Palm	Win	Turn handheld into remote control
Teal Script Plus	TealPoint Software www.handango.com	$20	Palm	Win	Replaces the standard graffiti system Tunable text recognition system
TealMagnify	www.tealpoint.com/softlens.htm	$12	Palm	Win	Magnifies screen
Due Yesterday	www.palmgear.com	Free	Palm	Win/Mac	Record classes, assignments, grades

Teaching Utility Applications					
Title	Source	Cost	Handheld OS	Computer OS	Description
Goal For It	www.handango.com	$14	Palm	Win	Goal setting database, journal and notes feature
Quizzler 3.5	www.palmgear.com		Palm/Win	Win	Add pictures to quiz, enter multiple choice, flash cards
Bookslog	www.palmgear.com	Free	Palm	Win	Organize books by title, author, genre, notes
AvantGo	https://my.avantgo.com/	Free	Palm/Win	Win	Download periodicals – USA Today, Scholastic World News
SuperMemo	Maple Top Software	$16	Palm	Win	Large Font, tools to assist memorization of facts, foreign languages
EasyTalk	www.freewarepalm.com/	Free	Palm	Win	Translates common phrases and words, foreign language tool

Walser, P. (2004)

Math Applications					
Title	Source	Cost	Handheld OS	Computer OS	Description
Sheet to Go	www.dataviz.com		Win/Palm	Win	Spreadsheet (Part of Documents to Go)
BeSmart	www.handango.com	$8	Palm	Win	Math program Generates problems randomly Includes negative numbers Checks answers
Converter	www.handango.com	$15	Palm	Win	Conversion tool
KidzTalk Calc	http://toysoft.ca/education.html	$6	Palm	Win	Talking Calculator
ArithmeFish	http://www.gmvhdl.com/acrodesign/fish.html	$6	Palm	Win	Memorize addition, subtraction, multiplication and division facts
Herbert's Math Time	www.beret.com	$15	Palm	Mac/Win	Supports math facts
Nipcalc Plus	www.asobiz.com	$10	Palm	Mac/Win	Standard calculator, scientific calculator, fractional calculator, unit converter and city time converter
powerOne Scientific	http://www.infinitysw.com/products/poweronegraph.html	$30	Palm	Mac. Win	Scientific calculator with algebric entry, statistics, conversion, and date/time worksheets, works with Dana

Walser, P. (2004)

Reading Applications					
Title	Source	Cost	Handheld OS	Computer OS	Description
Palm eBooks Studio	www.palmstore.com	$30	Palm	Mac/Win	Create ebooks that can be read by Palm Reader software
Dictionary ToGo	www.learningtogo.com	$12	Palm/Win	Win	150,000 words and sample sentences
WordTutor	http://www.antstech.com/	$16	Palm	Win	Memory Aid software
emWord Jumble	Emcon Emsys	$8	Palm	Win	Word jumble game
Herbert and the Presidents	www.beret.com	$15	Palm	Mac/Win	Teaches facts about Presidents of US
Herbert's 50 US States	www.beret.com	$15	Palm	Mac/Win	Teaches facts about 50 states
Beret Study Buddy: Vocabulary	www.beret.com	$15	Palm	Mac/Win	Organize vocabulary into lists, word games
Children's Illustrated eTales	http://www.ddhsoftware.com/software	$10	Palm	Mac/Win	Tales for K- Grade 2
TotTutor	http://www.rjen.com/Pilot/TotTutor.html	$5	Palm	Mac/Win	Teaches letters, numbers, shapes, directions and sizes

Walser, P. (2004)

Writing Applications					
Title	Source	Cost	Handheld OS	Computer OS	Description
FreeWrite	www.handheld.hice-dev.org www.freewarepalm.com	Free	Palm	Win	Word processor, Auto-caps 109,000 word spell checker 25 pages of letter size text
Word to Go	www.dataviz.com	$30	Palm/Win	Win	Word Processor PDA companion to Microsoft Word (Part of Documents to Go)
Sketchy	www.handheld.hici-dev.org/download.htm	Free	Palm/Win	Win	Create animations Produce a computerized flip book
PiCo Map	www.handheld.hici-dev.org/download.htm		Palm/Win	Win	Concept mapping program
ThoughtManager	www.handshigh.com/html/thoughtmanager.html	$40	Palm	Win	Concept mapping, outlining, templates available for purchase
A Zillion Kajillion Rhymes	www.eccentricsoftware.com	$20	Palm	Win/Mac	Type a word and it finds every word that rhymes
QuickWrite	www.handandgo.com	$40	Palm	Win	Word prediction program
Fitaly	www.fitaly.com/product/products.htm	$35	Palm/Win	Win	Overlays for graffiti area Different versions for different PDA's
Fling It	http://www.handheld.hice-dev.org/	Free	Palm	Win/Mac	Allows websites to fling to handheld
Copywrite	Revelation Computing www.handango.com	$30	Palm	Win	Works by replaying letters drawn by a teacher so student can observe the correct stroke order and direction.
TextPlus	www.smartcell.com	$20	Palm	Win	Word prediction, works with Dana
Word Complete	www.cic.com	$25	Palm		Word prediction, works with Dana
What-If Builder	http://www.kidsolve.com/products/palm/wib/		Palm	Win/Mac	Allows creation of decision trees
Teal Script	http://www.tealpoint.com/softscrp.htm	$17	Palm	Win	Tunable text recognition data entry

Walser, P. (2004)

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Math

Abacus/Math Line

↓

Enlarged math worksheets

↓

Low tech alternatives for answering

↓

Math "Smart Chart"

↓

Money calculator and Coin-U-Lator

↓

Tactile/voice output measuring devices

↓

Talking watches/clocks

↓

Calculator/calculator w/print out/calculator with large keys and/or large display

↓

Talking calculator

↓

Calculator with special features (e.g., easy function translation)

↓

On-screen/Scanning calculator

↓

Alternative keyboards (e.g., IntelliKeys®)

↓

Software for cueing for math computation or manipulation of objects

↓

Voice recognition software

Assistive Technology and Math

There has been "assistive technology" for math for years--only we didn't call it that. The abacus and fact sheets (or Smart Charts, as some are called) were excellent assistive tools for students with disabilities. Now we have several new products that are also very useful.

- **Abacus/Math Line**-The *Abacus* and the *Math Line* products are simple manipulatives for calculating early math problems. *Math Line* products are produced and marketed by Howbrite Solutions, Inc. They come in different sizes with up to 100 rings for counting. Each time you move a set of rings, the numeral they represent is exposed on the math line. They are color coded to assist counting by fives and tens. There is even one in Braille and one with tabs for easy manipulation using a head pointer or mouth stick.

- **Enlarged Math Worksheets**-For a student who has difficulty seeing the problems or writing in a small space, simply enlarging the math problems using the copier may be as solution. This also helps if the student needs to use rubber stamps to answer the problems due to difficulty with writing.

- **Low Tech Adaptations for Answering**-A variety of rubber stamps can be purchased or made for the student who cannot use a pencil. Often they work well, especially in the elementary grades as long as the space to stamp the answer is large enough. Another low tech alternative is to tape an enlarged worksheet to a cookie sheet or jellyroll pan with a 1/2" lip and place magnets with numerals on them on the cookie sheet. All the student needs to be able to do is select the correct numerals and push them to the right place on the worksheet in order to answer. Another alternative is to cover the floor of the cookie sheet with *Memo Board* removable *Contact* paper which turns it into a dry erase board. The teacher can write out a math problem on the cookie sheet and again provide magnets for the student to push into place to answer the problem. Onion Mountain Technology sells a *Magnetic Math Set* that allows students to solve math problems without handwriting. Also, refer back to Chapter 2 for low tech adaptations for handwriting.

- **Math Smart Charts**-Any particular math facts that a student is struggling with can be put on a chart to help them. Multiplication tables, conversions from metric, conversions from Celsius, etc. can all be helpful depending upon the content with which the student is struggling. These charts can be easily created on your own or purchased from manufacturers like Really Good Stuff. They come in assorted sizes and grade levels.

  The Master Fraction Set sold by Onion Mountain Technology is a three-part set for teaching fractions. The white plastic base of each shows four different shapes. Each clear layer divides these shapes into progressively smaller fractions. One set starts with halves, another with thirds, and the last with fifths. Another tool for teaching fractions is the *Fractiongrams*. *Fractiongrams* are available from Onion Mountain Technology and consist of two sets of stamps – one set of one complete whole and the other is a division of that whole to rectangles demonstrating 1,1/2's, 1/3's, 1/4's, 1/5's, 1/6's, 1/8's, 1/9's, and 1/10's.

- **Tactile/Voice Output/Adaptive Measuring Devices**-Talking measuring tapes, thermometers, and other devices designed for individuals who are blind can also be useful to students with other

disabilities who have trouble seeing or recognizing the numbers or amounts. These are generally available from specialized vendors such as LS & S, LLC.

The *Master Ruler* sold by Onion Mountain Technology is an ideal tool for teaching length, measurement and their divisions. The ruler has transparent overlays that can go over a white one inch incrementing ruler showing 1/2", 1/4", 1/8", and 1/32" increments. Because these different layers are transparent the student can always see the other layers and understand the relationships between the different units of measurement.

- **Talking Clocks/Watches -** Talking watches and clocks can also be helpful as can clocks which offer both digital and analog display can help to make the connection between those hands moving around the circle and the time they represent. LS & S, LLC features a wide variety of talking clocks, timers and watches.

- **Calculators**-There are a variety of calculators that can be helpful. Often having a print out is useful because it allows a student to review his or her work and identify errors. Other features such as large display or large keys can help some students. A talking calculator may be useful for an auditory learner. Other calculators such as conversion calculators which quickly and easily convert a variety of items such as fractions (Casio *Fraction Mate*), or metric to U.S. measurements for weight, length, area, liquid volume, cubic volume, and temperature (Radio Shack *English/Metric Conversion Calculator*). Handheld computers also have very useful calculators within the operating system. Additional calculator applications can also be added to the handheld to expand the functionality of the operating system calculator.

  The *Coin-U-Lator* is a calculator with keys shaped and sized exactly like coins along with a smaller dollar bill. The *Coin-U-Lator* adds or subtracts amounts and has voice output. The *MoneyCalc* is a calculator that also feature money shaped keys along with the standard keys. It is a standard calculator and money calculator in one easy to use device. It also features one touch figuring of tax and tips as well as help with unit pricing.

  The *Visable* jumbo display scientific calculator sold by LS & S display's numerals and measure .9" x .6". It features all the important scientific, statistical and trigonometric functions. Key pad features large keys with high visibility printing. Fully portable 9" x 6.2" x 1.5" - just 14 ounces.

- **On Screen/Scanning Calculators**-The on screen calculator that comes standard on most computers are handy for many students because it saves time hunting down the tabletop calculator. Beyond convenience though, specialized onscreen calculators provide larger print and a scanning feature. *Big:Calc*® from Don Johnston Incorporated offers several advantages. It can be arranged in six different layouts. It can speak individual keys, figures, or entire equations. It can also be set to scan the keys so that a student using a single switch to operate the computer can operate the calculator. It is a Macintosh only program.

- **Alternative Keyboards**-For the student with motor problems, an alternative keyboard such as an *IntelliKeys*® provides a way to complete computations with minimal motor skills. Other examples include *Little Fingers*®, *Big Keys*, and handwriting recognition graphic pads.

- **Software**-Perhaps most exciting new products in the area of math are the number of new software programs that can assist students. *Access to Math*™ is a math worksheet program from Don Johnston

Incorporated. The teacher can use it to generate customized worksheets for all students and then also use it on screen for a student who needs extra help. It has speech feedback so the student can hear digits, problems, and answers read aloud. There is a self-check function and number columns can be color coded to help students visually organize problems. Numerals can be enlarged for students with vision impairments.

Other math related programs from Don Johnston Incorporated include *Blocks in Motion®,* a highly creative animated tool for first to sixth graders that allows the student to move objects around to actually see what happens when you take 6 away from 14, etc. *Unifix® software* from the makers of *Unifix Cubes* is also a software program that allows a student to manipulate cubes, snap them together, and label his work with the manipulatives to print out and hand in. It can be operated with a single switch or touch screen. The *Unifix® software* has a built in scanning feature that works with single switch input.

IntelliTools, Inc. has released a series of software programs and curriculum-based activities designed to reinforce essential math skills. *Number Concepts 1™* with Oshi the Otter (Grades K-2) and *Number Concepts 2™* with Penn and Gwenn (Grades 3-5) provide practice in counting, beginning addition, subtraction, concepts like greater than and less than, skip counting, place value, and factoring.

MathPad™ (grades K-2) is an easy-to-use math processor by IntelliTools, Inc. that enables students to do math computations directly on the computer. With *MathPad™*, students can complete a variety of computations that they would normally do using pencil and paper. *MathPad™* can be used with the mouse pad, the IntelliKeys® keyboard or single switch. *MathPad™* comes with 300 sample problems that are grouped by level of difficulty and two *IntelliKeys®* overlays. Additional problems can be entered directly into the MathPad Problem List or from a word processor. It automatically sets up new problems in the correct vertical format. It also allows students to check their own work and put a check mark or dash next to the problem to indicate right or wrong. There are a variety of font sizes, background colors, and speech options for students who need them. *MathPad™ Plus* (grades 3-8) is the next level and includes fractions and decimals. *IntelliMathics® 3* (grades Pre-K-8) is a program that allows students to experience math within everyday activities. It includes: counting boxes for whole number counting, decimal grids, base ten blocks, sorting bins and Venn Hoops, attribute blocks, geoboards, tanagrams, coins, dice, spinners for probability, and adds the ability to author your own math activities by allowing you to add graphics, instruction boxes and auditory feedback. *ReadyMade Fractions 1* and *Fractions 2* (Grades 3-5) provide instruction and practice in areas such as: parts of a set, sorting fractions, comparing fractions, equivalent fractions, number line fractions, adding fractions, subtracting fractions, rounding fractions, and data analysis.

Astro Algebra® and *Cosmic Geometry®* are math programs from Riverdeep, Inc. that are designed for seventh through ninth grade students. They cover major concepts presented in algebra and geometry, but offer a way for students to interact who otherwise have trouble writing their answers due to various disabilities. These are part of the *Mighty Math Series®* that is a comprehensive line of math software for kindergarten through ninth grade

MathType™ is software that allows a student or teacher to add virtually all arithmetic symbols to create equations and formulas for advanced math and science problems. This tool is extremely useful to an advance student who must use the computer to produce written work. It can be previewed at their website.

Dollars & Cents (First Money, Spending Money, Making Change) from Attainment Company, Inc. provide practice using money with accessibility features built into the software.

Rick's Math Web is another useful website. It offers over 4, 750 math problems for learners from pre-kindergarten to high school who need help learning to count, write numbers, place value, addition, subtraction, multiplication, division, prime numbers, composite numbers, least common multiples, greatest common factors, factoring whole numbers and add or subtract fractions. It includes tips and tricks for learning different math operations.

National Library of Virtual Manipulatives http://matti.usu.edu/nlvm/nav/index.html
Developed by Utah State University and funded by a National Science Foundation grant, this site offers an extensive collection of virtual manipulatives and interactive concept tutorials. Activities and tools can be found for grades K-2, 3-5, 6-8 and 9-12

- **Voice Recognition Software for Math**- Metroplex Voice Computing, Inc. has developed several programs that allow students to complete math using the voice recognition technologies. *Mathpad™ by Voice™* is a voiced version of *MathPad™*. It allows student to do basic addition, subtraction, multiplication, and division using voice. *MathTalk™ Scientific Notebook* allows the user to voice any math from pre-algebra, algebra, trig, calculus, statistics, thru Ph.D. and graduate level. This includes voicing graphs

- **Handwriting Recognition for Math**-Handwriting recognition technology allows you to enter numbers and text into any Microsoft Office program by writing instead of typing. A writing input device such as stylus or mouse and a tablet PC or graphics tablet is used to enter writing. *Microsoft Office XP* offers handwriting recognition as well as many PDAs.

Products Mentioned in Chapter 5

Product	Vendor
A Book of Possibilities: Elementary Edition	AbleNet, Inc.
A Book of Possibilities: Secondary Edition	AbleNet, Inc.
Abacus	Howbrite Solutions, Inc.
Access to Math	Don Johnston Incorporated
Amazing Writing Machine®	Riverdeep, Inc.
AppleWorks 6	Apple
Astro Algebra®	Riverdeep, Inc.
Bailey's Bookhouse	Riverdeep, Inc.
Big Keys	Greystone Digital Inc.
Big:Calc®	Don Johnston Incorporated
Blocks in Motion®	Don Johnston Incorporated
BookWorm™	AbleNet, Inc.
BuildAbility	Don Johnston Incorporated
Casio Fraction Mate	Casio
Cast eReader	CAST
Cleer Adheer	Available locally
Clicker	Crick
Co:Writer 4000	Don Johnston Incorporated
Coin-U-Lator	Attainment Company, Inc.
Cosmic Geometry®	Riverdeep, Inc.
Dollars & Cents	Attainment Company, Inc.
Draft Builder	Don Johnston Incorporated
Dynavox	DynaVox Systems, Inc.
EZC Readers®	Available online
Easy Talk	Easy Talk Computers
English/Metric Conversion Calculator	Available online
Fractiongrams	Onion Mountain Technology
Hefty Tabs	Lee Products Company
Highlighting Tape	Lee Products Company
HyperStudio®	Sunburst Technology
I KNOW™ Series	SoftTouch Software.
Inspiration®	Inspiration Software, Inc..
IntelliKeys®	IntelliTools, Inc.
IntelliMathics® 3	IntelliTools, Inc.
IntelliPics Studio®	IntelliTools, Inc.
IntelliTalk II	IntelliTools, Inc.
IntelliTools Reading: Balanced Literacy	IntelliTools, Inc.
IRIS Pen™ express	I.R.I.S. Inc.
Jake's First Halloween	Slater Software
Kid Pix	Broderbund
Kidspiration®	Inspiration Software, Inc.
Kid's Time Deluxe	Great Wave Software
Product	**Vendor**

Kurzweil 3000	Kerzweil Educational Systems, Inc.
Language Master	2000 Drake Educational Associates Ltd
Little Fingers®	Datadesk Technologies
Little Step-by-Step Communicator	AbleNet, Inc.
Living Books®	Riverdeep, Inc.
Magnetic Math Set	Onion Mountain Technology
Magnifico	Office On The GoGO
Master Fraction Sets	Onion Mountain Technology
Master Ruler	Onion Mountain Technology
Math Line	Howbrite Solutions, Inc.
Math Pad™	IntelliTools, Inc
Math Pad™ Plus	IntelliTools, Inc.
MathTalk™ Scientific Notebook	Metroplex Voice Computing Inc.
MathPad™ by Voice™	Metroplex Voice Computing Inc.
MathType	Design Science, Inc.
Memo Board™ Contact Paper	Available Locally
Microsoft Excel	Microsoft
Microsoft PowerPoint	Microsoft
Microsoft Word	Microsoft
Mighty Math Series®	Riverdeep, Inc.
MoneyCalc	PCI Educational Publishing
My Own Bookshelf	Inclusive TLC
Number Concepts 1™	IntelliTools, Inc.
Number Concepts 2™	IntelliTools, Inc.
PictureIt	Slater Software
PixWriter	Slater Software
PJTs Reading Adventures	Microsoft
Pocket Reader	Fourth Dimension
QuickLink Pen	WizCom Technologies LTD
Quickionary II Pen	WizCom Technologies LTD
Read & Write for Mac	TextHelp
Read & Write Gold	TextHelp
Reader Rabbit®	Riverdeep, Inc.
ReadyMade Fractions 1 & 2	IntelliTools, Inc.
Scan 'n Read	Switch in Time
Simon S.I.O™	Don Johnston Incorporated
Speaking Dynamically™	Mayer-Johnson
Speaking Homework Wiz®	Franklin Electronic Publishers
Stanley Sticker Stories®	Riverdeep, Inc.
Start to Finish Books®	Don Johnston Incorporated
Talking Word Processor©	Premier Assistive Technology
Teach Me Phonemics	SoftTouch Software.
TestTalker™	Freedom Scientific
Transparent Post It Notes	Available locally
UKanDu Little Books®	Don Johnston Incorporated
Product	**Vendor**
Unifix Cubes	Didax, Inc.

Unifix® software	Didax, Inc.
Velcro™	Available locally
Visable	LS & S, LLC
Watchminder®	WatchMinder
WiggleWorks	Scholastic
Write:OutLoud®	Don Johnston Incorporated
Writing with Symbols 2000™	Mayer-Johnson
WYNN	Freedom Scientific

Notes:

Assistive Technology for Recreation, Leisure, and Activities of Daily Living

Jill Gierach, MSE, ATP, Marcia Obukowicz, OTR, and Penny Reed, Ph.D.

Recreation, Leisure, and Activities of Daily Living covers a very broad area. We have chosen this chapter of the manual to include information about using assistive technology with students with very severe cognitive disabilities. That is the first section included here. It includes suggestions for considering and increasing a student's level of attention/arousal as well as considerations for selecting assistive technology.

Two continuums, one for Activities of Daily Living, and one for Mobility follow this. We have not provided support materials for these two continua. These two areas are very specific and needs have been well met by Occupational Therapists (for Activities of Daily Living) and Physical Therapists (for Mobility). We strongly suggest you rely on your OT and PT for information on items in these areas. Finally, this section ends with a continuum on Control of the Environment. Providing access to appliances and electronics opens many new worlds of recreation and leisure activities.

All products mentioned in this chapter appear in a table at the end of the chapter along with the company that produces them. A complete list of products and company contact information for each is included in the Appendix.

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Recreation and Leisure

Toys adapted with Velcro™, magnets, handles, etc.

↓

Toys adapted for single switch operation

↓

Adaptive sporting equipment (e.g., lighted or beeping ball)

↓

Universal cuff or strap to hold crayons, markers, etc.

↓

Modified utensils (e.g., rubber stamps, rollers, brushes)

↓

Arm support for drawing/painting

↓

Electronic aids to control/operate TV, VCR, CD player, etc.

↓

Software to complete art activities

↓

Games on the computer

↓

Other computer software

Assistive Technology For Recreation and Leisure

One of the most challenging tasks in education is to work with students with severe and profound cognitive disabilities that leave the child functioning at a few months of age cognitively, regardless of their chronological age. Recreation and leisure is often a focus area within the Individual Educational Program for children with severe/profound cognitive disabilities. Because of this, the first Section of this chapter is written with this population in mind.

Assistive Technology and Children with Severe/Profound Cognitive Disability

What can limit a child's involvement in recreation and leisure? For the purposes of this chapter, the limitations are divided into three general areas; (1) arousal and/or attention, (2) ability to physically interact with equipment or objects in the environment, and (3) social or behavioral skills.

Sensory Planning for Increased Arousal/Attention

- **Increased Arousal-**When working with children who experience severe/profound cognitive disability, getting their attention and keeping them sufficiently focused and aroused to attend to things in their environment is the first step. When thinking about arousal/attention begin by considering the following: How do sensory experiences affect this child? Are there some that are preferred and should be utilized? Are there some that the child dislikes and should be avoided? What sensory stimuli (e.g., lights, music, sounds, smells, perfumes, food, taste, touch, movement) produce a consistent response in the child? That response may be an increase in arousal or attention or it may be the opposite and indicate a sensory area to avoid. It is important to note the arousal state after activities such as physical education or recess. Is the child in an increased attention state? If so, this indicates that it was a good level of activity and stimulation that left the child in an aroused state, when s/he will be most able to attend to a new activity or experience.

- **Decreased Arousal-**Conversely is the child who is in a "shutdown" response. If so this indicates the activity was too stimulating and produced a sensory overload. Shutting down is the result of too much stimulation. Unfortunately, we often interpret this response as a lack of interest or awareness and INCREASE the stimulation, causing the child to further shutdown. The first task in assessing this student's ability to benefit from assistive technology is to carefully observe and chart the child's level of alertness throughout the day and plan for the introduction of assistive technology when the child is at his/her most alert level.

- **Increased Time on Task-**The next questions is: How long is the child able to interact with various sensory stimuli (e.g. seconds, minutes, hours)? To increase the amount of time a child is able to attend to and participate in a learning task, utilize preferred sensory stimuli that you have identified to frame the activity. Assess which stimuli would assist the child in attending to the current environment and use the preferred stimuli to increase engaged time within that activity. (An IEP goal might be to decrease the number of times the preferred sensory stimulate has to be given to maintain the child's active response within the non preferred activity.) An example is the child who responds very positively to the scent of lemon. When lemon essence is presented, the child looks around, lifts her head, and becomes generally more alert. This aroused state can then be used to introduce the child to using a switch to turn on a fan or some music.

It is also important to consider sensory input as it relates to activity selection, because it can help or hinder a child's interaction with assistive technology. How children interact with sensory stimuli should affect the choices we make in choosing assistive technology devices (e.g. the color, vibration, intensity of light, loudness, etc.) The use of thoughtful sensory planning can create a window of opportunity for a low cognitive functioning child to participate in the target experience.

Remember that most movement will increase the alertness level of a child providing a window of opportunity for new or cognitively difficult tasks afterwards. Thus a cognitive activity may work better if it is timed after physical education or recess. At the same time, for children who have limited movement, a little gross motor activity may go a long way or can provide a delayed reaction. Sometimes this reaction (i.e. dizziness), can register as much as an hour later. Noted movement activities to watch are merry-go-rounds and swings. If a child is getting sick consistently during the day, review movement activity that has occurred earlier in the day, work with the Occupational Therapist, Physical Therapist or Adapted Physical Education instructor to find a better level and amount of movement for the child.

If you are not aware of the sensory stimuli that are most likely to cause a positive or negative response from a child, you may want to complete the *Every Move Counts* (Korsten, Dunn, Foss, and Francke, 1993)Assessment.

Sensory Consideration in Selecting AT

A child with cognitive and physical disabilities may be extremely sensitive to some type of sensory stimuli. If so, this will affect how he or she performs when that sensory stimuli is present. If a child is light and sound sensitive, a toy with bright flashing lights and a siren sound will not be the best choice as a reward for switch activation. On the other hand, if a child responds with "yum" sounds when the school lunch is tacos, the same spicy smell may provide a very motivating reason to hit the switch to help create a snack. Some sensory elements to consider when planning for assistive technology uses include the student's reaction to light, sound, smell, and touch.

If the child likes light, try:

- Bright flashy, hologram type paper streamers on a fan or switch
- Computer games with visual components
- Light cues on targets
- Lighted balls or other equipment
- Playground equipment with contrast color (on steps to slide, seat of swing, etc.)

If the child likes sound, try:

- Music on the computer or CD/ tape deck (Usually rhythmic, quiet music is calming and arhythmic, louder music will increase alertness level.)
- Computer games with an auditory component
- Auditory Scanning options on the computer to allow interaction for a visually impaired child
- Balls or other equipment with a bell or beep inside

If the child likes specific smells, try:

- Cooking activities that use the blender
- Fan that blows a scented breeze
- Associating different smells with different activities (and/or different switch, different movement)

It the child likes touch, try:

- Vibrating handles on joy stick
- Vibrating or textured balls/throwing objects
- Vibrating or tactile switch covers
- Textured cues on playground equipment
- Use of Gloves (may help a child who is tactilely sensitive interact with clay or finger paint)

Another area in which senses can play a role is with children with attention difficulties such as ADHD or Autism. These children may be distracted by sounds in the background, the bright glare of the window as they go outside, or the smell of a teacher's perfume. This distraction may cause them to miss cues in their surroundings. Examples might be not hearing the bell, not recognizing that kids are heading in after recess, or not seeing that everyone else has put their books away and are putting on their shoes for physical education even though the child is capable of noticing those things at other times. A child with physical or cognitive problems may be overly sensitive to some types of sensory stimuli. That in turn may affect how the child performs an activity. If that child is light and sound sensitive, a toy with bright flashing lights and a siren sound will not be the best choice at the other end of a switch. On the other hand, if a child responds with "yum" sounds when the school lunch is tacos, the same spicy smell in the blender may provide a very motivating reason to hit the switch for a snack.

Adapted Toys and Games

A second area to consider is physical access to equipment and toys for recreation and leisure. Ease of use is a key factor for staff, child and family in the consistent use of equipment. Adaptations that can be put in place easily, done quickly and run properly will be used many times. The adaptations that are difficult or not worth the effort, will be forgotten. Finding the right tools for the right tasks is often a trial and error process. But the outcome is worth the effort.

Accessing the appropriate position and use of equipment and tools is another common problem for students with severe/cognitive disabilities and accompanying physical challenges. Determining workable positions requires the input of physical or occupational therapists, the student's family, teachers, and others in the typical environments who can observe to see what is working.

There is a hierarchy of movement to consider when utilizing battery operated toys with children who are functioning at a low cognitive level. When assessing the appropriate use of toys, recognize that toys that move horizontally are easiest to track, then toys that have a vertical movement. Bump and go toys require a higher cognitive understanding to maintain the interest of children. If a child does not respond to a toy, check its movement pattern and try one that moves in another plane.

A great resource for play activities is *Play & Learn: A Motor-Based Preschool Curriculum for Children of All Abilities* (Coleman & Krueger, 1999). It has dozens of wonderful play activities with suggestions for adaptations and creative involvement.

Selecting Switches
Switches are frequently used to improve access to a device such as a radio, tape player, toy or computer. They are commonly used during the training process to teach concepts such as cause and effect. In selecting a switch, the first question to ask is, "What do you want a switch to do?" Switches come in a variety of shapes, textures, sizes and activation modes. However, virtually any item can be turned into a switch by using the *Taction Pad* (Adaptivation). *Taction Pads* are clear, adhesive backed, touch sensitive patches that can be adhered to any surface or object.

Take time to think about what the switch will do. Activities that involve water or cooking may not work well with a light sensitive switch that can get gummed up with food. A switch that is to be activated by hand or foot may need to be bigger than one activated by fingertip. So the end use and location are significant in the choice of a switch.

Consider:
- What is the most consistent movement the child makes and controls?
- What part of the body will be used to activate the switch?
- Is the switch appropriately durable for this? Is it the right size?
- Is the child capable of producing the amount of pressure required by the switch?
- Will use of the switch fatigue the child? If so, how long can it be used before fatigue is a factor?
- Will continued use cause contractures? If so, can the switch location be varied during the day?
- Does the use of the switch require an undesirable body position or movement?

Most switches are activated by touching them in some way. The most common is a round pressure switch such as the *Jelly Bean*® switch (Ablenet), but there are many other styles available. Please note the resources listed at the end of this article, if you are not familiar with common sources of switches and adapted toys. If a child cannot directly activate a switch, can they move their body in a way that a movement based switch or a remote type switch could be activated? Movement based switches react as their name implies, to a movement the child makes. Common ones are the mercury switch and a light sensitive switch. Moving the mercury from one side to the other activates the mercury switch. A child might wear the switch on his/her head and tilt the head to the side to activate the switch. It could also be strapped on the hand and then turning the hand over would activate the switch.

A light sensitive switch responds to a movement over the light sensor blocking the light, which then triggers the switch. There are also switches that work on the principle of a remote control. Some will interface with a computer, (e.g., the *Tracker 2000*). Using a head controlled sensor to point at the screen the computer is equipped with a receiver that interprets where the mouse is on the screen activating the area. Other switches work with an interface to control various electronic equipment in the environment.

Another consideration for switch use is the fatigue factor. Does this child tire easily? Fatigue can play a crucial role in how long a child can use a switch in the same position. Frequently changing the position of the child and/or the switch placement is often a useful way to prolong the child's ability to use assistive technology. Careful observation and record keeping can help identify a child's preferences for position and switch location. The preferred position can then be saved for tasks with a high cognitive demand. Utilize the more challenging access mode(s) or position(s) for lower cognitive load tasks and preferred

positions for more demanding tasks. Remember that although we don't often think of them, alternate sites may well be a foot or knee. Can the switch be activated by hand, head and foot? Some switches can be moved to variable locations throughout the day by using a device such as a camera mount with variable arms. In other cases, a completely different switch may be needed for some activation sites.

Locating the switch can be physically hard for some children. Letting a child know and feel where the switch has been placed can improve its utilization by the student. There is a tendency to place switches at midline on the tray or table in front of a child. For children who can't bring their eyes to focus at midline finding the switch in a midline position can be difficult. A simple test is to move the switch throughout the visual range, starting on the flat surface and moving horizontally from one side to the other. Then do the same up in the vertical plane. Watch their eye movement. Where do the pupils line up? This may take a few tries as the child may need time to figure out there is a new object in front of him/her. When you find the spot where the eyes line up, place the switch there to begin. A movable mounting system such as the *Universal Switch Mounting System* or *Slim Armstrong®* from AbleNet, Inc. can be helpful with positioning as they are so easily repositioned.

Switch selection must also address sensory issues. For children with visual problems consider a sharply contrasting background, or a switch that clicks when activated. Large, bright targets may be easier to find, and voice activated switches may also work well. Watch for things like surface glare on the common plastic switches. For children with auditory problems consider flashing or bright switches that change color when activated. Vibrating switches and textured covers for switches may assist their use by children with tactile concerns.

There are also alternative mice, joysticks and keyboards available to interact with electronic games or the computer. A good information source for switches and keyboards is the *Closing the Gap Resource Directory*. (See Resource List in the Appendix.) Other switch resources are listed in the appendix as well.

The connection between a battery operated toy and a switch is called a battery interrupter. There are directions available from many sources on how to make your own. However, commercial ones are available from AbleNet, Enabling Devices/Toys for Special Children, and several other sources. They are inexpensive and sturdy.

Aside from toys, many other devices can be controlled with switches. Environmental control units (ECU) or electronic aids for daily living (EADL) can be interfaced with a switch to activate electric items that can be plugged into it such as a radio, TV, stereo or small kitchen appliances. Blenders and mixers can be operated through ECU/EADLs to involve students in food preparation activities.

Switches can be interfaced with a computer as well. Software is available for very simple, low cognitive tasks to complex tasks like writing, using an onscreen keyboard and a word processor. Thus, it is very important to not only choose the right switch but choose the right task as well.

Modified Utensils

There are also numerous ways to modify simple tools such as pencils, brushes, stampers and scissors. Often increasing the diameter with a foam grip or creating a tackier surface helps a child to hold on to the item. For others, weighting the utensil or, conversely making it feather light can help. Once again observation and trial are the keys to identifying what modification might make a tool more functional for

a given student. A universal cuff, *Velcro*™ strap or other splint can be made or purchased for children who have trouble holding on to utensils. The cuff will "hold" the item, while the child controls it through hand and arm movements. Occupational or Physical Therapists are usually familiar with these splints. Children who need arm support can use items like an *Ergo Rest*®, which will support the arm for drawing and painting. There are several commercial modifications for grips, splints and universal cuffs that can be found in special education or therapy catalogs.

Some children will have great difficulty with utensils used in art and drawing projects. Creating adapted stamps with sponges or cookie cutter stamps can make if possible for a child to be a more active participant. In addition, adapted scissors can be purchased from common companies such as Fiskars and tape dispensers that have a hand strap and dispense one piece of tape at a time are available from 3M. Art projects utilizing paint spinners, squirt guns with paint or painting with large rollers are just a few other ways to modify activities. In some cases, other students will also enjoy using the adaptations so that the child with special needs isn't the only one using them.

Finally, using the computer to generate pictures, make sounds, or use for other projects may provide a means for participation. There are many hardware peripherals and software programs that can make it possible for a student to participate in art. Visit the WATI website at www.wati.org for suggestions from Melissa Enderle, Adaptive Art Specialist.

Some programs have a stamp selection that allows children to "draw" a picture for a project or to write a story. Common school programs like *Kid Pix® Studio Deluxe* (Riverdeep, Inc.), *Storybook Weaver®* (Riverdeep, Inc.) and *Destination/Imagination Express®* (Riverdeep, Inc.) series use stamps to accent selected backgrounds. Other drawing programs with easy access features include *Blocks in Motion®* (Don Johnston Incorporated), *IntelliPics Studio* (IntelliTools®), and the *AppleWorks 6,* (Apple Computer, Inc.) draw program.

The STAR System of Computer Use

The STAR system (See Figure 1) is an adaptation of the work of team members on the NORDIC Project, which provides a framework for thinking about and planning for the use of the computer with children with severe cognitive and physical disabilities. Its purpose is to identify possible adaptations and software features that will match the abilities of the target child.

At the **Basic Level** (one star), children who function at a very limited or passive level would be working to increase their attention to and response to computer stimuli. This could be done through switch access or a touch window. Software that has animation, movement and or sounds would be utilized.

At the **Automatic Level** (two star), students will be working towards goals that would allow a greater cognitive load. They would begin to act upon the computer with expectation of results. They may move objects around the screen, or explore the function of software. They may access the computer utilizing an alternative keyboard or a mouse. Software at this level may be less busy or multisensory. Children at this level may respond to words, changes in color, natural sounds, or changes in size and color.

At the **Purposeful Level** (three star), students are pre planning and analyzing their use of the computer and software. They may use the keyboard or an augmentative communication device to access their computer. The software is more geared to serve their academic needs and desire for cognitive challenge.

***Stages* Framework**

Another framework for the progression of technology use for students with developmental delays is the *Stages* framework. *Stages* is a software assessment program developed by Assistive Technology, Inc. that assesses students in seven stages of cognitive and language development. It recommends software and off-computer activities to help the student move from one stage to the next. The stages are:

1. Cause and effect
2. Language readiness
3. Emerging language
4. Early concepts
5. Advanced concepts and communication
6. Functional learning
7. Written expression

S.T.A.R. system for computer use

Results of the child's action

Session focus

Abilities of the child

Technology adaptation used

Session Focus	Technology Adaptation	Abilities of Child	Results of Action
Basic Level			
cause and effect increased awareness increased interaction	touch window switch access	to observe to touch to choose to point to indirectly choose	animation on screen movement on screen sounds
Automatic Level			
concept development perceptual/motor develop eye/hand coordination/ move a finger exploration perceptual training categorize	touch window alternative keyboard mouse switch	to remember to match to discriminate to plan to sort to copy (actions)	animation movement words natural sounds music control chance size/color
Purposeful Level			
mathematics concepts original consultation problem solving creativity	icon based aug. comm.. mouse alternative keyboard keyboard	to sequence to move within menus to organize to analyze to reorganize	words movement print out

Adapted by: J. Gierach, CESA #2 (608) 758-6232, 1997. Based on Nordic Project NORDanaLYS, Braende, Hilden, Mathiassen, 1995.

Utilize Outdoor Play

Outdoor play as an alternative during Recreation and Leisure allows for skill development to progress in a variety of areas. It allows for a greater opportunity to integrate the child's sensory experiences through the combination of auditory, visual, vestibular, and tactile senses that naturally occur during outdoor play. It frequently increases the motivation of children with severe cognitive disabilities to respond to a request. The potential for repetition also increases in this natural interactive setting.

The equipment available in playground areas is often the great focus of time and financial resources. More important to the child's ability to participate in these experiences is the preplanning and focus of the play experience that needs to be done prior to the child's arrival on the scene. Wide paths with a firm surface are desirable so that the child can get to the play equipment quickly and smoothly. Swings that have firm backs and safety straps make it possible to provide this stimulating activity for children who otherwise could not participate. The kind that can be installed on existing frames are great, because there is less expense and they can be on the same swing set with regular swings for other students. Sand boxes on raised platforms that are wheelchair accessible or climbing structures that allow a child in a wheelchair to roll within the structure provide opportunities for the child using a wheelchair to interact with the more able bodied climbers passing through and running by.

Important to the success of outdoor play is the attention to normal peer interactions. An important step is to assess the opportunity for a child to participate in playground games by using an augmentative communication device programmed with greetings, key phrases for games such as hide and go seek, using comments such as "try and catch me" or "bet you can't run faster than me!", or arranging an artificial (but still effective) opportunity to use a device to tell kids when it is their turn to go on the slide or when it is safe for them to slide down. It can be very effective to involve peers as "helpers" who get special privileges and can spend time with our target child and even cue him when to activate his augmentative communication device.

Simple adaptations to outdoor games can be used to make it more possible for the child with a disability to participate. For example, the ends of jump ropes can be adapted with pipe insulation or the outside of foam hair curlers to allow a child a larger and softer grip surface, or a new game can be devised that has all children stringing juice cans on a large rope to see who finishes first (Sher, 1992). These are also ways that outdoor play can be accessed for it's potential to include everyone.

Swimming is recreation and leisure that provides a stimulating and enjoyable experience for students. Swimming pools allow children to experience movement free of braces and barriers, often with friends and peers. There are a number of flotation devices available commercially that can help maintain buoyancy for a child with a physical disability. These include life jackets and float suits. (Please note that no child in these devices should be left in the water unattended.)

Transitions

Assistive technology can help children transition from classroom to playground or other play areas and back. Anti-tip bars on wheel chairs can decrease playground accidents. Wagons or strollers can be used to move a child to and from class and play ground equipment. Standers for larger children that allow children to free their hands to catch a ball are available from the Rifton Company, Sammons Preston, and other manufacturers. There are several companies that offer adapted sport equipment. Some additional suggestions include creating "Jungle gyms" from the long foam tubes and connectors offered at several of the large department stores in the swimming section. They are lightweight and soft and offer children with movement problems the opportunity to negotiate a soft maze alternative.

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Activities of Daily Living (ADL)

Nonslip materials to hold things in place

↓

Universal cuff/strap to hold items in hand

↓

Color coded items for easier locating and identifying

↓

Adaptive eating devices (e.g., foam handles, deep sides)

↓

Adaptive drinking devices (e.g., cup with cut out rim)

↓

Adaptive dressing equipment (e.g., button hook, elastic shoe laces)

↓

Adaptive devices for hygiene (e.g., adapted toothbrush, raised toilet seat)

↓

Adaptive bathing devices

↓

Adaptive equipment for cooking

↓

Adaptive driving equipment

Assistive Technology
For Activities of Daily Living (ADL)

The ADLs on this continuum are all low technology items designed to increase the independence in self-care for the school-aged child. The continuum is not a true continuum in that it is set up in categories rather than low tech to high tech. The higher tech items are in the continuum of Control of the Environment, Electronic Aids to Daily Living (EADL's). This does not include items used by a caregiver or classroom aide such as patient lifts.

The goal of these products are to increase independence in self-care and should be incorporated as they occur naturally in activities such as feeding, dressing, and toileting.

Occupational Therapists are trained in the area of adaptive technologies for self-care and should be consulted for further questions. Here are some resources to get you started.

ABLEDATA is a database of over 19,000 assistive technology devices including thousands of ADLs.
http://www.abledata.com

ATSTAR is a website for Assistive Technology Strategies, Tools, Accommodations, and Resources
http://www.atstar.org/at_daily_living.htm

Sammons Preston Rolyan is a catalogue for rehab specialist that includes ADL equipment.
http://www.sammonspreston.com/

Tech Connections is a website for connecting people with assistive technology
http://www.techconnections.org/resources/pubsLev3.cfm?category=3&subcat=1405

Assistive Technology Products: An Illustrated Guide to Terminology (Kratz, 1998)

Another area of assistance worth considering when looking at options for adaptive equipment and assistive technology in self-care is canine-assisted therapy. According to The Delta Society, Assistance Dogs of the West and Assistance Dogs International, dogs are available for several categories of assistance:

- **Guide dogs**: Enhance community mobility by hearing people compensate for visual impairments by alerting them to obstacles and retrieving items.
- **Hearing dogs:** respond and alert the person to sounds, such as doorbells, phones, crying infants, smoke detectors and alarm clocks.
- **Medical alert dogs:** Protect people by detecting and alerting them to physiological changes (seizure activity) or by locating help during medical emergencies.
- **Service dogs:** Assist people with compromised physical abilities by retrieving objects, aiding with transfers, opening doors, operating lights or door-opening devices, pulling a wheelchair, assisting with undressing, and similar tasks.

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Control of the Environment

Light switch extension

↓

Interface and switch to activate battery operated devices

↓

Interface and switch to turn on electrical appliances (e.g., radio, fan, blender, etc.)

↓

Radio/ultra sound to remotely control appliances

↓

Electronic aid to daily living to control environment in connection with an augmentative communication device

Assistive Technology
For Control of the Environment

Electronic aides to daily living (EADL) enable the person with disabilities to have more control of their environment. They go beyond the technologies described in the previous section on activities of daily living as they pertain to electronic devices only. By virtue of that characteristic, they tend to be higher, more complex technologies.

When the person lacks mobility, motor, or cognitive skills that prevent them from performing even the simplest tasks, EADL's can provide them with some basic control over their daily life. Individuals control even the smallest amount of movement by using various types of switches. Text or pictures can be used to access the devices. Different types of input (direct, switch, voice) are available. The user can accomplish control by using either X-10 (on/off control for lights, appliances, door openers, etc.) or infrared (for TVs, VCRs, infrared phone, etc.).

The attached charts developed by Michelle L. Lange, OTR, ABDA, ATP gives the reader valuable information and detail about EADL's. The electronic aids to daily living comparison chart details the type of input, control, signal use, portability, display, and battery backup for different devices. The reader can then begin to determine the features that will best match the needs of the person with a disability. The basic electronic aids to daily living chart gives samples of devices that can work with battery-operated, electrically operated, or infrared operated devices. Additionally there is a specific chart that details the features of four infrared control telephones. These charts can be very helpful when determining the various aspects of control that the person with a disability may have.

BASIC ELECTRONIC AIDS TO DAILY LIVING

Developed by Michelle L. Lange, OTR, ABDA, ATP, Assistive Technology Partners, The Children's Hospital, 1245 E. Colfax Avenue, Suite 200, Denver, CO 80218. 303-315-1289. Lange.Michelle@tchden.org. This does not imply product endorsement and is not inclusive. © 5/03. Printed with permission.

NAME	CONTROL MODE				COST	SWITCH INPUT	SWITCH OUTPUT	COMMENTS
	momentary	latched	timed secs.	timed mins.				
Battery Transmission								
Single SLAT AbleNet		X	0 - 60	0 - 60	$72	1	1	
Choice SLAT AbleNet		X	0 - 60	0 - 60	$92	2	2	2nd device will not activate until 1st device stops
Dual SLAT AbleNet		X	0 - 60	0 - 60	$92	2	2	allows 2 people to use at one time
Cordless Switch AbleNet	X	X	0 - 60	0 - 60	$95	1	1	requires cordless reciever $84
LinkSwitch Adaptivation	X	X	2-52		$106	1 2	1 2	includes 1 switch
5-in-1 Switch Modifier Enabling Devices	X	X	0-120		$75	1	1	intention mode includes adj. pressure switch
On and Off Module Enabling Devices		X			$35	2	1	
Switch Modifier Enabling Devices		X	0 - 120		$54	1	1	
Saucer Switch and Receiver Enabling Devices	X	X	0 - 120		$50	1	1	cordless version available $68
Switch Latch and Timer TASH	X	X	2 - 52		$99	2	2	battery included

NAME	CONTROL MODE				COST	SWITCH INPUT	SWITCH OUTPUT	COMMENTS
	momentary	latched	timed secs.	timed mins.				
Electrical Transmission								
Cordless Switch AbleNet	X	X	0 - 60	0 - 60	$95	1 (also remote switch jack)	1	requires small appliance receiver $34 up to 500 watts international version available
PowerLink 3 Control Unit AbleNet	X	X	0-60	0-60	$182	2	4	up to 1700 watts total remote switch access with AirLink ($79)
Electralink Access first	X	X	1-60	1-60	$139	1	1	ultrasound
FreeHand Adaptivation	X	X	1-60	1-60	$90	1	1	transceiver module $30
FreeSwitch Max Adaptivation	X	X	1-60	1-60	$325	1-4	1-8	Visual and auditory scanning (speech) requires receiver unit $10-17 includes transceiver
Wireless Pal Pad Adaptivation	X	X			$90	1	1	transceiver module $30
1-Switch Single-Appliance Unit Enabling Devices		X			$80	1	1	remote up to 600 watts
2-Switch Single-Appliance Unit Enabling Devices	X (with 1 switch)	X (2 switch)			$90	1 - 2	1	remote up to 600 watts
Ultra One TASH		X			$55	1	1	cordless, ultrasound signal, receiver $60

NAME	COST	SWITCH INPUT	SWITCH OUTPUT	COMMENTS
Infrared Transmission				
TV & VCR Remote AbleNet	$92	1 (also remote switch jack)	TV and VCR	TV: switch activations turn TV on, then advance channels, then turns off. Can program to scan specific stations. Can program one switch activation to be mute command. VCR: first activation turns on TV, VCR, sets station and starts "play". second activation turns off.
Wireless TV Remote Enabling Devices	$110	direct or 5 switches	TV	2" buttons or any 5 switches to control power, channels, volume
Wireless VCR Remote Enabling Devices	$103	direct or 5 switches	VCR	2" buttons or any 5 switches to control features
TV Remote Module Enabling Devices	$63	1-5 switches	TV	switch for each desired function: power, volume up, volume down, channel up, channel down
VCR Remote Module Enabling Devices	$60	1-5 switches	VCR	switch for each desired function: power, stop, play, fast forward, rewind
Cable Module Enabling Devices	$60	1-5 switches	Cable	Switch for each desired function
Single switch TV/VCR/Cable Control Unit Enabling Devices	$206	1	TV VCR Cable	Step scan
a. Mini Relax b. Mini Relax with X-10 c. Mini Relax with voice TASH	$199 $399 $399	a. 1-6 b. 1 c. 1	a.6 IR cmds b.5 IR cmds, 1 X-10 c.6 IR cmds	a. auditory and visual feedback, auto or hold scan b. auto or hold scan, includes radio receiver c. digitized speech, scanning

ELECTRONIC AIDS TO DAILY LIVING Comparison Chart

Developed by Michelle L. Lange, OTR, ABDA, ATP, Assistive Technology Partners, The Children's Hospital, 1245 E. Colfax Avenue, Suite 200, Denver, CO 80218. 303-315-1289. Lange.Michelle@tchden.org. This does not imply product endorsement and is not inclusive. © 5/03.

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	INPUT				CONTROLS				IR SIGNALS		Macro	Portable	Batry Bkup	Display	Comments	Cost
EADL NAME	Direct	Switch	Voice	Other	x-10	IR	Phone	Bed	Stored	Learn						
Direct Access Systems																
8-in-1 Pre-Programmed & Learning IR Remote X-10 (USA), Inc. 800-675-3044 www.x10.com	X				(16)	8			yes	yes	no	yes	yes	Backlit buttons Text	sends radio signals to X-10 radio receiver 2 Aux. functions	$24.99
Maxi Controller X-10 (USA), Inc. 800-675-3044 www.x10.com	X				16			(X10)			yes	no	none	Text	Preset macros: all lights on, all lights off	$24.99
Pronto Remote Touchscreen Smarthome 800-762-7846 www.smarthome.com	X touch-screen				(16)	X			No	2MB mem.	yes	yes	yes	Text Graphics Can customize screen	X-10s with IR X-10 Command Console $29.95 from Smarthome PC computer required to customize screen Color version $999.95	$399.95
Wireless Remote Control System X-10 (USA), Inc. 800-675-3044 www.x10.com	X				8 - 16			(X10)				yes	yes	Text	water resistant case $10 also reduces activation pressure. To control more than 8 X-10 functions, must slide lever	$39.99
Switch Access Systems																

	INPUT				CONTROLS				IR SIGNALS		Macro	Portable	Batry Bkup	Display	Comments	Cost
EADL NAME	Direct	Switch	Voice	Other	x-10	IR	Phone	Bed	Stored	Learn						
EZRA KY Enterprises 562-433-5244 www.quadcontrol.com		single remote			16	8	(X)	(X)	yes	yes	no	no	no	text menu displayed on users TV	Phone option $200 Bed option $100 optional voice playback of pre-recorded messages	$750
EZRA KY Enterprises 562-433-5244 www.quadcontrol.com		single remote			16	8	(X)	(X)	yes	yes	no	no	no	text menu displayed on users TV	Phone option $200 Bed option $100 optional voice playback of pre-recorded messages	$750
GEWA PROG III Zygo 800-234-6006 www. zygo-usa.com	X	single				X			no	100+	yes	yes	yes	Visual codes Scanning light Beeps for each choice scanned	requires Infra-Link receivers to control non-IR devices. Elevator, windows, curtains, intercom	$895
HECS-1 Genesisone Technologies 888-221-5032 www.genesisone.net		dual					X	X	N/a	N/a	no	no	1 ½ hours	Text Dynamic display English or Spanish	nurse call and hospital TV (pendant). Direct control of 2 appliances.	$3985
Imperium 200H InterAct Plus 800-944-8002 www.interactplus.com		dual			64	5	X	(X)	yes	yes	no	no	2 hours	Text with auditory scanning (Mobile Link remote display)	optional tape player, hospital controls. Bed control $420. basic communication menu. 2 auxiliary controls Mobile Link $2995, requires Imperium 200H	$3580

	INPUT				CONTROLS				IR SIGNALS		Macro	Portable	Batry Bkup	Display	Comments	Cost
EADL NAME	Direct	Switch	Voice	Other	x-10	IR	Phone	Bed	Stored	Learn						
Qcontrols Quantum Rehab 866-800-2002 www.quantumrehab.com	X	X single			X	X	(IR)	(X10)	yes	no	yes	yes	yes	Custom-izable dynamic display Test graphics	Stores up to 2500 commands User cannot customize display, rep. has to Universal Link $953 each for relays (curtain, door, etc.)	$9213
Relax II TASH, Inc. 800-463-5685 www.tashinc.com		single dual			(10)	4		(X10)	no	40	no	yes	yes	Text Scanning light Beeps for each choice scanned	X-10 radio transceiver $60. adjustable scanning (auto, hold, step). can access phone through EASI Dialer	$500
Scanning Director II Genesisone Technologies 888-221-5032 www.genesisone. net	X	single dual			(16)	X	(IR)	(X10)	EZ phone X-10	150	no	yes	yes	Text Dynamic display Beeps for each choice scanned (larger screen)	X-10s with IR X-10 Command Console $29.95 from Smarthome Step or auto scan Superview screen $100	$750
Solo Act TapLink 954-427-0478 www.taplink.net		dual			32	3	X	(X10)	yes	optional	optional	no	optional 24 hours	customize some of text on display Dynamic display	name each X-10 TV, VCR, Cable only optional 16 channel learning remote	$4389
Voice Access Systems																
Accenda Remote Control Innotech Systems 631-473-1500 www.accenda.tv	X		X			X			yes	yes	yes	yes	yes	Backlit buttons text	TV, VCR, Cable, DSS model or complete home theater model Voice prompts, larger buttons, memo recorder	$89.95

	INPUT				CONTROLS				IR SIGNALS		Macro	Portable	Batry Bkup	Display	Comments	Cost
EADL NAME	Direct	Switch	Voice	Other	x-10	IR	Phone	Bed	Stored	Learn						
InVoca Deluxe InVoca Smarthome 800-762-7846 www.smarthome.com	X		X 4 users		(10)	8			yes	no	50	yes	yes	Backlit buttons text	TV, VCR, DVD, cable, DSS, Aux X-10s with IR X-10 Command Console $29.95 from Smarthome	$69.95
Sicare Pilot TASH, Inc. 800-463-5685 www.tashinc.com		single dual	X 1 user		64	16	(IR)	(X10)	no	yes	yes	yes	yes	Text Dynamic display Speaks choices when selected 4 line display	programmable menus mount $350 IR telephone $700 Bed control $700	$4000
Simplicity All in One/Plus Quartet Technology 978-649-4328 www.qtiusa.com		single dual	X 1 user		64	6	X	X	240	yes	no	mic. headst	yes	Auditory only Beeps when choice is spoken Speaks options when asked.	speech feedback 1 year warranty Plus model provides full keyboard and mouse control TV, VCR, cable, stereo, CD, Sat.	$5285 $5918 (Plus version)
Voice Me Smarthome 800-762-7846 www.smarthome.com			X			X			no	30	no	yes	yes	none	Will control any IR controlled device, including TV, VCR, DVD, DSS, Cable, CD Player	$89.99
AAC Access Systems																

	INPUT				CONTROLS				IR SIGNALS		Macro	Portable	Batry Bkup	Display	Comments	Cost
EADL NAME	Direct	Switch	Voice	Other	x-10	IR	Phone	Bed	Stored	Learn						
a. PathFinder b. Vanguard c. Vantage Prentke Romich Co. 800-262-1933 www.prentrom.com	X	single dual		mouse joy-stick	(16)	X	(IR)	(X10)	EZ phone X-10 comds	yes	yes	yes	yes	Text Graphics Dynamic display Auditory scanning	X-10s with IR X-10 Command Consule $29.95 from Smarthome. Memory backup on computer	a. $7995 b. $7795 c. $6500
a. DynaVox 3100 b. DynaMyte 3100 c. DynaMo d. DynaWrite DynaVox Systems 800-344-1778 www.dynavoxsys.com	X	single dual		mouse joy-stick	(8)	X	(IR)	(X10)	GEWA phone X-10 comds	yes	yes	yes	yes	Text Graphics Dynamic display Auditory scanning	X-10s with IR X-10 Command Console $29.95 from Smarthome. Memory backup on computer. X-10 comds not pre-stored on Dynamo	a.$6495 b.$5995 c.$1995 d.$3495
Computer Access Systems																
Arial PAL (Personal Assisted Living) ArialPhone 847-282-3800 www.arialphone.com			X	X	X	X	X	(X10)				no	phone	Computer screen		$2500
CINTEX 4 NanoPac, Inc. 800-580-6086 www.nanopac.com					256	X	X	(X)	no	416	no	no	none	Computer screen	phone, IR, X-10 standard. Dragon Dictate or Nat. Speaking interface bed optional doors, pageturner, thermostat	$1890 base

	INPUT				CONTROLS				IR SIGNALS		Macro	Portable	Batry Bkup	Display	Comments	Cost
EADL NAME	Direct	Switch	Voice	Other	x-10	IR	Phone	Bed	Stored	Learn						
Digitouch XP Genesisone Technologies 888-221-5032 www.genesisone.net	(touch screen)		X	Electra-joy $499 or other comp. access method	256	X	X	X	yes	yes	yes	yes	2 hours	Computer screen	Portable version of MultiMedia Max. Includes DVD RW, can load digital pictures, w/c or bed mount, floor stand, can use w/c batteries for power, remote internet connection	$8800
MultiMedia Max Multimedia Designs 888-353-3996 www.multimediadesigns.com			X		256	X	X	(X10)	yes	yes	yes	no	no	Computer screen Graphics of rooms	unlimited IR signals $7995 entire package with computer	$2650
Protocol Genesisone Technologies 888-221-5032 www.genesisone.net			X	X	256	X	dialing	(X)		yes		no	no	Computer screen Photos on screen Customizable	Designed to use with Dragon Dictate Supports automatic telephone number dialing as well as number dictation	$3000

X-10: on/off control for lights, appliances, fan, buzzer, door opener, drapery control, more. IR: infrared control of TV/VCR, stereos, IR phone or other IR controlled device

A/V: audio/visual (i.e. stereo/TV)

( ): optional

Serial input: can be controlled by AAC or computer with serial port through adaptations to that device (i.e. switches).

Bed control can be accomplished with any X-10 system by X-10 System Electric Bed Operator #304, Jantek Home Controls, Inc., 416-620-5255, $430 or Genesis One X-10 Bed Control, 888-221-5032, $525.

Door Openers can usually be controlled with an X-10 module. If the EADL is not portable, you cannot open the door from outside. IR Door openers are available, as well.

Any EADL transmitting IR may be programmable to send to an IR telephone. Check with the manufacturer.

Infrared Controlled Telephones

An infrared controlled telephone can be used by virtually any Electronic Daily Living Aid (EADL, formally Environmental Controls) that can send infrared. Here is a comparision of features:

FEATURES	**EZ Phone** Genesisone Technologies 888-221-5032 www.genesisone.net	**GEWA** InfraLink 800-395-3596	**Tykriphone** Tykris 905-854-3009	**Sicare Telephone** TASH www.tashint.com 800-463-5685
cost	$1195 $1495 speech output	$895	$ 850	$700
access	single/dual switch scanning IR signal	single/dual switch scanning multiswitch IR signal	single switch scanning IR signal remote control	single switch scanning dual switch voice
user can build #s	Yes	Yes	Yes	Yes
prestored #s held	35	11	98	100
redial	Yes	Yes	Yes	Yes stores 20 redial #s
call waiting	Yes	Yes	Yes	Yes
battery back-up	Yes	Yes	Yes	Yes
Speech output	Yes	No	No	Yes
Display	Yes	No	Yes	Yes
Volume Control	ringer, prompts, receiver	Yes	ringer, audio - manual receiver - user	Yes
Adjustable scan speed	Yes	Yes	Yes by user	Yes
Privacy headset	Yes	Yes, $75	jack for pillow speaker	Yes, $175
X-10 capabilities	optional	built-in codes	Optional	Yes
Interfaces	-any learning IR transmitter -any IR transmitting EADL	-any learning IR transmitter -any IR transmitting EADL	-any learning IR transmitter -any IR transmitting EADL	Sicare Pilot
Other	-commands pre-programmed into PRC devices -customizable -Adj. accept rate -FCC certified -ETL approved	-Also can be used as standard phone. -DynaVox has GEWA commands built-in.	-mute feature -dial on/off hook -remote microphone and speaker -emergency dial-out -call display -speakerphone has record, playback -access voice mail	use as standard phone Access security numbers and voice mail

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Products Mentioned in Chapter 6

Product	**Vendor**
AppleWorks 6	Apple Computer, Inc.
Blocks in Motion®	Don Johnston Incorporated
Destination/Imagination Express®	Riverdeep, Inc.
Ergo Rest®	Infogrip, Inc.
IntelliPics Studio®	IntelliTools®, Inc.
Jelly Bean® switch	AbleNet, Inc.
Kid Pix® Studio Deluxe	Broderbund
Stages	Assistive Technology, Inc.
Slim Armstrong®	AbleNet, Inc.
Storybook Weaver®	Riverdeep, Inc.
Taction Pad	Adpativation
Tracker 2000	Madentec Limited
Universal Switch Mounting System	AbleNet, Inc.
Velcro™	Available locally

Assistive Technology for Positioning, Seating, and Mobility

Penny R. Reed, Ph.D., and Marcia Obukowicz, OTR

Positioning and seating plays a critical role in a student's ability to function. The first section of this chapter provides positioning and seating guidelines in three key areas: physical access, visual access, and attention. If a student requires special positioning and seating, an occupational or physical therapist should take the lead in determining the appropriate options.

On the following page is a continuum for positioning and seating. Following that is information on seating locations, the workstation, a drawing of good body mechanics, and a checklist for proper wheelchair positioning. A summary of an article by Irene McEwen and Lyle Lloyd on *Positioning Students with Cerebral Palsy to Use Augmentative and Alternative Communication* is also provided. Though the article specifically addresses augmentative communication and cerebral palsy, the guidelines can assist in other areas and across broader audiences.

The second continuum is for mobility technologies. The following text points out that a classroom is not a static situation and education takes place outside the classroom walls as well.

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Positioning and Seating

Standard seat at correct height and depth

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Nonslip surface on standard seat to prevent slipping (e.g., Dycem®)

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Bolster, rolled towel, blocks to assist in positioning

↓

Adapted/alternate chair, sidelyer, stander

↓

Custom fitted wheelchair or insert

Assistive Technology for Positioning and Seating

Seat Location

For a student with physical issues it is important to consider a seat placement with clear pathways to key areas they need to access such as exits, story pits, or shelves with frequently used classroom materials.

For students with attention or visual processing issues consider seating that offers the best vantage point to see teaching areas like the board or word wall. Watch for clear sight lines to boards or wall references. Keep clutter on the board and walls to a minimum. Items hanging from the ceiling can be difficult for a student to filter out. Use color or boarders to highlight key visual areas. Be aware of visual field cuts and position the student to minimize their effect. Talk with your OT or vision specialist for more specific ideas.

Workstation
A workstation consists of many components. You must consider all to achieve an optimal workstation. The individual's position relative to the workstation and the task is the first key component. Traditionally, seating guidelines have focused on the following:

An individual properly positioned to actively participate in a task such as writing or using a device, has the following characteristics:

- Feet resting on the floor - ankles dorsiflexed to 90 degrees
- Knees flexed 90 degrees
- Hips flexed 90 degrees
- Hips well back in chair
- Both arms resting comfortably on desk without causing shoulders to shrug

Some seating and positioning experts are now questioning that approach. New studies have found that active learning positions vary from this by bending the knee slightly from 90 degrees with the feet on the floor, bending the trunk slightly forward at the hips and holding the elbows slightly more than 90 degrees. This position is similar to the one we assume before rising out of a chair without actually getting up and offers a more dynamic support structure for the upper body, arms, and hands while engaged in activities at a desk.

Karen Kangas (2003) states, "Seating for anyone, cannot be a singular posture, and any singular posture without any inherent mobility within that system, cannot assist an individual in becoming independent in any task". One seating solution is not adequate because students cross environments within and outside the primary classroom. Multiple seating and positioning options must be identified, each providing a dynamic situation that allows the student to progress toward independence.

A second component is the relationship of the chair to the work surface where the task is to be performed. Desk and chair heights are an area that can be easily overlooked. You must adjust the chair and table height as needed to obtain proper positioning. A chair that is too high will cause the feet and legs to dangle from the seat of the chair or the child to slide forward with back rounded. A chair that is too low will also cause the child to sit in a position that will interfere with optimal use of the arms and attending.

Chair and table height adjustments are not just for students with motor impairments. All activity workstations should be reviewed for the students expected to work at them. Computer labs are a good example, especially at the elementary level. These students range in age and size making it hard to set chair and desk heights that fit that range. Adjustable seating and tables can decrease position injuries and make computer activities a lot more comfortable for everyone. Ergonomic support such as wrist pads, smaller keyboards for young hands and angled footrests also add support. Monitors should be positioned at eye level or slightly below. When a monitor is too high students may have to throw their heads back to an uncomfortable position so the eye can look up to the screen.

If you cannot adequately adjust the chair and table height (or obtain a different table or chair), consider the following low tech positioning devices:

- Bolster, pillow, rolled towels;
- *Dycem*® on the chair so child doesn't slip forward; and
- Supports such as phone book(s) under child's feet.

In addition, for students with fatigue issues you may want to find alternate work environments within the school day that allow the body to rest and yet still participate in classroom activities such as a beanbag or bolster chair for silent reading activities. For students that have difficulty attending, sitting on a therapy ball or bouncy cushion can increase attention level for some deskwork activities. Consult your OT or PT for students that have additional specialized seating and positioning requirements.

Angled writing surfaces can compensate for low tone, abnormal reflexes or poor grip patterns. The wrist, when bent back into greater extension, can use tendon positions (called tenodesis) to assist or strengthen the grip while holding a writing tool. Writing on a wall mounted chalkboard or whiteboard or on slant boards or by turning a three ring binder sideways can achieve this affect.

Some new studies are suggesting that an angled writing surface may help students with copying tasks. The eyes move from a vertical to the horizontal writing surface during copying tasks. For some, the visual information gets lost in the transition greatly slowing the information transfer. By angling the writing surface the eyes stayed on the same plane and the copying was done faster and with greater accuracy.

Accessing Materials

Position students so they can easily obtain materials. Desk organizers like a *Desk-a-Doo* or clip on holders for pencils can keep writing and fine motor tools ready and easily accessible. Easy in and out storage folders can be strapped to the desk or chair to keep homework and notes home in one area. Nearby storage surfaces that can hold adapted equipment such as angle boards may also be helpful.

Larger equipment or assistive technology devices such as an augmentative communication device or laptop computer can be positioned on a wheelchair or table by:

- Securing it to the lap tray or other work surface with Velcro™ or other temporary holding material until the optimum location is determined
- Permanently fastening it to a lap tray or table
- Purchasing a mounting system specifically designed to mount the device on a wheelchair (See AbleNet, Inc. for options)

Remember that a device should be positioned within an individual's optimum physical and visual range. Placing a device on a slant board may facilitate positioning.

Summary of: ***Positioning Students with Cerebral Palsy to Use Augmentative and Alternative Communication***

McEwen & Lloyd (1990) describe the importance of proper positioning for students to successfully use a communication device. They cite research that concludes this importance such as the work by Hardy (1983) and state, "a child's ability to control AAC devices may be totally dependent on adequate positioning" (McEwen & Lloyd, 1990, p. 15). The premise they base their article on is that seating and positioning is the domain of physical and occupational therapists, physicians, rehabilitation engineers, and equipment vendors but it is necessary for everyone on a child's team to know enough about positioning and seating "to recognize when it is not optimal and know how to make simple adjustments and recommendations" (McEwen & Lloyd, 1990, p. 15)

The authors note that it is rare that an individual has only one form of communication thus seating and positioning must be considered for all forms. Individuals who effectively use eye pointing or a gestural "yes" and "no" system in addition to a communication device need to be positioned optimally for each of these modes. When in a prone stander or in a side lying position, communication must be considered as well. When properly positioned, the head and arms are freer and muscle tone is greatly relaxed to allow the individual to do more than maintain a position.

An upright position is generally the primary desired position for communication as well as other functional activities. Several researchers have found the upright position to "aid in maximizing cognitive abilities, motor skills, and improving the variety of life experiences." (McEwen & Lloyd, 1990, p. 16) The use of a wheelchair also adds functional mobility.

McEwen & Lloyd (1990) provide guidelines for achieving optimal seating and positioning. The first and most fundamental rule is for the control of the hips and pelvis. The bottom must be positioned in the back of the chair with the hips flexed at a 90 degree angle. The pelvis should be neutral or slightly bent forward. The chair should provide a firm and stable seat. The position should not promote internal hip rotation. Persons with skeletal deformities may need to have the chair specially designed to achieve the best hip and pelvis placement.

To achieve optimal positioning of the hips and pelvis, the angle of the seat and back of the chair in relationship to the floor must be considered. The seat should be parallel to the floor and at an angle of 90 degrees from the seat back. They point out that tipped seats and reclined backs result in decreased performance. Once the hips and pelvis are properly positioned, blocks, towels, and other soft objects can be place around the hips and pelvis to support the position and help the individual maintain the position over time. Legs should be slightly apart to provide a better base of support. An abductor block can be placed between the legs if necessary. A seatbelt low across the hips helps secure the position. It is imperative that the student be carefully positioned in the chair each and every time.

A second basic rule that McEwen and Lloyd (1990) posit suggests the placement of the knees and ankles at 90 degrees of flexion to the chair and floor. Less than 90 degrees of knee flexion can contribute to extension and thrusting. An inappropriately placed footrest can contribute to poor pelvic tilt.

The third rule applies to head placement. McEwen and Lloyd (1990) note that "head position influences vision, breathing, listening, vocalization, feeding, and attention" (p. 18) and can also influence reflexes that can impact hand and arm use. It is important to consider head placement before trunk placement because of the head's importance to overall functioning.

Once the most neutral head position is achieved, adaptations for the trunk can be determined. Head supports have to be evaluated to determine their effect. Neck collars and occipital supports can provide the necessary support to maintain the best head position. Some head supports or restraints force the head forward, moving it from an optimal position to one that limits vision and function. Other head supports impair lateral and posterior vision simply because they are in the way.

After hip, pelvis, and head positions are optimized, the trunk must be considered. Typically a straight, firm, padded chair back is best however students with severe physical deformities may require more support of their trunk in order to maintain proper positioning of other body parts. Attempting to correct a deformity through trunk supports will only cause reduced function in other areas. Whatever final supports are needed, it should allow the student to perform a function without requiring mental effort to maintain the desired position.

The final rules apply to arm position and the use of a tray. Individuals with cerebral palsy often have arm flexion and abduction with shoulder retraction that makes it difficult to bring their hands forward and together. To successfully use their hands, they must lean forward and their chair must be designed to facilitate this position. Through the use of humeral blocks, tray dowels to grip, and wrist weights, a more functional position may be acquired. The height of the tray is also important. If it is too low it may result in additional head and neck flexion and items on the tray may not be within reach. If it is too high the student may not be able to see what is placed on the tray and it may inhibit arm use. A tray a bit higher than normal desk height has been found to be successful for many as it encourages trunk extension and arm elevation while inhibiting other flexor patterns. The best way to determine the right height is to try it out.

With the body in a good position and amply supported to allow optimal function, the placement of a communication device or switch that will control the device must be considered. Improper placement can void all of the work already done to achieve the optimal body position. Again, experimentation is the best way to determine appropriate placement. Generally you should consider abnormal patterns of movement so that they are not inadvertently “triggered” during positioning. Switch placement that requires the head to remain upright and in a neutral position are preferable to those that allow too much head movement or those which might trigger an extension reflex.

In summary, positioning and seating are critical to the successful use of an AAC device. Considering placement and support starting with the hips and pelvis, then the head, trunk, and arms is imperative to achieve the best position. Tray height for the individual and task are crucial, as well.

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Mobility

Walker

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Grab bars and rails

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Manual wheelchair

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Powered mobility toy (e.g., GoBot)

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Powered scooter or cart

↓

Powered wheelchair w/joystick or other control

↓

Adapted vehicle for driving

Assistive Technology for Mobility

Classrooms are not static. Students need to move in, around or between them throughout the school day. For students with mobility issues, moving around can add some additional challenges. Problems with mobility tend to fall into two categories visual and/or motor problems. Key areas to look at are school building accessibility, movements within the classroom, moving around a building, grounds and community and safe transport to and from the school or school events.

School Accessibility
The Americans with Disabilities Act (ADA) has encouraged many schools to address accessibility. Room numbers in Braille, ramps on the side walk, wheelchair friendly thresholds and elevators to reach upper levels are now in place at many schools so that all children can participate in rooms that were once not accessible to them. For more information on ADA access requirements go to their "web page".

Movement in the classroom
Envision a typical classroom. How are the desks arranged? Where are the key materials located? How many items are strewn on the floor? How wide is the space between desks? Are there clear pathways? Would you be able to negotiate the room with your eyes shut or roll through it in a wheelchair without getting hung up?

When a student with physical or visual issues arrives in the classroom it is critical to create an environment that accommodates their movement issues. When the issue is physical, what kind of equipment will the student be using to get around the room? They will need to move from desk to story pit to teacher small group tables. Are there pathways to these key areas that are clear and large enough to accommodate a walker or wheel chair as it goes past? Will they need to transfer to and from a desk? Do they need rest breaks from the chair? Do they need varied seating for different school tasks? Is their workspace high enough to allow the wheel chair to wheel underneath the table? Working with the schools the OT or PT can help to address these issues.

For a student with a visual impairment, many of the same questions may be asked. The student may use a cane to help them negotiate around the many potential obstacles in the classroom. Key tools like reference materials, desks or the pencil sharpener may need to stay in the same location. Create materials, signs, and labels in a larger font or in contrasting colors that make them easier to see and read. They also may need to be in accessible formats such as audio or Braille. Students may need to be seated within the classroom where glare from windows and lighting are not an issue while working on a computer or retrieving information from a white board. Materials on the floor that may not be "seen" and could trip the student. Working with the vision specialist can help address specific issues.

Moving around the building and/or community
Students with visual impairments will often work with an orientation and mobility (O and M) instructor when they begin to travel around the building and out in the community. These instructors may be able to offer some helpful tips to use. Students may be working with tactile or auditory maps or compasses as they learn to find their way. Electronic location systems, like GPS, can also help a student pinpoint where they are and locate a specific destination.

Efficiency of movement between locations, access to play ground equipment or some school locations and fatigue are key factors for students with physical issues. Students may be fitted with orthotics or

braces that help stabilize and/or position the body as it moves. A therapist or doctor usually fits these. Bunched socks or a growth spurt can cause skin to breakdown so service providers should attend to complaints of pain or discomfort. They should also alert family, caregivers and medical staff about reports of pain so that adjustments can be made, as needed. Students may also use a walker or crutches. Allowing extra time for these students to move between classes or locations if needed. Lots of walking with braces or crutches can result in fatigue and make it difficult for the student to keep pace with peers. Using alternate transport such as wagons, tricycles or sleds to go out to the playground or on field trips can help decrease fatigue and make the trip much more enjoyable.

For students who have difficulty standing on their own, a variety of wheeled vehicles, such as manual wheelchairs and strollers, may offer them increased movement opportunities around the school. For those students who can control where they go by steering or switch controls, a scooter or powered wheelchair can offer increased freedom. Special seating systems can be fitted by a therapist or doctor to help position a child for maximum function. Powered mobility toys such as the GoBot can be used to learn how to handle movement or to use the steering system they will be using on a wheelchair.

Transportation

Students may ride a bus to school and use their wheelchair or a specialized seating system to maintain upright posture or safe positions while being transported on the bus. ADA and your state Department of Public Instruction should offer guidelines for safe transport of special needs students.

Products Mentioned in Chapter 7

Product	**Vendor**
Desk-a-Doo	Walker Enterprises
Dycem®	Sammons Preston Rolyan
GoBot	Innovative Products Inc.
Velcro™	Available locally

Assistive Technology for Vision and Hearing

Penny R. Reed, Ph.D.

This chapter provides a very brief overview of assistive technology for students with sensory impairments. We have not attempted to cover this in depth, but have included resources and references to other places where you can get additional information. It begins with a continuum of assistive technology for students with vision impairments. Assistive technology for individuals who are totally blind are near the end of the continuum as they typically use more "high" technology devices.

The first part of this chapter is a brief overview of AT for students with vision impairments. In it we tried to give you a general idea of the three main ways that print materials can be made accessible to students with vision impairments: magnification, speech output, and Braille.

Next in this chapter is an assessment tool developed by the Minnesota State Assistive Technology Workgroup for Blind and Visually Impaired. They have incorporated the WATI process into a document that considers the unique needs of students with vision impairments.

The second half of this chapter is about assistive technology for individuals with hearing impairments. It includes a continuum of assistive technology and two fact sheets developed by the Assistive Technology and Hearing Impairment Task Force of the Wisconsin Department of Public Instruction.

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Vision

Eyeglasses

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Magnifier

↓

Large print books

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CCTV (closed circuit television)

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Screen magnification software

↓

Screen color contrast

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Screen reader, Text reader

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Braille materials

↓

Braille translation software

↓

Enlarged or Braille/tactile labels for keyboard

↓

Alternate keyboard with enlarged keys

↓

Braille keyboard and note taker

Assistive Technology for Students with Vision Impairments

Two of the major problems for students with vision impairments are accessing print materials and moving about safely in their environments (orientation and mobility). This chapter will address accessing print materials. There are three primary ways to utilize assistive technology to make print materials more accessible to students with vision impairments. They are magnification, speech output and Braille.

Magnification

Magnification is used to enlarge an image to a sufficient size to allow the student to receive and process the information. The amount of vision loss determines the degree of magnification needed. Some students may be able to read print using a larger monitor, which provides larger text or graphics while keeping all material on the screen. Many properties of onscreen images can be changed for students with less vision loss using built-in features of a computer's operating system. In *Windows 95, 98, 2000*, and XP, the Mouse Properties icon in the Control Panel allows the user to enlarge the size and shape of the mouse pointer, change its color, slow it down, and locate the pointer using a "sonar" function. When the control key is pressed, a shrinking circle appears around the pointer. It is also possible to activate a comet-like trail for the mouse pointer and slow down the speed of its movements over icons, buttons, and other controls. In the Accessibility Options found in the Control Panel, there is a High Contrast option that provides preset colors and fonts for easy reading and inverts the video to white letters on a black background or various other combinations. There is also a ToggleKeys option, which enables users to hear tones when the Caps Lock, Num Lock, or Scroll Lock keys are pressed. Comparable features are built-in to the Macintosh operating system as well.

If magnification is needed, there are three types of magnification: relative-size, relative-distance and angular.

- **Relative-size magnification**-involves making the material larger while maintaining the same working distance. Examples include using a large print book, a larger monitor, enlargement software (e.g. *ZoomText® 8.0, MAGic, InLARGE*), or hardware. Many of the software and hardware options will allow magnification levels up to 16 times the original size or more and also have the ability to adjust the colors for contrast, or to switch the image to a "negative" image (e.g. yellow print on a black background). Some of the new large screen monitors can magnify print up to 65 times. A limitation of screen magnification programs in general is that as the on screen material is magnified, less of it fits on the screen.
- **Relative-distance magnification-**involves maintaining the original size of the material but moving it closer to the student. A hand held magnifying glass and paper held close to the face, or a monitor mounted on a swing arm are examples of relative-distance magnification.
- **Angular magnification-**involves using a lens to enlarge the material. The level of magnification will depend upon the power of the lens or lens system.

Simple enlargement of print materials may be achieved by using a copier. If that is not sufficient, the material may need to be enlarged using more high tech options. When the student is learning to keyboard, large labels on the computer keys can help. *ZoomCaps* is a set of large key labels available from Don Johnston Incorporated.

Another way to enlarge print is with a closed circuit television (CCTV). This consists of a television style monitor with a camera. When a book or magazine is placed under the camera, the print is magnified up to 60 times on the monitor. There are portable CCTV's with a hand-held camera and a four inch monitor. These typically will only magnify print up to 12 or 13 times; however, they are very useful for their portability. These devices can be taken from classroom to classroom or outside of the school to work sites or field trips. In some models, the hand held camera portion can be transported and then hooked up to any television. The size of the magnification will vary dependent upon the size of the television. Some CCTVs use split screens so that you can look at a printed page on the same monitor that is being used for a computer system.

Speech Output

Another way to help the child with vision impairment gain access to print materials is to type the material into a computer with speech output. Speech output comes in two types: synthesized and digitized. Synthesized speech is generated by the computer using a complex set of rules. Systems with fewer rules sound more robotic than those with more rules. Near human-quality speech can often be achieved. Digitized speech is recorded speech, much like a tape recorder. The quality of the speech is dependent on the recording and playback conditions.

For many years Macintosh computers have come with built in sound and synthesized speech capability. PCs require add-on sound systems, although they are frequently bundled with the computer system now. Speech output capabilities may come with a sound card but software must be written to utilize those capabilities. The newest Microsoft Corporation Operating System, *Windows XP*, has some speech output capabilities built in like the Macintosh.

For a person with low vision or blindness, it is desirable to have a screen reading program. A screen reading program is software that works with the speech synthesizer to allow a person to "hear" what is on different parts of the screen. For instance, depending on which keys are activated on the keyboard, the user could choose to hear the current word or sentence, or the preceding, current, or next paragraph. Some screen reading programs can also "read" the icons, menus, and scroll bars on the screen. Some screen reading programs have special keypads. The only screen reading program for the Macintosh is *OutSpoken*, by ALVA Access Group, Inc. Some screen reading programs for PCs include *JAWS*®, *OutSpoken for Windows*, and *Window-Eyes*.

Screen reading programs can identify and read text and graphics, identify and announce the function of Windows, buttons, menus, and dialog boxes, identify graphics, and serve as a mouse or pointing device. In selecting a screen reading program it is important to identify the unique features that the user needs and find a program that best matches those needs. Information and assistance can be obtained from the American Foundation for the Blind's National Technology Program at 212/502-7642 or email: techctr@afb.net.

Speech output can also be obtained from talking word processing software. However, talking word processing software reads **only** the text within the word processing program. You can input text into that program by typing it in, importing it from another program, or scanning it and then importing it into the talking word processing program. Talking word processing programs also offer other helpful features such as feedback from each key press and the ability to choose different color backgrounds and text. However, if the student has very limited vision or is totally blind, they will not be independent until they have a screen reading program that provides access to the whole screen, menus included.

A very portable device is the *Road Runner* (Ostrich Software). The *Road Runner* is a tiny electronic text reading devices that will let a person take reading material anywhere. It can read any text based file: email, Internet, online newsletters, web pages, books, and any other scanned text. It stores up to 2000 pages of text and weighs only four ounces with two AA alkaline batteries installed. The batteries will run it for 40 hours or more of continuous reading. The *Road Runner* connects to a standard 9 pin PC serial port with a cable (provided). It has no speaker, but comes with a jack for headphones. (Ostrich Software)

- **Scanning** In order to create electronic text from print material, you need a scanner and Optical Character Recognition (OCR) software. A scanner uses the same technology found in FAX or copy machines to feed the printed letters into the computer where they are recognized with the OCR program. It is the OCR software that labels the marks on the page and allows the computer to recognize them as text. As with all electronic text, they can then be enlarged, spoken, or turned into refreshable Braille display. Three software OCR products specifically for blind individuals are Lernout & Hauspie's *Kurzweil Educational Systems, Inc. 1000*, Arkenstone's *Open Book*, and TeleSensory Corporation *Reading AdvantEdge 2.2*. There are also several other good OCR programs that are not designed specifically for blind users. OCR software is often included with the scanner's software.

Braille

Braille continues to be the most versatile, complete way to read for the person who is totally blind. Many blind students use small hand-held Braille note takers. These have a Braille keyboard and speech output. *Braille N Speak 2000* and the *Braille Lite 2000* are two such devices. In addition to speech output, a computer can send text out in embossed (hard copy) or refreshable Braille. A refreshable Braille display attaches to a computer and shows up to one computer line at a time in Braille. As the user moves around the computer screen, tiny pins on the display raise and lower to form the Braille character of each computer screen character. Some Braille displays are *Braille Window*, *ALVA*, and several in the *Braillex*® line from Papenmeier.

A standard computer keyboard can be configured to emulate a *Perkins Braille* keyboard to allow the user to type using the Braille format. Braille can also be produced with a printer. The speed of Braille printers varies from 40 characters per second to 400 characters per second, depending on the printer. Some Braille printers are: Enabling Technology's *Juliet* or *Romeo*, TeleSensory Corporation *VersaPoint.* The *Braille-n-Print Slimline* from HumanWare, Inc, produces both a Braille and print copy.

Successful Strategies for Working with Students with Vision Impairments

For successful integration of students with visual impairments into a general education classroom, the learning environment should:

- Welcome all students
- Appeal to all senses (multisensory) in its approach to curriculum
- Be open to investigation
- Provide flexibility for lighting changes and/or size of work area changes
- Be hazard free
- Provide easy access to vision supplies
- Provide sensory clues for orientation to surroundings
- Allow freedom of movement within the classroom or work area for viewing materials at close range

Classroom materials should be adapted to meet the needs of the student with vision impairment, including classroom assessments and standardized testing. The Vision program when necessary will provide Braille and/or large print texts. In addition, the classroom materials can:

- Be adapted by the vision teacher when given to him or her in a timely manner
- Be more effective if a desk-top copy is provided of material presented on the board
- Be more easily understood if worksheets are uncluttered and adapted with clear, dark outlines and symbols

Instructional strategies should:

- Include verbal descriptions of visual activities
- Include verbalization of routines for ease of transition
- Allow for physical prompts (e.g. hand-over hand) with the student's consent
- Be multisensory in approach
- Pair classmates or small groups when appropriate as an option for completing tasks
- Allow adequate or extra time to complete assignments and or examinations
- Allow brief periods of rest during activities that require extensive use of visual skills
- Include the use of actual experiences and real objects to introduce new concepts
- Allow flexibility for the vision teacher to observe or participate within the classroom

Access to textbooks can include:

- Magnifiers with regular or large print
- Special lighting (lamps, seat placement, etc.)
- Large print
- Reading stand

- Closed circuit TVs (CCTV)
- Taped materials reader
- Scanner with optical character recognition
- Braille
- Tactual maps and diagrams
- Line markers/tachistoscopes
- Colored acetate overlays

Written work and assignments can be accomplished with such aids as:

- Paper: bold lined, tactual lined, or Braille paper
- Markers: fine line, bold line, etc.
- CCTV
- Braille writer
- Tape recorder
- Cubarithms, abacus for math calculation
- Talking calculators
- Tachistoscopes
- Tactual rulers, voice output measuring devices, talking watches and clocks
- Manipulatives such as counters or MathLine
- Computer with voice output and enlargement software
- Templates and writing grids

Board work, projected presentations and group programs can be accessed through:

- Monocular aids
- Preferential seating
- Desk top copies
- Oral presentation/interpretation

Demonstrations can be assisted through the use of:

- Hands on activities
- Real objects
- Monocular aids
- Magnifiers
- Closed circuit TVs

Note: This was adapted from an unknown source. Our appreciation to the original writer.

Notes:

MATCH

Minnesota Assistive Technology for CHildren:

Planning Guide for Blind/Visually Impaired

A compilation of materials from:

Penny Reed, Wisconsin Assistive Technology Initiative
Intermediate District #287, Plymouth, MN
MN Regions I&II Assistive Technology Committee
MN State Assistive Technology Workgroup for
Blind/Visually Impaired.

Spring 1999

The Minnesota State Assistive Technology Work Group for Blind/Visually Impaired was established by the Minnesota Resource Center for the Blind/Visually Impaired for the purpose of making assistive technology issues and solutions consistent and available to professionals in the field of blind/visually impaired across the state. The 1998-1999 committee representatives included:

Loralee Bailey	Intermediate District 287
Karen Berger	St Paul Schools
Diane Dohnalik	Anoka-Hennepin
Carol Earle	Austin
Jane Hofkamp	Meeker & Wright Special Education
Barb thotka	Cooperative
Jean Martin, Director	MN Resource Center for the Blind/Visually
Steve Wasserman	Impaired
Intermediate District 917	MN State Academy for the Blind

The MATCH Process

I. Gathering Information/Problem Identification
   - A. Parent/Teacher Concerns (10 min)
   - B. Student Information (10 min)
   - C. Environmental Considerations (5-10 min)
   - D. Task Considerations (10-15 min)

II. Worksheet for Generating Solutions
   - A. Worksheet Facilitation Guide (Optional)
   - B. Brainstorm Alternative Means Of Access (5-10 min)

III. Solution Selection/Discussion
   - A. Summarize Brainstorming (10 min)
   - B. Prioritize Needs (15 min)
   - C. Pros-Cons Of Considerations/Solutions (25 min)

IV. Implementation Plan
   - A. Roles And Responsibilities (10 min)
   - B. Trial Information (10 min)

V. Follow-Up Plan
   - A. Evaluation Of Implementation Plan (20 min)
   - B. Notes For Future Needs/Planning (10 min)
   - C. Extended Assessment (On-going Option)

Materials Needed:

To create a "group memory" of the above process, the team will need large sheets of paper or laminated recording sheets, markers, and tape.

Note:

**In accordance with IDEA 97, all assistive technology resource and service considerations and solutions should be documented in the IEP.

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP,. (IDEA *97)*

SECTION I:
GATHERING INFORMATION/PROBLEM IDENTIFICATION

PURPOSE: To gather information from all team members.

DIRECTONS: All team members should receive a copy of Section I-A for review prior to the planning meeting. A group memory of thoughts and ideas will be created at the planning meeting on large paper or laminated recording sheets for all to see.

TIME: 10 minutes to share ideas and thoughts.

Section I, Part A: Parent/Teacher Concerns:

- What are your child's/student's interests?
- What motivates your child/student?
- Are there activities at school in which you feel your child/student needs to increase his/her participation or independence?
- Is your child/student experiencing any problems at school or expressing any frustrations?
- How could assistive technology enhance your child's/student's learning, participation and/or independence?
- Does your child/student use any assistive devices at school?
- Describe your child's/student's feeling about using these devices at school.
- Do you feel the devices are meeting his/her needs?
- Does your child/student use any assistive devices at home?
- Do you feel the devices are meeting his/her needs?
- Other thoughts/ideas:

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97)*

SECTION I:
GATHERING INFORMATION/PROBLEM IDENTIFICATION

PURPOSE: To gather information concerning the student's current use of assistive technology.

DIRECTIONS: The team should check (~/) all items that apply in each area.

TIME: 10 minutes to review and check.

Section I, Part B: Student Information

Recording data/information

____ Regular keyboard/input pad
____ Adapted regular keyboard/input pad
____ Braille keyboard
____ Voice input
____ Power pad/touch screen
____ ADL switch

Accessing data/information

____ Adapted play or vision stimulation materials
____ Regular screen
____ monitor
____ Enlarged print on screen
____ Voice synthesizer
____ Refreshable Braille display

Producing data/information

____ Regular print (for classroom teachers)
____ Large print (for student use)
____ Braille (for student who is a Braille reader)
____ Speech

Reading modes (How does student currently access written materials?

____ Reader _____ Non-reader ____ Pre-reader

Primary reading mode:

_____Braille
_____large print
_____regular print
_____regular print with CCIV or magnifier
_____auditory

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP,. (IDEA *97)*

Section I, Part B: Student Information (cont'd.)

Other reading modes:

_____Braille
_____large print
_____regular print
_____regular print with CCTV or magnifier
_____auditory

_____ Reading comprehension commensurate with grade level peers? If not, describe discrepancy (either higher or lower than peers) and criteria used to determine.

Reading Speed(s) _____ Mode: _____
Reading Speed(s) _____ Mode: _____
Reading Speed(s) _____ Mode: _____

Writing modes

_____ Handwriting
_____Legible by student? _____ by classroom teachers? Distance from paper when writing: _____
_____ Braille
readable/legible by student? _____ by teacher for the B/VI
If no, describe
_____ Keyboarding
Style of keyboarding:
_____ hunt and peck _____ touch typing _____ one-handed
Speed:_____wpm Accuracy:
_____ Verbal
_____Dictation _____ Tape recordings

Writing speed(s) _____ Mode _____
Writing speed(s) _____ Mode _____
Writing speed(s) _____ Mode _____

Previous Assistive Technology Experience:

_____ Computer instruction in school (including classroom and special education). Give details:

_____ Home learning, give details:

Other:

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97)*

SECTION I:
GATHERING INFORMATION/PROBLEM IDENTIFICATION

PURPOSE: To gather information concerning the student's environment.

DIRECTIONS: The team should check (✓) all items that apply in each area

TIME: **5-10** minutes to review and check.

Section I, Part C: Environmental Considerations

Site(s) of student activities

____ Daycare
____ Home
____ Preschool classroom
____ School—single classroom
____ School—multiple classrooms
____ Community-based
____ Work site
____ Other:

Impact on student's education

____ Required to complete assignments in multiple locations within the school building.
____ Required to start an assignment at one location and finish it at another location. Specify:
____ Uses/needs easily portable writing tool. Specify:
____ Participates in community-based vocational activity requiring written communication.
____ Participates in community-based recreational activities requiring written communication.
____ Other:

SECTION I: GATHERING INFORMATION/PROBLEM IDENTIFICATION

PURPOSE: To gather information concerning the student's schedule and tasks for the one year duration of the IEP.

DIRECTIONS: The team should include the student's schedule and check (✓) all task items that apply.

TIME: 10-15 Minutes to review and check

← **Schedule of Classes**							
Accessing community resources							
Art projects							
Assignment logs, daily calendar							
Basic concept development							
Calculating (scientific, graphing, etc)							
Computer applications (specify)							
Daily written class work/assignments							
Developmental play							
Drafting projects							
Filling in pre-printed materials							
Fixation and visual following							
Homework							
Industrial arts projects							
Internet access							
Keyboarding							
Lab experiments-chemistry, sewing							
Leisure (Independent or not)							
Mathematics							
Measuring/weighing (vol., lbs., temp.)							
Money identification, use, budget							
Music: reading, composing, playing							
Notetaking (personal or classroom)							
Oral communications, presentations							
Proofreading and editing							
Reading printed graphics							
Reading printed text							
Social interaction							
Term papers, journals, projects							
Turn taking							
Using dictionary, encyclopedia, etc							
Visual stimulation activities							
Work Experience							

Note: All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97*

Note:

All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97)*

SECTION II:
WORKSHEET FOR GENERATING SOLUTIONS

PURPOSE: To brainstorm alternative means for the student to increase accessibility within the environment(s). No final decisions.

DIRECTIONS: The team may need some starter ideas for brainstorming by checking (✓) all items that apply in each area.

TIME: **5-10** minutes of brainstorming. (optional guide)

Section II, Part A: Worksheet Facilitation Guide

Accessing information.

____ Regular print media.
____ Other normal classroom materials. Which?
____ Library materials including reference materials.
____ Community resources and publications.
____ Developmental/play materials.
____ Other.

Needs or use alternative means to produce readable written work for:

____ Self-produced handwritten or printed work.
____ Proofreading all self-produced handwritten printed work.
____ A classroom teacher to read.
____ Handwritten assignments.
____ Assignments.
____ The final copy of written work.
____ Messages for sighted people.
____ Grades or teacher comments on returned assignments.

Needs or uses alternative means for speed because:

____ Handwriting speed is slower than peers.
____ Unable to read and write in cursive at same rate as peers.
____ Requires more time to copy from text or board than peers.
____ Requires more time to read class assignments than peers.
____ Is unable to use regular answer sheets (e.g., computerized, blanks)
____ Is much slower than peers in completing answer sheets.
____ Spends significantly more time doing homework than peers.
____ Produces assignments in two or more modes.
____ Dictates assignments rather than writing them.
____ Assignments must be inter-lined.
____ Self-produced notes need to be transcribed into a different format.

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97)*

Section II, Part A: Worksheet Facilitation Guide (cont'd.)

Needs or uses alternative means for accuracy for:

____ Proofreading a final copy.
____ Editing written work.
____ Producing legible handwritten copies.
____ Copying accurately.
____ Lining up material in columns and rows, e.g., math problems.

Needs or uses alternative means to support physical or cognitive effort

____ To manipulate two or more reading and writing modes.
____ To transport more equipment and larger books than peers.
____ To make decisions regarding how to effectively complete assignments when using two or more modes in a timely manner.
____ When experiences significant fatigue when: _____
____ When producing two or more copies of the same assignment, one for self and one for teacher.
____ When needs more time to complete homework assignments.
____ When unable to shift gaze to copy off chalkboard, whiteboard or screen.
_____When expends more physical effort to complete written assignment than do peers.
____ When posture or position required for reading and writing results in significant discomfort and fatigue.
____ When the student has a second physical condition Which impedes access.
____ When student has difficulty seeing the value in use of alternatives.

Other:

Note: The information above is optional for use in conjunction with the brainstorming page that follows.

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97)*

SECTION II:
WORKSHEET FOR GENERATING SOLUTIONS

PURPOSE: To brainstorm alternative means for the student to increase accessibility within the environment(s). No final decisions.

DIRECTIONS: The team should brainstorm for each area of concern.

TIME: **5-10** minutes of brainstorming.

Section II, Part B: Brainstorm Alternative Means Of Access

Areas of Consideration	Specific Areas of Concern → Brainstorming Solutions
Accessing Information	
Readability of Written Work	
Speed	
Accuracy	
Physical or Cognitive Effort	
Other	

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97)*

SECTION III:
SOLUTION SELECTION/DISCUSSION

PURPOSE: To summarize and prioritize the information compiled thus far through the MATCH Process.

DIRECTIONS: Summarize the information, prioritize according to student need, and come to consensus on solutions with group memory.

TIME: 50 minutes.

Section III, Part A: Summarize Brainstorming

Summarize as concisely as possible the findings of the team:

Section III, Part B: Prioritize Student Needs

Identify the student's prioritized needs?

1.

2.

3.

Notes for future planning:

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97)*

Section III, Part C: Pros-Cons Of Considerations/Solutions

What types of assistive technology could address the prioritized needs?

Assistive Technology	Pros	Cons

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97)*

SECTION IV:
IMPLEMENTATION PLAN

PURPOSE: To determine roles, responsibility and process for carrying out recommendations of the team.

DIRECTIONS: Complete the planning grid.

TIME: **10** minutes.

Section IV, Part A: Roles and Responsibilities

Responsibility	What and Who	
What is the funding plan?		
Who will order the AT device?		
What is the availability and timeline to receive the device?		
What and who will train the student in the use of the AT?		
What is the funding plan for training?		
Who will set up, install, maintain, upgrade the device?		
Who will arrange for environmental considerations and solutions (space, etc.)?		
Who will provide follow-up service? Timeline?		
Will device(s) be used at home or any other setting?		
Who is responsible for replacement or device? Contract?		
Where is the serial number registered and who carries the insurance?		
How will the use of AT be measured in terms of meeting the student's needs?		
When will the plan be reviewed?		
Other:		

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97)*

SECTION IV:
IMPLEMENTATION PLAN

PURPOSE: To offer the team additional options in assessment over time and as the need arises.

DIRECTIONS: Complete this part only at a future time:

TIME: **10** minutes

Section IV, Part B: Trial Information

Customary environments where devices will be used:
Environment:
Tasks:
Person responsible for implementation:
Days to be used:
Times to be used:

Specific devices for trial:
Devices: Source for device trial:
Date of trial initiation: Minimum length of trial period:
Device trial review date:
Contact person for technical assistance for trial:
Manufacturer: Manufacturer technical assistance number:

Specific devices for trial:
Devices: Source for device trial:
Date of trial initiation: Minimum length of trial period:
Device trial review date:
Contact person for technical assistance for trial:
Manufacturer: Manufacturer technical assistance number:

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97)*

SECTION V:
FOLLOW-UP PLAN

PURPOSE: To determine current status and effectiveness of implementation plan at a later date.

DIRECTIONS: The team should discuss the issues/successes of the plan.

TIME: **20** minutes.

Section V, Part A: Evaluation Of Implementation Plan

- Review the implementation plan, has everything been implemented?
- Is the assistive technology utilized as stated in the implementation plan?
- Is the assistive technology being used to address the student's IEP goals and objectives? (explain)
- How has the student reacted to use of the assistive technology?
- How has the assistive technology functioned?
- Is staff comfortable or need training with the use of assistive technology?
- Does it appear, based on the student's functional use of assistive technology, that any additional adaptations to the assistive technology are needed?
- Are there any additional problems which may need to be addressed?
- Does the student need extended assessment in area of assistive technology?
- When will use of the assistive technology be reviewed again to identify effectiveness/functional limitations/problems?
- Other:

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97*)

SECTION V:
FOLLOW-UP PLAN

PURPOSE: To do a follow-up that will allow for planning future access.

DIRECTIONS: The team should discuss the issues and plan into the future.

TIME: **10** minutes.

Section V, Part B: Notes For Future Needs/Planning

Future Needs:	Grade Levels:	AT Options:

Note:
All assistive technology resource and service considerations and solutions should be documented in the IEP. (IDEA *97)*

SECTION V:
FOLLOW-UP PLAN

PURPOSE: To allow for assessment to continue as needed.

DIRECTIONS: The team should decide how extended assessment will be addressed.

TIME: To be determined.

Section V, Part C: Extended Assessment (On-Going Option)

Customary environments where devices will be used:
Environment:
Tasks:
Person responsible for implementation:
Days to be used:
Times to be used:

Specific devices for trial:
Devices: Source for device trial:
Date of trial initiation: Minimum length of trial period:
Device trial review date:
Contact person for technical assistance for trial:
Manufacturer: Manufacturer technical assistance number:

Specific devices for trial:
Devices: Source for device trial:
Date of trial initiation: Minimum length of trial period:
Device trial review date:
Contact person for technical assistance for trial:
Manufacturer: Manufacturer technical assistance number:

A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY

for Hearing

Pen and paper

↓

Computer/portable word processor

↓

TTY/TDD for phone access with or without relay

↓

Signaling device (e.g., flashing light, vibrating pager)

↓

Closed captioning

↓

Real time captioning

↓

Computer aided note taking

↓

Flash for alert signals on computer

↓

Phone amplifier

↓

Personal amplification system/Hearing aid

↓

FM or loop system

↓

Infrared system

ASSISTIVE TECHNOLOGY FOR INDIVIDUALS WHO ARE DEAF OR HARD OF HEARING

Penny Reed, Wisconsin Assistive Technology Initiative and
Christine Fuller, State Coordinator for Deafness, Deaf-blindness, LD & Transition, Arizona Department of Economic Security

Assistive technology for individuals who are deaf or hard of hearing fall into one of three categories: Telecommunications, Assisted Listening Devices (ALDs), and Alerting Devices. Persons with hearing impairments use amplified systems to assist with their hearing, however they also rely upon their vision and their sense of touch, particularly to vibrations to supplement their reduced hearing capabilities.

Hard of Hearing
The definition of a person who is hard of hearing is one whose hearing is impaired to an extent that makes hearing difficult, but whose impairment does not preclude the understanding of speech through the ear alone, with or without a hearing aid. The person's speech may or may not be affected by the hearing loss. Hearing aids and other amplification devices often significantly assist these individuals

Deaf
The definition of a person who is deaf is one whose hearing is impaired to the extent that precludes the understanding of speech through the ear alone, with or without the use of a hearing aid. The person's speech may or may not be affected by the hearing loss. An individual with this type of loss relies on visual modes rather than the auditory mode for communication. This individual will use various modes of manual communication (sign language, cued speech) and visual assistive devices. In addition to the use of vision, a person who is deaf may rely on his/her sense of touch and use devices with vibrating output.

Telecommunications
There are many devices included in this category.

- **Pen and Paper**-For the student who can write and read, this is still a tried and true method of communication.

- **Computer**-Depending on the ability of the student to keyboard, the computer can be used by individuals with hearing impairments with few adaptations. A Screen Flash is one adaptation for the computer that may be helpful. A screen flash is a substitute for the alert signals (e.g., error beep) on a computer that are typically different sounds.

- **Phone Amplifiers**-These can be low or high tech. Phone amplifiers can be built into the phone or they can be external and either clamp on or connect to the phone. The optimum phone amplification system is dependent upon the individual's hearing loss, hearing aids, and the time spent on the phone.

- **TDD (Telecommunications devices for the Deaf)-**Previously known as TTY (teletype machine). These are used by individuals who cannot hear on the phone to enable them to place a phone call. A TDD has a small keyboard with a screen that has text moving across it. The user types in what they

would like to communicate and through a series of tones the message is relayed to the TDD on the other end of the line. These machines can be basic (nothing but the keyboard, screen, and phone connection) or complex, with added printer, answering machine, and memory to record general greetings or even the complete text of the last conversation.

- **Relay Service-**The person who is deaf calls into the relay service using a TDD and gives the relay operator the number they would like to call. The relay operator dials the given number. When the phone is answered, using voice telephone equipment, the operator identifies him/herself and explains how to use the relay system. The operator then verbalizes all the text messages and types all spoken messages between the two callers. This process also works in reverse when the hearing person wants to contact the deaf person. This service is offered in each state. The service itself is free, but does not negate long distance charges.

- **Relay Service with Voice Over-**This option is for an individual with a hearing impaired who has a clear speaking voice but cannot hear on the phone. The job of the relay operator is to type what the hearing person says to the person who is deaf or hard of hearing so that the message to respond can be read on the TDD. The person who is hard of hearing can then use their voice.

- **Virtual Relay Interpreting (VRI) -**This is currently used when it is difficult to get an interpreter to a remote location. The situation can either be a meeting or a phone call to be interpreted. There needs to be two computers (Pentium 166Mhz or better) with large monitors, and equipped with cameras. Both systems need to be connected through analog phone lines and have 28.8 or better modems. The system enables the person who is deaf to sign to an interpreter at another location. This enables the person who is deaf to have a phone call interpreted or have a meeting at one location with the interpreter in another location. This system also enables 2 individuals who sign to communicate "face-to-face".

- **Closed Captioning-**The text of a TV show or video appears in print at the bottom of the TV screen. This system rarely shows up on live TV, other than the news. (News shows are pre-scripted.) Most TV shows are closed captioned. It is called closed captioning because the decoding function is optional to the user. This is currently included on most television shows. All TV's over 19 inches sold since 1993 must contain the chip that decodes the captioning signal. There is also a separate closed captioning decoder box that can be purchased and hooked up to smaller or older televisions. Open captioning, not an option to the user, is often done to training videos. An example of this is a foreign movie with subtitles.

- **CAN-Computer Aided Notetaking-**This is usually used in classroom and meeting situations. The system consists of 2 computers, usually laptops. A typist types a summary of the discussion while the meeting/class is occurring. Thus the person with the hearing loss can participate.

- **CART- Computer Aided Real Time Translation-**Most often used in classrooms, court or meetings. Court reporting equipment (portable chord keyboard, and special software) is connected to a lap top computer. The court reporter transcribes exactly what is said, word for word. The text shows up on the screen of the laptop for the person with the hearing impairment to read. A disc or hard copy of the proceedings may then be made available.

Assisted Listening Devices

Assisted Listening Devices are amplification systems that are designed to enable the person who is deaf or hard of hearing to participate in different situations through the awareness and/or recognition of sounds. The purpose of an ALD is to increase the signal input and reduce the background noise. There are several types of ALDS, personal amplification systems, FM systems, loop systems, and infrared systems. Personal preference plays a large roll in the choice and use of an ALD. The following are a list of ALDS.

- **Personal Amplification Systems-**These are often most helpful to individuals who are hard of hearing. They are most useful in one-to-one communication situations, car rides, and when watching TV. These are usually small like a walkman, with a microphone and a choice of headset. The basic unit is an amplifier that can be used with a hearing aid if it has the T-Coil.

- **Hearing Aids**-There are several types of hearing aids; behind-the-ear or in-the-ear are the most common. The new ones are electronically programmable, enabling the audiologist to set the amplification per frequency as determined by the hearing test. Hearing aids do not make sound clearer, just louder. Think of a hearing aid as the volume control of a radio. If the radio is not set exactly on the station there is static. When you turn up the volume it increases not only the desired signal (speech, music) but also the static. Most hearing aids come with the option of a T-Coil (telecoil). This coil is to amplify sound from electronic devices, such as telephones. If a person is hard of hearing and is dependent upon speech for communication, a Telecoil is a must. A hearing aid is an electronic device and sweat can ruin it. It is a good idea to purchase a dehumidifier for the hearing aid. These are pocket size and usually cost under $10.00.

- **FM Systems-**These are usually found in movie theaters, conference halls and classrooms. An FM system transmits sound using radio waves. The speaker wears a microphone and a transmitter (walkman size) while the listener uses a headset and receiver. Individuals who have a telecoil in their hearing aid can use this feature. FM signals are not limited to one room; the sound can go through the wall or the ceiling. If there are 2 different FM transmitters within an area, they need to be on different frequency channels.

- **Loop Systems-**The person must have a hearing aid with a telecoil to benefit from a loop system. A loop wire is placed under a carpet circling a specific listening area. The hearing impaired person must sit within the looped area. The speaker uses a special microphone and amplifier. The loop system picks up the speech and amplifies it within the telecoil of the hearing aid. These are easy to install and the sound is accessed only by those within the looped area and who are using a hearing aid with a telecoil. These systems are commonly found in theaters, conference rooms and classrooms.

- **Infrared Systems-**Infrared systems transmit sounds through invisible light beams. To work, the receiver must be in the direct line of sight of the transmitter. The sound stays within the room. The system cannot be used outside due to sunlight interference. Sometimes really bright incandescent light may interfere. These systems are commonly found in classrooms and conference centers.

- **Cochlear Implants**-Although the cochlear implant itself is medical because it requires surgery, the peripheral equipment and the training and maintenance may be considered assistive technology devices or services.

Alerting Devices
There are a variety of alerting devices that may utilize a visual or tactile signal or an amplified auditory signal to notify the student who is deaf or hard of hearing that something has happened or needs their attention.

- **Alert Signalers**-There are a variety of systems that can be positioned next to or connected to sound output devices, such as the phone, the doorbell, and the fire alarm. These devices amplify the existing auditory output to about 85 dB. Eighty-five decibels is equal to the sound of a gas lawn mower.

- **Door Knock Signaler**-This device hangs on the door and responds to either the vibration or the sound of the knock. The output is a flashing light. These are particularly useful in hotel rooms

- **Visual Signaling Devices-**Signaling devices are used to alert the person who is deaf or hard of hearing to various sounds. Those that provide visual cues use some form of blinking light; either a strobe, a light bulb, or a regular lamp. These devices connect a lamp with a sound output item to provide a visual cue. When the item makes noise the light flashes. The signaling device can hook up to a doorbell, telephone, smoke and fire alarms, carbon monoxide detectors or alarm clock. Some systems can hook-up to several devices. There is a system called "*Baby Crier Signaler*" that blinks when the baby cries. Almost any machine that uses noise for a signal can be fitted with a light system to indicate the need for attention.

- **Vibrating Alarm Clocks**-The clock has a separate plug in bed vibrator. When it is time for the alarm to ring, the bed vibrator shakes the whole bed. The vibrator itself is usually the size of a hockey puck and fits under the pillow. However, there are some that are 8 1/2” by 11” by 2”. The vibrators can be set to produce either a pulse or steady vibration. These clocks vary in size from the small travel size to the bedside clock with a large digital display.

- **Vibrating Watches**-Many watches beep to signal the hour or to remind the wearer of a meeting. There is a watch with a vibrating alarm and hourly alert options.

- **Vibrating Pagers**-These come with a variety of options. Some will just vibrate and give the phone number to call. Others vibrate and offer an alphanumeric window on which the caller can leave a detailed message. Some pagers use the Internet to send the message and others use a special keyboard, back at the office, to send the message.

Assistive Technology Fact Sheet #1:
Assistive Technology for Children with Hearing Impairments
May, 2000

Developed by the Department of Public Instruction in collaboration with
The Wisconsin Assistive Technology Initiative

1. What is assistive technology? Assistive technology (AT) is any item, piece of equipment, or product system whether acquired commercially off the shelf, modified, or customized that is used to increase, maintain, or improve the functional capabilities of a child with a disability.

2. What are some examples of assistive technology appropriate for students with hearing impairment? Assistive technology for a child with a hearing loss may be used to either supplement or replace the auditory event depending upon the needs of the child. Assistive technology for a child with a hearing loss falls into three categories: Telecommunications equipment and peripherals, Assistive listening devices, and Alerting devices. Telecommunications equipment includes such things as amplified telephones, closed captioning, and TDDs. Assistive listening devices include FM Systems and other classroom amplification devices designed to improve the auditory reception of speech information, which are further explained in Assistive Technology Fact Sheet #2. Alerting devices are devices that let the person know something is happening in his or her environment. They may provide a visual cue, amplify sound, or vibrate.

3. Why may assistive technology for students with a hearing impairment be needed in the schools? In addition to assistive listening devices which are discussed in another fact sheet, assistive technology may be needed in the school to support a student's independence for functional life tasks such as using a telephone, alarm clock, or smoke alarm. Other items such as vibrating pagers may be used to gain the child's attention. Videotapes and television programs that are closed-captioned provide written and, therefore, visual information, allowing the student access to the program.

4. Which Wisconsin students with hearing impairment will benefit from assistive technology? Any student with a hearing impairment may benefit from assistive technology if it makes it possible for them to access their education, progress in the general education curriculum, gain independence, or achieve a specific educational standard. The child's IEP team determines individual need and potential benefit of the assistive technology.

5. How do I find out about assistive technology? You can begin by talking with your teacher for Deaf and Hard of Hearing (DHH) or the Educational Audiologist. If you are not currently working with either of these, then contact the special education director in your local school district. In addition, the regional coordinators for the Bureau for Deaf and Hard of Hearing may have information. You can find the names and addresses for them at their website, http://www.dhfs.state.wi.us/sensory. General information about assistive technology can also be obtained from the Wisconsin Assistive Technology Initiative, which has a consultant at each CESA. Their names and address can be found at their website, http://www.wati.org.

6. Where do I get assistive technology for a student with hearing impairment? DHH teachers and Educational Audiologists are involved in procuring assistive technology for students with hearing impairment. They work with a variety of resources in Wisconsin. Some larger school districts may have

an assortment of assistive technology devices. Many of the Cooperative Education Service Agencies (CESAs) have assistive technology lending libraries. In addition, the Wisconsin Assistive Technology Initiative, a statewide project of the Department of Public Instruction operates a lending library that is open to every school district and Birth to Three programs in the state. Assistive technology devices may be borrowed at no charge from their lending library. In addition, the Center for Deaf and Hard of Hearing-Universal Link in Milwaukee and North Central Technical College in Wausau rent or lease a variety of assistive technology and most vendors will lease their products prior to purchase to help determine if they provide the necessary help. Finally the Independent Living Centers throughout the state all have assistive technology for individuals with hearing impairment, including alerting devices, telephonic devices, and assistive listening devices. These can be borrowed for children as well as adults.

7. Is the school district required to pay for assistive technology? The school district is required to provide a free appropriate public education (FAPE). If the IEP team determines that assistive technology is needed in order for a child to receive FAPE, then the school district will need to provide it at no cost to the child's parent. "Provide" however, does not always mean, "pay for". They may borrow an item, lease it, or receive it as a donation from some other source, as long as they provide it at no cost to the parent when needed to implement the IEP.

8. Can just anyone decide to use it? Federal and state law specifically empowers the IEP team to determine what is needed in order for a child to receive FAPE at school. Therefore, they are the group that must decide if assistive technology is an appropriate part of the child's program at school. Every IEP team is required to consider the need for assistive technology during the IEP meeting. During this consideration, any member of the team can suggest specific assistive technologies. If it is decided to try assistive technology, a trial period of use is recommended. The trial period can determine if the assistive technology is appropriate and has the desired outcome, before the school district commits to the long-term provision. Families may independently decide to use assistive technology at home for activities that take place there and which may not be part of their child's IEP, such as use of a TDD, a visual or vibrating alarm clock, or a visual doorbell.

9. How do I write assistive technology in the IEP? Assistive technology can be part of the specially designed instruction, a related service, or a supplementary aid or service. There is no one "right" place to write it. The task is to write it where it best fits and best explains what the IEP team intends to have happen.

10. What is the school district's responsibility under the Americans with Disabilities Act (ADA)? The ADA has a different standard than IDEA. It requires "effective communication" and "consideration of consumer preference". School districts are impacted in two ways by the ADA. They must meet ADA requirements in making information and events accessible to the community and to their staff, in addition to considering it in the provision of services to their students with disabilities. Safety and access to information are general provisions for all students and others entering the school building. For students with hearing impairments, this could include providing captioned TV programs whenever possible and visual fire alarms in isolated areas where a student might be left alone, such as the rest rooms, study carrels, etc. Another example of a school supporting effective communication and independence of a student with a hearing impairment would be to provide a TDD along with the phone number to the telephone relay system. Using the TDD and relay system will promote greater independence and facilitate the achievement of communication standards.

11. How does the team determine which assistive technology is needed? The determination of when assistive technology is "appropriate" and "necessary" is based on the needs of the child. It involves consideration of the student's unique needs related to the hearing loss and should also include his or her age, social interests, physical abilities and needs, maturity, and cognitive ability. For example, while one student might be able to use an older style assistive listening device with wires, another may be embarrassed by it, or find it gets constantly bumped due to a related physical disability. Each IEP team must think about all factors and then should try the specific assistive technology in the environment in which it will be used, before committing the school district to provide it on a permanent basis.

Assistive Technology Fact Sheet #2:
Assistive Listening Devices For Children With Hearing Impairments

(Developed by the Department of Public Instruction in collaboration with the Wisconsin Assistive Technology Initiative)

1. **What are assistive listening devices (ALDs)?** ALDs are devices designed to solve specific listening problems created by a hearing impairment that cannot be solved by personal hearing aids alone. ALDs may be use alone or in conjunction with personal hearing aids.

2. What are some example of ALDs? Two major categories of ALDs are personal frequency modulated (FM) systems that are worn by the student and receive speech input from a teacher-worn microphone, and sound field FM systems that provide amplified speech from a teacher-worn microphone to a loud speaker directed into an entire room or parts of a room. Both types of ALDs may be used alone or in conjunction with a student's hearing aid(s).

3. Why are ALDs needed in schools? The acoustic environment in most public school classrooms makes auditory learning and communication extremely difficult or impossible for many students with hearing impairments. The most common acoustic problems in classrooms are excessive background noise, reverberation, and distance between the teacher and student. None of these acoustic problems are solved by the use of personal hearing aids alone.

4. Which Wisconsin students will benefit from an ALD? Any student with a hearing impairment, with or without hearing aids, for whom the acoustical conditions in the learning environment are a significant barrier to auditory learning and communication may benefit from using an ALD. Students with all types and magnitudes of hearing impairment are vulnerable to these acoustic barriers.

5. How do you define a hearing impairment for students in Wisconsin schools? Federal special education law defines hearing impairment as an impairment in hearing, whether permanent or fluctuating, that adversely affects a child's educational performance. The definition may include children with mild hearing loss, unilateral hearing loss, chronically fluctuating hearing loss, and children with normal auditory sensitivity with a central auditory processing disorder.

6. How many students in Wisconsin schools are identified by school districts as having a hearing impairment? Based on a statewide count made on December 1, 2002, 1605 students were identified as needing special education services because of an identified hearing impairment. Over 500 additional students with an identified hearing impairment receive special education services for another disability.

7. How many students in Wisconsin schools may have an educationally significant hearing impairment that has NOT been identified? Estimates of the prevalence of educationally significant hearing impairment in the national school-age population vary from 1% to more than 10%. If the most conservative estimate of 1% were applied to students in Wisconsin public schools, the number of students with educationally significant hearing impairment would be at least 8,795 (based on December 1, 1998 enrollment data), or four times the number of children currently identified by school districts.

8. What should I do if I think a child is having listening difficulties in the classroom? If the child is receiving special education services under the IDEA or services under section 504 of the Rehabilitation Act of 1973; consult with the child's special education teacher or another member of the child's individualized education program (IEP) team or 504 team. The child may need to be referred for an audiological evaluation, and an IEP team or a 504 team meeting may need to be held to address the child's educational needs. If the child is not receiving special education services or services under section 504, the child should be referred to the building administrator or school nurse to ensure that the child's hearing is properly screened (see The Wisconsin Guide to Childhood Hearing Screening, Wisconsin Department of Public Instruction, 1993). Some children with normal auditory sensitivity may have significant problems processing auditory language. If concerns about listening problems persist following a hearing screening, a referral to the building student assistance team or a referral to an audiologist may be appropriate. Such children may benefit from the use of ALDs.

9. Who decides if a student needs an ALD? If the child is identified as a child with a disability under the IDEA, the child's IEP team decides whether the child needs an ALD, and conducts an IEP team evaluation if needed. For such a child, an educational audiologist should be a member of the IEP team. In the case of a child who is qualified as a handicapped person under section 504, the team that determines the child's educational needs and develops the child's accommodation plan should make the decision. If the IEP team or section 504 team decides that an ALD is necessary for the child, the school district must provide the device, and the services necessary to select, fit, monitor, and maintain the device. The ALD and the services should be clearly identified in the child's IEP or accommodation plan.

10. Can any member of a child's IEP team or 504 team evaluate a child's candidacy for an ALD, select the ALD, and fit it to the child? The child's IEP or 504 team must make the decision concerning the child's need for an ALD. However, some ALDs are considered "hearing aids" and can only be provided to children in accordance with applicable state laws. Only persons licensed by the state may dispense "hearing aids". Audiologists in Wisconsin are licensed to dispense hearing aids, and are the appropriate professional to evaluate, select, and fit ALDs for children for use in the school environment. Fitting an ALD that qualifies as a hearing aid under state law also requires clearance from a physician. ALDs that do not qualify as a hearing aid do not require the involvement of a person licensed to dispense hearing aids or a physician's approval. If you need help in determining if an ALD qualifies as a hearing aid, contact your district's educational audiologist, teacher of the hearing impaired, or speech and language pathologist.

11. What should I do if my school district doesn't have access to an educational audiologist? Many school districts in Wisconsin are located in cooperative educational service agencies (CESAs) that employ educational audiologists. School districts in those CESAs may purchase educational audiology services from their CESA. Some individual school districts also employ educational audiologists. If your school district does not have access to an educational audiologist, someone on the child's IEP or accommodation plan team should facilitate the involvement of a community audiologist. The audiologist should be willing to work with the child and school staff in the educational environment to ensure that the proper audiological evaluations are conducted and that the proper ALD is provided to the child in accordance with applicable laws

Products Mentioned in Chapter 8

Product	Vendor
Alva	ALVA Access Group, Inc.
Baby Crier Signaler	Adaptive Technology and Innovation Centre
Braille Lite 2000	Freedom Scientific
Braille-n-Print Slimline	Quantum Technology Pty Ltd
Braille N Speak	Freedom Scientific
Braille Window	GW Micro
Braillex®	Papenmeier
InLarge	Synapse Adaptive
JAWS®	Freedom Scientific
Juliet	Enabling Technologies
Kurzweil 1000	Kurzweil Educational Systems, Inc.
MAGic	Freedom Scientific
Windows 95, 98, 2000, XP	Microsoft Corporation
OpenBook	Freedom Scientific
OutSpoken	ALVA Access Group, Inc.
Perkins Brailler	Braille Plus, Inc.
Reading AdvantEdge 2.2	Telesensory Corporation
Road Runner	Ostrich Software
Romeo	Enabling Technologies
Versa Point	TeleSensory Corporation
Window Eyes	GWMicro
ZoomCaps	Don Johnston Incorporated.
ZoomText® 8.0	AiSquared

Notes:

Documenting Assistive Technology into the IEP

Penny R. Reed, Ph.D.
With contributions from numerous WATI Consultants

This chapter is about the challenging task of documenting in the IEP the assistive technology devices and services that the school district will be providing. We have tried to include a variety of examples. We have not shown a specific form because there are so many different ones being used.

We believe, as stated by Brent Odell, Wisconsin Department of Public Instruction, that there are many "right" ways to include assistive technology in the IEP. The concern should not be so much on getting it "right" or "wrong", but rather trying to clearly communicate to the parents and future readers of the IEP document. One of the major purposes of the IEP document is to communicate exactly what services the school district will provide and the intended outcomes for the student.

We have attempted to include here a variety of examples of children with varying ages, disabilities, and needed assistive technology, not to provide something you would copy, but instead to stimulate your thinking about potential ways to describe your own unique situations.

Documenting AT in the IEP

The Individuals with Disabilities Education Act (IDEA) requires that the IEP committee consider what, if any, assistive technology may be needed by every student with a disability. When a determination is made that there is assistive technology required by the student, it is then necessary to describe the assistive technology in the student's IEP. That may be done in a variety of ways. This section provides several examples. First there is a review of the legal requirement.

Assistive technology may be any tool that helps a child perform a functional task that they cannot perform well or cannot perform at all because of their disability. Assistive Technology devices and services are defined in IDEA as:

300.5 Assistive Technology device

Any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of children with disabilities. (Authority: 20 U.S.C. Chapter 33, Section 1401 (25))

300.6 Assistive technology service

Any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology device. Such term includes:
(A) the evaluation of needs including a functional evaluation, in the child's customary environment;
(B) purchasing, leasing or otherwise providing for the acquisition of assistive technology devices;
(C) selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing, or replacing of assistive technology devices;
(D) coordinating with other therapies, interventions, or services with assistive technology devices, such as those associated with existing education and rehabilitation plans and programs;
(E) training or technical assistance for an individual with disabilities, or where appropriate that child's family; and
(F) training or technical assistance for professionals (including individuals providing education and rehabilitation services), employers or others(s) who provide services to employ, or are otherwise, substantially involved in the major life functions of children with disabilities.
[Authority 20 U.S.C., Chapter 33, Section 1401(26)]

IDEA requires schools to provide assistive technology if it is required for a student to receive a free appropriate public education (FAPE). FAPE may include a variety of components such as special education, related services, supplementary aids and services, and modifications to the program. Like all other aspects of FAPE, assistive technology must be provided at no cost to parents. The specific IDEA requirement for schools to provide assistive technology states:

300.308 Assistive Technology

Each public agency shall ensure that assistive technology devices or assistive technology services or both, as those terms are defined in 300.5 - 300.6 are made available to a child with a disability if required as a part of the child's

(a) Special education under 300.17;
(b) Related services under 300.16; or
(c) Supplementary aids and services under 300.550(b)(2).

In the 1997 reauthorization of IDEA, added a more specific requirement for Individualized Education Program (IEP) teams to consider the assistive technology needs of students with disabilities:

Section 614(d)(3)(B) Consideration of Special Factors.--

The IEP Team shall --

(v) consider whether the child requires assistive technology devices and services.

It is probably most logical to complete this "consideration" after the goals and objectives are established. Since assistive technology by definition is something that helps a child to "increase, maintain, or improve a functional capability" it is important to know what specific tasks the child will be expected to be able to accomplish in the next year. This information will make "consideration" more focused and concrete. The decision to provide assistive technology would logically be based on the recognition that the student is struggling to complete one or more specific tasks, is not able to access specific aspects of the curriculum or environment, is not able to communicate effectively, or is not as productive as will be needed over the course of the next year.

The IDEA amendments also state that the IEP include "a statement of measurable annual goals, including benchmarks or short-term objectives related to -

(i) meeting the child's needs that result from the child's disability to enable the child to be involved in and progress in the general curriculum;

In Wisconsin the progress in the general curriculum is measured by standards, so where the IEP goal is related to progress in the general curriculum (i.e. standards) it should reflect the standard to which it is related. This is most apparent in academic goals. However, there may also be goals on the IEP that address the student's educational needs that result from their disability which are not academic, and hence there would be no reference to the general curriculum (i.e. standards). While it is important to show involvement and progress in general curriculum, it is important not to forget the "I" in the IEP, which specifically references the child's individual needs.

Previously policy letters from the US Office of Education, Office of Special Education Programs have clarified a variety of assistive technology issues, the 1997 reauthorization incorporated many of these policies and specifically stated that policy letters may no longer be used for this purpose. One of the issues originally addressed by a policy letter and now included in the reauthorization is the requirement that the school district send assistive technology home if needed for the child to receive a free appropriate public education (FAPE).

Although assistive technology devices or services may be either a part of a child's **special education program**, a **related service**, or a **supplementary aid or service**, documenting it in the IEP continues to be a challenge for many. Following are examples of assistive technology that has been included in the IEP document in each of these three ways.

AT as Special Education

When the assistive technology is provided as special education, it will be described in the goals and objectives. In some cases the child will need training and instruction on the use of the assistive technology and in others, it will be a material that the child is using to achieve a specific goal or objective. For example an augmentative communication device might be used under either of these conditions. Included here are a variety of examples of AT in annual goals and short term objectives.

Because all schools in Wisconsin are striving to help all students demonstrate their mastery of the Wisconsin Performance Standards, we have grouped several examples according to the standard to which they are related. Of course assistive technology may be used to help a child acquire or demonstrate knowledge in a variety of subjects and there are needs that are not reflected in the standards, so these examples are by no means exhaustive. They are simply intended to illustrate some of the many situations we have seen in public schools.

In writing annual goals, both academic and non-academic, it is important to include three components, the area of need, the direction of change, and the level of attainment (Wright & Laffin, 2001). In addition, it is critical to relate it to the functional task that the child needs to complete. For instance, a technically correct annual goal might be, "Bobby will activate a single switch 75% of the time." However, it fails the "So What?" test. Why is it that you want Bobby to activate a switch in the first place? What will he accomplish? Will he operate a toy? Will he operate a computer? Will he use it to call for help? Will he use it to indicate he is ready to be moved to a new position? Will he greet a friend? If we always relate the use of the technology to a functional outcome, we will avoid the mistake of focusing on the equipment as an end in itself rather than a means to an end.

Please note that it is now permissive to use benchmarks rather than short term objectives to indicate progress toward a goal. We have included an example of this and it is identified as such.

Examples related to English Language Arts Content Standard: B. Writing

Present Level of Educational Performance (PLEP): Johnny uses his right hand to write and to physically position his left arm and hand. He has difficulty managing papers as he writes.
Annual Goal: Johnny will complete all written work independently.
Benchmark 1: Johnny will utilize a lap tray, incline board, non-slip mat and modified clipboard when positioned for him by staff.
Benchmark 2: Johnny will demonstrate good set up of material in a timely fashion when directed by staff.
Benchmark 3: Johnny will store materials in the assigned area upon completion of written task.
Benchmark 4: Johnny will determine when he needs to use his writing modifications, gather materials, and use appropriately.

PLEP: Eric participates in regular education programs for his academic subjects. His hand strength is limited and he fatigues quickly when doing any handwriting task. Civics and English homework are a particular problem because of lengthy assignments and reports that need to be completed.
Annual Goal: Eric will use a computer or portable word processor to complete assignments in 10th grade English and Civics classes.
Short Term Objective (STO) 1: Eric will review and practice keyboarding skills to input information into a computer or portable word processor at a functional rate of at least 15 words per minute when tested on a standard keyboarding assignment.
STO 2: Eric will use a portable word processor at home or school to complete 100% of English and Civics homework assignments each day as reported by respective teachers.
STO 3: Eric will learn to transfer documents from portable word processor to computer, use spell checker, use other computer features to reformat appropriately (e.g. cut, paste, bold, tab, etc.) and operate printer 100% of time as reported by respective teachers.

PLEP: Becky is learning to read and is anxious to complete writing assignments with her peers. She is not able to produce handwritten material due to severe spastic quadriplegia. Becky is interested in using the computer and has been introduced to it. The staff have helped Becky experiment with several switches in a variety of locations. She seems to be most accurate using a switch mounted next to her head.
Annual Goal: Becky will use a single switch mounted on a switch mounting arm positioned to the right side of her head and scanning software to access the computer 9 out of 10 times for a variety of educational assignments.
STO 1: Using the single switch and scanning software, Becky will follow therapist's directions with 90% accuracy to make selections for simple instructional software, according to weekly data.
STO 2: Using the single switch and scanning software, Becky will select the correct row, followed by the correct letter to select letters from the "Alphabet" activity with 90% accuracy and minimal verbal cueing according to weekly data.
STO 3: Using the single switch, scanning software and an on-screen keyboard, Becky will produce a list of five or more spelling words from oral dictation with 80% accuracy on weekly test.

Examples related to English Language Arts Content Standard C: Oral Language

PLEP: Mary currently communicates with sounds that are not always understood by those around her. She often becomes upset when she is not understood. She likes people and likes to be around both adults and children. She is beginning to play simple games.
Annual Goal: Mary will communicate her interests and needs in three or more environments/situations using a single message voice output device.
STO 1: Using a single message voice output device, Mary will communicate when she wants to change activities during play time on three out of five opportunities on three consecutive days.
STO 2: Mary will use the single message device to interact with others during games, such as Peek-a-Boo on three out of five opportunities on three consecutive days.
STO 3: Mary will initiate communication by "calling" someone using a preprogrammed message on a single message voice output device on three out of three opportunities on three consecutive days.
STO 4: Mary will "lead" singing during circle by activating a preprogrammed single message voice output device on three out of three opportunities when it is her turn.

PLEP: Sarah can use eye gaze fairly successfully to indicate her wants and needs when items are appropriately displayed so that her communication partner can tell what she is gazing at. She currently makes a grunting sound to greet others, to get attention, and to represent both yes and no. She has recently been using a four message output device and is having some success at making choices. Sarah travels independently about the school in her power chair.
Annual Goal: Sarah will interact with others in the school environment in four out of five opportunities to indicate her preferences and needs using voice output devices and eye gaze strategies.
STO 1: When provided with a single message voice output device on her wheel chair, Sarah will use it to greet peers in the hallways, lunchroom and classroom 100% of the time.
STO 2: Using an eye gaze frame mounted on her wheelchair, Sarah will indicate her preference between four choices 80% of the time on five random trials.
STO 3: When asked "yes/no" questions, Sarah will indicate "yes" with a smile and eye contact with communication partner, and "no" by looking down at her wheelchair tray for at least three seconds 90% of the time on 10 random trials.
STO 4: When provided with a preprogrammed four message voice output device, Sarah will participate in story time by using repetitive phrases, requests to "hear more", "turn the pages", etc. appropriately 80% of the time during five random trials.

PLEP: Andy uses a variety of sounds, gestures, signs, and picture/symbols to communicate with his family. He is very social and enjoys parallel play. Andy does not communicate vocally in the classroom, but does use some gestures. At school Andy will sign, but only with prompts.
Annual Goal: Andy will increase expressive language production by using a variety of communication methods in the classroom, including sign language, gestures, communication boards, pictures, and simple voice output devices during four out of five opportunities.
STO 1: Andy will use a simple one or two message voice output device to actively participate in story time by requesting a story or contributing a repetitive line, when given the opportunity, four out of five times.
STO 2: Andy will make two choices during snack time using vocalization, sign, gesture, picture board, or a simple voice output communication device 75% of opportunities four out of five days.

STO 3: Andy will actively participate in interactive play by initiating interaction using one or more of the following: vocalization, sign, gesture, picture board, or voice output communication device, 90% of opportunities on four out of five days.

PLEP: Brandon communicates by using unintelligible vocalizations. He will physically obtain desired items independently and indicates refusal by pushing objects/people away. Brandon currently understands cause/effect relationships and will activate a switch with voice output to obtain a desired activity. It is questionable whether he understands the specific meaning of the utterance he has produced or if he simply knows that pressing the switch earns him an activity.

Annual Goal: Brandon will select activities and interact with peers/adults within those activities four out of five times when provided with voice output devices.

STO 1: Given a choice of two activities, Brandon will use a single message voice output device to choose a desired activity three out of five times on three consecutive days.

STO 2: Brandon will participate within play activities where an adult is using aided language stimulation on a phrase-based communication board five times per day.

STO 3: Brandon will use single message voice output devices to interact at appropriate times with peers/adults on 8 of 10 communicative attempts in play activities on three consecutive days.

STO 4: Brandon will use a four message voice output device to interact at appropriate times with peers/adults on 8 of 10 communicative attempts in a play activity on three consecutive days.

PLEP: Michael is in the second grade classroom for most of the school day. He is interested in the material being presented by the teacher and wants to participate. He has a full time paraprofessional who assists him. He has difficulty being an active participant in academics because he uses a voice output AAC device and frequently does not have the "right" answer. The teacher is concerned at the amount of time it currently takes while Michael struggles to answer questions. The teacher is interested in finding ways for Michael to more actively participate.

Annual Goal: Michael will use eye gaze and prerecorded messages to respond to appropriately phrased questions in four subject area classes, mathematics, reading, science and social studies in three out of five opportunities.

STO 1: When provided with three pooled responses on cardboard strips placed on his table in front of him. Michael will look at the correct answer 70% of the time during seatwork activities.

STO 2: When provided with overlays and prerecorded messages on his AAC device that are specific to the content being covered in class, Michael will respond at least one time per class period and will select a response that indicates he understands the question 90% of the time during random observations.

STO 3: When the teacher uses a group response technique such as asking everyone who thinks the answer is one thing to look at the door and everyone who thinks the answer is another thing to look at the window, Michael will respond 100% of the time and will be correct 90% of the time when charted daily.

Miscellaneous examples not specifically related to Wisconsin Performance Standards

PLEP: Joey is a 20 month old with developmental delays. He is beginning to respond to visual and auditory action toys and laughs or makes sounds when a toy is activated. He will sometimes reach out to attempt to make the toy move again. Joey's parents are happy to see him responding to toys and beginning to make sounds, but would like to see him making more attempts at communicating his wants and participating in turn taking games with the family.

Annual Goal: Joey will use a switch or voice output device to actively participate in play experiences to communicate interests to his parents or other caregivers in four out of five opportunities.

STO 1: Joey will use a switch to activate a mechanical toy, after being shown how in a turn-taking situation with his parents, with 80% success as observed during three random observations.

STO 2: Using a single message voice output device, Joey will request "more" or "do it again" when playing simple interactive games, like Peek-a-Boo or tickling that his family knows he is enjoying 80% of the time on three random samples.

STO 3: Using a voice output device with two options, Joey will indicate wanting to play a game or not play a game, "do it again" or "not do it again" during three out of three opportunities as observed on three of four random samples.

PLEP: Jeff likes to interact with his family. He enjoys eating and being involved in meal time and other functional activities in the home. He has not been able to participate in cooking or cleaning except to look toward the item that is needed next, or make a sound when his mother purposely "forgets" something.

Annual Goal: Jeff will use a single switch to activate adapted utensils and appliances to assist family members in targeted functional household tasks during three out of four opportunities.

STO 1: Jeff will activate the blender and mixer with a single switch at appropriate times to participate in preparing meals in three out of four opportunities on three consecutive trials.

STO 2: Jeff will activate the vacuum cleaner using a single switch at appropriate times when cued by his mother to participate in vacuuming in three out of four opportunities on three consecutive trials.

PLEP: Kelly is in the third grade classroom for most of his day. He has a full time paraprofessional who assists him. He is unable to use a standard keyboard because of his physical limitations. Additionally, his speech is frequently unintelligible. He currently uses single message and multiple message voice output devices, eye gaze, and limited direct selection to complete his academic work. Kelly is functioning at about the second grade level in most curricular areas.

Annual Goal: Kelly will use an adapted keyboard with custom overlays and a computer with talking word processing to complete all academic work.

STO 1: Using an adapted keyboard with a custom spelling template, Kelly will complete a 10 word weekly spelling test taken from second grade curriculum and his current reading materials, with 80% accuracy once a week.

STO 2: Using an adapted keyboard with a custom overlay with three character names and facts or characteristics about them from a current reading selection, Kelly will generate three sentences describing a character or their actions with 100% accuracy on three out of four opportunities.

STO 3: After participating in a cooperative group science project, Kelly will use an adapted keyboard with a custom overlay that randomly lists three to five steps involved in the science project to sequence the steps in proper order with 80% accuracy and "read" them to his group as the "recorder" on three out of four opportunities.

STO 4: Using a basic numbers overlay on an adapted keyboard, Kelly will complete his adjusted daily math assignment with 100% accuracy on four out of five opportunities.

PLEP: Steven is a four year old boy diagnosed with pervasive developmental disorder. His placement is in an Early Childhood classroom. He is able to understand and comprehend when spoken to, but

does not communicate his needs consistently. When choices are simplified and broken into steps, Steven will try to communicate wants and needs. Peer interactions are limited.

Annual goal: Steven will use a picture board or voice output device to express wants and needs to adults and peers in both home and school at least four times each day.

STO 1: During meal times at school and at home, Steven will use a picture board to point to at least three of six foods he wants to eat, two of three meals each day.

STO 2: Using a voice output device, Steven will make a choice of a "center" he wishes to participate in during choice/work time three or four days per week.

STO 3: During group story time, Steven will use a single message voice output device to complete a repeated story line with peers 90% of the time as observed on 10 random trials.

PLEP: Barb is a 15-year old girl. She uses a modified wheelchair with a specialized insert. She is medically fragile and has no speech, because her vocal cords were damaged as an infant. She does have mood swings that are triggered by various situations that result in self abusing behaviors. She enjoys music and being talked to. She has difficulty in large rooms. She cannot tolerate loud sounds. She has limited experience in integrated settings.

Annual goal: Barb will use a voice output device to respond in Life Skills class on three out of five opportunities.

STO 1: Barb will activate a single message output device during two of three life skills classes to answer one prearranged question. She will progress from a level of physical prompt at the elbow to no physical assist by the end of the semester. Given the verbal cue from the life skills instructor "Barb can you tell me what you think?"

STO 2: Barb will use a multiple message device to call on three of her cooperative group members to give their report during review day session. Moving from a level of full physical assistance to activate the switch to a level of slight physical cue and verbal prompt, three out of five review sessions.

STO 3: Barb will activate a switch connected to a pouring device. Barb will comply from a level of slight physical assist and three verbal prompts, to slight physical assist and one verbal prompt, on three of the last five cooking classes.

STO 4: Barb will activate a single message voice output device to be excused from an over stimulating environment rather than exhibiting inappropriate behaviors. She will increase use of this method from a level of zero uses to a level of three uses during the first quarter.

AT as a Related Service

A related service is a service that a child needs in order to benefit from their specially designed instruction. AT most typically appears as a related service when it is not an integral part of a student's educational program, but is needed in order to benefit from that educational program. Examples of AT as a related service include walkers, wheelchairs, and various positioning devices. Augmentative communication devices and computers are also sometimes listed there. When AT is to be included in the IEP as a related service, it will appear in the chart of related services. If Assistive Technology is not one of the choices under Related Services on the district's IEP form, it can be written in under "Other". Since Related Services must have the Amount/Frequency, Duration, and Location specified. That information must be filled in.

Example:
Stephanie is in the third grade. She has cerebral palsy, which makes it difficult for her to walk long distances. It is so fatiguing that she does not recover from the exertion for 30 to 45 minutes and is not able to concentrate on school activities if long walks are required. She is able to walk short distances with no ill effects if enough time is provided.

Related Services	Frequency	Duration	Location
☑ Other: (Specify):			
Walker	daily during lunch	entire school year	classroom/lunchroom

It is the specificity of frequency, duration, and location that may account for the fact that parents frequently request that the assistive technology being provided be documented as a Related Service. However, the provision of AT is equally binding when it is described under Supplementary Aids and Services or in the Short Term Objectives. Note: IDEA does not automatically **require** that an IEP include separate annual goals and short term objectives for related services. For example, while typically there are not goals for things like transportation, there could be if the student is learning to access public transportation to get to a work site during transition. The determination of whether annual goals and short term objectives are needed **is contingent upon the related services. If the related services includes the learning of new skills which are not already part of, or incorporated in, an existing annual goal or short term objective, and some type of instruction is being provided, then there would need to be goals and objectives in addition to the statement under Related Services**.

AT as Supplementary Aids and Services
Supplementary Aids and Services are those aids, services, and other supports which are provided to enhance or allow the student's placement in the least restrictive environment (LRE), especially when LRE is the regular education classroom. Assistive Technology may be a Supplementary Aid or Service. Assistive technology is most logically included in the IEP as a Supplementary Aid when it provides more independence and requires little instruction in order to be used effectively. Items such as portable word processors, talking spell checkers, and other small, portable devices are often included under Supplementary Aids and Services.

Example: Jacob is in kindergarten. He likes to do the coloring and writing activities with the other children. He has difficulty with these activities because he is subject to the symmetric tonic neck reflex (STNR) which causes him to round his shoulders and flex his arms whenever he bends his head down to look at the paper. It is very fatiguing for him to look down and back up at the teacher. It is important to Jacob to participate in the same way as the rest of the students.

Supplementary Aids & Services	Frequency	Duration	Location
☑ Yes ❒ No			
Slant top table for all writing, drawing, and painting	daily	entire school year	kindergarten and coloring, art room activities

Example: Carl uses his personal hearing aid to good advantage in quiet environments. However, he is confused when the background noise is elevated, as often occurs in active classroom situations and large

group activities. He has therefore not been able to effectively participate in many important school activities.

Supplementary Aids & Services	Frequency	Duration	Location
☑ Yes ❒ No			
FM classroom amplification system to assist with auditory discrimination	daily	entire school year	5th grade classroom

Notes:

Funding Assistive Technology

Penny Reed, Ph.D. and Paula Walser, CCC-SLP, ATP

In this chapter of the manual we will address the funding options for assistive technology. These include the school district, Medical Assistance, insurance, and other private funders such as service clubs and groups.

Also included in this chapter are print and online references that provide additional information.

Funding Assistive Technology for Children and Youth with Disabilities

Penny R. Reed, Ph.D. and Paula Walser, CCC, SLP, ATP

As we approach the topic of funding for assistive technology, it is important to remember that only a few short years ago our major problem was the lack of appropriate technology. How wonderful it is that we now have a wide range of devices available and the prospect of many more being developed every day. These devices allow a student with a disability to do many things that were not possible in the past. As more and more devices become available, our challenges are to keep up with the rapid changes in the field, to train service providers to operate and appropriately utilize the technology devices and to obtain funding to pay for assistive technology.

Over ten years ago as the field of assistive technology was developing, the primary sources of funding were Medical Assistance (or Medicaid), private insurance, and service clubs. Trefler (1989) found that approximately 60% of clients had their technology paid for by Medicaid. Others received funding from private associations, insurance companies, and private donations from service clubs. Unfortunately, in many areas this is still true today.

Procuring funding from these sources is time consuming. Gathering the necessary information and writing the request for funding approval can take 15 to 20 hours of work. In addition, specialists who routinely deal with third party payers state that it is typical to be rejected on the first request. Therefore additional hours are required to further explain and justify the funding request for resubmission.

In an effort to make assistive technology more available to individuals with disabilities, the federal government has created several specific entitlements. These entitlements, or funding streams, include the public schools under the Individuals with Disabilities Education Act (IDEA) and Vocational Rehabilitation under the Rehabilitation Act of 1993. IDEA requires assistive technology to be provided as part of early intervention services, and as part of the special education, related services, or supplementary aid or service by local school districts. Schrag (1991) made it very clear that school districts may not "presumptively deny assistive technology" to a child until a determination is made that assistive technology is not an element of a Free Appropriate Public Education (FAPE) for that child. It is clear that school districts have a responsibility to make assistive technology devices and services available to students with disabilities who need such a device or service in order to benefit from their special education program. If assistive technology is needed to accomplish the goals and objectives listed in the child's IEP, then it must be provided.

However, IDEA does not prevent school districts from seeking funding from other sources to fund a portion of the technology devices they may find necessary for students with disabilities. It requires the school district to “provide” the assistive technology. In providing it, the school district may borrow it, rent it, or seek an outside or “third party” funding source. Before seeking outside funding, school district personnel should consider the amount of time that may be required to obtain such funding and the reason the technology is needed in the first place.

The reason the technology device is needed is important because there are almost no funding sources that will pay for equipment for the school to use to teach students new skills. Providing a basic range of devices for teaching purposes is clearly the school's responsibility, just as they provide computers, tape recorders, and other types of equipment for student without disabilities. This basic provision should

come from the school district's general budget or special education funding such as IDEA flow through or discretionary money.

There are instances where state grants may be available which will allow some of the money to be spent on equipment. The Technology Literacy Challenge Fund (TLCF) program is a recent example, however no longer in existence. TLCF made a significant difference in the availability of all technology in the schools including assistive technology. The TLCF program was a federal Title III program that went to every state education agency. The amount of money received by each state was determined by the state's Title I count. The state education agency distributed the funds in competitive grants to school districts. The federal guidelines for TLCF required that the school district describe how assistive technology was included in their technology plan. The description of the planned use of assistive technology was worth five points out of the possible 100 points in the application. Across the country the TLCF Funds dramatically increased the availability of technology for **all** students including those with disabilities. Although there is no comparable program available at the time of this writing, another opportunity may be offered in the near future.

In Wisconsin, in addition to TLCF, we had the governor's Technology Education for Achievement program (TEACH Wisconsin, www.teachwi.state.wi.us). It had two components, one was an allocation and the other was a competitive grant program. The allocation was based on the size of the school district and its economic base. Every school district that had a technology plan approved by the Department of Public Instruction received this allocation. A district technology committee developed the technology plan. In school districts where a special educator participated on the technology committee, there was a greater awareness of assistive technology and it was more likely to be included in the plan.

There are also federal grants available, but to obtain such grants, school district staff must spend a great deal of time and effort planning and writing the grant and they must have an idea that is sufficiently unique and clever to be selected over dozens of (sometimes hundreds of) other grant proposals.

Because this area is so competitive, the chances of obtaining federal funding through grants are very slim. In most cases, the time could be better spend in planning for the timely acquisition of needed devices through their normal budgeting process and by developing a system to share, trade, and cooperate with nearby districts. Having a range of assistive technology devices available for instructional purposes is a basic service requirement that school districts need to meet. They can best do this by working collaboratively to plan for the acquisition of an appropriate selection of devices over the next two to three years. The development of a statewide lending library of assistive technology hardware, software, and resource materials plus increased access to low cost assistive technology are two of the strategies being implemented by the Wisconsin Assistive Technology Initiative to meet this need. Other strategies include the formation of Assistive Technology Planning Groups in each area of the state, the Used Equipment Marketplace, and special prices on various assistive technology products.

In addition to the basic array of technology devices, school districts have an additional responsibility that goes beyond basic training. Under IDEA school districts must make available the specific assistive technology devices and services that are needed by a child to benefit from his or her special education program. This could include use of a device off of school premises and outside of school hours, if needed. However, this does not always require a school district to make a large expenditure of dollars. In the vast majority of cases, a child's assistive technology needs can be met for under $500.

Table 1 illustrates the range of possibilities for meeting a child's need for assistive technology. Planning teams should not overlook the many "no," "low," and "mid" tech possibilities, as well as increased access to existing technology to meet student's needs. There are many ways to help the child to benefit from his/her special education program.

Table 1
Provision of Technology

Increased access to existing computer lab	0
Increased access to existing computer in classroom	0
Placement of an existing computer into the child's classroom	0
Sole use of an existing computer	0
Purchase of low tech items	$10-50
Purchase of a word processor that interfaces with a computer	$200-500
Addition of adaptive input or output peripherals to a computer	$50-1500
Purchase of specialized software	$20-500
Fabrication of a custom designed device	$100-300
Adaptation of an existing device	$50-300
Purchase of a computer	$600-3000
Purchase of an augmentative communication device	$200-8000
Purchase of a power mobility -device	$5000-30,0000

If the only possibility for meeting the child's need is one of the more expensive options, such as purchasing an augmentative communication device, there are some funding sources that may potentially be approached to purchase or to contribute to the purchase of a device.

Seeking outside funding for assistive technology is most appropriate when you are trying to obtain a device that will belong to the family rather than the school district. This allows the device to go with the child if he moves or graduates. Applying for funds from any of these sources takes a minimum of several hours of staff time to obtain forms, fill them out, copy existing reports or write new ones, gather any additional information that is needed, and submit the final packet of documentation. In some cases, for both entitlements and other funding sources, personal information about the family such as their income may be necessary in order to complete the forms. When that is the case, the family must be involved in completing the application.

One of the most frustrating aspects of obtaining funding is that many of the funding sources require written rejection from other sources. This requires a system of multiple requests for payment for a single device. Enders (1988) recommends these strategies for obtaining third party funding:

- Learn the specifics of the services delivery system from which you are trying to secure funding.
- Be aware that the entrance to all systems is controlled by gatekeepers, find out what they are looking for.
- Remember that all funding systems operate within a bureaucratic environment, you cannot change their timeline.
- Request funding or assistance in terms consistent with the purpose or mission of the system to which you are applying, e.g. medical assistance funds durable medical equipment.
  - Conduct yourself in a professional manner.
- Educate the funding system about the effectiveness of your proposed purchase. Don’t expect the person there to already know all about technology.
- Remember that systems work because of the efforts of the people within them. You can never be too nice.
- Remember that all systems have some sort of appeal procedure.

Patience and persistence as well as accuracy and thoroughness are needed to obtain outside funding. Markowicz and Reeb (1988) and Hofmann (1989) point out that the **major reasons for denial of claims** from Medicaid include:

- The request supplied incomplete or inaccurate information.
- The equipment or service was deemed not medically necessary.
- No diagnosis was indicated on prior authorization forms.
- The claim exceeded filing time limit.
- The equipment would not lead to an increase in self-care.
- Another device would be less costly, with no justification for the higher cost.
- There were typographical errors in the request.

These are all things that could have been corrected before submission. If you decide to take the time to seek funding for a device, take the time to do it well. Utilize the language that will help the funding source understand why they are the logical entity to provide funding for this piece of equipment and what effect this device will have on the child's life. Always have someone else read your completed application before mailing so that they can look for typographical errors and for statements that are unclear or unpersuasive.

IDEA

Remember that IDEA requires school districts to provide assistive technology devices and services that are necessary to allow the student to benefit from their special education program. They have a responsibility to make a basic array of equipment available for training purposes and to provide any individual piece of technology that is needed to meet the goals and objectives in the IEP or IFSP for an individual child. **The requirement for school districts to provide assistive technology is not new.**

Assistive technology, although not mentioned specifically in P.L. 94-142, has, since 1975 been a responsibility of the school district if it was required in order for the child to receive a Free Appropriate Public Education (FAPE) (Golinker, 1992). When P.L. 94-142 was re-authorized in 1990 to become IDEA, assistive technology was one of several areas that were more clearly articulated by adding definitions and a more clearly defined directive.

Since 1990, the role of school districts has been further clarified by a series of policy letters from the US Office of Special Education and Rehabilitation Services that addressed questions that have been asked by individual families. A policy letter is a written, public response to a member of the general public who writes a letter to the Department asking for clarification on a section of the law. Courts pay great deference to agencies' interpretations of the laws they administer (Goodman,1995). Each letter has clarified a specific point:

- A child's need for assistive technology must be determined on a case-by-case basis. The IEP must include a specific statement about the needed AT and that it can be part of the child's specially designed instruction, related services, or a supplementary aid or service to help maintain a child with a disability in a regular classroom. School districts cannot presumptively deny assistive technology to a child with a disability. (August, 1990).
- If the IEP committee determines that a particular assistive technology device is required for home use in order for the child to receive FAPE, the technology must be provided by the school district (November, 1991).

- A hearing aid may be assistive technology and must be available to the child if it is determined by the IEP committee that it is needed for the child to benefit from his/her educational program (November, 1993).
- If parents provide a device for a child in order for his/her IEP to be implemented, the school must assume liability for the device (November, 1994).
- If a child with a disability needs eyeglasses to receive FAPE and the child's IEP specifies that the child needs eyeglasses, they must be provided by the school district. (1995).

Although the U.S. Office of Education was prohibited from using policy letters in the future, all of these points were incorporated into IDEA ’97. In addition the requirement that every IEP team “consider” the need for assistive technology was added. (For more information on Consideration, see Chapter 1.) This is an important addition because in the past many educators had the mistaken idea that only “certain” children were candidates for assistive technology.

For parents, the IEP is the key to obtaining assistive technology through a school district. This often makes IEP meetings very stressful as the representative of the school district attempts to determine if the assistive technology is truly “needed” or just a “nice” addition. That point is the difference between receiving FAPE and not receiving FAPE.

However, if it is determined to be “needed”, what the law requires is that the school district "provide" the AT, nothing in the law prevents school districts from seeking funding assistance from outside sources as long as it is provided at no cost to the parents. They must remember, though that they cannot delay providing the needed assistive technology devices or services while they are seeking outside funding.

For more information on seeking funding of assistive technology through your school district, you can download *The Public school’s special education system as a funding source: The cutting edge*. (Hager, Smith 2003) from http://www.nls.org/pdf/special-ed-booklet-03.pdf.or request a print copy from the Neighborhood Legal Services, Inc. 295 Main Street, Room 495, Buffalo, New York 14203 (716) 847-0650

Medicaid

The Medicaid program (Title XIX of the Social Security Act) is a program of medical assistance for low-income individuals and families, and is the primary source of health care coverage for America's poor. Medicaid, which is commonly referred to as "Medical Assistance" in Wisconsin, was created in 1965. Medicaid provides financial assistance to families with dependent children (Title IV-A), and the aged, blind and disabled receiving Supplemental Security Income (Title XVI). Medicaid provides reimbursement for the cost of health care services for more than 35 million people in the United States, half of whom are children (Golinker & Mistrett, 1997). Medicaid was the principal entitlement for funding for assistive technology before the revisions of IDEA and the Rehabilitation Act in 1993. Medicaid is financed jointly with state and federal funds and is administered by each state under Federal requirements and guidelines. States participate in Medicaid at their option.

The federal Medicaid law requires that certain basic services must be included in each state program. These include hospital services, laboratory and x-ray services. States may also provide a number of other items and services, if they choose to do so, including prescription drugs, physical therapy, speech, hearing, and language therapy, prosthetic devices, and durable medical equipment. There are wide

variations from state-to-state in the benefits offered, program eligibility standards, and reimbursement levels. One of the most important things to remember is that the term "assistive technology device" is not used by Medicaid, and should not be used in funding justifications or other documents submitted to Medical Assistance (Golinker & Mistrett, 1997).

Unfortunately, "medical necessity" is not clearly defined in all Medicaid programs. Golinker and Mistrett (1997) point out several other funding barriers, including: The existence of lists of covered or non-covered items are significantly out of date or incomplete. The lists often include similar equipment on both lists, demonstrating a lack of knowledge, skill, and discretion among Medicaid decision makers. All of this presents frustrating and unnecessary barriers to obtaining technology through Medical Assistance.

One important factor to remember is that there are specific restrictions within the Medicaid program that prevent states from severely restricting access to devices within the covered services the state provides (Golinker & Mistrett, 1997). For instance, Medicaid is not permitted to provide prosthetic devices that will address some nonfunctioning or malfunctioning body parts but not others. Therefore, Medicaid programs are not permitted to limit the scope of prosthetic devices to those capable of meeting the needs of people with missing, nonfunctioning, or malfunctioning upper and lower limbs, but not nonfunctioning or malfunctioning oral-motor mechanisms. Medicaid programs are not permitted to provide coverage for an artificial larynx, which is one form of AAC device and not also provide funding for other types of AAC devices. Despite its complexity and its often frustrating slowness, Medicaid programs, including Wisconsin's Medical Assistance Program, remain one of the primary funding programs for assistive technology.

Vocational Rehabilitation

The original purpose of the Vocational Rehabilitation Act was to assure that all individuals with disabilities are able to live their lives as independently as possible. The 1993 revisions added assistive technology and a presumption of ability, meaning that vocational rehabilitation counselors must assume that all individuals regardless of the severity of their disability must be regarded as being able to work. Because of the revision, the state VR plan must now describe how a broad range of rehabilitation technology services will be provided at each stage of the rehabilitation process. It must also describe the manner in which assistive technology devices and services will be provided, or work site assessments will be made as part of the assessment for determining eligibility and the vocational rehabilitation needs of each individual.

Assistive technology may be provided as part of employment or independent living. The key to obtaining funding is the inclusion of assistive technology in the Individualized Written Rehabilitation Program (IWRP). The technology must be needed to enhance or improve independent skills in working or living. Students are not eligible for services from Vocational Rehabilitation Division until age 14. VRD should become involved through transition planning that is required to start by the time the student is 16 years old.

Medicare

Medicare is a federal health insurance program serving individuals over 65 years of age plus those with severe disabilities under 65. It covers health care costs and is divided into two parts. It is Part B that can be a source of funding for assistive technology for individuals who qualify for Social Security Disability Insurance (SSDI) for a-period of at least 25 months. Its requirements are similar to those for Medicaid. Medicare only pays for durable medical equipment (DME) which can withstand repeated use, is

primarily and customarily used to serve a medical purpose, is generally not useful to a person in the absence of illness or injury, and is appropriate for use in the home. Examples of equipment covered include internal prosthetic devices, external braces, and artificial limbs or eyes. For more information, download *Medicare, Managed Care and AAC Devices*, a joint project between Assistive Technology Funding & Systems Change Project at the United Cerebral Palsy Associations and National Assistive Technology Advocacy Project http://www.nls.org/medihmo.htm

Social Security Benefits

In 1990 the U.S. Supreme Court (Zebley v. Sullivan) found that the childhood disability determination process used by Social Security was illegal. The law now provides that Supplemental Security Income (SSI) is available to children with serious disabilities, as based on functional assessments. Because of this ruling, children can be any age, even newborn. Family income is a factor in eligibility, but value of house, land, vehicle, personal and household belongings, pensions, and work property are exempt.

In addition, Social Security Disability Insurance (SSDI) and Plan for Achieving Self-Support (PASS) can be a source of funding for some children. There are no age requirements, but PASS is most appropriate for students over 15. PASS allows a person with a disability to work, but set aside a portion of their earnings so that they are still eligible for SSI (or so they can receive higher payments). The money set aside must be used for job related expenses such as a job coach, attendant care, transportation, or assistive technology.

TEFRA, the Tax Equity and Fiscal Responsibility Act of 1982, makes children, infants through age six, eligible for assistance. TEFRA provides coverage for children deemed diagnostically eligible, using SSI definition, but who would be financially ineligible for SSI due to parental income. Children must meet medical necessity requirements for institutional care; however, the technology can be used to help maintain the child at home.

Private Health Insurance

Private insurance companies represent a major source of third party funding. Because they are private, their coverage varies a great deal. In 1978, over 1200 separate companies provided group hospital coverage to 88 million Americans and covered almost 100 million people for surgical services and doctors visits. They also wrote individual insurance health policies for 21 million people and surgical policies for 10 million (Hofmann, 1989). Those numbers have grown since that time.

Coverage for a computer or dedicated augmentative communication device by a private insurance company depends on the terms of the individual policy and its interpretation. Policies specifically mentioning "prosthetic services and supplies" are more likely to cover augmentative communication devices or other assistive technology than those that do not. The specific areas covered by the individual policy are the critical factor in seeking funding from private health insurance. Remember that the use of insurance cannot result in any cost to the family. And it cannot be required of the family to seek to use their insurance. It must be strictly voluntary.

In general, funding an assistive technology device through private health insurance will require a doctor's prescription, supported by a funding justification prepared by someone working with the family. The justification must explain how the device is a covered service, and it must describe the medical need for the device, just as is required by Medicaid and Medicare. It is not unusual for the request to be denied initially, although appeals may lead to a reversal of an adverse decision. Sadler (1996) recommends approaching all applicable insurance carriers simultaneously to avoid delays.

Steps to Securing Funding

Pressman (1987) recommends the following steps when you attempt to secure funding from a third party payer.

1. Locate an advisor who can support and guide you through the funding maze. This may be a social worker, therapist, vocational rehabilitation counselor, or virtually anyone who has knowledge and is willing to help you with jargon and paperwork.
2. Begin collecting information that will help you figure out where to submit your first request. If the family has private medical insurance that is the place to start, if the family is willing. Work together with the family to complete and submit the appropriate forms.
3. Get a good technology evaluation. Be sure you are asking for the best and most appropriate device for your need. A computer search through a database such as AbleData or a call to your Regional AT Consultant can help assure that you have explored all of the possibilities.
4. When making the request, make sure that you build in training and ongoing support, if funds will be needed for those, and set aside some money for software and a small contingency fund for repairs.
5. Use the right words when developing the justification. Medical Assistance does not fund based upon "educational need".
6. Be prepared for at least one denial, and be ready to make an appeal. A significant number of denials are overturned.
7. Include written information about the device for which you are seeking funding. Claim adjusters may know nothing about the device you need.

The heart of your application is the cover letter that explains exactly what you are requesting and why. The remainder of the packet that you will submit will be copies of evaluations and reports that support your request. Generally, the letter should contain the following information (Reed, 1991):

- A description of the child with age, diagnosis, prognosis (what is expected to happen), and his or her current level of functioning.
- An explanation of how the device will help. What the assistive technology will allow the child to do, its purpose (communication, recreation, vocational, homework, or some combination of these). Describe the settings in which it will be used and the advantages of this particular device. Be sure to explain why a cheaper device will not work. Include the total cost with shipping, support needs, software, additional parts, repair, etc.
- A chronological history of the evaluations that led to this conclusion. (Be sure to attach copies of those evaluations.) Include a doctor's examination and evaluations by speech/language pathologists, occupational therapists, physical therapists, psychologists, or teachers. Be sure you include the disciplines that work directly with the device you are requesting.
- End with an explanation of why the request is being made to this particular funding source. Explain the family financial situation, other funding sources that have been tried or exhausted and why some funding sources are not available to you.

Cohen (1987) points out that the wording of the letter is crucial. Subtleties in terminology are extremely important. A computer can be a "prosthetic device meeting basic medical needs" or a device which "enhances employment potential". It all depends on how you describe it. If at all possible, it often helps to end the letter with a picture of the child using the device for which you are seeking funding.

MAKING THE REQUEST

Once you have decided where you are going to seek payment for an assistive technology device, it is time to think about the specific details that you will need to provide to the potential payer. In this section of the chapter, we are going to look first at what we will call medically based funding sources such as Medical Assistance, private health insurance, etc.

Components of a Medically Based Request
If you are pursuing funding through a medical payment plan such as Medical Assistance or private insurance, it is important to review the policy of the payment plan to ensure that the recommended technology device falls within the domains of that particular funding source. For example, in Wisconsin, devices used for facilitated communication or auditory integration therapy are considered to be experimental and will not be reimbursed from Medical Assistance.

Prior to considering the use of parent's private medical insurance to pay for an augmentative communication device it is of critical importance to obtain informed parental consent. Remember the requirement that schools provide a Free and Appropriate Public Education (FAPE) 'without charge' or 'without cost'. This means that a school district may not compel parents to file an insurance claim, when filing the claim would pose a realistic threat that the parents of the child with a disability would suffer a financial loss not incurred by similarly situated parents of non-disabled children. Financial losses include, but are not limited to the following-

- a decrease in available lifetime coverage or any other benefit under an insurance policy,
- an increase in premium under an insurance policy,
- an out-of-pocket expense such as the payment of a deductible amount incurred in filing a claim.[Source: 45 Fed. Reg. 86390 (Dec. 30,1980)]

With respect to augmentative and alternative communication systems, Wisconsin Medical Assistance has established specific policy defining the criteria that must be met to be considered for reimbursement:

- Functional communication-the individual must be able to demonstrate authorship of messages and be able to exchange thoughts and ideas with others;
- Basic and medically necessary-as defined within HSS code section 101.03;
- Self contained unit-Medical Assistance will not pay for a computer with software that provides augmentative communication, because they believe it could be used by the family for other purposes. They only fund dedicated augmentative communication devices.

Durable Medical Equipment
Under Medical Assistance guidelines, augmentative communication systems fall within the category. of durable medical equipment (DME). For Medical Assistance to pay for the DME the following criteria should be met:

1. Medically necessary for the person (i.e. must be required to prevent or treat a person's illness or injury).
2. Consistent with the person's symptoms or with prevention or treatment of that person's symptoms.
3. Not solely for the convenience of the consumer, their family, or providers.
4. Cost effective when compared to alternative medical services for the consumer.
5. The most appropriate type of service for the consumer.

The following is a list of frequently requested durable medical equipment that are not covered under medical assistance:

- cold air humidifiers
- air conditioners and air purifiers
- ring walkers
- intercom monitors
- exercise and physical fitness equipment
- whirlpools
- ramps
- van lifts or van modifications
- seat lift chairs
- elevators/stair gliders/stair lifts
- bolsters, wedges
- computers
- electric page turners

Prosthetic devices are covered if they replace all or part of an internal body organ or replace all or part of the function of a permanently inoperative or malfunctioning internal body organ. An electronic speech aid (electrolarynx) has been accepted under Medical Assistance as a prosthetic device.

Getting Started

The first step in the funding process for Medical Assistance is completing the prior authorization. Medical Assistance has special forms for requesting prior authorization. A prior authorization is required for short and long term rentals, purchase of equipment, and repair of equipment. In Wisconsin, the Department of Health and Family Services use the following criteria to approve or turn down a request for prior authorization:

1. The medical necessity of the service;
2. The appropriateness of the service;
3. The cost of the service;
4. The frequency of providing the service;
5. The quality and timeliness of the service;
6. The extent to which less expensive alternative services are available;
7. The effective and appropriate use of available services;
8. The limitations imposed by pertinent federal or state statutes, rules, regulations or interpretations, including Medicare, or private insurance;
9. The need to ensure that there is closer professional scrutiny for care which is of unacceptable quality;
10. The flagrant or continuing disregard of established state and federal policies, standards, fees or procedures; and the professional acceptability of unproven or experimental care, as determined by consultants to the department.

The request for prior authorization must show that the device or service meets the above criteria. The type of additional information required when requesting a prior authorization will depend on the type of device or equipment. Traditionally, in addition to the completed prior authorization form, the following information must also be included:

1. The name, address, and medical assistance number of the recipient for whom the service or item is requested;
2. The name and provider number of the provider who will perform the service;
3. The name of the person or provider who is requesting prior authorization;
4. The attending physician's diagnosis including where applicable, the degree of impairment. The physician's order must also include a listing of the specific equipment including modification and show why the equipment is medically necessary;
5. A description of the service being requested, including procedural code, the amount of time involved, and the dollar amount were appropriate;
6. A justification for the provision of services. Include a justification for why the device will be rented or purchased;
7. An evaluation should be included which includes evidence that the proposed equipment is effective for the person -in the case of an augmentative communication user this would include documentation the device enables the user to communicate more effectively; and
8. Include any denials from third party insurance or other funding sources to demonstrate that you have attempted to procure funding from other sources.

Additional information. Depending on the type of service or equipment that is being requested, the written evaluations may be completed by a speech & language pathologist, physical therapist, occupational therapist, or other provider. The individual reports are typically lengthy and specific to professional content area, but combined provide all of the essential information.

Creating a Funding Request Portfolio

The request for funding is a very critical event. It is not just a quickly written letter or a single report. The following suggested content of a funding request portfolio is adapted from the Colorado Easter Seal Society's Center for Adapted Technology (Blakely, 1994). It applies to requests from many sources, not just medically based ones.

1. A letter from a doctor which should include:
    A. Information about the child's specific disability;
    B. An explanation of why assistive technology is important to the child's quality of life; and
    C. Specific technology requested - including access, if appropriate.
2. A letter from the parent which should include:
    A. A thorough description of the difference the assistive technology would make;
    B. Why technology is important to the child, the emphasis should not be education; and
    C. Goals which could be obtained.
3. Letters from professionals involved in the child's life that should include:
    A. Therapy/Instruction to be enhanced by equipment;
    B. Functional activities in which the child will be able to participate; and
    C. Goals which could be obtained.

4. Any of the following:
    A. Completed copies of the IEP;
    B. Evaluations - any evaluation which has been done within the last 2 years;
    C. Therapy progress reports if applicable to the technology being requested; and
    D. Long-term goals for use of the device.
5. Letter from the child, if that is possible, should include:
    A. Why this technology is important; and
    B. What the child hopes this technology will do for him/her.
6. Also included should be all denial letters the family has received
    A. Insurance;
    B. Private organizations;
    C. Philanthropic organizations; and
    D. Anything relevant to the denial of this technology.

Documenting Specific Evaluations

Kathleen Saunders of the Wisconsin Medical Assistance office developed a sample form for augmentative communication system evaluations for Wisconsin Medicaid applications (1997). (Located at end of chapter). Kathleen suggested including information concerning gross/fine motor skills, vision/hearing, oral motor, and cognition. Specific test scores reflecting receptive and expressive language abilities should also be included.

Augmentative Communication Evaluation
The augmentative communication system evaluation should also include an itemized description of each augmentative communication device considered. The description should include information concerning access method and accuracy of activation, mounting and positioning of device relative to access method, justification for acceptance or rejection of the device, and a listing of all critical components needed with the device. Description of how the device is used within all environments including home, work, community, and school should be included.

The augmentative communication system evaluation should also include a plan for implementation of the device during the trial period. You will need to specifically list goals and objectives for each week of the trial period. Document the vocabulary you intend to program during each trial week. You must keep functional communication as the end result and not just the "using" a device.

Remember that we need to document increased functional communication across environments as a result of use of the device. So our focus will need to be on how and what the individual will be able to do that he or she cannot do without the needed device.

Potential objectives. Following are several examples of potential objectives for a trial period. These are adapted from Kempka and Zientara (1993).

Medical need

- Student will communicate the need for assistance nine out of ten times he experiences pain (or other medical needs specific to the student you are writing about).
- Student will describe pain/discomfort in specific body parts during therapy.
- Student will communicate the need to be suctioned.
- Student will request to be repositioned
- Student will ask for help putting on his jacket before going outside on a cold day at least four out of five opportunities.

Feelings

- Student will learn and use four symbols for feelings with 90% accuracy as judged by the teacher and parent.
- Student will spontaneously communicate feelings four out of five opportunities during a one week period.
- Student will use the names of three people within her environment during functional communication tasks.
- Student will learn and use functionally ten messages related to social conversation on five randomly selected occasions.

- Student will learn to use greeting messages and follow-up questions with peers in regular classroom four out of five opportunities.
- Student will demonstrate at least five communicative intents.
- Student will request objects during play.
- Student will provide information concerning daily activities when he gets home.
- Student will use his device to successfully use the phone to complete routine tasks (order prescription, call for van).
- Student will indicate that he knows the answer to a question in class and then answer question correctly 80% of the time.
- Student will give a food order while in cafeteria or fast food restaurant.

Programming/authoring

- Student will program three new messages in the device.
- Student will author five new messages weekly to be programmed into the device.
- The student wi1l use appropriate volume when using his device.
- The student will be able to switch from spell to communication mode on device.
- The student will give a written note to a teacher using print command.

Keeping accurate data on the functional use of the device across all environments can be a challenge, but it is absolutely essential. One way of facilitating this is to attach a data sheet to the device and ask communication partners to document target goals during each week of the trial period. Remember to include goals and objectives to increase the independence of the user in the operation of the device.

After the completion of the trial period, the data collected reflecting the use of the device should be written up and submitted to the Wisconsin Medical Assistance office. The report should include:

- A brief summary of student, diagnosis, and type of device used during trial.
- A summary of experience with the device including the length of time used, the access method, mounting protocol, and a listing of overall goals of the trial period.
- A week by week account of specific objectives met during the target weeks. Include examples of functional use across environments and document increased successful communication attempts. Document the number of messages that the device had programmed in each particular week and the growth the client has demonstrated by use of the additional vocabulary.
- Note how the student is beginning to learn how to operate the specific features of the device (print function, volume control, tool box, etc.), or increased his or her range, or increased mean length of communication, or complexity of communication. (See sample at end of chapter).

Appealing a Denial under Medical Assistance

First requests for funding of assistive technology from Medical Assistance are frequently denied. Upon receipt of a denial of services for durable medical equipment you have the right to appeal their decision. You will appeal the decision through the fair hearing process. Murphy (1995) suggests your appeal should be in accord with the following.

1. The appeal must be in writing.
2. If you are currently receiving services you must appeal within 45 days after the denial.
3. If you are appealing a durable medical equipment denial you will need to do so within 45 days after notice is given.
4. After you have submitted the appeal follow-up with a call to the Office of Administrative Hearings to find out the time and location of the hearing.
5. If you need to postpone the hearing you may do this by phone and the hearing will be rescheduled.
6. If you need to cancel the hearing you must do so in writing and make sure this is done in advance of the hearing.

The Fair Hearing is a meeting between you, a representative from the opposing agency and the Fair Hearing Officer. All parties will be able to tell their story. A decision will be mailed to you by the Hearing Officer. Unless the record has been requested to be kept open for more information to be shared, the decision will be made within 90 days of when your request to have a fair hearing was received. (see sample letter of appeal for DME at end of chapter).

While all of these steps can seem overwhelming, Sadler (1996) reminds us that each time you complete one, you are that much closer to your ultimate goal of funding an AT device for a student with a disability.

Additional Sources of Funding

There are some other sources of funding that are sometimes utilized. Again, this can be time consuming, and is not necessarily a recommendation, but both foundations and service clubs have historically been a source of funding for assistive technology for individuals.

Foundations

There are thousands of foundations in the United States. The best way to begin to identify which one might be willing to fund an assistive technology device is to review one or more of the foundation directories. These are usually available at larger public libraries. In addition, Wisconsin's Marquette University is affiliated with the Foundation Center, a national network of library reference collections. The Marquette University library contains an extensive collection of directories as well as annual reports from state and national foundations. Other collections are available at UW Stevens Point and UW Madison libraries.

In general, foundations are either "general purpose" or "special purpose." Some special purpose foundations are dedicated to "handicapped individuals" or "technology" or "education." General purpose foundations may also have these interest areas as part of their focus. Any of these interest areas may make them a possible funding source. Once you have selected several potential foundations, a letter of inquiry is the best way to begin. You will need to find out if they accept unsolicited requests, if so, when

requests are received, how to apply, etc. Based on the information you receive, you can target one and begin the application process.

Service Clubs
Service clubs are a very good source of financial assistance to purchase (or help purchase) assistive technology devices. These are groups of people who are looking for projects that they can support. A personal contact within the group is most helpful. However, if you don't know anyone personally, you can get to know them by approaching the group by telephone or letter and explain who you are and what you are seeking.

A list of all clubs is not possible, but the most common are: Elks, Kiwanis, Knights of Columbus, Lions, Moose, Optimists, Rotary, and Shriners. If you do not know anyone in these organizations, you can find a telephone number for them under Fraternal Organizations in the yellow pages of your telephone book.

Often the relationship that develops between the service club and the child or family that received funding is one of the added benefits. People enjoy raising money for a “good cause.”

Conclusion
As technology continues to become a more and more significant part of our daily life, it will hopefully mean that assistive technology will be more available and more affordable. In addition, as basic computer software become more “user friendly” its features will be more assistive to the user with a disability. Speech output and speech recognition input are examples of this.

In addition, as schools become more comfortable with technology and more aware of their role in providing assistive technology, it is our hope that the necessary devices and services will become almost “automatic” and there will no longer be a need for special funding.

Resources on Funding

http://www.ucpa.org
Assistive Technology Funding and Systems Change Project (ATFSCP)
1660 L Street, NW. Stuie 700
Washington, DC 20036
(202) 776-0406
This five year project has produced many useful documents on funding assistive technology. They can be found on the United Cerebral Palsy Association's website.

http://trace.wisc.edu/archive/fintech/fintech.html
This online handbook, put together by the George Washington University Regional Rehabilitation Continuing Education Program, in collaboration with the electronic Industries Foundation, covers many aspects of financing assistive technology. The handbook presents information on over nine different major funding sources.

http://www.empowermentzone.com/at_faqs.txt
This online document, produced by the Empowerment Zone, answers many frequently asked questions on assistive technology in great detail. It provides information on a number of different funding sources.

http://www.nls.org/natmain.htm
Neighborhood Legal Services, Inc.
495 Ellicott Square Building
295 Main Street
Buffalo, New York 14203
This project offers a number of different articles related to financing assistive technology. A special focus of the project is on legal issues related to assistive technology. An on line newsletter and booklet are offered as well.

http://www.katsnet.org/funding1.pdf
*The Buck Stops Here: A Guide to Assistive Technology Funding in Kentu*cky
Kentucky Assistive Technology Service Network
Workforce Development Cabinet
Department for the Blind
Louisville, Kentucky
1 - 800 - 327 - 5287
Although this book speaks directly to funding in Kentucky, much of the information translates across states and is an excellent resource. The entire book can be downloaded from the above website.

AUGMENTATIVE COMMUNICATION SYSTEM EVALUATION for Wisconsin Medicaid

Name:_____ D.O.B.:_____Address:_____

Medicaid ID #:_____

Diagnoses:_____Dates of Onset:_____

M.D. Order and Date:_____

Speech Pathologist:_____Evaluation Date:_____

History: brief social and clinical_____

Gross/Fine Motor:_____

Vision/Hearing:_____

Oral/Motor:_____

Cognition:_____

Receptive Language: e.g., Peabody Picture Vocabulary Test-Revised (PPVT-R)
Receptive One Word Picture Vocabulary (ROWPVT)
Test for Auditory Comprehension of Language (TACL)
Non Speech Test for Receptive Language
Receptive/Expressive Emergent Language Scale (REEL)

Expressive Language: e.g., Receptive/Expressive Emergent Language Scale (REEL) Non Speech Test for Expressive Language
Expressive One Word Picture Vocabulary Test(EOWPVT)

DEVICES CONSIDERED: itemize each separately and include:
Accuracy of Activation
Performance History
Mounting and Access - stress positioning
Justification for Acceptance or Rejection
All necessary Components

TRIAL PERIOD: INCLUDES TRIAL IN ALL PLACES OF USE, HOME/WORK/ SCHOOL
1) List each week separately with measurable, functional goals and specific measurable outcome - avoid using percentages - speak to functional communication.
2) List mounting and component parts with cost.
3) Has 3rd party insurance denial been obtained prior to prior auth. request? ks9/95

Report of trial results with AAC Device

Re: Student name_____

DOB:MA# _____

This letter is a written request for approval of funding for the purchase of a _____ communication prostheses for _____ Student is a five year old boy with a diagnosis of cerebral palsy and a seizure disorder. Due to excessive muscle tone throughout his body, Student has no functional verbal speech, despite near age level receptive language skills. Please refer to the augmentative communication evaluation report for specific evaluation results and justification of a communication prosthesis for student.

Student was provided access to the _____ through a four week rental agreement between the Company and the ABC School District. Student was accompanied by his mother and father to an introduction to the prosthesis conducted by the _____ Company representative. All classroom personnel were also in attendance at the initial training. The following goals were set at the onset of the four week rental period. Student will:

1. make 10 requests per day
2. use at minimum five communicative intents per day
3. identify 10 categories
4. make requests using two symbol combinations - 10 per day
5. initiate communication with adults, peers and family - 10 per day

Progress:
Week 1: Student using 16 location individual menu and two activity pages to spontaneously make requests and describe feelings. _____ device accompanies student to Early Childhood, day care and back home. Student was able to successfully communicate messages to parents concerning activities completed during day from onset of introduction. Student is able to directly access the _____ using forefinger of right hand.

Week 2: Activity pages were added to include favorite toys, home routines, games, and a family page. Student is now using the _____ to give directions while being pushed in his chair, while being positioned in the Early Childhood classroom and to his caregivers at home. Student has also been introduced to an alphabet display to begin to spell his name and address. He has demonstrated knowledge of use of dynamic display by independently navigating from menu to activity pages.

Week 3: Student's parents again visited school for additional help and instruction in programming the _____ Student is functionally using device within the Early Childhood program to choose snack, indicate discomfort, interact with peers, and to relay messages between off-ice and the classroom. Student has been introduced to the backspace and clear function keys as two symbol combinations have been added to overlays.

Student is successfully using both of these keys to edit incorrect messages. Approximately ten new activity pages were added this week to include vocabulary for field trips, grocery shopping, participation in a play, and many other activities.

Week 4: Additional messages for school and home are being added daily. Student is using the spontaneously without prompting. He has assumed responsibility for keeping the in close proximity and often is seen gesturing for his prosthesis so he can speak. Mrs. _____ reports that Student successfully used his device to complete a phone conversation with a Grandparent.

Summary and Justification:
Student demonstrates no functional verbal communication. Gestural communication is limited by motor constraints. Student has demonstrated effective use of the _____. He has excelled in vocabulary usage in a variety of contexts and in many different environments. Specific features of the _____ which were critical for Student's use include: dynamic display, color coding of categories, flexibility for size of symbols, easy self correction, potential for spelling, ease of operation and ability to use within varying environmental conditions. This prosthesis is the most functional choice for Student as a communication prosthesis which will be able to grow with Student and continue to meet his need for the future.

APPEAL LETTER FOR DURABLE MEDICAL EQUIPMENT

EXAMPLE

January 12, 1998

Wisconsin Department of Health and Social Services
Office of Administrative Hearings
P.O. Box 7875
Madison, Wisconsin 53707-7875

To Whom It May Concern:

My name is Ms. Advocate and I'm Ms. Consumer's representative. On her behalf I'm appealing the denial sent on January 11, 1999 for a communication device for my client Ms. Consumer (999-99-9999) who resides at 1111 N. Plankinton Avenue, Milwaukee, Wisconsin, 53203.

Correspondence can be sent to:

Ms. Advocate
Advocates of Wisconsin
5555 ADA Drive
Milwaukee, Wisconsin 53203

Sincerely,

Ms. Advocate

Advocacy Specialist

cc: Ms. Consumer

Notes:

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Assistive Technology Resources

Internet Sites

AAC Intervention.com provides a wealth of ideas about augmentative communication for children of all ages. Check under "read" for a list of books with repeated lines. www.aacintervention.com

ABLEDATA is a database of over 19,000 assistive technology devices including thousands of ADLs. http://www.abledata.com

Assistance Dogs International provides information on training, placement, and utilization of dogs to assist people with disabilities. http://www.adionline.org/

Assistance Dogs of the West in conjunction with the *Desert Academy* describes a training program of assistance dogs. http://www.desertacademy.org/dogs.html

ATSTAR is a website for Assistive Technology Strategies, Tools, Accommodations, and Resources http://www.atstar.org/at_daily_living.htm

Camera Obscura website provides access to e-text resources for blind individuals using speech synthesis and/or refreshable Braille. http://www.hicom.net/~oedipus

Closing the Gap provides their Resource Directory as a searchable database on-line as well as articles from their bimonthly newsletter. http://www.closingthegap.com

LD On Line, has a new section specifically on assistive technology. To get to it go to LD in Depth and then choose Technology. http://www.ldonline.com

LD Resources by Richard Wanderman has many wonderful ideas. ttp://www.ldresources.com *National Association of Educators of Young Children* provides many excellent sources of information. Some of these include articles on early learning including a list of good books for young children. http://www.naeys.org

National Center to Improve Practice (NCIP) Education Development Center, Inc, videos and other AT resources. http://www2.edc.org/NCIP/

National Technology Program of the American Foundation for the Blind conducts evaluations of assistive technology for persons with visual impairments, provides information on these products, and coordinates the Careers and Technology Information Bank (CTIB).
http://www.afb.org/info_document_view.asp?documentid=225

The*Project Gutenberg* website has a wealth of e-texts divided into: light literature, heavy literature, and references. http://promo.net/pg/

Project LITT: Literacy Instruction Through Technology is a website based on research on the role of technology in learning to read for students with learning disabilities. It includes software profiles of many programs available for reading and literacy.
http://edweb.sdsu.edu/SPED/ProjectLITT/LITT

Tech Connections is a website for connecting people with assistive technology
http://www.techconnections.org/resources/pubsLev3.cfm?category=3&subcat=1405

Trace Center offers links to numerous adaptive freeware and shareware.
http://trace.wisc.edu/world/computer_access/index.html

Wisconsin Assistive Technology Initiative has WATI assessment forms, updates, lending library, info, best practice tips, and more. http://www.wati.org

Journals/Newsletters

Augmentative Communication News, Augmentative Communication, Inc., 1 Surf Way, Suite #237, Monterey, CA 93940.

Augmentative and Alternative Communication, ISAAC, 49 The Donway West, Suite 308,Toronto, ON ,M3C 3M9 Canada

Closing the Gap, Closing the Gap, P.O. Box 68, Henderson, MN 65044. Subscription $32.

Journal of Special Education Technology, Free with TAM Membership (a division of CEC), $40 per year for others. Kyle Higgins & Randall Boone, JSET Editors, Dept. of Special Education., UNLV, 4505 Maryland Pkwy. Box 453014, Las Vegas, NV 89154-3014 or email higgins@nevada.edu or rboone@nevada.edu.

The Monitor, published six times per year by Milwaukee Public Schools and WATI, free from: http://wait.org.

Special Education Technology Practice, Knowledge by Design, 5907 N. Kent Ave., Whitefish, Bay, WI 53217-4615, $29.95 per year. http://www.setp.net

Technology and Learning, CMP Media, Inc. 600 Harrison St., San Francisco, CA 94107, $29.95 per year.

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CD-ROMs

The Gate – Part 1. Shows a variety of individuals using assistive technology. ORCCA Technology, Inc., 317-B South Ashland Ave., Lexington, KY 40502, 606/268-1635, http://www.orcca.com.

UKAT Toolkit. Provides tools for districts to deliver AT services from referral to implementation and evaluation. Dr. Margaret Bausch, EDSRC, University of Kentucky, 229 Taylor Education Building, Lexington, KY 40506-0001.

Video Tapes

Assistive Technology, We Can Do It. American Speech and Hearing Association, $24.

Attainment's AT Video Series: Assessment Made Easy; The IEP Team and AT Decisions; and *AT: More Than Computers.* Available from Attainment Company, Inc. P. O. Box 930160, Verona, WI 53593-0160. 800-327-4269.

NCIP Video Profiles, National Center to Improve Practice, EDC, Inc., P.O. Box 1020, Sewickley, PA 15143-1020. Five videos are available: H591-*Multimedia and More: Help for Students with Learning Disabilities*; H592-*Jeff With Expression: Writing with Word Prediction Software*; *H593-Telling Tales in ASL and English: Reading, Writing and Videotapes*; H594-*"Write" Tools for Angie: Technology for Students who are Visually Impaired*; and H596-*Welcome to My Preschool! Communicating with Technology.*

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The Wisconsin Assistive Technology Initiative has developed a variety of materials to help support school district staff as they implement the assistive technology requirements of IDEA. These include manuals, assessment forms, self assessment tools, children's stories, and more. In addition we have found several low cost AT devices that we find useful and want to pass those on to others.

Our materials have been sold in 50 states and 7 countries, with many repeat customers, so we know we are providing products that are useful to assistive technology service providers in many different situations.

* *

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Assessing Students' Needs for Assistive Technology (ASNAT) 4th Edition

ASNAT is designed to help educational teams assess a student's need for assistive technology. ASNAT provides a wealth of information about assistive technology. The first chapter explains the assessment procedure and forms that WATI has developed to support school teams as they engage in the assessment process. Subsequent chapters provide detailed information on specific categories of assistive technology. The appendix contains resources including print, web, and AT vendors.. The 4th edition (2004) is completely revised. Upgrades are available for half price by including the cover insert from your old manual with your order. One insert is required for each upgrade.

ASNAT manual: $35 within Wisconsin or $50 outside of Wisconsin, + $5 s&h each
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AT Video Series

A 3-video series ideal for training of teachers, therapists, parents, assistants and administrators. Video One, *Assistive Technology Assessment Made Easy* describes the WATI process to assess a student's AT needs. Relevant forms are included on an accompanying CD. Video two, *Assistive Technology is More than Computers* emphasizes the importance of considering low tech tools and high tech devices. The AT Checklist on the CD offers a wide range of solutions for educational challenges. Video Three, *The IEP Team and AT Decisions* shows how an IEP team uses WATI's Decision Making process to make effective decisions about AT.

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AT Tools and Strategies Assessment Kit for Students with Autism Spectrum Disorder (ASD)

The purpose of this kit is to provide ideas and materials that can be used to assess the impact of color, visual symbols and other assistive technologies for students with ASD. This kit of materials **includes** the *AT Tools and Strategies Assessment Manual* described below. In addition, there are a variety of low tech items. These items include a magnetic visual schedule, communication boards, a book in both color and black and white, an acrylic easel, visual timer, simple voice output device with overlays, reusable alert symbols, activity termination signals, calming down activity board, true object based icons, cloud ball, twosd memo boards, and directions for use of all items. Information on sources for these and other items is provided. The AT Planning Guide for Students with Autism is specifically developed to facilitate effective team planning for students with Autism. It is designed to help you address sensory, communication, academic, motor behavior, social, and transition issues.

Complete Assessment Kit: $175 within Wisconsin or $225 outside of Wisconsin, + $10 s&h each
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Assistive Technology Tools and Strategies Assessment Manual for Children with Autism Spectrum Disorder (ASD)

This set of three sequential AT assessment guides will lead you through a process of information gathering and decision making related to the selection and use of assistive technology tools and strategies for students with ASD. The Student Information Guide is a tool used to gather information about a student with ASD. The Environmental Observation Guide is another information gathering tool. It is used while observing, to gather information from the various environments in which the child is expected to function. The AT Planning Guide is a team decision making guide. It will lead your team through the process of making a decision about assistive technology tools and strategies based on the information you gathered. In addition a Resource Guide for Students with ASD is included. It describes a variety of assistive technology tools and strategies that may be useful to students with Autism Spectrum Disorder.

AT Tools & Strategies Assessment Manual: $35 within Wisconsin or
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Assistive Technology and Transition Planning Portfolio

The AT and Transition Planning Portfolio is a collection of useful forms designed to help the team successfully prepare an AT using student for transition. It lays out the planning and training process beginning before age 14 and moving through the entire transition process. Upon transition the completed portfolio is designed to go with the student so that all needed information will be readily available in the future.

AT and Transition Planning Portfolio: $10 within Wisconsin or
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Assistive Technology Pointers for Parents

Assistive Technology Pointers for Parents is a workbook to assist parents in working with schools and other agencies to identify appropriate assistive technology devices and services for their children with disabilities. It focuses on specific questions that parents can use to help with the decision making process. .

Assistive Technology Pointer for Parents: $12 + $3 s&h each (available in English or Spanish)
(**Note**: WATI sells AT Pointers for Parents in Wisconsin only by special arrangement with CATO, orders from outside Wisconsin MUST be sent to: CATO, P.O. Box 431, Winchester, OR 97495, or call 541/440-4791.)

D.E.S.K. (Designing Environments for Successful Kids)

This manual provides examples of simple, inexpensive, easy to use strategies and tools to promote student success in a variety of environments from home, to early childhood through secondary school. In considering each environment, the manual focuses on the tasks that children are typically attempting to do in those environments. This manual is written in a non-technical format

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Education Tech Points: A Framework for Assistive Technology Planning

This manual is a tool to help school districts determine and meet the assistive technology needs of individual students and to evaluate and improve their assistive technology services system wide. The manual provides and overview of the Education Tech Points framework and its uses. At each Education Tech Point, key questions to be considered about an individual child are highlighted and implications for school districts are discussed.

Ed Tech Points manual: $36 + $5 s&h
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Hey! Can I Try That?

This 20-page workbook is designed to introduce assistive technology to teens. It provides simple text with worksheets they can complete to help them be more active participants in the selection and use of assistive technology. The full version can be downloaded from the WATI web site, www.wati.org, and copied as long as credits to the author and WATI are maintained. It can also be purchased.

Hey Can I Try That?: 1 for $1 + $1 s&h; 6 for $5 + $1 s&h; 12 for $10 + $2 s&h;
25 for $20 + $3 s&h; 50 for $38 + $4 s&h; 100 for $75 + $5 s&h
(available in English or Spanish)
***Actual shipping charges outside of the US**

How Do You Know It? How Can You Show It?

This easy to read manual explains a variety of ways to collect and use data to make decisions about assistive technology. It utilizes numerous examples of questions that arise about assistive technology to illustrate how teams can collect and use data to make good decisions that are both appropriate and defensible. Numerous copy ready forms are included as well as suggestions for creating your own.

How Do You Know It? How Can You Show It?: $18 within Wisconsin,
$24 outside of Wisconsin, + $3 s&h
***Actual shipping charges outside of the US**

Resource Guide for Teachers and Administrators about Assistive Technology

This 24 page manual explains assistive technology and its uses in simple, easy to understand terms. It provides dozens of websites and other resources for additional information. The full version can be downloaded from the WATI website www.wati.org and copied as long as credits to the author and WATI are maintained. It can also be purchased.

Resource Guide: 1 for $1 + $1 s&h; 6 for $5 + $1 s&h; 12 for $10 + $2 s&h;
25 for $20 + $3 s&h; 50 for $38 + $4 s&h; 100 for $75 + $5 s&h
***Actual shipping charges to addresses outside of the US**

Showcasing Assistive Technology Use in Wisconsin Schools

This manual is a collection of ideas and useful tools from over 50 schools in Wisconsin. This manual is intended to save you time and help you avoid "reinventing the wheel." It includes hundreds of ideas, examples, pictures and handouts that have worked in Wisconsin schools.

Showcasing Manual: $25 within Wisconsin or $35 outside of Wisconsin, $5 s&h each
***Actual shipping charges outside of the US**

School Profile of Assistive Technology Services

The School Profile of Assistive Technology Services is a self assessment tool for school districts. The information it provides is the key to effectively developing or improving assistive technology services. It asks the user to consider 23 different components of effective AT service delivery and provides five descriptors for each component. The results provide a profile of strengths & weaknesses.

School Profile of Assistive Technology Services: $15 within Wisconsin or $20 outside of Wisconsin, + $4 s&h each
***Actual shipping charges outside of the US**

WATI Assessment Package

The WATI Assistive Technology Assessment is a process based, systematic approach to providing a functional assessment of the student's need for assistive technology in their customary environment. THIS IS NOT A TEST PROTOCOL. This assessment package includes the WATI Assessment forms including the Consideration Guide, Student Information Guide, Environmental Observation Guide, Decision Making Guide, AT Checklist, and the Trial Use Guide. A cross platform CD is included with the package with includes all forms in a fillable format to allow input of student information.

WATI Assessment Package: $25 within Wisconsin or $35 outside of Wisconsin, + $3 s&h each
***Actual shipping charges outside of the US**

Casio Fraction Mate Calculator (fx-55-w)

This calculator makes working with fractions a snap! There are specific function keys to reduce fractions, change improper fractions to mixed numbers or mixed numbers to fractions, and change decimals to fractions or fractions to decimals. By pressing one key, students can do these complex tasks. The special fraction keys are green and easily recognized.
All other standard calculator functions are also included.

Casio Fraction Mate Calculator: $16 + $2 s&h each
***Actual shipping charges outside of the US**

Clear Acrylic Easel

This clear acrylic collapsable easel has many uses. For example,
it can be an easel for presenting visual information, a transparent surface for the child to trace lines, or to visually track the movement made by another and much more.
The folding Acrylic Easel is 14" x 12" wide.

Acrylic Easel: $70 within Wisconsin or $90 outside of Wisconsin, + $10 s&h each
***Actual shipping charges outside of the US**

Clear Acrylic Eye Gaze Frame

This clear acrylic frame is perfect for using eye gaze to communicate. It is free-standing and folds when not in use. It comes with a set of sample communication symbols.

Acrylic Eye Gaze Frame: $35 within Wisconsin or $40 outside of Wisconsin, + $5 s&h each
***Actual shipping charges outside of the US**

Five Hungry Mice Storybooks

by Judi Cumley

These storybooks present the identical story in two formats – black and white and color. Black and white and color formats will allow you to assess what impact (either positive or negative), if any, the presence of color has on the child's ability to attend or to read the story. Two literacy boards are included.

$35 outside of Wisconsin, + $3 s&h each

Memo Board "Dry Erase" Boards

A set of two pre-made dry erase boards 9" x 12" made with Memo Board Dry Erase Contact paper.
Dry Erase Boards: $5 within Wisconsin or $7 outside of Wisconsin, + $2 s&h each
***Actual shipping charges outside of the US**

Miscellaneous Activity Boards, Communication Boards, Symbols and Overlays

This packet contains several low tech Activity Boards, Communication Boards and other materials.

- Communication Boards – one for recess and one for snack, in both color and black and white.
- Overlays – for the Time Frame Talking Picture Frame for snack and recess.
- Activity Termination Signals – This set of Go (green), Almost Done (yellow), and Wait (red)
- Wait Symbol – Oval orange
- I Need Help Signal
- Calming Down Activity Board – A six-step activity board for calming down.
- Social Story about Waiting in Line – provided in black and white.

Packet of Activity Boards, Communication Boards, Symbols and Overlays: $10 within Wisconsin or $13 outside of Wisconsin, + $2 s&h each
***Actual shipping charges outside of the US**

Reusable Alert Symbols

The Universal "no" and Lightening Bolt "alert" symbols are pre-printed on transparencies. Package of nine "no" symbols and twelve "alert" symbols in three different sizes.
Reusable Symbols: $2 within Wisconsin or $3 outside of Wisconsin, + $1 s&h each
***Actual shipping charges outside of the US**

Visual Schedule

Symbols to create a visual schedule for a student are provided in both color and black and white. Magnetic symbols eliminate the Velcro™ "sound". Symbols attach to a magnetic page mounted on a clip case.
Visual Schedule & Symbol Sets: $15 within Wisconsin or $20 outside of Wisconsin, + $3 s&h each
***Actual shipping charges outside of the US**

Wisconsin Assistive Technology Initiative

Order Form

QTY.	ITEM DESCRIPTION	UNIT PRICE	S&H EA.*	TOTAL
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Check #_____ Purchase Order #_____ Total Enclosed _____

Ship To: Name: _____

Agency: _____

Address: _____

City/State/Zip: _____

Telephone: _____

E-mail: _____

***Actual shipping charges to addresses outside of the US**
***All orders of 5 or more deduct 50% of the shipping charges.**
***Orders for 20 or more of any 1 item are eligible for Wisconsin prices.**

Purchase Orders accepted. Please make checks payable to: WATI/CESA 6

Mail order to: WATI
Polk Library
800 Algoma Blvd
Oshkosh, WI 54901

or fax purchase order to: (920) 424-1396

Direct questions regarding content, ordering information or the status of an order to WATI at (920) 424-2247.

Wisconsin Assistive Technology Initiative staff are available to teach a variety of workshops on topics related to the provision of assistive technology services to children with disabilities, including assessment. For more information, please call Liz Lahm at (920) 424-2247.

WATI Assistive Technology Consideration Guide

Student's Name_____ School_____

1. What task is it that we want this student to do, that s/he is unable to do at a level that reflects his/her skills/abilities (writing, reading, communicating, seeing, hearing)? Document by checking each relevant task below. Please leave blank any tasks that are not relevant to the student's IEP.
2. Is the student currently able to complete tasks with special strategies or accommodations? If yes, describe in Column A for each checked task.
3. Is there available assistive technology (either devices, tools, hardware, of software) that could be used to address this task? (If none are known, review WATI's AT Checklist.) If any assistive technology tools are currently being used (or were tried in the past), describe in Column B.
4. Would the use of assistive technology help the student perform this skill more easily or efficiently, in the least restrictive environment, or perform successfully with less personal assistance? If yes, complete Column C.

Task	A. If currently completes task with special strategies / accommodations, describe.	B. If currently completes task with assistive technology tools, describe.	C. Describe new or additional assistive technology to be tried.
❒ Motor Aspects of Writing			
❒ Computer Access			
❒ Composing Written Material			
❒ Communication			
❒ Reading			
❒ Learning/ Studying			

Task	A. If currently completes task with special strategies / accommodations, describe.	B. If currently completes task with assistive technology tools, describe.	C. Describe new or additional assistive technology to be tried.
❒ Math			
❒ Recreation and Leisure			
❒ Activities of Daily Living ADLs)			
❒ Mobility			
❒ Environmental Control			
❒ Positioning and Seating			
❒ Vision			
❒ Hearing			

5. Are there assistive technology services (more specific evaluation of need for assistive technology, adapting or modifying the assistive technology, technical assistance on its operation or use, or training of student, staff, or family) that this student needs? If yes, describe what will be provided, the initiation and duration.

_____

_____

Persons Present:_____ Date:_____

W.A.T.I.
Assistive Technology Assessment
Directions/Procedure Guide

School District/Agency_____School_____

Student_____Grade_____

Team Members_____

	Date Completed	Comments

Gathering Information:

Step 1: Team Members Gather Information

Review existing information regarding child's abilities, difficulties, environment, and tasks. If there is missing information, you will need to gather the information by completing formal tests, completing informal tests, and/or observing the child in various settings. The WATI Student Information Guide and Environmental Observation Guide are used to assist with gathering information. Remember, the team gathering this information should include parents, and if appropriate, the student.

Step 2: Schedule Meeting

Schedule a meeting with the team. Team includes: parents, student (if appropriate), service providers (e.g. spec. ed. teacher, general ed. teacher, SLP, OT, PT, administrator), and any others directly involved or with required knowledge and expertise.

Decision Making:

Step 3: Team Completes Problem Identification Portion of AT Planning Guide at the Meeting.

(Choose someone to write all topics where everyone participating can see them.)

The team should move quickly through:

Listing the student's **abilities/difficulties** related to tasks (5-10 minutes).

Listing key aspects of the **environment** in which the student functions and the student's location and positioning within the environment (5-10 minutes).

Identifying the **tasks** the student needs to be able to do is important because the team cannot generate AT solutions until the tasks are identified (5-10 minutes).

(Note: The emphasis in problem identification is identifying tasks the student needs to be able to do and the relationship of the student's abilities/difficulties and characteristics of the environment of the child's performance of the tasks.)

Date Completed Comments

Step 4: Prioritize the List of Tasks for Solution Generation

Identify critical task for which the team will generate potential solutions. This may require a redefining or reframing of the original referral question, but is necessary so that you hone in on the most critical task

Step 5: Solution Generation

Brainstorm all possible solutions.

Note: The specificity of the solutions will vary depending on the knowledge and experience of the team members; some teams may generate names of specific devices with features that will meet the child's needs, other teams may simply talk about features that are important, e.g. "needs voice output," "needs to be portable," "needs few (or many) messages," "needs input method other than hands," etc. Teams may want to use specific resources to assist with solution generation. These resources include, but are not limited to: the AT Checklist, the ASNAT Manual, the Tool Box in *Computer and Web Resources for People with Disabilities*, *Closing the Gap Resource Directory*, and/or AT Consultant.

Step 6: Solution Selection

Discuss the solutions listed, thinking about which are most effective for the student. It may help to group solutions that can be implemented 1) immediately, 2) in the next few months, and 3) in the future. At this point list names of specific devices, hardware, software, etc. If the team does not know the names of devices, etc., use resources noted in Step 5 or schedule a consultation with a knowledgeable resource person (that is the part of the decision-making that should require the most time. Plan on 20-30 minutes here).

Step 7: Implementation Plan

Develop implementation plan (including trials with equipment) – being sure to assign specific names and dates, and determine meeting date to review progress (follow-up Plan).

Reminder: Steps 3-7 occur in a meeting with all topics written where all participants can see them. Use a flip chart, board or overhead during the meeting, because visual memory is an important supplement to auditory memory. Following the meeting, ensure that someone transfers the information to paper for the child's file for future reference.

Trial Use:

Step 8: Implement Planned Trials

Step 9: Follow Up on Planned Date

Review trial use. Make any needed decisions about permanent use. Plan for permanent use.

Referral/Question Identification Guide

Student's Name_____ Date of Birth_____ Age__

School_____ Grade_____

School Contact Person_____ Phone_____

Persons Completing Guide_____

Date_____

Parent(s) Name_____ Phone_____

Address_____

Student's Primary Language_____ Family's Primary Language_____

Disability (Check all that apply.)

- ❒ Speech/Language
- ❒ Cognitive Disability
- ❒ Traumatic Brain Injury
- ❒ Emotional/Behavioral Disability
- ❒ Orthopedic Impairment – Type_____
- ❒ Significant Developmental Delay
- ❒ Other Health Impairment
- ❒ Autism
- ❒ Specific Learning Disability
- ❒ Hearing Impairment
- ❒ Vision Impairment

Current Age Group

- ❒ Birth to Three
- ❒ Middle School
- ❒ Early Childhood
- ❒ Secondary
- ❒ Elementary

Classroom Setting

- ❒ Regular Education Classroom
- ❒ Home
- ❒ Resource Room
- ❒ Other_____
- ❒ Self-contained

Current Service Providers

- ❒ Occupational Therapy
- ❒ Physical Therapy
- ❒ Speech Language
- ❒ Other(s)_____

Medical Considerations (Check all that apply.)

- ❒ History of seizures
- ❒ Has degenerative medical condition
- ❒ Has multiple health problems
- ❒ Has frequent ear infections
- ❒ Has allergies to_____
- ❒ Currently taking medication for_____
- ❒ Other – Describe briefly_____
- ❒ Fatigues easily
- ❒ Has frequent pain
- ❒ Has frequent upper respiratory infections
- ❒ Has digestive problems

_____

Other Issues of Concern_____

Assistive Technology Currently Used (Check all that apply.)

- ❒ None
- ❒ Manual Communication Board
- ❒ Low Tech Vision Aids
- ❒ Environmental Control Unit/EADL
- ❒ Power Wheelchair
- ❒ Voice Recognition
- ❒ Low Tech Writing Aids
- ❒ Augmentative Communication System
- ❒ Amplification System
- ❒ Manual Wheelchair
- ❒ Computer – Type (platform)_____
- ❒ Word Prediction
- ❒ Adaptive Input - Describe_____
- ❒ Adaptive Output - Describe_____
- ❒ Other_____

Assistive Technology Tried

Please describe any other assistive technology previously tried, length of trial, and outcome (how did it work or why didn't it work.)

_____ _____

Assistive Technology Number and Dates of Trial(s)

_____

Outcome

_____ _____

Assistive Technology Number and Dates of Trial(s)

_____

Outcome

_____ _____

Assistive Technology Number and Dates of Trial(s)

_____

Outcome

REFERRAL QUESTION

What task(s) does the student need to do that is currently difficult or impossible, and for which assistive technology may be an option? _____

_____

Based on the referral question, select the sections of the Student Information Guide to be completed. (Check all that apply.)

- ❒ Section 1 Fine Motor Related to Computer or Device Access
- ❒ Section 2 Motor Aspects of Writing
- ❒ Section 3 Composing Written Material
- ❒ Section 4 Communication
- ❒ Section 5 Reading
- ❒ Section 6 Learning and Studying
- ❒ Section 7 Math
- ❒ Section 8 Recreation and Leisure
- ❒ Section 9 Seating and Positioning
- ❒ Section 10 Mobility
- ❒ Section 11 Vision
- ❒ Section 12 Hearing
- ❒ Section 13 General

WATI Student Information Guide

SECTION 1

Fine Motor Related to Computer (or Device) Access

1. Current Fine Motor Abilities

Observe the student using paper and pencil, typewriter, computer, switch, etc. Look at the movements as well as the activities and situations. Does the student have voluntary, isolated, controlled movements using the following? (Check all that apply.)

❒ Left hand	❒ Right hand	❒ Eye(s)
❒ Left arm	❒ Right arm	❒ Head
❒ Left leg	❒ Right leg	❒ Mouth
❒ Left foot	❒ Right foot	❒ Tongue
❒ Finger(s)	❒ Eyebrows	❒ Other _____

Describe briefly the activities/situations observed_____

_____

_____

_____

2. Range of Motion

Student has specific limitations to range. ❒Yes ❒No

Describe the specific range in which the student has the most motor control._____

_____

_____

_____

3. Abnormal Reflexes and Muscle Tone

Student has abnormal reflexes or abnormal muscle tone. ❒Yes ❒No

Describe briefly any abnormal reflex patterns or patterns of low or high muscle tone that may interfere with the student's voluntary motor control._____

_____

_____

_____

4. Accuracy

Student has difficulty with accuracy. ❒Yes ❒No

Describe how accurate, reliable and consistent the student is in performing a particular fine motor task.

_____

5. Fatigue

Student fatigues easily. ❒Yes ❒No

Describe how easily the student becomes fatigued._____

_____

_____

_____

6. Assisted Direct Selection

What type of assistance for direct selection has been tried? (Check all that apply.)

❒ Keyguard ❒ Head pointer/head stick

❒ Pointers, hand grips, splints etc. ❒ Light beam/laser

Other:_____

Describe which seemed to work the best and why._____

_____

7. Size of Grid Student Is Able to Access

What is the smallest square the student can accurately access? ❒ 1" ❒ 2" ❒ 3" ❒ 4"

What is the optimal size grid? Size of square_____

Number of squares across_____

Number of squares down_____

8. Scanning

If student cannot direct select, does the student use scanning?

❒ No

❒ Yes, if yes ❒ Step ❒ Automatic ❒ Inverse ❒ Other_____

Preferred control site (body site)_____

Other possible control sites_____

9. Type of Switch

The following switches have been tried. (Check all that apply. **Circle the one or two** that seemed to work the best.)

❒ Touch (jellybean) ❒ Light touch ❒ Wobble ❒ Rocker

❒ Joystick ❒ Lever ❒ Head switch ❒ Mercury (tilt)

❒ Arm slot ❒ Eye brow ❒ Tongue ❒ Sip/puff

❒ Tread ❒ Other_____

Summary of Student's Abilities and Concerns Related to Computer/Device Access_____

_____

_____

WATI Student Information Guide

SECTION 2

Motor Aspects of Writing

1. Current Writing Ability (Check all that apply.)

- ❒ Holds pencil, but does not write
- ❒ Scribbles with a few recognizable letters
- ❒ Uses pencil adapted with_____
- ❒ Copies from book (near point)
- ❒ Prints a few words
- ❒ Prints name
- ❒ Writes cursive
- ❒ Writing is limited due to fatigue
- ❒ Writing is slow and arduous
- ❒ Pretend writes
- ❒ Uses regular pencil
- ❒ Copies simple shapes
- ❒ Copies from board (far point)
- ❒ Writes on 1" lines
- ❒ Writes on narrow lines
- ❒ Uses space correctly
- ❒ Sizes writing to fit spaces
- ❒ Writes independently and legibly

2. Assistive Technology Used (Check all that apply.)

- ❒ Paper with heavier lines
- ❒ Special pencil or marker
- ❒ Computer
- ❒ Paper with raised lines
- ❒ Splint or pencil holder
- ❒ Other _____
- ❒ Pencil grip
- ❒ Typewriter

3. Current Keyboarding Ability (Check all that apply.)

- ❒ Does not currently type
- ❒ Types slowly, with one finger
- ❒ Accidentally hits unwanted keys
- ❒ Requires arm or wrist support to type
- ❒ Uses mini keyboard to reduce fatigue
- ❒ Uses Touch Window
- ❒ Uses access software
- ❒ Activates desired key on command
- ❒ Types slowly, with more than one finger
- ❒ Performs 10 finger typing
- ❒ Accesses keyboard with head or mouth stick
- ❒ Uses switch to access computer
- ❒ Uses alternative keyboard
- ❒ Uses Morse code to access computer
- ❒ Uses adapted or alternate keyboard, such as_____
- ❒ Other_____

4. Computer Use (Check all that apply.)

- ❒ Has never used a computer
- ❒ Uses computer for games
- ❒ Uses computer at school
- ❒ Uses computer for word processing
- ❒ Uses computer at home
- ❒ Uses computer's spell checker
- ❒ Uses computer for a variety of purposes, such as_____
- ❒ Has potential to use computer but has not used a computer because_____

_____

_____

_____

_____

5. Computer Availability and Use

The student has access to the following computer(s)

❒ PC ❒ Macintosh ❒ Other_____

❒ Desktop ❒ Laptop

Location:_____

The student uses a computer

❒ Rarely ❒ Frequently ❒ Daily for one or more subjects or periods ❒ Every day, all day

Summary of Student's Abilities and Concerns Related to Writing _____

_____

_____

_____

_____

WATI Student Information Guide

SECTION 3

Composing Written Material

1. Typical of Student's Present Writing (Check all that apply.)

- ❒ Short words
- ❒ Short phrases
- ❒ Complex phrases
- ❒ Sentences
- ❒ Paragraphs of 2-5 sentences
- ❒ Longer paragraphs
- ❒ Multi-paragraph reports
- ❒ Other _____ _____

2. Difficulties Currently Experienced by Student (Check all that apply.)

- ❒ Answering questions
- ❒ Getting started on a sentence or story
- ❒ Adding information to a topic
- ❒ Sequencing information
- ❒ Integrating information from two or more sources
- ❒ Relating information to specific topics
- ❒ Determining when to begin a new paragraph
- ❒ Generating ideas
- ❒ Working w/peers to generate ideas and information
- ❒ Planning content
- ❒ Using a variety of vocabulary
- ❒ Summarizing information
- ❒ Other_____ _____

3. Strategies for Composing Written Materials Student Currently Utilizes (Check all that apply.)

- ❒ Story starters
- ❒ Preset choices or plot twists
- ❒ Templates to provide the format or structure (both paper and electronic)
- ❒ Webbing/concept mapping
- ❒ Outlines
- ❒ Other_____

4. Aids/Assistive Technology for Composing Written Materials Utilized by Student
(Check all that apply.)

- ❒ Word cards
- ❒ Word book
- ❒ Word wall/word lists
- ❒ Prewritten words on cards or labels
- ❒ Dictionary
- ❒ Electronic dictionary/spell checker
- ❒ Whole words using software or hardware (e.g. IntelliKeys)
- ❒ Symbol-based software for writing (e.g. Writing with Symbols 2000 or Pix Writer)
- ❒ Word processing with spell checker/grammar checker
- ❒ Talking word processing
- ❒ Abbreviation/expansion
- ❒ Word processing with writing support
- ❒ Multimedia software
- ❒ Voice recognition software
- ❒ Other_____

Summary of Student's Abilities and Concerns Related to Computer/Device Access_____

_____

_____

WATI Student Information Guide

SECTION 4

Communication

1. Student's Present Means of Communication

(Check all that are used. **Circle the primary method** the student uses.)

❒ Changes in breathing patterns ❒ Body position changes ❒ Eye-gaze/eye movement

❒ Facial expressions ❒ Gestures ❒ Pointing

❒ Sign language approximations ❒ Sign language (Type_____ # signs_____

combinations _____ # signs in a combination _____)

❒ Vocalizations, list examples_____

❒ Vowels, vowel combinations, list examples_____

❒ Single words, list examples & approx. #_____

❒ Reliable no ❒ Reliable yes

❒ 2-word utterances ❒ 3-word utterances

❒ Semi intelligible speech, estimate % intelligible:_____

❒ Communication board ❒ Tangibles ❒ Pictures ❒ Combination pictures/words ❒ Words

❒ Voice output AC device (name of device)_____

❒ Intelligible speech ❒ Writing ❒ Other_____

2. Those Who Understand Student's Communication Attempts (Check best descriptor.)

	Most of the time	Part of the time	Rarely	Not Applicable
Strangers	❒	❒	❒	❒
Teachers/therapists	❒	❒	❒	❒
Peers	❒	❒	❒	❒
Siblings	❒	❒	❒	❒
Parent/Guardian	❒	❒	❒	❒

3. Current Level of Receptive Language

Age approximation _____

If formal tests used, name and scores_____

If formal testing is not used, please give an approximate age or developmental level of functioning. Explain your rationale for this estimate. _____

_____

4. Current Level of Expressive Language

Age approximation: _____

If formal tests used, name and scores_____

If formal testing is not used, please give an approximate age or developmental level of functioning. Explain your rationale for this estimate._____

5. Communication Interaction Skills

Desires to communicate ❒ Yes ❒ No

To indicate *yes* and *no* the student

❒ Shakes head ❒ Signs ❒ Vocalizes ❒ Gestures ❒ Eye gazes

❒ Points to board ❒ Uses word approximations ❒ Does not respond consistently

Can a person unfamiliar with the student understand the response? ❒ Yes ❒ No

	Always	Frequently	Occasionally	Seldom	Never
Turns toward speaker	❒	❒	❒	❒	❒
Interacts with peers	❒	❒	❒	❒	❒
Aware of listener's attention	❒	❒	❒	❒	❒
Initiates interaction	❒	❒	❒	❒	❒
Asks questions	❒	❒	❒	❒	❒
Responds to communication interaction	❒	❒	❒	❒	❒
Requests clarification from communication partner	❒	❒	❒	❒	❒
Repairs communication breakdown	❒	❒	❒	❒	❒
Requires frequent verbal prompts	❒	❒	❒	❒	❒
Requires frequent physical prompts	❒	❒	❒	❒	❒
Maintains communication exchange	❒	❒	❒	❒	❒
Terminates communication	❒	❒	❒	❒	❒

Describe techniques student uses for repair (e.g. keeps trying, changes message, points to first letter etc.).

_____

_____

_____

6. Student's Needs Related to Devices/Systems (Check all that apply.)

❒ Walks ❒ Uses wheelchair ❒ Carries device under 2 pounds

❒ Drops or throws things frequently ❒ Needs digitized (human) speech

❒ Needs device w/large number of words and phrases

❒ Other _____

7. Pre-Reading and Reading Skills Related to Communication (Check all that apply.)

❒ Yes ❒ No Object/picture recognition

❒ Yes ❒ No Symbol recognition (tactile, Mayer-Johnson, Rebus, etc.)

❒ Yes ❒ No Auditory discrimination of sounds

❒ Yes ❒ No Auditory discrimination of words, phrases

❒ Yes ❒ No Selecting initial letter of word

❒ Yes ❒ No Following simple directions

❒ Yes ❒ No Sight word recognition

❒ Yes ❒No Putting two symbols or words together to express an idea

8. Visual Abilities Related to Communication (Check all that apply.)

- ❒ Maintains fixation on stationary object
- ❒ Scans line of symbols left to right
- ❒ Visually recognizes people
- ❒ Visually recognizes photographs
- ❒ Needs additional space around symbol
- ❒ Visually shifts vertically
- ❒ Looks to right and left without moving head
- ❒ Scans matrix of symbols in a grid
- ❒ Visually recognizes common objects
- ❒ Visually recognizes symbols or pictures
- ❒ Visually shifts horizontally
- ❒ Recognizes line drawings

Is a specific type (brand) of symbols or pictures preferred?_____

What size symbols or pictures are preferred?_____

What line thickness of symbols is preferred? _____ inches

Does student seem to do better with black on white, or white on black, or a specific color combination for figure/ground discrimination?_____

Explain anything else you think is significant about the responses the student currently uses or his/her need for augmenting communication (Use an additional page if necessary)_____

_____

_____

_____

_____

_____

Summary of Student's Abilities and Concerns Related to Communication_____

_____

_____

_____

_____

_____

WATI Student Information Guide

SECTION 5

Reading

1. The Student Demonstrates the Following Literacy Skills. (Check all that apply.)

- ❒ Engages in joint attention with adult caregiver to activities (e.g. songs, stories, games and/or toys)
- ❒ Shows an interest in books and stories with adult
- ❒ Shows and interest in looking at books independently
- ❒ Associates pictures with spoken words when being read to
- ❒ Realizes text conveys meaning when being read to
- ❒ Recognizes connection between spoken words and specific text when being read to
- ❒ Pretend writes and "reads" what he or she has written, even if scribbles
- ❒ When asked to spell a word, gets first consonant correct, but not the rest of the word
- ❒ Demonstrates sound manipulation skills including:
  - ❒ Initial and final sounds in words
  - ❒ Initial letter names/sounds
- ❒ Recognizes, names and prints the alphabet (if motor skills are limited, may use alternative means rather than printing to demonstrate knowledge of the alphabet)
- ❒ When asked to spell a word, gets first and last sounds correct
- ❒ Applies phonics rules when attempting to decode printed words
- ❒ Sound blends words
- ❒ Reads and understands words in context
- ❒ Spells words using conventional spelling in situations other than memorized spelling tests
- ❒ Reads and understands sentences
- ❒ Composes sentences using nouns and verbs
- ❒ Reads fluently with expression
- ❒ Reads and understands paragraphs
- ❒ Composes meaningful paragraphs using correct syntax and punctuation

2. Student's Performance Is Improved by (Check all that apply.)

- ❒ Smaller amount of text on page
- ❒ Word wall to refer to
- ❒ Graphics to communicate ideas
- ❒ Bold type for main ideas
- ❒ Additional time
- ❒ Spoken text to accompany print
- ❒ Other_____
- ❒ Enlarged print
- ❒ Pre-teaching concepts
- ❒ Text rewritten at lower reading level
- ❒ Reduced length of assignment
- ❒ Being placed where there are few distractions
- ❒ Color overlay (List color_____)

3. Reading Assistance Used

Please describe the non-technology based strategies and accommodations that have been used with this student

_____

_____

4. Assistive Technology Used

The following have been tried. (Check all that apply.)

❒ Highlighter, marker, template, or other self-help aid in visual tracking
❒ Colored overlay to change contrast between text and background
❒ Tape recorder, taped text, or talking books to "read along" with text
❒ Talking dictionary or talking spell checker to pronounce single words
❒ Hand held scanner to pronounce difficult words or phrases
❒ Computer with text to speech software to
❒ Speak single words ❒ Speak sentences ❒ Speak paragraphs ❒ Read entire document

Explain what seemed to work about any of the above assistive technology that has been tried.

_____

_____

_____

5. Approximate Age or Grade Level of Reading Skills_____

6. Cognitive Ability in General

❒ Significantly below average ❒ Below average
❒ Average ❒ Above average

7. Difficulty

Student has difficulty decoding the following. (Check all that apply.)

❒ Worksheets ❒Reading Textbook ❒ Subject Area Textbooks ❒ Tests

Student has difficulty comprehending the following. (Check all that apply.)

❒ Worksheets ❒ Reading Textbook ❒ Subject Area Textbooks ❒ Tests

8. Computer Availability and Use

The student has access to the following computer(s):

❒ PC ❒ Macintosh

9. The Student Uses a Computer:

❒ Rarely ❒ Frequently ❒ Daily for one or more subjects or periods ❒ Every day, most of the day

For the following purposes_____

Summary of Student's Abilities and Concerns Related to Reading

_____

_____

_____

_____

WATI Student Information Guide

SECTION 6

Learning and Studying

1. Difficulties Student Has Learning New Material or Studying (Check all that apply.)

- ❒ Remembering assignments
- ❒ Remembering steps of tasks or assignments
- ❒ Finding place in textbooks
- ❒ Taking notes during lectures
- ❒ Reviewing notes from lectures
- ❒ Organizing information/notes
- ❒ Organizing materials for a report or paper
- ❒ Turning in assignments
- ❒ Other_____

_____

2. Assistive Technology Tried (Check all that apply.)

- ❒ Print or picture schedule
- ❒ Low tech aids to find materials (e.g. index tabs, color coded folders)
- ❒ Highlighting text (e.g. markers, highlight tape, ruler)
- ❒ Recorded material
- ❒ Voice output reminders for assignments, steps of task, etc.
- ❒ Electronic organizers
- ❒ Pagers/electronic reminders
- ❒ Hand held scanner to read words or phrases
- ❒ Software for manipulation of objects/concept development
- ❒ Software for organization of ideas and studying
- ❒ Palm computers
- ❒ Other_____

3. Strategies Used

Please describe any adaptations or strategies that have been used to help this student with learning and studying.

_____

_____

_____

_____

Summary of Student's Abilities and Concerns in the Area of Learning and Studying

_____

_____

_____

_____

WATI Student Information Guide

SECTION 7

Math

1. Difficulties Student Has with Math (Check all that apply.)

- ❒ Legibly writing numerals
- ❒ Understanding meaning of numbers
- ❒ Understanding money concepts
- ❒ Completing multiplication and division
- ❒ Understanding units of measurement
- ❒ Creating graphs and tables
- ❒ Understanding fractions
- ❒ Converting to mixed numbers
- ❒ Solving story problems
- ❒ Graphing
- ❒ Understanding and use of trigonometry functions
- ❒ Understanding math related language
- ❒ Understanding place values
- ❒ Completing simple addition and subtraction
- ❒ Completing complex addition and subtraction
- ❒ Understanding tables and graphs
- ❒ Understanding time concepts
- ❒ Working with fractions
- ❒ Understanding decimals /percents
- ❒ Understanding geometry
- ❒ Understanding the use of formulas
- ❒ Checking work
- ❒ Other_____

2. Assistive Technology Tried

- ❒ Abacus
- ❒ Math line
- ❒ Enlarged math worksheets
- ❒ Low-tech alternatives for answering
- ❒ Recorded material
- ❒ Voice output reminders for assignments, steps of task, etc.
- ❒ Pagers/electronic reminders
- ❒ Software for manipulation of objects/concept development
- ❒ Talking or Braille watch
- ❒ Palm computers
- ❒ Talking calculator
- ❒ Braille calculator
- ❒ Alternative keyboards (e.g., IntelliKeys)
- ❒ Math "Smart Chart"
- ❒ Tactile math devices (ruler, clock, etc.)
- ❒ Electronic organizers
- ❒ Single word scanners
- ❒ On screen scanning calculator
- ❒ Software for organization of ideas and studying
- ❒ Other_____

3. Strategies Used

Please describe any strategies that have been used to help._____

_____

_____

_____

Summary of Student's Abilities and Concerns Related to Math_____

_____

_____

WATI Student Information Guide

SECTION 8

Recreation and Leisure

1. Difficulties Student Experiences Participating in Recreation and Leisure (Check all that apply.)

- ❒ Understanding cause and effect
- ❒ Understanding turn taking
- ❒ Handing/manipulating objects
- ❒ Throwing/catching objects
- ❒ Understanding rules
- ❒ Waiting for his/her turn
- ❒ Following simple directions
- ❒ Following complex directions
- ❒ Communicating with others
- ❒ Hearing others
- ❒ Seeing equipment or materials
- ❒ Operating TV, VCR, etc.
- ❒ Operating computer
- ❒ Other _____

2. Activities Student Especially Enjoys_____

_____

_____

_____

3. Adaptations Tried to Enhance Participation in Recreation and Leisure_____

_____

_____

How did they help?_____

_____

_____

4. Assistive Technology Tried (Check all that apply.)

- ❒ Toys adapted with Velcro®, magnets, handles etc.
- ❒ Toys adapted for single switch operation
- ❒ Adaptive sporting equipment, such as lighted or beeping ball
- ❒ Universal cuff or strap to hold crayons, markers, etc.
- ❒ Modified utensils, e.g. rubber stamps, rollers, brushes
- ❒ Ergo Rest or other arm support
- ❒ Electronic aids to control/operate TV, VCR, CD player, etc.
- ❒ Software to complete art activities
- ❒ Other computer software
- ❒ Games on the computer
- ❒ Other _____

Summary of Student's Abilities and Concerns in the Area of Recreation and Leisure

_____

_____

WATI Student Information Guide

SECTION 9

Seating and Positioning

1. Current Seating and Positioning of Student (Check all that apply.)

❒ Sits in regular chair w/ feet on floor
❒ Sits in regular chair w/ pelvic belt or foot rest
❒ Sits in adapted chair
❒ Sits in seat with adaptive cushion that allows needed movement
❒ Sits in wheelchair part of day
❒ Sits comfortably in wheelchair most of day
❒ Wheelchair in process of being adapted to fit
❒ Spends part of day out of chair due to prescribed positions
❒ Spends part of day out of chair due to discomfort
❒ Enjoys many positions throughout the day, based on activity
❒ Has few opportunities for other positions
❒ Uses regular desk
❒ Uses desk with height adjusted
❒ Uses tray on wheelchair for desktop
❒ Uses adapted table

2. Description of Seating (Check all that apply.)

❒ Seating provides trunk stability

❒ Seating allows feet to be on floor or foot rest

❒ Seating facilitates readiness to perform task

❒ There are questions or concerns about the student's seating

❒ Student dislikes some positions, often indicates discomfort in the following positions_____

_____

How is the discomfort communicated?_____

❒ Student has difficulty using table or desk

❒ There are concerns or questions about current wheelchair.

❒ Student has difficulty achieving and maintaining head control, best position for head control is_____

_____

Where are their hips?_____

❒ Can maintain head control for _____ minutes in this position.

Summary of Student's Abilities and Concerns Related to Seating and Positioning

_____

_____

WATI Student Information Guide
SECTION 10
Mobility

1. Mobility (Check all that apply.)

❒ Crawls, rolls, or creeps independently
❒ Is pushed in manual wheelchair
❒ Uses wheelchair for long distances only
❒ Uses manual wheelchair independently
❒ Is learning to use power wheelchair
❒ Uses power wheelchair
❒ Needs help to transfer in and out of wheelchair
❒ Transfers independently
❒ Has difficulty walking
❒ Walks with assistance
❒ Has difficulty walking up stairs
❒ Has difficulty walking down stairs
❒ Needs extra time to reach destination
❒ Walks independently
❒ Walks with appliance
❒ Uses elevator key independently

2. Concerns About Mobility (Check all that apply.)

❒ Student seems extremely tired after walking, requires a long time to recover
❒ Student seems to be having more difficulty than in the past
❒ Student complains about pain or discomfort
❒ Changes in schedule require more time for travel
❒ Changes in class location or building are making it more challenging to get around
❒ Transition to new school will require consideration of mobility needs
❒ Other_____

Summary of Student's Abilities and Concerns Related to Mobility_____

_____

_____

_____

_____

WATI Student Information Guide

Section 11

Vision

A vision specialist should be consulted to complete this section.

1. Date of Last Vision Report _____

Report indicates (please address any field loss, vision condition, etc.)_____

_____

_____

2. Visual Abilities (Check all that apply.)

❒ Read standard textbook print

❒ Read text if enlarged to (indicate size in inches)_____

❒ Requires specialized lighting such as_____

❒ Requires materials tilted at a certain angle (indicate angle)_____

❒ Can read using optical aids, list:_____

❒ Currently uses the following screen enlargement device_____

❒ Currently uses the following screen enlargement software_____

❒ Recognizes letters enlarged to _____ pt. type on computer screen

❒ Recognizes letters enlarged to _____ pt. type for _____minutes without eye fatigue.

❒ Prefers ❒ Black letters on white ❒ White on black ❒_____(color) on _____

❒ Tilts head when reading

❒ Uses only one eye: ❒ Right eye ❒ Left eye

❒ Uses screen reader:_____

❒ Requires recorded material, text to speech, or Braille materials

3 Alternative Output

Currently uses (Check all that apply.)

❒ Slate and stylus

❒ Talking calculator

❒ Braille calculator

❒ Braille notetaker

❒ Electric Brailler

❒ Refreshable Braille display

❒ Tactile images

❒ Screen reader

❒ Braille translation software:_____

Level of proficiency (Check the one that most closely describes the student.)

- ❒ Requires frequent physical prompts
- ❒ Requires frequent verbal cues
- ❒ Needs only intermittent cues
- ❒ Uses device to complete tasks independently
- ❒ Trouble-shoots problems related to device

4. Writing/Handwritten Materials (check all that apply)

- ❒ Writes using space correctly
- ❒ Writes on line
- ❒ Writes appropriate size
- ❒ Reads own handwriting
- ❒ Reads someone else's writing
- ❒ Reads hand printing
- ❒ Reads cursive
- ❒ Skips letters when copying
- ❒ Requires bold or raised-line paper
- ❒ Requires softer lead pencils
- ❒ Requires colored pencils, pens, or paper
- ❒ Requires felt tip pen ❒ Thin point ❒ Thick point

Summary of Student's Abilities and Concerns Related to Vision_____

_____

_____

_____

_____

WATI Student Information Guide

SECTION 12

Hearing

A hearing specialist should be consulted to complete this section.

1. Audiological Information

Date of last audiological exam_____

Hearing loss identified

Right Ear	❒ Mild	❒ Moderate	❒ Severe	❒ Profound
Left Ear	❒ Mild	❒ Moderate	❒ Severe	❒ Profound

Onset of hearing loss _____Etiology _____

2. Unaided Auditory Abilities (Check all that apply.)

❒ Attends to sounds ❒ High pitch ❒ Low pitch ❒ Voices ❒ Background noises
❒ Discriminates environmental vs. non-environmental sounds
❒ Turns toward sound
❒ Hears some speech sounds
❒ Understands synthesized speech

3. Student's Eye Contact and Attention to Communication (Check best descriptor.)

❒ Poor ❒ Inconsistent ❒ Limited ❒ Good ❒ Excellent

4. Communication Used by Others

Indicate the form of communication generally used by others in each of the following environments. (Check all that apply.)

	School	Home	Community
❒ Body language	❒	❒	❒
❒ Tangible symbols	❒	❒	❒
❒ Gestures	❒	❒	❒
❒ Speech	❒	❒	❒
❒ Cued speech	❒	❒	❒
❒ Picture cues	❒	❒	❒
❒ Written messages	❒	❒	❒
❒ Signs and speech together	❒	❒	❒
❒ Signed English	❒	❒	❒
❒ Contact (Pidgin) sign language	❒	❒	❒
❒ American Sign Language (ASL)	❒	❒	❒

5. Level of Receptive Proficiency in Each Environment

	School	Home	Community
❒ Understands single words	❒	❒	❒
❒ Understands short phrases	❒	❒	❒
❒ Understands majority of communications	❒	❒	❒

6. Student Communicates with Others Using (Check all that apply)

❒ Speech ❒ American Sign Language ❒ Body language
❒ Signs and speech together ❒ Gestures ❒ Written messages
❒ Signed English ❒ Picture cues ❒ Contact (Pidgin) sign language
❒ Other_____

Level of expressive communication:

❒ Single words ❒ Combination of words ❒ Proficient

7. Is There a Discrepancy Between Receptive and Expressive Abilities?

❒ Yes ❒ No

If yes, describe further._____

_____

8. Services Currently Used (Check all that apply)

❒ Audiology_____ ❒ Note taker
❒ Educational interpreter using:_____ ❒ ASL ❒ Transliterating ❒ PSE ❒ Oral

9. Equipment Currently Used (Check all that apply.)

❒ Hearing aids ❒ Cochlear implant ❒ Telecaption decoder
❒ Vibrotactile devices ❒ Classroom amplification system ❒ TTY/TDD
❒ FM system ❒ Other_____

10. Present Concerns for Communication, Writing, and/or Educational Materials

❒ Cannot hear teacher/other students ❒ Cannot respond to emergency alarm
❒ Cannot participate in class discussions ❒ Cannot benefit from educational videos/programs
❒ Displays rec./exp. language delays ❒ Cannot use telephone to communicate

11. Current communication functioning (Check all that apply)

❒ Desires to communicate
❒ Initiates interaction
❒ Responds to communication requests
❒ Reads lips
❒ Appears frustrated with current communication functioning
❒ Requests clarification from communication partners ("Would you please repeat that?")
❒ Repairs communication breakdown (Keeps trying, changes message)

12. Current Reading Level_____

Summary of Hearing Abilities and Concerns_____

_____

_____

WATI Student Information Guide

Section 13

General

Are there any behaviors (both positive and negative) that significantly impact the student's performance?

_____

_____

_____

_____

_____

_____

Are there significant factors about the student's strengths, learning style, coping strategies or interests that the team should consider?

_____

_____

_____

_____

_____

_____

Are there any other significant factors about the student that the team should consider?

_____

_____

_____

_____

Does student fatigue easily or experience a change in performance at different times of the day?

_____

_____

_____

_____

Environmental Observation Guide

Student's name:_____

School:_____

Observer:_____

Date of Observation: _____

Type of class: _____

Directions: Complete this Environmental Assessment Checklist before beginning

Describe the environment: Record short responses in the space provided.

Special or general education classroom?	
Specialty classroom (Specify: e.g., P.E., computer lab)	
Therapy room? (Specify)	
Number of teachers in class?	
Number of aides in class?	
Number of volunteers in class?	
Number of students in the class?	
How many days per week is the program?	
How many hours/day?	
Is the atmosphere busy or quiet?	
Are there large open areas or small divided sections?	
How are the desks arranged?	
Is the furniture sized for children?	
Are materials accessible, appropriate, varied, interesting?	
Is special equipment available (i.e., chairs with arm supports)?	
Where is the classroom located in relationship to the cafeteria, therapy, outdoor play areas, etc.?	
Are bathrooms located in or outside the classroom?	

Sensory Stimulation: Judge the level of sensory stimulation and record it with a check in the corresponding box. Enter comments or notes that clarify your responses if needed.

	Excessive	**Balanced**	**Reduced**	**N/A**	**Comments**
Auditory					
Hallway					
Street					
Other classrooms					
Other students					
Instructional media					
Teacher aides/volunteers					
Other (specify):					

Sensory Stimulation: continued

	Excessive	Balanced	Reduced	Comments
Visual				
Color				
Clutter/busy				
Art/decorations				
Visual information				
Lighting				
Other (specify):				

Persons Present During Observation: For each person on the list, put a check in the appropriate column indicating their level of participation.

Persons	Participating	Observing	Not Present
Student			
Special Educator			
General Educator			
Peer Tutors (How many? _____)			
Instructional Assistant #1			
Instructional Assistant #2			
Instructional Assistant #3			
Personal Attendant			
Speech-Language Pathologist			
Occupational Therapist			
Physical Therapist			
School Psychologist			
Parent			
Volunteer			
Administrator			
AT Specialist			
Other (specify):			

Notes:

Access to Assistive Technology: Record the presence or absence of **EACH TYPE** of assistive technology by placing a check in the corresponding box. Record the AT found in the classroom as a whole, not just the AT used by the target student.

Types	Present-Not Used	Present-Used	Not Present
Communication cards/boards			
Digitally recorded communication devices			
Electronic communication devices			
AT for activities of daily living			
Adjustable seating (not a wheelchair)			
Positioning equipment			
Amplification			
Visual signaling devices			
Brailler/brailled materials			
Magnifiers			
Notetaking devices/keyboards			
Speech output devices/computers			
Handwriting aids			
Alternate/adapted keyboards			
Alternate/adapted mouse			
Computer switch interface			
Touch window			
Talking word processor/word prediction/abbreviation & expansion			
Transfer aids - Hoists/lifts			
Mobility aids (not wheelchairs)			
Adapted environment (e.g., doors, fixtures, furniture)			
Electronic equipment for instruction (calculator, e-books)			
Adapted instructional materials			
Instructional software			
Computer stations			
Adapted art/craft materials			
Adapted sports/recreation equipment			
Adapted toys			
Other (specify):			

Environmental Observation Summary

Activity/Task(s) observed:
Ways that typical students participated:
Ways the target student participated:
Barriers to target student's participation:

Adapted from:

Wirkus-Pallaske, M., Reed, P., & Stokes, S. (2000). *Wisconsin Assistive Technology Initiative*. Oshkosh, WI: Wisconsin Assistive Technology Initiative.

Center for Instructional Development and Research. (1998). Classroom observation. *CIDR Teaching and Learning Bulletin, 1*(4), Available online: http://depts.washington.edu/ObsTools.htm

Pearson, L. (no date). *Apraxia guide: Classroom observation checklist*. Available online: http://hometown.aol.com/lynetteprs/myhomepage/profile.html

WATI Assistive Technology Decision Making Guide

Referral Question_____

_____

PROBLEM IDENTIFICATION

Student's Abilities/Difficulties	Environmental Considerations	Tasks
Writing/Use of Hands Communication Reading/Academics Mobility Vision Hearing Behavior Other	e.g. Classroom Playground Lunch Room Home, etc. In Each: Technology Equipment Available Room Arrangement, Lighting Sound Activities, etc.	e.g. Produce legible written material Produce audible speech Read text Complete math problems Participate in recreation/leisure Move independently in the school environment
		Reframed Question
		i.e. Specific task identified for solution generation
SOLUTION GENERATION	**Solution Selection**	**Implementation Plan**
Brainstorming Only No Decision	Discuss & Select Idea from Solution Generation	AT Trials/Services Needed: Date Length Person Responsible
		Follow-Up Plan
		Who & When Set specific date now.

Important: It is intended that you use this as a guide. Each topic should be written in large print where everyone can see them, i.e. on a flip chart or board. Information should then be transferred to paper for distribution, file, and future reference.

WATI Assistive Technology Assessment Technology Checklist

COMPUTER ACCESS

- ρ❒ Keyboard using accessibility options
- ρ❒ Word prediction, abbreviation/expansion to reduce keystrokes
- ρ❒ Keyguard
- ρ❒ Arm support
- ρ❒ Track ball/track pad/joystick with on-screen keyboard
- ρ❒ Alternate keyboard
- ρ❒ Mouth stick/head mouse with on-screen keyboard
- ρ❒ Switch with Morse code
- ρ❒ Switch with scanning
- ρ❒ Voice recognition software
- ρ❒ Other: _____

WRITING

Motor Aspects of Writing

- ρ❒ Regular pencil/pen
- ρ❒ Pencil/pen with adaptive grip
- ρ❒ Adapted paper (e.g. raised line, highlighted lines)
- ρ❒ Slantboard
- ρ❒ Use of prewritten words/phrases
- ρ❒ Portable word processor to keyboard instead of write
- ρ❒ Computer with word processing software
- ρ❒ Portable scanner with word processing software
- ρ❒ Voice recognition software to word process
- ρ❒ Other: _____

Composing Written Material

- ρ❒ Word cards/word book/word wall
- ρ❒ Pocket dictionary/thesaurus
- ρ❒ Writing templates
- ρ❒ Electronic/talking electronic dictionary/thesaurus/spell checker
- ρ❒ Word processing with spell checker/grammar checker
- ρ❒ Talking word processing
- ρ❒ Abbreviation/expansion
- ρ❒ Word processing with writing supports
- ρ❒ Multimedia software
- ρ❒ Voice recognition software
- ρ❒ Other: _____

COMMUNICATION

- ρ❒ Communication board/book with pictures/objects/ letters/words
- ρ❒ Eye gaze board/frame communication system

READING, STUDYING, AND MATH

Reading

- ρ❒ Standard text
- ρ❒ Predictable books
- ρ❒ Changes in text size, spacing, color, background color
- ρ❒ Book adapted for page turning (e.g. page fluffers, 3-ring binder)
- ρ❒ Use of pictures/symbols with text
- ρ❒ Talking electronic device/software to pronounce challenging words
- ρ❒ Single word scanners
- ρ❒ Scanner w/OCR and text to speech software
- ρ❒ Software to read websites and emails
- ρ❒ Other: _____

Learning/Studying

- ρ❒ Print or picture schedule
- ρ❒ Low tech aids to find materials (e.g. index tabs, color coded folders)
- ρ❒ Highlight text (e.g. markers, highlight tape, ruler, etc.)
- ρ❒ Recorded material (books on tape, taped lectures with number coded index, etc.)
- ρ❒ Voice output reminders for assignments, steps of task, etc.
- ρ❒ Electronic organizers
- ρ❒ Pagers/electronic reminders
- ρ❒ Hand-held scanners
- ρ❒ Software for concept development/manipulation of objects – may use alternate input device, e.g. switch,
- ❒ Touch Window
- ρ❒ Software for organization of ideas and studying
- ρ❒ Palm computers
- ρ❒ Other: _____

Math

- ρ❒ Abacus/Math Line
- ρ❒ Enlarged math worksheets
- ρ❒ Low tech alternatives for answering
- ρ❒ Math "Smart Chart"
- ρ❒ Money calculator and Coinulator
- ρ❒ Tactile/voice output measuring devices
- ρ❒ Talking watches/clocks
- ρ❒ Calculator/calculator with printout
- ρ❒ Calculator with large keys and/or large display
- ρ❒ Talking calculator
- ρ❒ Calculator with special features (e.g. fraction translation)

RECREATION AND LEISURE

ρ❒ Toys adapted with Velcro, magnets, handles, etc.
ρ❒ Toys adapted for single switch operation
ρ❒ Adaptive sporting equipment (e.g. lighted or beeping ball)
ρ❒ Universal cuff/strap to hold crayons, markers, etc.
ρ❒ Modified utensils (e.g. rubber stamps, brushes, etc.)
ρ❒ Ergo Rest or other arm support for drawing/painting
ρ❒ Electronic aids to control/operate TV, VCR, CD player, etc.
ρ❒ Software
ρ❒ Completion of art activities
ρ❒ Games on the computer
ρ❒ Other computer software
ρ❒ Other: _____

ACTIVITIES OF DAILY LIVING (ADLS)

ρ❒ Non slip materials to hold things in place
ρ❒ Universal cuff/strap to hold items in hand
ρ❒ Color coded items for easier locating and identifying
ρ❒ Adaptive eating utensils (e.g. foam handles, deep sides)
ρ❒ Adaptive drinking devices (e.g. cup with cut-out rim)
ρ❒ Adaptive dressing equipment (e.g. button hook, elastic shoelaces, Velcro instead of buttons, etc.)
ρ❒ Adaptive devices for hygiene (e.g. adapted toothbrush, raised toilet seat, etc.)
ρ❒ Adaptive bathing devices
ρ❒ Adaptive equipment for cooking
ρ❒ Other: _____

MOBILITY

ρ❒ Walker
ρ❒ Grab bars and rails
ρ❒ Manual wheelchair including sports chair
ρ❒ Powered mobility toy (e.g. Cooper Car, GoBot)
ρ❒ Powered scooter or cart
ρ❒ Powered wheelchair w/ joystick or other control
ρ❒ Adapted vehicle for driving
ρ❒ Other: _____

POSITIONING AND SEATING

ρ❒ Non-slip surface on chair to prevent slipping (e.g. Dycem)
ρ❒ Bolster, rolled towel, blocks for feet
ρ❒ Adapted/alternate chair, sidelyer, stander

VISION

ρ❒ Eye glasses
ρ❒ Optical aids
ρ❒ Large print materials
ρ❒ Auditory materials
ρ❒ Dictation software (voice input)
ρ❒ CCTV (closed circuit television)
ρ❒ Screen magnifier (mounted over screen)
ρ❒ Screen magnification software
ρ❒ Screen color contrast
ρ❒ Screen reader, text reader
ρ❒ Braille notetaker
ρ❒ Braille translation software
ρ❒ Braille embosser
ρ❒ Enlarged or Braille/tactile labels for keyboard
ρ❒ Alternate keyboard
ρ❒ Other: _____

HEARING

ρ❒ Pen and paper
ρ❒ Computer/portable word processor
ρ❒ TDD for phone access with or without relay
ρ❒ Signaling device (e.g. flashing light or vibrating pager)
ρ❒ Closed captioning
ρ❒ Real Time captioning
ρ❒ Computer aided note taking
ρ❒ Screen flash for alert signals on computer
ρ❒ Phone amplifier
ρ❒ Personal amplification system/hearing aid
ρ❒ FM or loop system
ρ❒ Infrared system
ρ❒ Other: _____

COMMENTS

WATI Assistive Technology Trial Use Guide

AT to be tried:_____

Student's Name: _____DOB:_____ Age:__
Meeting Date:_____

School/Agency:_____
Grade/Placement:_____

Contact Person(s):_____

School/Agency Phone: _____Address: _____
_____

Persons Completing Guide: _____

Parent(s) Name: _____Phone: _____
_____

Parent(s) Address: _____

Goal for AT use: _____

ACQUISITION

Source(s)	Person Responsible	Date(s) Available	Date Received	Date Returned

Person primarily responsible to learn to operate this AT:_____

Training

Person(s) to be trained	Training Required	Date Begun	Date Completed

MANAGEMENT/SUPPORT

Location(s)	Support to be provided (e.g. set up, trouble shoot, recharge, program, etc.)	Person Responsible

Student Use

Date	Time Used	Location	Task(s)	Outcome(s)

WATI Assistive Technology Trial Use Summary

Student's Name:_____Age:_____Date Completed:_____

Person(s) Completing Summary: _____

Task Being Addressed During Trial_____

Criteria for Success_____

AT Tried	Dates Used	Criteria Met?	Comments (e.g. advantages, disadvantages, preferences, performance)

Recommendations for IEP: _____

_____

_____

_____