

# Chapter 7 – Assistive Technology for Reading

- Introduction.....1
- Using the SETT Process .....7
- Decision Making Guide .....8
- SETT Process .....9
- Reading Continuum.....14
- Reading Continuum Expanded .....15
- Student-specific Reading Solutions .....35
  - Nonverbal Reading Approach .....37
  - Adapted Phonemic Assessment .....39
  - Other Alternative Assessments.....39
  - Response to Intervention (RtI) .....40
- References and Resources .....41

## Assistive Technology for Reading

Judi Cumley

### Introduction

There are students who struggle with reading every day. They may be students who have an identified disability in reading or are “unidentified” struggling readers. We also know that students who have language learning disabilities often struggle with making meaningful connections with printed text, as do students who are English Language Learners (ELLs) and students with cognitive disabilities. Some students with physical impairments, visual and hearing impairments, and AAC (Augmentative and Alternative Communication) users often have difficulty accessing the text. This chapter will outline some of the research that impacts students who struggle with the reading process, National Instructional Materials Accessibility Standards (NIMAS) definitions, requirements, definitions and restrictions will be addressed. Factors about the student, environment and tasks that should be considered when contemplating assistive technologies and strategies will be explored. Finally, we will examine some of the tools from low- to high-tech that can support struggling readers.

This chapter is not intended to educate professional staff in appropriate reading instruction. If you are interested in knowing more about how children learn to read, McGee and Richgels book, *Literacy's beginnings: Supporting young readers and writers* and *Put reading first: The research building blocks for teaching children to read* by Adler provide a good analysis of reading development. Free copies of the Adler publication are available from their website <http://www.nifl.gov/partnershipforreading/publications/PFRbooklet.pdf> . A good resource for teaching reading to students with disabilities is *Children with Disabilities: Reading and Writing the Four-blocks® Way* by Karen Erickson and David Koppenhaver.

### Students with Print Disabilities

For many students with disabilities, the limitations of print raises barriers to access, and therefore to learning. Following the passage of the IDEA in 1997 and more recent reauthorizations, it has become essential that all students have access to the general curriculum, and thus to print materials. Some students cannot see the words or images on a page, cannot hold a book or turn its pages, cannot decode the text or comprehend the sentence structure. Students may experience different challenges, and may require different supports to obtain meaning from books. For each of them however, there is a common barrier - the centuries-old fixed format of the printed book. Many students with disabilities presently do not have access to the printed material they need. There are several reasons for that. In some cases, the problem is technical - schools may not have the technology they need to properly provide accessible versions to students, even if they had such versions. In other cases, the problem is lack of knowledge - many teachers and schools do not understand the issue of access or the potential solutions that are available (“NIMAS at CAST: About NIMAS”, 2006).

Educators usually select technology for two reasons. They select programs that remediate specific skills through individualized and/or repetitive practice or they select programs that compensate for a student’s disability. Deciding when to provide remedial supports and when to provide assistive technology accommodations is critical when designing a student’s instructional plan. As many reading researchers have suggested, the focus in the early grades is on learning to read, and the focus in the intermediate and upper grades becomes reading to learn. Some of the research shows that using technology for compensatory intervention actually also provides remedial benefits (Silver-Pacuilla, H., Ruedel K. & Mistrett, S. p. 8). While assistive technology by definition is not instructional, sometimes the support that assistive technology provides enables the student to further develop his or her skills.

### Research

There is an abundance of books and research about how children learn to read and the typical progression of most students. McGee and Richgels (2000) say that children’s literacy learning is developmental, but not in the sense of proceeding in an irreversible, step-by-step progress. No child’s literacy development exactly matches those of another child. Furthermore, an individual child’s literacy behaviors vary in sophistication depending on the task and situation. Although the age may vary with each student as they acquire literacy skills, research tells us that students with cognitive disabilities follow the same developmental progression as “typical readers”. Additionally adolescent aged or older students with cognitive disabilities continue to develop literacy skills long after “traditional reading instruction” usually stops (Katims, 2001; Erickson, 2007). When Katims looked at reading instruction for students with mild to moderate cognitive disabilities, he discovered that although many students engaged meaningfully with print, the special education reading instruction they received focused primarily on word identification with

little instruction on engagement with connected text (Katims, 2001). Karen Erickson says that in order to build comprehension when reading, instruction must have emphasis on both automatic word identification and phonics or decoding skills. The combination of the two is required for reading success. Successful readers must be able to effortlessly recognize most words they encounter and have the skills to figure out unfamiliar words. Comprehension is adversely affected when instruction emphasizes only one skill. When readers do not have the skills to figure out unfamiliar words, they are forced to skip or guess words (often based on the initial letter with no regard for sentence context). When readers are taught to stop and sound out or consciously think about every word they encounter, they are expending cognitive resources that would otherwise be devoted to comprehension (Erickson, K. 2003).

Teachers who use the Four-Blocks<sup>®</sup> method of literacy instruction by Pat Cunningham (1991) can modify the activities for students with disabilities. The original Four-Blocks framework was developed to adjust to individual differences in the classroom and teaches students not only how to decode unfamiliar words but also builds comprehension, writing skills and independent reading. The basic premise is that each day is devoted to four different approaches to teaching all students to read. Incorporating Guided Reading, Self Selected Reading, Writing and Working with Words on a daily basis enables students to interact with print meaningfully. Karen Erickson and David Koppenhaver further addressed the specific accommodations of the Four-Blocks framework for students with disabilities, using assistive technology when appropriate (2007).

Although teachers have been using technology to support students' reading for a relatively short time period, research is reporting that it improves student's reading fluency, comprehension, speed and vocabulary. When students use text-to-speech technology, their writing quality and length of writing projects increase. Older students report better editing when using text-to-speech than when reading for editing purposes on their own. Ann Orr and Lorena Parks summarize this research in *Educator's Ezine* (2007).

## NIMAS

### What is NIMAS?

NIMAS is the **N**ational **I**nstructional **M**aterials **A**ccessibility **S**tandard that is part of IDEA- 2004 20 U.S.C. 1474 (e)(3)(A). NIMAS files are text files from publishers that can be converted to a standard or specialized format. Files and documents we traditionally see and use (word processing doc, pdf, html, etc.) are not accessible to all users. But those files can be changed into an accessible document or format depending on the student's needs. NIMAS is a file format that is accessible and flexible and can be converted to:

- RTF (Rich Text Format) for text-to-speech and large print alternatives
- HTML (Hyper-Text Markup Language) for large print and text-to-speech that can include audio, text and video
- BRF (Digital Braille) for common Braille devices or Braille printers
- DSY (Digital Audio-based Information System) digital talking book standard.

### Goal of NIMAS

The goal of NIMAS is to ensure the development of high quality and consistent text source files in order to create specialized formats for students with print disabilities. State and Local Education Agencies (SEAs and LEAs) must ensure that students who are blind, visually impaired or those with other print disabilities receive instructional materials in a timely manner. Each state is required to adopt NIMAS or provide an assurance that students will have appropriate instructional materials in a timely fashion. The state of Wisconsin has adopted NIMAS. NIMAS files will be "housed" in a national repository, the NIMAC - National Instructional Materials Accessibility Center - 20 U.S.C. 1474 (e).

### School District Responsibilities

School districts must send their Department of Public Instruction (DPI) an assurance form stating that district students who are blind, visually impaired or those with other print disabilities, will receive their materials in the appropriate format and in a timely manner. Wisconsin DPI strongly recommends school districts coordinate with NIMAC (a national repository for NIMAS source files).

### How will it work?

How will this work? When schools districts who coordinate with NIMAC, purchase core materials or textbooks for elementary or secondary schools, they *must* request that the publisher send a NIMAS source file to the NIMAC. It should be noted that the mandate is not to the publisher, but rather to the SEAs and LEAs. It also only relates to those printed core materials published after July 19, 2006. When the school district requires an alternate form of the text for a specific student with a documented print disability, they must contact one of the state authorized entities that can download files from the NIMAC database. The authorized entity will convert the source file into a useable format as requested by the school. Some of the authorized entities are already sources of alternative text such as Recordings for the Blind and Dyslexic (RBFD), American Printing House for the Blind (APH), Bookshare.org or state schools that support students with visual impairments. Anyone can search the NIMAC <http://www.nimac.us/> for files, but only authorized agencies can download files from the NIMAC.

### Alternate files from publishers

School districts may be able to purchase a CD version of textbooks directly from the publisher in an attempt to provide accessible versions for students with print disabilities. While this is encouraged, care must be taken to make sure these versions will actually work for the students. CDs can be "locked" so that it is difficult or impossible for a screen or text reader to "read" them, or an audio file created from them. Some may not contain full text versions or only outline key points in a text. Requesting NIMAS-compliant digital copies in the original PO can help. Don't assume that just because a publisher provides a CD, it will be accessible. Remember that NIMAS is not retroactive and will not apply to core materials purchased prior to July 19, 2006. School districts can also purchase NIMAS files directly from the publisher.

In Wisconsin, Stanford Taylor (December, 2007) from the Department of Public Instruction recommends the following language be included on purchase orders of new text:

By agreeing to deliver the materials marked with “NIMAS” on this contract or purchase order, on or before \_\_\_/\_\_\_/\_\_\_, the publisher agrees to prepare and submit files meeting NIMAS requirements to the NIMAC at the American Printing House for the Blind (APH) located in Louisville, Kentucky. Should the vendor be a distributor of the materials and not the publisher, the distributor agrees to immediately notify the publisher of its obligation to submit NIMAS file sets of the purchased products to the NIMAC. The files will be used for the production of accessible formats as permitted under the law for students who are blind or have other print disabilities (Section 1). (Retrieved 6/2/08 from <http://dpi.wi.gov/sped/bul07-03.html>)

### Copyright Issues

Whenever a school uses an alternative version of copyrighted text with a student, we need to be certain that it is a legal copy of the text. The Chaffee Amendment is the law most frequently referenced when providing alternate versions of text to be used with students with print disabilities.

The Chaffee Amendment:

- Allows authorized entities to reproduce or distribute copies of phonorecords of previously published non-dramatic works in specialized formats for use with individuals who are blind or other persons with disabilities.
- ...*specialized formats* refers to Braille, audio
- or digital text which is exclusively for use with individuals who are blind or other persons with disabilities.

There is no new language or clarification regarding which students qualify as having print disabilities. Current language states that students whose reading disability is physically based are eligible to receive NIMAS files. By definition of the Copyright Act of 1931 as Amended, student with “print disabilities” are those who have been certified by a competent authority as unable to read printed materials because of:

- Blindness
- Visual Impairment
- Physical Limitations
- An Organic Dysfunction
- Students who qualify as a student with a disability under IDEA 2004

In all instances, the student who will be using the NIMAS files must be one who qualifies under IDEA 2004 and have an IEP that reflects the student’s print impairment. For more information on NIMAS, NIMAC or copyright, please go to the CAST (Center for Applied Special Technology) website at <http://www.cast.org>. Wisconsin schools can go to <http://dpi.wi.gov/sped/vision.html> and view the information listed under National Instructional Materials Access Center (NIMAC) and Accessibility Standard (NIMAS).

While it is legal and ethical to provide adapted text for those students who meet the eligibility under current definitions, it is illegal to make copies of those same materials for other students even if a student could benefit from the alternative format. Those materials are the copyright

## Chapter 7 – Assistive Technology for Reading

---

holder's property and should be paid for when used. It behooves all of us to request accessible digital files from the publishers when purchasing their textbooks. Those publisher-produced files can be used legally with any student.

When a team is deciding whether accessible instructional materials are necessary for a student, they should consider these key questions

- Does the **STUDENT** need instructional materials in specialized formats to access the curriculum and receive a free, appropriate, public education?
- In which **ENVIRONMENTS** will specialized materials be used?
- For which **TASKS** will the student require materials in which specialized format?
- What **TOOLS** will the student and others need?

(Marfilus, S. 2008)

### Using the SETT process and Decision Making Guide

It is intended that you use this as a guide. The Decision Making Guide follows the SETT (Student, Environment, Task, and Tool) format with a subcategory of Sensory Considerations included with Student and Environment. Additional categories include:

- Narrowing the Focus to help identify a specific task in order to select appropriate assistive technologies
- Implementation Plan to assign trials, dates, responsibilities and data collection
- Follow-Up Plan to set a date for the team to reconvene and review the student's progress

Again, this is intended as a guide; during the actual assessment process, each topic should be written in large print where everyone can see (i.e., on a flip chart or board). Information should then be transferred to paper for distribution, filing, and future reference. For more information about using the SETT process, please refer to Chapter 1 of this manual.

The questions posed in the guide are not intended to be all inclusive but rather to prompt the team to consider as many factors as possible in order to identify and ultimately try appropriate assistive technology tools and strategies for their students.

## WATI Assistive Technology Decision Making Guide

Area of Concern: Reading

### PROBLEM IDENTIFICATION

| Student's Abilities/Difficulties                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Environmental Considerations                                                                                                                                                                                                                                                                                                                                                         | Tasks                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>What are the student's abilities &amp; difficulties related to reading?</p> <ul style="list-style-type: none"> <li>Review Section 6 WATI Student Information Guide (Chapter 1, page33)</li> <li>Physical considerations</li> <li>Communication considerations</li> <li>Visual considerations</li> <li>Background knowledge and/or receptive language</li> <li>Comprehension of text-read or listened to</li> <li>Phonemic awareness</li> <li>Sight vocabulary</li> <li>Other concerns</li> </ul> | <p>What environmental considerations impact the student's reading?</p> <ul style="list-style-type: none"> <li>Reading requirements for different settings</li> <li>Student's distance from text</li> <li>Reading group size</li> <li>Visual clutter on page</li> <li>Lighting</li> <li>Computer operating system</li> <li>Current or past AT used</li> <li>Other concerns</li> </ul> | <p>What reading task(s) do you want the student to do?</p> <p>Read:</p> <ul style="list-style-type: none"> <li>Standard Curriculum</li> <li>Modified Curriculum</li> <li>Community print</li> <li>Worksheets</li> <li>Tests</li> <li>Recreational</li> <li>Computer</li> </ul> |
| Sensory Considerations                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                      | Narrowing the Focus                                                                                                                                                                                                                                                            |
| <p>What sensory challenges does the student have that impacts Reading? (i.e., visual, auditory, tactile)</p>                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                      | <p>Identify specific reading task(s) for solution generation</p>                                                                                                                                                                                                               |
| Solution Generation Tools & Strategies                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Solution Selection Tools & Strategies                                                                                                                                                                                                                                                                                                                                                | Implementation Plan                                                                                                                                                                                                                                                            |
| <p>Brainstorming only- no decisions yet</p> <p>Review the Reading Continuum</p>                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>Use a Feature Match Process to discuss and select idea(s) from Solution Generation</p>                                                                                                                                                                                                                                                                                            | <p>AT Trials/Services Needed:</p> <ul style="list-style-type: none"> <li>Formulate reading objectives to determine effectiveness of trial</li> <li>Training needed</li> <li>Date</li> <li>Length</li> <li>Person(s) Responsible</li> </ul>                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                      | Follow-Up Plan                                                                                                                                                                                                                                                                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                      | <p>Who &amp; When</p> <p>Set specific date now.</p>                                                                                                                                                                                                                            |

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, filing, and future reference.

### Student's Abilities and Difficulties

As a team, discuss what the student's abilities and difficulties are related to reading. Please complete and review Section XX of the WATI Student Information Guide: Reading (pp. \*\*\*\*)

#### Physical Considerations

Students who have difficulty physically manipulating books, text, or other print based materials may benefit from assistive technology solutions to increase their accessibility to the text. Once those accommodations have been made, the student may need no further accommodations. Some examples of physical access questions are:

- Does the student have difficulty turning pages in a book, magazine, or other paper-based material?
- Can the student support or hold the printed materials in a comfortable and accessible fashion without compromising his/her posture?
- How well does the student see the print?
- Have you noticed a difference in the student's reading ability when the font size is smaller, larger, with or without a serif?
- Does the spacing between the words or lines of text impact the student's vision?
- Can the student track the words across the page/line without losing his/her place?
- What happens when there are more or fewer words on a line such as when text is bulleted or indented?
- Is the student affected by the amount of visual "clutter" on a page?
- Has anyone assessed the impact of color on the student's reading skills?
- Is visual or physical fatigue an issue for this student?
- What other physical considerations/questions are specific to this student?

#### Communication Considerations

Does the student have the ability to express their knowledge in all of the areas below? If not, please see Chapter 3 Assistive Technology for Communication.

#### Reading Comprehension

Erickson & Koppenhaver say that without instruction aimed at making meaning from text, children are left with an impression that "reading is merely decoding words and successfully saying them aloud....addressing only word reading will not promote successful silent reading comprehension." (Erickson & Koppenhaver, p.64)

If a student has an identified language learning disability, is an English Language Learner (ELL), has a cognitive disability or otherwise lacks sufficient background knowledge, reading comprehension can be limited. Some questions to consider for this child include:

- Does the use of pictures supporting the text increase the student's background knowledge and comprehension?
- Does the student benefit from "brainstorming" sessions using words or graphic maps?
- How do you know the student understands the vocabulary used in the text?
- What other pre-reading strategies have been used, and with what success?

## Chapter 7 – Assistive Technology for Reading

- Is there a difference in the student’s comprehension when the text is read aloud by an adult compared to the student’s independent silent reading?
- Does the student comprehend equally well when the text is read aloud by an adult compared to computer read text?
- Would the student benefit from seeing text highlighted as the computer reads it?
- Does the student have auditory processing difficulties?
- Is the student’s listening comprehension sufficient for auditory text only?
- Is the student’s comprehension different for different types of text such as fiction, nonfiction, directions, and assessments?
- Has the student’s working memory and/or short-term memory been assessed?

### Word Attack Skills

It used to be assumed that students with cognitive limitations could only learn to read using a “sight-word approach”. That assumption has proven to be erroneous. Regardless of disability, successful readers need to build their skills to read and decipher unfamiliar words.

- Does the student have the phonemic awareness to identify similar and dissimilar patterns in words?
- Has the student established sound/symbol relationships?
- Does the student recognize familiar words and patterns?
- Can the student isolate individual sounds (i.e., initial, final, medial)?
- Does the student use resources such as a word wall to decode unfamiliar words?

### Sight Vocabulary

Word attack skills are important when encountering unfamiliar words, but if students need to decode every word they read in a sentence, their comprehension of the text will suffer. Good readers have automatic sight word vocabularies that they can read without stopping to decode.

- Does the student have a sight word vocabulary?
- Does the student remember previously taught words?
- Can the student recognize and remember the visual pattern that words or letter combinations make (i.e. “ing”)?

### Sensory Considerations

Some students are adversely affected by environmental stimulation that others can filter out or ignore. Some common factors that can impact a student’s learning and focus include hypersensitivity or hyposensitivity to stimuli such as

- Visual clutter
- Fluorescent lighting versus full spectrum lighting
- Classroom and background noise
- Tactile stimulation
- Awareness of physical space

- Other individual specific sensitivities

Although these factors are not directly related to reading, they impact the student's ability to learn and focus on instruction so should always be considered.

### Other Considerations

Each individual student has specific skills and areas of concern. Be certain to address those as you capture the particular traits of the student in this part of the SETT process.

### Environmental Considerations

**As a team, discuss and write on chart paper any environmental considerations that might impact the student's reading such as auditory or visual distracters, placement in the classroom, number of different reading environments or any other environmental impacts.**

Students may encounter different reading requirements, expectations, tasks, stimuli, and other differences that can affect their reading performance in each setting. Some questions to ask and consider for each reading environment include:

- What is the student's position and distance from the text to be read (i.e., the board, computer or other surface which cannot be manipulated by the student)?
- Do the student's reading skills change according to environmental influences such as group reading versus independent reading?
- Do individual teachers have different reading expectations for the student?
- Does the student have different reading requirements in each classroom/subject?
- What kind of support does the student receive in the regular education classroom with standard curriculum?
- If the student uses or will potentially use computer based programs for reading or reading assistance, where are the computers located; what is the computer's age, operating system and system capabilities?
- Does the student have ready access to computers with supports (reading support, access support, adult support)?
- If text needs to be scanned into the computer, are the scanning stations easily accessible to the student/staff?
- Can text be quickly scanned when necessary?
- Is the school Technology Coordinator involved in decision-making when discussing options for electronic text?

### Assistive Technology: past and present

What assistive technology (AT) has been employed in the past or is currently used with the student? List all assistive technologies that have been used with the student. If some have been discontinued, make note of the reasons. Sometimes effective tools are discontinued for reasons that no longer exist such as computer conflicts, lack of training, lack of interest, or other reasons. Do not discount assistive technology that was previously tried and discarded. There may have been a mismatch between the assistive technology and the student's skills at the time.

Differences in skill development, maturity, a different environment or other factors may make all the difference. If the student is currently using assistive technology note the AT used, location, level of effectiveness, trained staff, and any other issues that are pertinent to the student/building. Be certain to list low and high tech AT supports.

### Sensory Considerations

Different environments have different levels of sensory stimulation. If the team has determined that sensory impacts are influential for the student's learning, identify the sensory levels in each environment in which the student will be reading.

### Tasks

**As a team, discuss and write on chart paper the reading tasks that the student needs to do.**

One of the most important questions when assessing a student's need for assistive technology is: What are the tasks the student needs to do? In this instance what does the student need to read and then what does the student need to do with the information read? These are some questions to consider:

- Is this student currently reading standard curriculum?
- Is the student currently reading modified curriculum? If so, what modifications have been made?
- Does the student need assistance in reading worksheets, assessments, directions, information from the board or overhead, study guides or other typical requirements in the classroom?
- When the student uses the Internet, can he/she read web sites, wikis, blogs?
- Does the student have a need to read electronic text?
- Does the student have access to appropriate reading materials for recreation or personal purposes?
- How does the student read text they encounter in the community such as menus, signage, product labels?

Skilled readers use multiple cues when reading, such as contextual clues in the sentence, initial letters of an unfamiliar word, word shape, automatic word recognition, prior knowledge, concepts about the type of text they are reading and more. Struggling readers often only employ one or two strategies and will skip unfamiliar words/text if they are not successful (McGee & Richgels).

- Does the student employ reading strategies when encountering unfamiliar words? Which strategies?
- Does the student automatically use effective strategies or need prompting to do so?
- What strategies and cues does the student use to enhance comprehension?

We generally read prior to completing a process, whether it is to take a test, write a report, discuss the material with others, follow directions, pursue an interest, or many other reasons.

- What does the student need to do after they have read the material?

Reading is often the first step in eventually using the material. We always need to keep in mind, what will the student do with the material read?

### **Narrowing the Focus**

**As a team, identify by circling or other means those few tasks the student needs to do for reading that will have the most impact.**

After the team has generated a list of tasks that the student needs to do, you may want to refine the list to limit the tasks that the team (including the student) will focus on. Too many tasks can overwhelm the team. Introduction of too many factors and tools may reduce your ability to determine effectiveness. Maintain your original list of tasks and review it later. Some tasks may already be effectively addressed with the new tools/strategies that you are using. The tasks that remain can become your new focus at a later date.

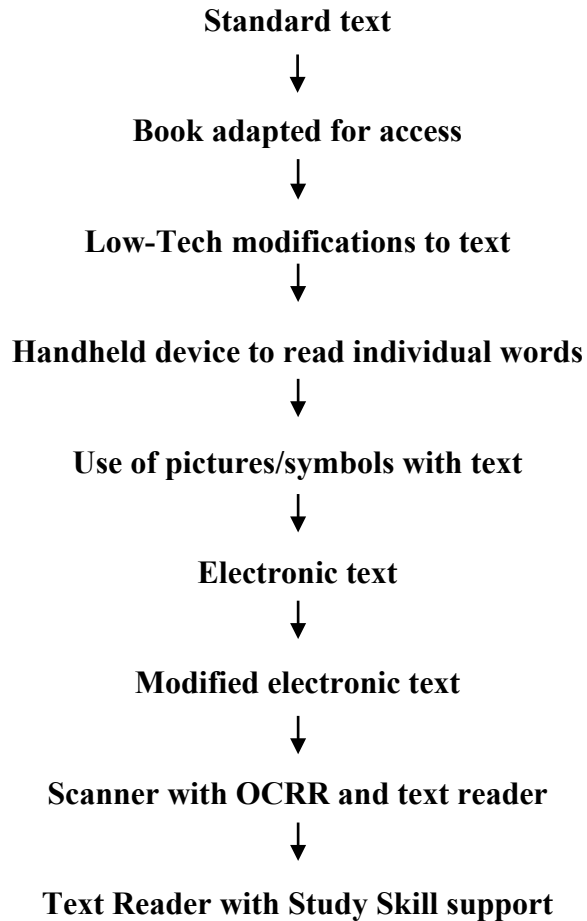
### **Solution Generation: Tools/Strategies**

**As a team, brainstorm and write on chart paper any assistive technologies &/or strategies you think will assist the student in successfully completing those tasks you identified.**

The team brainstorms strategies and assistive technology tools that may be of benefit for the student to complete the identified tasks in the given environments. Do not critique or otherwise evaluate the suggestions at this time. List all suggested tools and strategies including those currently in use on chart paper for all to see. The tools and strategies discussed below follow the general continuum for reading. The continuum is generally organized from low to high Assistive Technology. It is not intended to be used as a step-by-step protocol for using AT tools with a student, but rather an organizational continuum of types of Assistive Technology.

## **A CONTINUUM OF CONSIDERATIONS FOR ASSISTIVE TECHNOLOGY**

### **For Reading**



### Standard Text

#### Using Reading Strategies

Some students are successful reading standard text with the assistance of low-tech strategies and systems. Students may need regular reminders in order to use successful reading strategies. Harvey and Goudvis describe strategies that students can use to enhance their understanding of the text such as:

Think how the book is like me.

Think how the book is like another book.

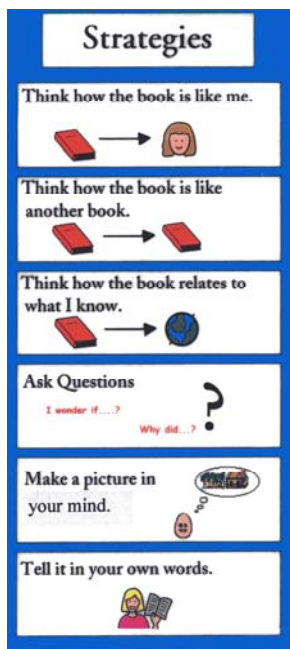
Think how the book relates to what I know.

Ask questions.

Make a picture in your mind.

Tell it in your own words. (Harvey & Goudvis, 2000).

These strategies and others can be written on a bookmark and laminated. Some students do better with a visual or picture clue of strategies to use. You can find symbols to represent the strategies from the Internet or programs with graphic libraries such as *Boardmaker*® or *Inspiration*®. The student can then easily refer to the strategies while reading.



(Based on Harvey & Goudvis, 2000. The Picture Communication Symbols ©1981-2008 by Mayer-Johnson LLC. All Rights Reserved Worldwide. Used with permission.)

### Using Color

*Highlighters* can be used to make specific letters or words stand out. Highlighters come in many colors and sizes. Students should be taught strategies for highlighting. Students can 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. Use a consistent color for each category; vocabulary-orange, main ideas-pink, important people/dates-blue, etc. Students can later transfer that information to study guides or outlines. Some *Crayola*® highlighters are even erasable so that a student's highlighting can be later removed.

*Highlighting Tape* can be used in lieu of standard highlighters. *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 should not be permanently marked. The tape is easily removable and can be written on.

Transparent colored *Post-it*® notes can be used similarly to *Highlighting tape* and standard *Post-its*. *Post-its* can be used to remind the student of important text, facts, charts, or can be used by teachers to write pre-reading or summary questions (i.e., “What were the main reasons for the start of the Civil War?”). “Hefty” *Post-it* tabs can be used to mark important pages such as glossaries, table of contents or as a bookmark for students who have difficulty organizing themselves or their materials.

Another low-tech strategy for students reading standard text is using *transparent color overlays*. Some students experience a significant improvement in their reading when the standard white background is changed to a contrasting color. Experts in the field recommend trying different colors to see what the impact is on reading. If you have two copies of the same page of text and place a different colored overlay on each, you can ask the student to tell you which is better, clearer, and easier to read. Continue trying different colors to see if the student can find one that makes a difference. 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 students are helped by different colors. Blue, pink, red, green, purple and other combinations have all been known to work. Some students benefit from two or more overlays overlapped on top of each other. Once the student finds a filter, have the student read 10 or more lines first without the filter and then with the selected filter. If this is going to work, it will work immediately (Sweeney, 2000).

Colored reading strips sometimes called *Reading Helpers* or *EZC Readers*® are widely available and can be used in lieu of colored overlays. They come in a variety of widths and colors. Another simple idea is 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.

## Book Adapted for Access

### Physical Access

If a student has a physical disability that makes it difficult to handle books, pages can be made

easier to manipulate. 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 for the student. 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 into one inch squares and then paper clipped to each page. A small piece of the soft side of sticky-back Velcro™ can be stuck to the corner of each page as another “page fluffer”. Any lightweight item that will sufficiently separate the pages will work. Some students simply need a way to “grab” pages. You can use large paper clips or Hefty *Post-it*® tabs, or the student can try wearing an office “rubber finger” to grip individual pages. It is also important to consider the physical placement of the reading material. Often an easel is used to hold the reading material in an upright position so the student can easily view it.

Automatic page-turners such as *Flip* by AbleNet® can turn the pages of a book or magazine when the student presses a switch. Reading materials are inserted in the page-turner, adjusted and activated by one or more switches depending on the student’s needs. They can be programmed for automatic dwell times that can be adjusted depending on the user and reading material.

The *BookWorm*™ Literacy Tool from AbleNet is a device that makes almost any children’s book a “talking book.” Record the text of each page of a children’s book into the *BookWorm* literacy tool and affix the matching stickers. Students press the keypad or use an external switch to listen to the recorded pages of the book as they read.

### AAC Users

Students with Severe Speech and Physical Impairments (SSPI) who use communication devices generally need special accommodations for their reading instruction. As students with SSPI develop reading skills, teachers can program building words activities, phonetic exercises, word banks/walls, vocabulary pages, and more into the student’s communication system. As the student’s reading skills progress so will the overlays/pages the student uses to support their reading. They may have overlays to ask and answer comprehension questions, word definition pages, vocabulary to express prior knowledge before reading text or even have replicas of books, pages or repeated lines on their device so that they can read independently or as part of a group reading activity. These students require the support of Speech and Language Pathologists in addition to their special and regular education staff in order to meaningfully interact with print. One literacy program, *MEville to WEville* by AbleNet uses standard children’s books with specific adaptations for students with limited communication skills. The program suggests possible communication devices and activities for those students. For more information about students with SSPI, please see Chapter 3 – Assistive Technology for Communication.

### Visual Modifications

Special adaptations of text need to be made for students with visual impairments; books can be converted to Braille or large print, text can be copied and enlarged on a copier or low-tech tactile cues can be placed in the book. All are adaptations that could be appropriate for students with visual impairments. Students who need Braille copies of text or large print books can receive those from vision support services-local, state or national.

Some students without an identified visual impairment might also benefit from large print because of visual processing deficits, problems with tracking words in a sentence, identifying word borders/boundaries or other impairments. A low-tech solution might be enlarging the page on a copy machine. While you can only enlarge to a certain point before cutting off text, it might be enough to relieve the visual fatigue that some students experience without even knowing it. Some students with sensory impairments benefit from tactile cues such as pieces of textured material glued on the page to illustrate a concept (soft, scratchy, smooth), or glue or puffy paint to outline a shape in the book.

Others may benefit from using hand-held magnifiers. Although you can find low level magnifiers at retail discount stores, be aware that their clarity and magnification are less accurate than those developed specifically for individuals with visual impairments. Some students may improve their ability to track the words in a line using a bar magnifier. Vision specialists should be consulted about high quality magnifiers for students with identified visual impairments. Please see Chapter 12 - Assistive Technology for Students who are Blind or have Low Vision, for more adaptations for students with visual impairments.

### Low-Tech Modifications to Text

#### Changing the Readability of Text

When students need standard text or curriculum slightly modified, there are some low-tech solutions. Using *Wite-Out*® on challenging vocabulary and replacing the words with easier synonyms can change the readability of the text. Another solution is to summarize the text on the computer with easier vocabulary and less details. Paste the summary over the existing text so that the student's book "looks" like their peers. Enlarging the font, increasing the line or word spacing, or increasing the margins on the document so that fewer words are on a line can increase readability. Once again, that modified text can be glued over the existing page.

#### Marking Text

Color coding, either with highlighters, *Highlighting Tape*, colored text printed from the computer or any other means can give students a visual clue to identify important vocabulary, facts, main ideas, recurring "trouble" words, where to start/stop reading, repeated lines or whatever the skill the student needs support for.

#### Independent Reading

If students need individual vocabulary words or short phrases/sentences read to them, the text can be printed on *Language Master* cards and recorded by the teacher. Students can then run the card through the *Language Master* or similar card reader to hear the text read aloud as many times as needed. Other reading supports such as spelling the words, giving definitions or synonyms to unfamiliar vocabulary, and syllabication cues can also be recorded on the cards.

### Handheld Device to Read Individual Words

#### Talking Dictionaries

The various talking products such as those from Franklin Electronic Publishers are especially helpful for students who stumble over new words or larger words as they are reading. The

student types in the trouble word and the talking spell checker/dictionary/thesaurus will pronounce it. There are a number of these products. Some of the devices let you enter a word list so that the student can scroll through the list; looking for the word they are unsure of and select the word to hear it spoken. It clarifies homophones such as *too*, *two*, and *to*. The phonetic spelling correction lets the student look up a word even if he doesn't know how to spell it.

### Reading Pens

A single word scanner can be of great help to an advanced reader who struggles with large, multi-syllabic or unfamiliar words. A device such as a *Readingpen*® 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 uses built in optical character recognition (OCR), to pronounce the word or read the line of text. It provides the definition if needed, speaking it on some models. A thesaurus is also included on some versions. 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 can be a good match for the right student. A similar device, the *QuickLink Pen*® *Elite* from WizCom Technologies LTD also speaks entire lines of text. Unlike the Reading Pens, it stores the scanned text into the pen to be transferred later to a Windows® based computer. The *IRISPen*™ series are pen scanners that transfer scanned text into Windows or Mac® applications. They are small and lightweight and connect to a computer using a USB cable. Some versions have text to speech technology.

### Use of Pictures/Symbols with Text

Adding pictures to text can be very helpful for students who struggle with reading text. Using pictures together with words not only strengthens the association of text with vocabulary but also allows struggling readers to more easily comprehend what is written. Seeing words illustrated makes the text more meaningful and easier to remember. This is a strategy that has been reported as being effective for emerging readers (Silver-Pascuilla, H., Ruedel, K. & Mistrett, S.).

### Software

One example of software that easily adds rebus symbols to text is *Picture It*. *Picture It* from Slater Software allows the teacher or therapist to enter text and quickly add rebus symbols. Rebus symbols are added to the entire passage with just the click of one button. One way to adapt books is to paste with adhesive picture-supplemented text over the traditional text. *Picture It* software consists of a library of over 6000 pictures/symbols linked to words, including the 100 most commonly used words. Customized pictures can be imported into the library. Pictures can be placed above or below the text and reduced in size so that as the student increases his or her reading ability, the text is more prominent than the picture. If necessary, the picture-supported text can also be read to the student by the computer and is accessible by switch, touch screen, keyboard or mouse.

## Chapter 7 – Assistive Technology for Reading

A typical line might look like the following text from *Monkey Business at the Market*© (1994) by Jean Slater.



When a student no longer needs the support of pictures, he will tend to stop looking at it and naturally fade its use. The teacher can also reduce the size of the graphic while enlarging the size of the text so that it has increased prominence on the page. *Clicker5*, *Writing with Symbols 2000*<sup>™</sup>, *IntelliTools® Classroom Suite*, *PixWriter*<sup>™</sup> and *Boardmaker* are software programs that can be used to supplement text with pictures. Slater Software, the developers of *Picture It* have a free online service, *Literacy Support Pictures*<sup>™</sup> which supplies symbols for words entered into their search window.

### Newspapers



*News-2-You*<sup>®</sup> is a weekly online newsletter with picture supports for beginning readers. This weekly downloadable newsletter consists of an 18-20 page edition of current events, jokes, a recipe and activity pages. The simplified version of the same newsletter includes communication boards that support the newsletter. The “higher edition” has fewer picture supports and higher-level activities. The subscriber does not need to have specialized software to download and view the pictures. A speaking edition of the *News-2-You* newsletter is available if you have the free software *Flash* installed on your computer.

If a student could benefit from just a few pictures to support general concepts or key words, you might consider using a standard word processor for the text and add images to the document. You can use digital pictures, clipart or download images from the internet using a search engine set for images or other software programs that have a graphic library to illustrate key points or vocabulary.

### Electronic Text

Electronic text allows you or the students to manipulate or access the text in ways that would not be possible using standard printed text. Words can be seen and heard when used with a text reader. Electronic text is abundant and comes from a variety of sources:

- Commercial
- Free downloadable
- Subscription-based downloadable
- CD included from some publishers when a hard copy of the text is purchased
- Scanned from a paper copy
- NIMAS text from an authorized entity

These are just a few of the many available resources. A more comprehensive listing of electronic resources for reading follows at the end of the chapter.

#### Commercial e-books

The following commercial products are highlighted because of the accessibility features that are built in. Electronic books or e-books are another way to allow students with physical disabilities to interact with text. When they are well designed with accessibility features, they offer a way for students to interact with the text. 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 can also be a good choice for other students with other disabilities. Generally these programs read stories aloud to students in digitized (recorded) speech. Many have colorful graphics, music and sound effects. The students can interact with both the text and graphics. Here are just a few of those available.

*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 *IntelliKeys*® overlays that support *IntelliKeys* users and customizable options including one for low vision.

*LeapFrog*® products are commercially available at discount stores or over the Internet. They have a variety of learning systems, books, pads, and other digital devices that can read text, spell and interact with the student in a variety of ways. They have products suitable for students from infancy through secondary. While not developed to be assistive, they provide reading supports for many students by reading and spelling words, adding meaning to a term or concept, asking comprehension questions and more.

*Planet Wobble* from Crick Software is another series that provides hard copy and on-screen books. Activities included in the series are based on specific literacy objectives such as repeated text for the first series, word study, comprehension activities and writing activities. These activities are differentiated, enabling children of all abilities to use them and are switch accessible. The series of books and activities provides progression through three levels. *Planet Wobble* books must be used with *Clicker* software.

*Start-to-Finish*® Books from Don Johnston Incorporated are high quality literature based stories. The stories come with a CD, a hard copy of the book that looks age-appropriate and an audiotape. The CD includes the text in exactly the same arrangement as in the book. 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. 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* include 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 passages, multiple-choice quizzes and open ended questions for each chapter. Titles cover history, literature, science and nature, mystery and sports.

*Start-to-Finish Literacy Starters* are written and edited to match the interests and issues of older beginning readers. The content and graphics are more mature but take into account the barriers of language, syntax, and vocabulary that would make text difficult to read or comprehend for a beginning reader. *Start-to-Finish Literacy Starters* uses a proprietary combination of three text types—Enrichment, Transitional and Conventional—to provide the support for different skill areas: print conventions, oral language development, alphabetic principle and phonological awareness. All *Start-to-Finish* books and materials are read to the student using recorded speech from an actor rather than synthesized computer speech. The student or teacher can set the books to highlight word-by-word, by line or sentence as the text is read.

*Thinking Reader* from Tom Snyder Productions is a software series of electronic books developed to provide support for struggling readers. The program trains students to read strategically in order to increase their comprehension. Specifically designed for Grades 5-8, the *Thinking Reader* series presents unabridged, grade-level literature via the computer screen combined with human voice narration.

*UKanDu Little Books*® are switch accessible simple books for emerging readers. Students can choose words to complete the sentences on each page and create their own stories. When finished, the story is read back to the student and can be printed for a hard copy.

*WiggleWorks*® by Scholastic 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 book, and write or dictate their own books, which the computer can read aloud. Customizable features allow teachers to choose how text is read and

highlighted and customize text size, background color, recorded sound, and graphics. It has an on-screen keyboard and is single-switch accessible.

There are many other sources of e-books available. 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.

### **Free e-books (downloadable)**

There are several excellent websites that provide access to electronic books. *Starfall Learn to Read* is a free website featuring a multitude of stories appropriate for Early Childhood through second grade. Stories are categorized according to early emergent readers through advanced emergent readers. The website allows the user to highlight words and have the words sounded out for the reader.

*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. 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 but does not read the book aloud for the student.

Text and books 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.

*Bookshare.org* is a web-based system supplying current accessible books in digital formats designed for people with print disabilities. These digital formats are in NISO/DAISY format for talking books, and BRF format for Braille devices and printers. Access to copyrighted books from Bookshare.org is limited to people in the United States with bona fide print disabilities and the non-profit organizations serving them. Bookshare requires an affidavit of print disability. Bookshare has partnered with Don Johnston, Inc. to offer a free Bookshare.org edition of *Read:OutLoud*®. Eligible members will have full access to the NIMAS compliant reader complete with study skills tools.

*Teacher Tap* is professional resource for educators that lists electronic text with and without pictures, audio texts, interactive stories and more. The site is organized according to reading level, content, lists and collections, etc.

UDL Editions by CAST take advantage of the flexibility of digital text and power it with a text reader, highlighters and other study tools using the *Texthelp*® *Toolbar* and animated reading “coaches” that provide leveled supportive reading strategies.

### **Fee based e-books**

Some organizations offer electronic books to schools or individuals with disabilities for a modest fee. Most require a written proof of disability.

#### *Accessible Book Collection*

Books are listed by reading level, grade level and word count. They have specific high interest/low vocabulary books listed. Many of their books include illustrations and are switch accessible. The annual membership for schools requires a certification that the books will be used with students with disabilities.

#### *One More Story*

E-text subscription service that uses recorded voice with e-text. Offers books in a library format. Booklist mirrors frequently used elementary reading books.

#### *Reading A-Z*

Provides access to leveled readers, lessons, Benchmark books with running records, phonemic, phonetic and alphabet activities, vocabulary, assessments and more.

#### *Tumblebooks*

Tumblebooks for early readers are adapted by taking existing picture books and adding animation, sound, music and narration to produce an electronic picture book that either the child can read or have read to them. Older readers have a separate library of chapter books, high interest/low level, literature and more that have been adapted with narration, highlighting options and adjustable online text.

Publishing houses, including those that provide curriculum for schools and commercial sites ([www.amazon.com](http://www.amazon.com)) are also resources for digital books that can be purchased.

### **Handheld ebook readers and applications**

Many of the handheld devices, PDAs and ebook readers can be used as an assistive tool for reading text. Ebook readers hold hundreds of pages, can enlarge the text and may be physically easier for students to turn pages. Many come with MP3 converters, so a student may be able to listen to the text while reading it.

The *Amazon Kindle* and *Cybook* are examples of portable reading devices that can hold hundreds of titles including books, magazines, newspapers, documents, and pictures. They use “electronic paper”, with the readability of paper and adjustable font size. Students can add bookmarks and annotations, copy and paste passages and then export them. Some of the devices are wireless, others use USB connectivity. Portable reading devices read text using a proprietary format, thus most text is not interchangeable between devices.

*TouchBook™* uses Touch User Interface (TUI) technology. By pressing the surface of a printed page that is TUI-enabled the reader is able to retrieve digital content such as definitions, links or bookmarks that are stored on the computer, websites, DVDs, and CDs.

*Children's Illustrated eTales* is a Palm application of four short stories with colorful illustrations for students Kindergarten through Grade 2. On Palm OS handhelds, *Palm eBook Studio* allows ebooks to be created, formatted, and converted for reading on a handheld.

Digital audio book readers such as the *EZDaisy Talking Book Player* and *Scholar Talking Book Player* by Telex Communications, Inc. or *VictorReader® Stream* by Humanware are designed for students with a vision or learning disability. These hand-held book players read DAISY files and can convert digital text into audio files, and feature navigation controls, audio formats including MP3 and variable speed control. Because they are digital, students don't have to worry about tapes or CDs. The *Scholar* and *VictorReader Stream* includes additional features such as bookmarking and "Go To" options. In addition to playing audio files in an MP3 format, the digital book reader, *ClassMate Reader* by Humanware also visually displays text with a highlighting feature so that students can see and hear the text read using the portable device. It also includes study skills features, the ability to create voice and text notes, bookmarking options, a dictionary and the ability to listen to audio only files. Some of the readers use "human-like" voices while others use high quality synthesized voices. They can all hold literally thousands of books on flash memory cards. Humanware reported a study in which 29 "college-bound" students were instructed in the use of and had access to a ClassMate Reader over a 24-week period. At the conclusion, the study reported that students read electronic text for significantly longer time periods than printed text (4.7 hours compared to 1.46) and self-reported an increase in comprehension of the electronic text when they could see and hear the text being read (<http://www.humanware.ca/web/en/Newsletter/15.html> Retrieved 11/20/08)

### Audio Texts

Audio-only texts are a resource that should be considered for some students given the technology available and used within the mainstream. Students can listen to audio books on CD players, playaways, MP3 players, cell phones, *iPods* and other handheld devices and/or the computer. Because audio formats are familiar to so many students, they may be more accepting of audio books as an alternative format than other options. One study showed that secondary level students with mild disabilities performed higher in content assessments when they used audio texts compared to standard print based text (Boyle, Rosenberg, Connelly, Gallin, Washburn, Brinckerhoff, & Banerjee). Text files can be converted to MP3 files, WAV files, AAC files (for *iPods*), or a number of other audio formats. The software for MP3 and AAC (*iTunes*) playback is available for download at no cost, and many text-reading programs have MP3 players built in. Another option for audio text is to create your own podcast of short books, chapters, tests or other traditional text. A podcast is simply an audio file that is recorded to be downloaded at a later time. Students can download the podcast and listen either on the computer or a portable media player. Podcasts can be created using a telephone (*gcast*) or using free or commercial programs. Audio files come in many different formats, each geared to be played by specific media players. Not all are interchangeable.

Audio files of text are also available from different sources. Audio books are available from commercial web sites such as Amazon and iTunes. Audio books are also available from *Recording for the Blind and Dyslexic®*. This organization provides audio books for students with a verified print disability for a fee. They provide a list of compatible portable media players for RFB&D audio files at <http://support.rfbd.org/index.aspx?page=playing>.

*Playaway*® self-playing digital audio books from Follett Library Resources come ready to play. They are self-contained single audio books complete with a battery, earbuds and a lanyard. The device has a simple interface with 8 buttons to play, increase or decrease the narrator speed, navigate throughout the book and bookmark pages. These may be available at the local public library.

A slightly different format from a standard MP3 player is the *FP™3 Player* from Fisher-Price. This is a child friendly player with large navigation buttons, volume control and a graphic representation of books and songs that are listed on the player. Books can be downloaded from the Fisher-Price website (fee) or converted from existing CDs using the software from the player. Media must be converted into the specific format for the *FP3 Player* and is not compatible with MP3.

*Text-to-Audio*® by Premier Assistive Technology, Inc. is a tool that converts text documents to sound files. *Text-to-Audio* can create 10 different types of audio output files including MP3 and WAV files. It compresses files as it creates them. *Text-to-Audio* uses *AT & T's Natural Voices*™ to produce high quality digital-speech audio. The WAV or MP3 files that are created can be played back using an MP3 player or on the computer. They could even be burned to a CD to be played later by the student.

There are many resources available for teachers to convert text into some type of audio format. While this is a format that many students are familiar with on a recreational basis, they may need support in comprehending the text, navigating through multiple pages and building good listening skills. Teachers who need support in teaching those skills may want to use websites such as *Learning through Listening* from *Recordings for the Blind and Dyslexic*. Lesson plans, research articles and other downloadable materials are available regarding teaching listening skills even if your school doesn't subscribe to the service.

### Modified Electronic Text

When reading materials are electronic, the text becomes flexible and can be reformatted or transformed into accessible alternative formats. Text can be enlarged, format can be adjusted with more spacing between words or lines, or presented in high contrasting colors to make it easier to see. Once text is in a digital format, it can be read on the computer, word definitions can be spoken or students can click embedded links for a multimedia presentation of the content to increase understanding.

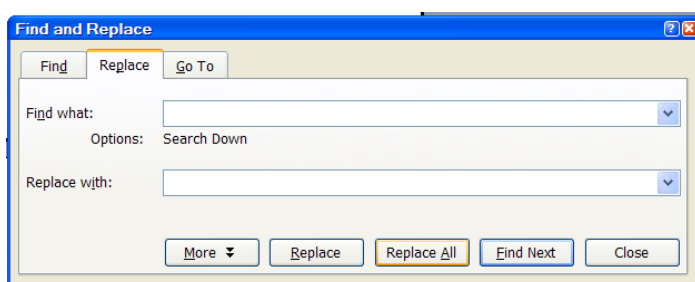
Using digital text makes format changes easy to do which may actually increase the readability of the text for a student.

In this example, you or the student can “Select All” of the text from the Edit menu of the word processor application and select a larger font size (Times New Roman 16pt).

Some fonts (such as Verdana 14pt) may be easier for students to read than others, so the student may use the same procedure (“Select All”) to change the font type to one that is easier for them to read. There is no research to support the claims of readability of typeface. However personal preference does make a difference.

Other students may have difficulty tracking words and need increased space between lines.

“Select All” and increase the line spacing to 1.5 or double line spacing. These sentences use the same font and size as the rest of the text, but are double-spaced.

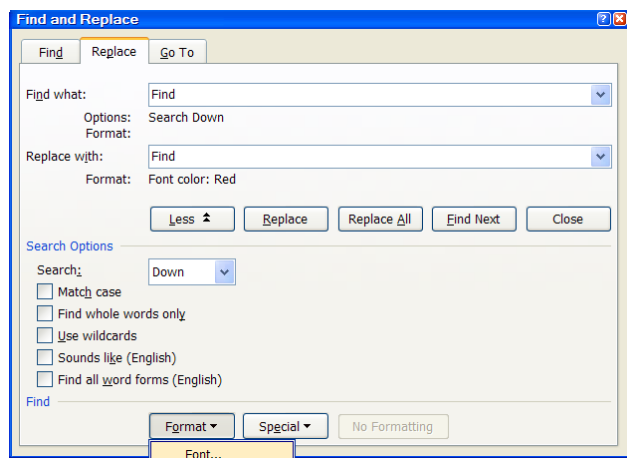


It is also possible to change the spacing between words. In this example the “Select All” feature is used to change the spacing between words. Type one space in the “Find” window and two spaces in the “Replace” window. Having more spacing between words may assist those students with “word boundary” problems who have difficulty seeing where one word stops and the other begins. This sample inserted two spaces between words.

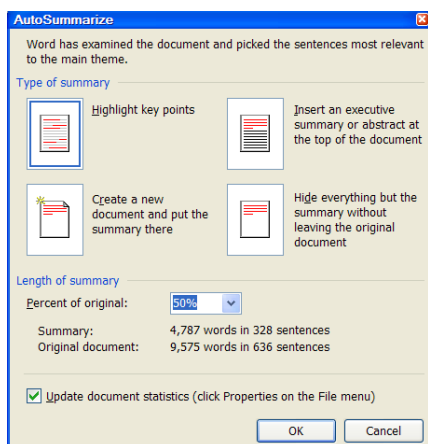
Another formatting change may be to increase the margins so that fewer words appear on the line. Students with difficulty tracking the words across a page may be more successful when there are fewer words per line such as in this example.

If the student is more successful using a colored overlay (see Using Color with Standard Text), change the background color on the computer by going to the “Format” menu, then “Background” to replicate the colored overlay on the computer. Use color to bring key words to a student’s attention by using the “Find/Replace” options again. This time insert the key word in

the “Find” window and “Replace” it with the same word, except change the format font to a colored one or highlight selected words and change the text color.



Some students need the text simplified for them. If the document is in *Microsoft Word® 2003*, you can “cognitively reformat” the text by using the AutoSummarize function in the “Tools” menu. Select the type of summary (highlight key points, executive summary, new document or hide everything but the summary) and the percentage of the original document included in the summary. As with any curricular modifications, you or the content teacher may need to adjust the summary to insure that it matches curricular objectives and benchmarks.



The AutoSummarize feature is still present in *Microsoft® Office 2007*, but is in a different menu location.

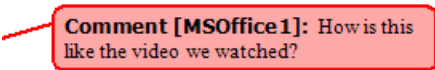
The AutoSummarize tool now appears on the Quick Access toolbar which may need to be installed. Directions to do so can be found in the Help menu. To create a summary of the document:

1. Open the document you want to summarize.
2. Click the AutoSummary tool on the Quick Access toolbar.
3. Choose Auto Summarize from the submenu that appears.

4. In the Type of Summary area, specify which of the four summary types you want to create.
5. In the Length of Summary area, indicate by using the Percent of Original drop-down list exactly how long you want the summary to be.
6. Click on the OK button.

Remember to show students other helpful features of *Microsoft Word* such as inserting bookmarks for easy navigation (to glossary, chapter questions, table of contents) or returning to the last page read, using different “Views” like the “reading layout” and using the Thesaurus and Dictionary (right click on *Windows*, Control + click on *Mac*) as they encounter unfamiliar words.

Instructional staff can insert comments as pre-reading or summary questions or definitions in the text to assist a student’s comprehension by using the “Review” Toolbar. Click on “New



Comment [MSOffice1]: How is this like the video we watched?

Comment” and insert a question, definition, definition or statement to encourage student reflection of the text.

One software program that can create most of the above-mentioned modifications for e-text is *CueLine ED* from Onion Mountain Technology. It allows you to control the presentation of electronic text on the computer screen. You can change font, background and margin (cue line) colors, adjust the font size and alignment, decide the number of lines per screen, the distance between those lines, and the number of words on each line. A left click takes the student to the next page, and a right click reads the text on that page to the student. Color cues can be attached to the left side of the screen to visually cue the student to sweep back to the left side.

*Visual Thesaurus*<sup>®</sup> is an online interactive dictionary and thesaurus with a display much like a semantic map. The graphical map displays the connections between a word and its definitions and synonyms in a unique display that can increase understanding and comprehension.

Modified text can come in a variety of types, formats, genres, and ability levels. *Route 66* is a website that contains modified high-interest low-vocabulary text for beginning adolescent and adult readers with significant disabilities. An “e-tutor” assists the reading partner in supporting the student in reading, writing and word study.

*Classic Book Shelf* allows students to adapt literature “classics” to a more readable format and presentation. Students can adjust font size and type, colors, margins and more. Students can even bookmark pages and later return to read.

*Symbol World* has modified newsletters, stories and more with pictures and rebus symbols for students who need picture supports.

Please review the Internet Reading Resources pages at the end of this chapter for more listings of online resources.

### Create your own modified electronic books

You can create your own electronic books and text by using many software programs. Creating personalized books that students can relate to can be motivating to reluctant readers or students with emerging literacy skills. *Kid Pix*®, *HyperStudio*®, *IntelliTools Classroom Suite*, *My Own Bookshelf*, *CAST UDL Book Builder* (a free online program), *PowerPoint*®, *Buildability*, *SwitchIt Maker 2* and *Clicker* are examples of software that can be used to create electronic books for beginning readers or advanced readers who need accessibility features built in. *Clicker* and *IntelliTools Classroom Suite* also have online resources such as books and activities that other educators have created and are available to download. *KidBook*, a free download for Macintosh is available from *Switch in Time*'s website. The program is appropriate for all ages and literacy levels. It enables users to convert all standard books into electronic documents that can be highlighted, magnified, colored, and speech-synthesized. Another simple way to create digital books is to literally take a picture of each page of the book using a digital camera, the built in camera available on some computers or an inexpensive "web cam". After the digital picture has been transferred to the computer, it can be imported or copied into any of the programs listed above. Add text and recordings to create your own electronic book. Many of the software programs have switch accessibility built in or the program can be modified so that it will work with a switch.

### Modified text for the Hearing Impaired

Many students with hearing impairments have a difficult time learning to read English. In fact, at the time of high school graduation, the average Deaf/HH student reads at or below the 4<sup>th</sup> grade level even though they understand and use sign language at a much higher level. (There are many reasons for this occurrence that can be found in Chapter 13 – Assistive Technology for Students who are Deaf or Hard of Hearing). For these students, written English is a second language that they don't have the luxury of hearing or practicing. Students who are deaf or hearing impaired can benefit from specialized software that uses 3-dimensional signing "avatars". These realistic animations provide students with sign language translations of vocabulary and assist with comprehension and fluency. *Sign Smith*™ products from Vcom3D provide signing translations within a dictionary, a studio program and signing animations, all of which can help students learn word meanings and make the connections between English text and American Sign Language (ASL).

### Modified text for the Visually Impaired

Computer operating systems have accessibility features built into them. Accessibility features are generally found in the Control Panel and/or the Accessories and Settings menus. The display can be set with a higher contrast so that text stands out more clearly against the background. Magnification options enlarge the entire display or portions of it. Resolution and display settings make icons on the desktop bigger. If students need enlarged text on their web browser pages, go to <http://www.saltmeadow.com/large.html> where you can find instructions for enlarging the text on any web browser. Please read Chapter 12 – Assistive Technology for Students who are Blind or have Low Vision about other modifications for students with visual impairments.

### Text Reader

#### Research Supporting Text Readers

Using a simple text reader has been an accepted accommodation for students with reading disabilities. Educators have been using text-to-speech (TTS) software and TTS functions of computer operating systems for a number of years. But what does the research say? It's been assumed that converting text-to-speech will improve the reading abilities and comprehension of students with reading disabilities. Silver-Pascuilla, et al. reviewed the research about the effectiveness of TTS with students with disabilities. They report that

- TTS helps special education students improve comprehension, fluency, and accuracy and enhances concentration (Leong, 1992; Lundberg & Olofsson, 1993).
- Word recognition skills also improve with this technology (Olson & Wise, 1992).
- Being able to immediately decode a word by hearing it spoken within the context of a passage helps students build word recognition and vocabulary without disturbing the flow of comprehension (Calfee, Chambliss, & Beretz, 1991).
- Comprehension is augmented by supporting decoding, thereby freeing the listener to focus on the meaning of the text (Wise, Ring, & Olsen, 2000).
- These technologies provide a supportive reading environment and increase a student's ability to read interesting and appropriate grade-level materials by minimizing the need for decoding skills and maximizing the student's ability to comprehend (Silver-Pascuilla, H., Ruedel, K. & Mistrett, S., p 24).

Elkind and Elkind (2007) interviewed secondary and college-aged students about their use of text readers. They found that

- 93% of the students with learning disabilities reported that reading was easier, less stressful, and less tiring.
- 91% of students with learning disabilities said that they were able to increase the time that they could sustain attention to reading before their attention wandered or they needed a break.
- The average duration of sustained reading reported by students with attention disorders increased about 60%, from 30-40 minutes to 50-60 minutes.
- The combined effect of faster reading speed and longer reading durations can result in a dramatic increase in the amount of material that a slow reader can read in an extended reading session of several hours. Some slow readers saw improvements in the number of pages read by factors of 2 or 3.

#### Research about using Text Readers

The Iowa Assistive Technology Text Reader Project (Maurer, Dimmitt, Hodapp, Judas, Munn & Rachow, 2006) was a statewide project that studied the impact of using a text reader on student achievement and attitudes. The Iowa Study specifically used Kurzweil 3000 as their text reader; however the effects of using text-reading software could be generalized to any of the previously mentioned programs. The study documented improved reading fluency and comprehension as well as very positive subjective responses from the students and teachers implementing the text

reader project. Data indicated that there might have been an initial adverse effect on student's performance while they were learning to navigate within the software. However, as they became more familiar with the program, their performance improved. Week 13 was the tipping point when students move from the acquisition process to the implementation process and their comprehension scores improved. The final results of the three-year study indicates that students accessed twice the amount of material (160 words per minute using the computer vs. 79 words per minute using paper probes) using text reader software rather than conventional means (2008). Additionally, while the student's comprehension of the paper text declined as the text difficulty increased, they were able to maintain and even improve comprehension levels using the text reader with the more difficult text. It should be noted that rates of satisfaction and greater gains were observed over the second year for both students and teachers.

### **Text Readers as part of the computer operating system**

Prior to purchasing or downloading a free text reader, look at your own computer operating system. *Macintosh OS*® has long had text-to-speech (TTS) built into their operating system. *TextEdit* is a simple text-editing program with built in speech or the speech settings in the system preferences can be set to speak highlighted text when you use a keyboard command (i.e., control + T). *Windows XP* and *Vista*™ OS for *Windows* has the equivalent TTS with "Narrator" built into the system. Systems running *Windows XP* with *Office 2003* can use built in TTS in *MS Word*®.

### **Free Text Readers on the Internet**

Another free program that includes TTS is one that works with the Internet browser *Firefox*®. *Click, Speak* adds text to speech capability to the browser so that students can hear text spoken while they are on the web. *Adobe Reader* is a free download that reads many pdf documents. A pdf document is often the type of document downloaded from web sites. Many standard text readers cannot read them, however *Adobe Reader*, v. 7 or higher can read, although it has navigational and other limitations. *Zamzar* is a free online document converter. You can convert a pdf document into a document your text reader can read and highlight. *PowerTalk* is a free program that speaks the text in any presentation in *Microsoft PowerPoint* for *Windows*. Another free resource for anyone that uses *MS Word 2003* on a *Windows* machine is *WordTalk*. It highlights each word as it is read, and it has a talking spellchecker and talking thesaurus.

Simply entering a keyword search for "free text readers" in your Internet browser should create a listing of available resources for you including *ReadPlease*, *Natural Reader*, *Microsoft*® *Reader*, *iSpeak* and more. Many of these programs offer versions with more options for a minimal fee.

*WebAnywhere* is a web-based free screen reader that can read whatever appears on the computer screen. *WebAnywhere* is a web-based, self-voicing web browser that enables web users to hear the text that is on web sites from almost any computer that can produce sound. It works in the browser and speech is generated remotely, then delivered to the computer, all without installing any software. This service resides on the University of Washington server.

### **Commercial Text Readers**

There are many text readers that are available for purchase with pricing generally dependent on number of functions, capabilities and voice quality. Some of the lower cost programs that still

offer good options include *TextAloud* and *TextAssist*® for Windows and *AbleReader* for Macintosh. A program by Premier Assistive Technology, *PDF Equalizer* reads PDF files, including text in graphs, fancy lettering, etc. without converting. It also includes a “notes” function and the ability to convert to MP3 format. Do consider the “lower cost” programs as many of them are very capable and may offer the supports your students need. They are oftentimes a good option for families.

Many school districts already have talking word processing programs such as *Write:OutLoud*® or *IntelliTalk*® for supporting struggling writers. While these programs are designed primarily for writing, any digital text can be copied and pasted into talking word processing programs and set to read sentences, paragraphs or the entire document.

When downloading e-text, you may see the term DAISY (Digital Accessible Information SYstem) as an option to select. DAISY is an international standard for formatting ebooks. There are six different types of DAISY books. Four of the types offer improved access and human voice delivery. They are navigable which enable readers to move from heading to heading, page to page, paragraph to paragraph, phrase to phrase and/or word to word. Pages can be bookmarked so that students can easily return to the last page read, search for words, go to a selected page and have the ability to speed up and slow down the audio playback without distorting the sound. DAISY books have both audio and text files but not all text readers are compatible with them. DAISY books can only be read with a DAISY reader or DAISY software which is embedded into many text or screen reading programs such as *JAWS*®, *ReadPlease*®, *Kurzweil 3000*™, *WYNN*™, *TextHelp Read & Write Gold*, *AspireREADER*™ and others. As DAISY books become the standard, expect to see most text reading software to be DAISY compatible.

### Scanner with OCR and Text Reader

In order to use a text reader or even talking word processing software such as those listed above, the text must be in a digital format that text readers recognize as print. It can be from a CD, downloaded, scanned into the computer using a flat bed scanner or a copy machine with scanning capabilities or entered into a document by “traditional” methods. If the text is scanned into the computer, it must be converted by Optical Character Recognition (OCR) software before it can be “read” by any type of text or screen reader. OCR software recognizes print as text and inserts it into word processing programs or other text formats. Most scanners come with “light” versions of OCR software which will convert the text and allow you to manipulate it, copy it into a word processing or text document and use it with other programs. The full versions of OCR software such as *OmniPage Pro*, *FineReader Pro* or *TextBridge Pro* generally retain the format of the document that was scanned in, including graphs, tables, graphics/pictures and the specific formats found on worksheets or tests. It must be stated that the quality of the scanned text is largely dependent on the quality of the printed material. If you are scanning a print document that is a second-generation copy of the original, on low-grade paper, has faded ink or is of marginal quality, the scanned text will likely have numerous OCR errors. Whenever possible, scan documents from high quality, original sources.

## Chapter 7 – Assistive Technology for Reading

“Scan and Read” programs are a different class of OCR software. These are sophisticated software programs that allow the student to create “user profiles” which adjusts the digital text to personalized reading settings. These programs easily allow the student to change the spacing between words and lines, add voice notes, typed notes and much more. Two examples of these are WYNN (What You Need Now) and Kurzweil 3000. Both of these programs include their own OCR software that converts scanned images into their own formatted text. Students can view the image on the computer as it looks on the page and have the text read to them. They can also add text, hear definitions, use powerful study tools, change the format of the text, select reading speeds, styles, voices and other customized settings. Additionally these programs will read the text on web sites.

Some slightly different programs, but within the same class are *Read&Write GOLD* and *Premier Assistive Technology’s Accessibility Suite*. These programs work with standard applications on your computer such as word processing, email, web browsers, and spreadsheet and media presentation software. *Read&Write GOLD* adds an additional toolbar to your programs with its own reading supports. The *Accessibility Suite* has a variety of programs that can provide reading supports for different documents. Both of these programs and *Kurzweil 3000* also have mobile versions installed on flash drives. The *Key to Access* is a flash drive with the accessibility programs from Premier Assistive Technology Suite while *Read&Write GOLD MOBILE* includes is a portable version of *Read&Write GOLD*. Students who have a flash drive containing this software are able to access digital text and all of the other reading supports regardless of the school, home or community computer that they are using.

The last scan and read program to consider which is slightly different than those previously mentioned is the more economical *Colligo Scan N Talk*. The scanner is included as part of the program. It combines full OCR scanning options with accessibility features such as scanning to Braille, DAISY, Large Print, Audio, accessible pdf in addition to scanning to a word processing document. *Scan N Talk* uses *AT&T Natural Voices™* and has some limited study supports.

All of these programs are worth considering if you need to scan large amounts of text for students. As with all assistive technology software, each program has unique strengths. It is well worth the time to explore each program with students to identify which one is the best match for students and district technology requirements. All of these programs have the ability to be trialed before purchase using vendor-provided demo CDs, trial downloads or through vendor grants (Premier Assistive Technology). Readers can also refer to product comparison matrices such as those developed by NCTI and CITED’s *Tech Matrix* <http://www.techmatrix.org/index.aspx>.

*Test Talker™* is a program from Freedom Scientific designed to assist with test taking, worksheet completion, and study of written materials by highlighting and reading the text. *TestTalker* maintains the integrity of the written test by not modifying the test, but providing the accommodation of a bimodal presentation of the written information. *TestTalker* supports true/false, multiple choice, fill-in, and extended answer tests. It includes a PDF converter so teachers can simply open an existing PDF file in *TestTalker* without needing to scan it to the computer.

It should be noted that all of the “scan and read” programs listed previously also have the capability of reading tests or worksheets and most can have text added to them by using specific features or scanning/conversion methods. However the OCR software may compromise the format of the printed page.

### Text Reader with Study Skill Support

#### Research supporting the use of electronic study tools

Studies have found that proficient readers automatically use comprehension strategies to help them bring meaning to the text as they read. Struggling readers, on the other hand rarely use common comprehension strategies as they are reading, even though their understanding of the text is poor. “There is good evidence that struggling readers can improve reading comprehension skills by learning the strategies of proficient readers and putting them into practice” (Don Johnston, Inc., 2005). A study reported in the *Journal of Special Education Technology* by Lange, Phillips, Mulhern, & Wylie found that the following study tools—the speech synthesizer, spellchecker, electronic dictionary, and the homophone tool in *Read & Write GOLD*—all made a significant difference in reading comprehension for secondary students with literacy difficulties (Lange, Phillips, Mulhern & Wylie, 2006).

Many assistive reading programs have built in study skill support tools. Highlighting tools of different colors are available in supportive text readers, *Read:OutLoud* and *Microsoft Reader* and all of the scan and read programs (*WYNN*, *Kurzweil 3000*, *Read&Write GOLD*, *Premier Assistive Technology Accessibility Suite* and the mobile versions of both). Students or their support staff can highlight key vocabulary, main ideas, supporting details, important dates/places, organizational structure of the text, etc. with different colors from the toolbar. Those highlighted details can then be extracted into separate or combined study guides. Important passages a student needs to return to for clarification can be bookmarked so that the student can easily navigate to the desired page. Text notes can be added by teachers with explanatory information, to prompt a “think aloud”, ask a pre-reading question, or provide a summary of the passage. Students can use text notes or voice notes to record questions about text as they read or as the computer reads to them. Talking dictionaries provide explanations of key vocabulary often in the context of a sentence. Most of the programs offer either graphic organizers or outlining supports so that students can extract highlighted or bookmarked information. The extracted information can provide study guides, an outline for further research, vocabulary lists and other supportive information.

Hearing and seeing text read as it is by the computer may help the comprehension of many struggling readers, but providing and using study support tools increases student engagement with the text. Furthermore, the Don Johnston Inc. (2005) study showed when at-risk students learned and used effective strategies, those students generalized the strategies to other reading tasks and continued to use them after the instruction ended.

### Student Specific Solutions

#### 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 or recognize familiar words by sight. They demonstrate those processes by speaking the 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.

#### Research

AAC-RERC is dedicated to the development of effective AAC, including a project researching effective literacy instruction for students using AAC. Summaries of their progress thus far, webcasts, *Maximizing Literacy Skills of Individuals who Require AAC* (Light), and publications are available on the website <http://www.aac-rerc.com>. Heller, Fredrick, and Diggs (1999) 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.

**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. (1999) 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

## Chapter 7 – Assistive Technology for Reading

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., 1999, p. 7).

**Assistive Technology**—A variety of assistive technologies 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 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. It can be as simple as writing words, phrases, word endings, etc. on a small “wipe-off” board, note cards or even “sticky notes” so that the student can indicate their choice in their preferred manner. Low-tech options allow for the teacher to quickly monitor the student’s understanding and provide content “on the fly”. However there are times when it is necessary to program a student’s communication system with content vocabulary for increased participation, checking for understanding, book study or any other instructional reasons. To read more about using an alternative communication system, please refer to Chapter 3 – Assistive Technology for Communication in the manual.

### Using the Nonverbal Reading approach

When teaching a word, the instructor first showed the word, then pointed to each letter or moved a card across the word revealing each letter as it is 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.

Next, the student was instructed to “sound out the word in your head without stopping between sounds” as the instructor verbally blended the sounds aloud. Finally, the student was told 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.

This study indicated 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.

### **Silent reading using an augmentative or alternative communication system**

The ability to read, specifically to read silently with comprehension, has a positive impact on school success, employability, independence, and autonomy, as well as providing a means for lifelong learning, entertainment, and introspection. For people who use augmentative and alternative communication (AAC), this ability carries each of these benefits, as well as enhanced face-to-face communication and the added ability to participate in asynchronous communication...Although many (AAC users) successfully learn to read words in isolation and understand text when someone reads it to them, estimates are that no more than 10% can read with comprehension above a second-grade level (Erickson, 2003).

Students who use AAC need to integrate and use all of the skills “typical readers” employ, but for the most part do so internally or silently. They must use their inner voice to “hold words” in their working memory long enough to process and understand the text. They must understand the structure of written language and have background knowledge about vocabulary and the topic. This is in addition to the physical aspects of reading such as coordinating eye movements involved in reading. Erickson (2003) says that it is especially important to build background knowledge with this group since so many of these students have limited experiences. Set a purpose for reading the passage so that the student understands clearly the reason for reading and

the expectation of the task after the passage is read. She also stresses the importance of teaching AAC users to build meaning using the existing vocabulary already in their communication system rather than teach text specific vocabulary in isolation.

### Solution Selection: Tools & Strategies

Use a Feature Match process to discuss and select those ideas, tools, and strategies that were generated during the solution brainstorming. Select those that best match the student, the environment and the reading tasks that need to be accomplished. Limit your selections to a reasonable number and prioritize them according to those that can be accomplished immediately, in a reasonable time period and those that will be considered at a later time or require additional or significant staff training.

### Implementation Plan

After tools have been selected and prioritized, identify any trials or services that are needed including procurement of trial materials, team member(s) responsibilities, start date and length of trial, training needed and any other student/staff specific issues. Be certain to identify reading objectives and criteria of performance to determine the effectiveness of the trials.

#### Assessment

As the team completes the SETT process, questions may arise about the student's ability to perform certain reading tasks. Standardized reading assessments or teacher observations may answer those questions; however, adapted, specialized or alternative assessments are occasionally in order.

#### Adapted Phonemic Assessment

Phonemic Awareness is the ability to hear, think about, and work with the individual sounds in words. It is an auditory skill and does not involve words in print or sound symbol relationships. However, it is one of the building blocks of beginning reading skills because it involves the isolation and manipulation of sounds. Because it is auditory and oral in nature, phonemic awareness is difficult to assess in students with complex communication needs. Standard phonemic assessments such as *The Phonological Awareness Test* can be adapted using *Boardmaker* picture communication symbols. Students are presented with symbols (with no text label) representing words/phonemes that demonstrate a student's phonemic awareness of segmentation, isolation, deletion, substitution and blending. Students could select the symbol using a preferred selection method (e.g., pointing, picture exchange, eye gaze) instead of vocalizing the sound or word.

#### Commercial Alternative Assessments

Some skills are more accurately assessed using a commercial product designed for a specific population of students. *Stages* is a seven-level developmental framework that assesses a student's cognitive and language abilities. Stages 4, 5 and 7 assess early reading and

## Chapter 7 – Assistive Technology for Reading

reading/writing skills. Additionally the program has built in access features such as single switch accessibility. A promising program still under development is the *ABC-Link*. It asserts that it will be a reliable and valid reading assessment tool for use with students who have complex communication needs (CCN). Students will have to be able to respond yes-no, select from a field of four, and have access to the alphabet. In its final form, *ABC-Link* will yield individualized instructional plans. The goal is to guide instructional decision-making for students who experience CCN. Standard, percentile, and other types of scores will not be generated as a result of completing the assessment because *ABC-Link* is intended for use as a guide to good instruction rather than as a tool for accountability, program placement, and/or eligibility. Other reading based programs such as *Simon S.I.O.*™ and *WordMaker*® track student progress and identify areas for further work.

### Response to Intervention (RtI)

Response to Intervention (RtI) is a general and special education initiative that combines best practices in both fields. As staff work together to analyze those students who continue to struggle to develop reading skills despite skilled differentiated instruction, we should see Universal Design for Learning (UDL) and AT mesh together so that all staff and students use multiple means of expression and representation. That may mean that a school district has a text reader installed on all school computers so that any student can hear digital text read back to them by the computer. It may mean that teachers regularly represent textual facts, characters, timelines, etc. using a graphic organizer and encourage their students to do the same. It may mean that all staff and students know how to manipulate digital text to increase readability by increasing font size, word, line and margin spacing or change background and text color. Talking and standard handheld dictionaries might be available in all classes and media centers. There will still be those students who need more intense and individualized intervention and resources including very specific assistive technology, but our hope is that those distinct lines between students who are using AT and those who are not will start to blur.

## References

- Adler, C. R. (2001). Put reading first: The research building blocks for teaching children to read. In *The National Institute for Literacy: Publications*. Retrieved October 27, 2006 from <http://www.nifl.gov/>
- Bigge, K., Best, S., Heller, K.W. (2001). Teaching individuals with physical, health and multiple disabilities, 4<sup>th</sup> edition. New York: Prentice Hall.
- Boyle, E.A., Rosenberg, M.S., Connelly, V.J., Gallin Washburn, S., Brinckerhoff, L.C., & Banerjee, M. (2003). Effects of audio texts on the acquisition of secondary-level content by students with mild disabilities. *Learning Disability Quarterly*, 26, 203-214.
- Cunningham, P.M., Hall, D. P. & Sigmon, C.M. (1999). The teacher's guide to the Four Blocks ®. Greensboro, NC: Carson-Dellosa.
- Don Johnston, Incorporated. (2005). The scientific-based research underlying Read:OutLoud™ & Solo™. Retrieved March 3, 2007, from [http://www.donjohnston.com/research/readoutloud\\_index.html](http://www.donjohnston.com/research/readoutloud_index.html)
- Edyburn, D. (2003, March/April). Learning from text. *Special Education Technology Practice*, Vol. 5, Issue 2, pp. 16-27.
- Elkind, K. & Elkind, J. (2007). Text-to-speech software for reading. International Dyslexia Association newsletter, *Perspectives*, Summer 2007, vol. 33, no. 3, pages 11-16.
- Erickson, K. (2003, June 24). Reading comprehension in AAC. *The ASHA Leader* , Vol. 8, No. 12, pp. 6-9.
- Erickson, K. (2007). Student Success: Progress After All These Years” In *Route 66 Literacy success for adolescent and adult beginning readers*. Retrieved March 3, 2007, from [http://www.route66literacy.org/about/student\\_profile.shtml](http://www.route66literacy.org/about/student_profile.shtml)
- Erickson, K.A. & Koppenhaver, D.A. (2007). Children with disabilities: reading and writing the Four-Blocks ® way. Greensboro, NC: Carson-Dellosa.
- Harvey, S. & Goudvis, A. (2000). Strategies that work: Teaching comprehension to enhance understanding. Portland, MN: Stenhouse Publishers.
- Heller, K. W., Frederick, L. D., & Diggs, C. A. (1999). Teaching reading to students with severe speech and physical impairments using the nonverbal reading approach. *Physical Disabilities: Education and Related Services*, 18 (1), 3-34.
- Katims, D. S. (2001). Literacy assessment of students with mental retardation: An exploratory investigation. *Education and Training in Mental Retardation and Developmental Disabilities*, 36 (4), 363-372.

## Chapter 7 – Assistive Technology for Reading



- Lange, A.A., McPhillips, M., Mulhern, G., & Wylie, J. (2006). Assistive software tools for secondary-level students with reading difficulties. *Journal of Special Education Technology*, 21 (3), 13-22.
- Light, J. (n.d.) Maximizing literacy skills of individuals who require AAC. Webcast from AAC-RERC. Retrieved December 17, 2008 from <http://aac-rerc.psu.edu/index-10925.php.html>.
- Marfilius, S. (2008, December). Text Story: Accessible Instructional Materials 101. What Wisconsin Teachers, Local Education Agencies and Families Need to Know about NIMAS “to infinity and beyond”. Presentation at the Wisconsin Assistive Technology Initiative Leadership Institute, Stevens Point, WI.
- Maurer, S. A., Dimmitt, S., Hodapp, J., Judas, C., Munn, C., & Rachow, C. (2006). Summary report of the Iowa text reader study 2005-2006. Iowa Department of Education Statistics. Retrieved May 16, 2007 from [http://www.iowa.gov/educate/component/option,com\\_docman/task,doc\\_view/gid,3409/](http://www.iowa.gov/educate/component/option,com_docman/task,doc_view/gid,3409/)
- Maurer, S.A., Hodapp, J., Rachow, C., Judas, C., Munn, C., & Dimmit, S. (2008). Summary report of Iowa text reader studies 2006-2007 Overview. Iowa Department of Education, Bureau of Children, Family, and Community Services. Retrieved March 4, 2008 from [http://www.kurzweiled.com/files/Iowa\\_Text\\_Reader\\_Study.pdf](http://www.kurzweiled.com/files/Iowa_Text_Reader_Study.pdf)
- McGee, L., & Richgels, D. (2000). Literacy’s beginnings: Supporting young readers and writers (3<sup>rd</sup> Ed.). Boston, MA: Allyn & Bacon.
- NIMAS at CAST: About NIMAS. (July 10, 2006). The need for flexible alternatives to print. Retrieved March 3, 2007, from <http://nimas.cast.org/about/index.html>
- Orr, A. & Parks, L. (August 1, 2007). Assisted reading software- teachers tell it like it is. Retrieved January 28, 2008, from <http://www.techlearning.com/showArticle.php?articleID=196604599>
- Silver-Pasquilla, H., Ruedel, K. & Mistrett, S. (2004). A review of technology based approaches for reading instruction: Tools for researchers and vendors. In *National Center for Technology Integration: Reading Matrix*. Retrieved March 30, 2007 from <http://www.nationaltechcenter.org/matrix/default.asp>
- Stanford Taylor, C. (2007, December). Guidance for the implementation of National Instructional Materials Accessibility Standard (NIMAS). Information update bulletin 07.03. Retrieved June 2, 2008 from <http://dpi.wi.gov/sped/bul07-03.html>.
- Sousa, D. (2004). How the brain learns to read. Thousand Oaks, CA: Corwin Press.
- Universal Design for Learning Pilot Project (UDL-P) (n.d.). Evaluating the benefit of using Read:OutLoud. Rockville, MD: Montgomery County Public Schools. Retrieved May 16, 2007 from [www.montgomeryschoolsmd.org/departments/hiat/tech\\_success/Read\\_OutLoud.pdf](http://www.montgomeryschoolsmd.org/departments/hiat/tech_success/Read_OutLoud.pdf)

Wolfe, P., & Nevills, P. (2004). Building the reading brain, PreK-3. Thousand Oaks, CA: Corwin Press.

## Products Mentioned in Chapter 5

| Product                                 | Vendor                                |
|-----------------------------------------|---------------------------------------|
| AbleReader                              | NextUp Technologies, LLC.             |
| Amazon Kindle                           | Amazon.com <sup>®</sup>               |
| AspireREADER 4.0 <sup>™</sup>           | CAST                                  |
| AT&T Natural Voices <sup>™</sup>        | AT&T                                  |
| Boardmaker <sup>®</sup>                 | Mayer-Johnson                         |
| BookWorm <sup>™</sup>                   | AbleNet, Inc.                         |
| BuildAbility                            | Don Johnston Incorporated             |
| CAST UDL Book Builder                   | CAST                                  |
| ClassMate Reader                        | Humanware                             |
| Clicker                                 | Crick Software                        |
| Crayola <sup>®</sup> Erasable Markers   | Crayola                               |
| Cybook                                  | Bookeen                               |
| CueLine <sup>®</sup> ED                 | Onion Mountain Technology             |
| EZC Readers <sup>®</sup>                | Available online                      |
| EZDaisy Talking Book Player             | Telex                                 |
| FineReader Pro                          | ABBYY                                 |
| Firefox <sup>®</sup>                    | Mozilla                               |
| Flip                                    | AbleNet, Inc.                         |
| FP <sup>™</sup> 3 Player                | Fisher-Price                          |
| Franklin Talking Dictionaries           | Franklin Electronic Publishers        |
| Hefty Tabs                              | Lee Products Company                  |
| Highlighting Tape                       | Lee Products Company                  |
| HyperStudio <sup>®</sup>                | Sunburst Technology                   |
| IntelliTalk <sup>®</sup>                | Cambium Learning                      |
| IntelliTools Classroom Suite            | Cambium Learning                      |
| IntelliTools Reading: Balanced Literacy | Cambium Learning                      |
| iPod                                    | Apple                                 |
| IRIS Pen <sup>™</sup> series            | I.R.I.S. Inc.                         |
| iTunes                                  | Apple                                 |
| JAWS <sup>®</sup>                       | Freedom Scientific                    |
| Key to Access <sup>©</sup>              | Premier Assistive Technology          |
| Kid Pix <sup>®</sup>                    | The Learning Company                  |
| Kidspiration <sup>®</sup>               | Inspiration Software, Inc.            |
| Kurzweil 3000 <sup>™</sup>              | Cambium Learning                      |
| Language Master                         | 2000 Drake Educational Associates Ltd |
| LeapFrog <sup>®</sup>                   | LeapFrog Enterprises                  |
| Literacy Support Pictures <sup>™</sup>  | Slater Software                       |
| Little Step-by-Step Communicator        | AbleNet, Inc.                         |
| MEville to WEville                      | AbleNet, Inc.                         |
| Microsoft Word <sup>®</sup>             | Microsoft <sup>®</sup>                |
| Monkey Business at the Market           | Slater Software                       |
| My Own Bookshelf                        | SoftTouch                             |

## Chapter 7 – Assistive Technology for Reading



| Product                                | Vendor                             |
|----------------------------------------|------------------------------------|
| News-2-You <sup>®</sup>                | News-2-You.com                     |
| OmniPage Pro                           | Nuance                             |
| PDF Equalizer                          | Premier Assistive Technology       |
| PictureIt                              | Slater Software                    |
| Planet Wobble                          | Crick Software                     |
| Playaway <sup>®</sup> audio books      | Follett Library Resources          |
| Post-it Notes                          | Office supply stores               |
| PowerPoint <sup>®</sup>                | Microsoft <sup>®</sup>             |
| QuickLink Pen <sup>®</sup> Elite       | WizCom Technologies LTD            |
| Reading Pens                           | WizCom Technologies LTD            |
| Read & Write for Mac                   | TextHelp                           |
| Read & Write GOLD                      | TextHelp                           |
| Read&Write GOLD MOBILE                 | TextHelp                           |
| ReadPlease <sup>®</sup>                | ReadPlease Corporation             |
| Scan 'n Read                           | Switch in Time                     |
| Scan N Talk                            | Colligo Corporation                |
| Scholar Digital Talking Book Player    | Telex                              |
| Simon S.I.O. <sup>™</sup>              | Don Johnston Incorporated          |
| Sign Smith <sup>™</sup>                | Vcom3D                             |
| Stages                                 | Assistive Technology, Incorporated |
| Start to Finish Books <sup>®</sup>     | Don Johnston Incorporated          |
| SwitchIt Maker 2                       | Inclusive TLC                      |
| Talking Word Processor <sup>©</sup>    | Premier Assistive Technology       |
| TestTalker <sup>™</sup>                | Freedom Scientific                 |
| TextAloud                              | NextUp Technologies, LLC           |
| TextAssist <sup>®</sup>                | Mindmaker                          |
| TextBridge                             | Nuance                             |
| The Phonological Awareness Test        | Lingui Systems                     |
| Thinking Reader                        | Tom Snyder Productions             |
| TouchBook <sup>™</sup>                 | Somatic Digital Technology         |
| Transparent Post It Notes              | Available locally                  |
| UKanDu Little Books <sup>®</sup>       | Don Johnston Incorporated          |
| Velcro <sup>™</sup>                    | Available locally                  |
| VictorReader <sup>®</sup> Stream       | Humanware                          |
| Visual Thesaurus <sup>®</sup>          | Thinkmap, Inc.                     |
| WiggleWorks <sup>®</sup>               | Scholastic                         |
| WordMaker <sup>®</sup>                 | Don Johnston Incorporated          |
| Write:OutLoud <sup>®</sup>             | Don Johnston Incorporated          |
| Writing with Symbols 2000 <sup>™</sup> | Mayer-Johnson                      |
| WYNN <sup>™</sup>                      | Freedom Scientific                 |

### Internet Reading Resources (based on the Reading Continuum)

#### Standard Text

##### Reading A-Z

An excellent source of literacy materials that can be printed or adapted. A free 30 day trial is available. Colored online reading materials from RAZ-Kids.

<http://www.readinga-z.com>

<http://www.raz-kids.com/>

##### Starfall Learn to Read

A free website featuring a multitude of stories appropriate for Early Childhood through second grade.

<http://www.starfall.com/>

##### Seussville Story Maker

Users can create a three-scene story selecting from "Dr. Seuss" backgrounds, characters, and music. You add your own text. When the story is played, the text appears in "conversation bubbles" but is not spoken.

[http://www.seussville.com/games/storymaker/story\\_maker.html](http://www.seussville.com/games/storymaker/story_maker.html)

##### Tumblebooks

An online collection of books for young readers up to middle and high school aged. Picture books have been adapted with sound, music, narration and animation. Those for older students have adjustable text, highlighting options and audio narration. They include chapter books, high interest, classics and English and American literature. Free trials available.

<http://www.tumblebooks.com/>

#### Books Adapted for Access

##### Accessible Book Collection Wiki

This Wiki has templates from Clicker 5 and IntelliTools Classroom suite that are designed to meet the needs of as many students as possible. Download the templates and books that others have created and share books that you have done.

<http://accessiblebookcollection.wikispaces.com/>

##### Books2burn

A Macintosh program. You copy and paste text to makes audio books with chapters and everything! Can be transferred to MP3 files, etc.

<http://books2burn.sourceforge.net/>

##### Tar Heel Reader

Tar Heel Reader is a collection of free, easy-to-read, and accessible books on a wide range of topics. Each book can be speech enabled and accessed using multiple interfaces (i.e. switches, alternative keyboards, touch screens, and dedicated AAC devices). The books may be

downloaded as slide shows in PowerPoint, Impress, or Flash format. You may also write your own books using their tools.

<http://tarheelreader.org/>

### Handheld Device for Reading

#### Children's Illustrated e Tales

Handheld application of children's books

<http://handheld.softpedia.com/get/Documents-E-Books/Childrens-Illustrated-eTales-21102.shtml>

#### iPod eBook creator

Convert text files to iPod Notes, download existing eBooks from the eBook library. Conversion of web pages and copy & pasted texts is available. Conversion of RSS feeds to iPod Notes is available for registered users.

<http://ebookhood.com/ipod-ebook-creator>

#### Many Books

Free eBooks for your PDA, iPhone, or eBook reader.

<http://manybooks.net/>

#### Memoware

Free ebook titles for Palm

<http://www.memoware.com>

#### Palm ebook Studio

Creates eBooks that can be read by the eReader and eReader Pro software on Palm OS ® or PocketPC handhelds.

[http://www.ereader.com/ereader/software/product/15001\\_eBookstudio\\_win.htm](http://www.ereader.com/ereader/software/product/15001_eBookstudio_win.htm)

#### University of Virginia eText Library

Free ebook library for the Microsoft ® Reader and Palm.

<http://etext.virginia.edu/ebooks/>

### Use of Pictures/Symbols with Text

#### Boardmaker ® Books

A list of many books that have Boardmaker symbols already made for them from the Baltimore City Public School System.

<http://www.bcps.k12.md.us/boardmaker/Results.asp>

#### bubbl.us

A free online graphic organizer for students to create a visual representation of text to assist in comprehension.

<http://bubbl.us>

### **Gliffy.com**

Free online graphic organizer can help students create a visual representation of text to assist in comprehension.

<http://gliffy.com>

### **Literacy Support Pictures™**

A free resource of pictures from Slater Software. Simply enter the word into the search window. Copy the picture and insert it into the document for picture supported text.

<http://www.slatersoftware.com/PixLibrary.html>

### **News-2-You ®**

A weekly online newsletter with picture supports. Subscribers can download newsletters with differing degrees of difficulty and pictorial support.

<http://www.news-2-you.com>

### **Symbol World**

Everything has symbols attached to it. Newsletters, stories (for older students also), Nursery Rhymes, personal care and more.

<http://www.symbolworld.org/>

### **Visuwords™**

A free online visual dictionary. Diagrams demonstrate word meanings and associations with other words and concepts.

<http://www.visuwords.com/>

### **Visual Thesaurus ®**

A dictionary and thesaurus with an intuitive interface that encourages exploration and learning.

<http://www.visualthesaurus.com/>

## **Electronic Text**

### **Accessible Book Collection**

A non-profit corporation that provides high interest/low vocabulary and other digital books to qualified individuals and schools for a modest fee.

<http://www.accessiblebookcollection.org>

### **Assistive Technology Training Online**

This module identifies software features and programs that enhance independent reading opportunities. Includes descriptions, resources, links to programs, e-text and more.

<http://atto.buffalo.edu/registered/ATBasics/Curriculum/Reading/index.php>

### **AudibleKids**

Actors read stories which can be loaded to MP3/Ipod. There is a fee for the books

<http://kids.audible.com/>

## Chapter 7 – Assistive Technology for Reading

### AudioBooks for Free

MP3 and DVD audiobooks (adventures, detectives, horrors, classics, children, non-fictions, philosophy, etc.) for you to download. You can listen to their mp3 audio books on your computer, SmartPhone, PDA, CD-MP3 or portable MP3 player. Convert their mp3-files into ordinary CD-audiotracks. Some packages are available for a cost.

<http://audiobooksforfree.com>

### Baen Books

A publisher of science fiction, will provide its books to “fans who are blind, paralyzed, or dyslexic, or are amputees, in electronic form free of charge.” Application for the free ebooks will be processed by ReadAssist <http://www.readassist.org/> , a volunteer group devoted to helping disabled readers find the books they want in the form they need.

<http://www.baen.com/>

### Bibliomania

This site contains many of the classics, like Little Women, poetry, fiction and nonfiction, and even full-text Shakespeare. Since the content is purely textual, it is easily accessible for students with sensory impairments or learning disabilities who are using screen readers, text readers, or simply text-to-speech software programs.

<http://www.bibliomania.com/>

### BookShare.Org

Bookshare.org gives print disabled people in the United States [legal](#) access to over 31,000 books and 150 periodicals that are converted to Braille, large print or text to speech audio files. As of Fall 08, registered users will be able to download Read:OutLoud, a text reader with study/comprehension supports.

<http://bookshare.org/>

### Digital Content in the Classroom

A resource page available at the CAST website. An extensive list of links to digital text resources.

[http://www.cast.org/teachingeverystudent/toolkits/tk\\_resources.cfm?tk\\_id=41](http://www.cast.org/teachingeverystudent/toolkits/tk_resources.cfm?tk_id=41)

### DMFC - Daisy Multi Format Converter

The Daisy Multi Format Converter allows conversion of DAISY books between different formats.

<http://www.oatsoft.org/Software/dmfc-daisy-multi-format-converter>

### E-text Resources

This site is through Freedom Scientific & lists all sorts of electronic text resources, free and subscription based.

[http://www.freedomscientific.com/LSG/resources/industry\\_links.asp#elec](http://www.freedomscientific.com/LSG/resources/industry_links.asp#elec)

## Chapter 7 – Assistive Technology for Reading

---

### HighTech Redwoods

This website is dedicated to creating accessible documents of all types. This link has tips and the process for creating accessible podcasts.

<http://hightech.redwoods.edu/accessibility/podcasting>

### International Children's Digital Library

A digital library of outstanding children's books from around the world.

<http://en.childrenslibrary.org/>

### Just Free Books

JustFreeBooks searches the content of more than 450 web sites. With JustFreeBooks you can find public domain texts, open books, free audio books, ad-supported books and more

<http://www.justfreebooks.info/>

### Librivox

Librivox uses volunteers to record chapters of books in the public domain, and then release the audio files back onto the net (podcast and catalog). Their objective is to make all books in the public domain available, for free, in audio format on the internet. They are a totally volunteer, open source, free content, public domain project.

<http://librivox.org/>

### Lit2go

All of the Gutenberg books available in Mp3, html and pdf format. So, you can listen and read the book at the same time! It nicely done with great chapter summaries.

<http://etc.usf.edu/lit2go/>

### Literative

Literative provides reading material for pre-school, kindergarten and grade 1 students online. The program is comprised of carefully leveled guided readers, comprehensive phonic activities and a wealth of supplemental reading material which gradually develop a child's reading skills in a sequential manner. Developed and approved by teachers and parents across the United States. Many of the "talking books" can be read with a mouse click. All the material is available for free from this site but you need to register.

<http://www.literative.com/Home/index.asp>

### Microsoft ® Reader

Create eBooks from Microsoft ® Word version 2002 or 2003 files. The Reader in Microsoft ® Reader (RMR) add-in enables you to convert any Word document into a Microsoft ® Reader format eBook. It is free and has many features found in more expensive programs: text to speech, alter font sizes, annotations color coded bookmarks, notes, colored highlighting, extraction of annotations.

<http://www.microsoft.com/reader>

## Chapter 7 – Assistive Technology for Reading

---

### National Center for Supported Electronic Text

The Center has created a Delicious site:

This list has been vetted and has descriptions to help you locate text.

[http://delicious.com/Supported\\_etext](http://delicious.com/Supported_etext)

### One More Story

An online library (subscription) with contemporary and classic children's literature.

Professionally narrated, highlights word by word, or student can use "*I can read it mode*" to only hear individual words read as needed.

<http://www.onemorestory.com/>

### Project Gutenberg

E-texts and e-books that are over fifty years old and are part of public domain. There is no charge for these books.

<http://www.promo.net/pg/>

### Recording for the Blind and Dyslexic ®

RFB & D is the nation's largest audio textbook library. They offer audio books for school, recreation and professional reading in addition to playback equipment and software. Schools pay a fee and must provide documentation of student's print disability.

<http://www.rfbd.org/>

### Resource Room Hi-Lo Reading

Lists of books which librarians & publishers have gathered 'for reluctant readers,' and sites with books specifically written with "hi-low" readers in mind.

[http://www.resourceroom.net/older/hilow\\_sources.asp](http://www.resourceroom.net/older/hilow_sources.asp)

### Route 66

A beginning reading instructional tool for adolescent and adult learners, particularly those with significant developmental disabilities. Access features as well as essential components of literacy development are built into the program.

<http://www.benetech.org/literacy/route66.shtml>

### Storyline Online

Well known actors read books using different voices for characters, good expression and more.

The books are in a movie format so you hear the actor reading but you see pictures from the books, however the words to the books are not shown.

<http://www.storylineonline.net/>

### Teacher Taps: Electronic Books and Online Reading

A comprehensive listing of sites for electronic books. It lists sites for age levels Pre-Adult. It also includes a legend identifying which sites are easy readers, have audio, require Macromedia Flash, etc.

<http://eduscapes.com/tap/topic93.htm>

### **The Key**

*The Key* is a newspaper written for new but not beginning older readers. It provides reading material for adults with limited reading skills. These include adults who have not completed their high school educations, those learning English and those with learning disabilities. All material in *The Key* is copyright free for nonprofit, education purposes.

<http://www.keynews.org/>

## **Modified Electronic Text**

### **BookBuilder**

Use this free site to create, read, and share digital books for students. Your universally designed books can engage and support diverse learners according to their individual needs, interests, and skills.

<http://bookbuilder.cast.org/>

### **Classic Book Shelf**

An awesome collection of the classics. Choose your best font, size, even color with a mouse click and the book redraws itself at once using the new font. Do you like parallel margins? Justify or don't, it's up to you. Each time you change an option or turn a page the book redraws itself. It bookmarks where you are in the book when you stop reading and will send you an email with a link that takes you right back into the book and retains your color and size changes.

[www.classicbookshelf.com](http://www.classicbookshelf.com)

### **eStoryMaker**

A simple means for assembling text, picture and sound files into an e-story that supports multiple access means.

<http://www.oatsoft.org/Software/estorymaker>

### **KidBook**

Available as downloadable freeware from Switch in Time. It enables users to convert all standard books into electronic documents that can be highlighted, magnified, colored, and speech-synthesized.

<http://www.switchintime.com/>

### **WordFlashReader**

This is an open source program that flashes one word or a chunk of text on the screen at a user-determined rate. The appearance is completely customizable. It can be set up to cover the full screen with giant words in whatever font or color preferences needed. WordFlashReader allows the user to pause, rewind, fast-forward...all very important if the reader needs to review for comprehension or just because they blinked or had to look away from the screen. For emerging or fluent readers who want to increase their reading speed.

<http://wordflashreader.sourceforge.net/>

### Text Reader

#### Adobe® Reader

Use Adobe Reader to read pdf documents. These are documents that are frequently downloaded from web sites. Once the document is open in Adobe Reader, go to the View menu then to Read Out Loud.

<http://get.adobe.com/reader/>

#### AMIS

AMIS is a free software program that you can use to read DAISY books. AMIS is a multilingual player for reading books complying with DAISY standards.

<http://www.oatsoft.org/Software/amis>

#### Awesome Talking Library

Awesome Talkster combines a browser, directory, search engine, and text-to-voice technology. This allows you to select online text and have it read to you. Children can have the Web pages read to them slowly, but adults can have pages read at normal speed.

[http://www.awesomelibrary.org/Awesome\\_Talking\\_Library.html](http://www.awesomelibrary.org/Awesome_Talking_Library.html)

#### Click, Speak

A free download extension that enables text to speech in the Firefox® web browser

<http://clickspeak.clcworld.net/>

#### DSpeech

A free Text-to-Speech program (Windows) that allows you to save the output as a .WAV or .MP3 file. You can select from different voices.

<http://dimio.altervista.org/eng/index.html>

#### Google™ Directory of Desktop Readers

A directory with links and brief descriptions of simple text readers.

[http://www.google.com/Top/Computers/Speech\\_Technology/Speech\\_Synthesis/Desktop\\_Readers/](http://www.google.com/Top/Computers/Speech_Technology/Speech_Synthesis/Desktop_Readers/)

#### HELP Read™

HELP Read™ is FREE software that reads along with you while you do the reading.

<http://www.oatsoft.org/Software/help-read>

#### Orca

Orca is a free, open source, flexible, and extensible screen reader that provides access to the graphical desktop via user-customizable combinations of speech, braille, and/or magnification.

<http://www.oatsoft.org/Software/orca-1/>

#### NaturalReader

The free version of this text reader uses Microsoft® voices. The fee version uses natural “human” voices.

<http://naturalreaders.com>

### **PowerTalk**

Free download for reading PowerPoint® slideshows/books. You can add in page-forward buttons requiring an action from the reader (switches, touch screen, mouse, headmouse) or leave it to "flip pages" on its own.

<http://fullmeasure.co.uk/PowerTalk/ReadMe.htm>

### **Readthewords.com**

A free and versatile online text-to-speech service which allows the user to enter text with the keyboard, to copy and paste it, or to upload text files in a variety of formats from the computer or from other websites. Speech is generated quickly, with a choice from 15 high quality voices whose reading rate can be varied easily. Users can listen online, download an mp3 file for use offline. ReadTheWords.com offers text-to-speech in French and Spanish as well as in English.

[www.readthewords.com](http://www.readthewords.com)

### **ReadPlease**

A free text reader (also one for purchase) for Windows. Reads any text out loud that you can select and highlight.

<http://www.readplease.com>

### **Spoken Text**

This free resource allows you to record PDF, Word, plain text, PowerPoint files, RSS news feeds, emails and web pages, and convert them to speech. You can download your recording as an iPod book or mp3 file. Every member gets a personal podcast URL, which they can use to download recordings to iTunes or their iPods.

<http://www.spokentext.net/>

### **WordTalk**

Free download that works with MS Word. It highlights each word as it is read, and it has a talking spellchecker and talking thesaurus.

[www.wordtalk.org.uk](http://www.wordtalk.org.uk)

### **WebAnywhere**

A web-based, self-voicing web browser that enables blind or other print disabled web users to access the web from almost any computer that can produce sound without installing new software.

<http://webanywhere.cs.washington.edu/wa.php>

## **Scanner with OCR with Text Reader**

### **Badger Accessibility Services**

This service at UW-Madison offers a scanning service for a fee. They will convert with or without "optimization". Quick turnaround for small amounts of text.

<http://www.bas.wisc.edu/documentconversion.htm>

### **PACER Simon Technology Center**

The PACER Simon Technology Center has compared four scan and read software programs to help consumers and families choose which program best suits their needs. This information is current as of November 2008, but is subject to change. It is not intended to endorse one product over the other.

<http://www.pacer.org/stc/pubs/ScanandRead.pdf>

### **TechSolutions**

Offer a scanning service where they will copy and make text files "Kurzweil ready," offering a proofing and editing service. This includes spell checking the underlying text as well as zone editing the documents. TechSolutions has also started a library of scanned documents, making some books readily available. For more information call (1-866-538-9984) or go to

<http://www.tech-solutions.org>

## **Text Reader with Study Skill Support**

### **Talking Dictionary**

Talking Dictionary is a speech enabled encyclopedic dictionary that can be used with or without a screen reader. This free talking dictionary is based on the Wordnet 2.1 database and contains over 250,000 words.

[http://www.download3000.com/download-Talking\\_Dictionary-count-reg-6527.html](http://www.download3000.com/download-Talking_Dictionary-count-reg-6527.html)

### **UDL Editions by CAST**

Cast has combined digital text with the Texthelp Toolbar to provide text to speech, highlighters, other study skills and leveled supported reading strategies.

<http://udleditions.cast.org/>

## **Professional Resources**

### **AAC-RERC**

The AAC-RERC is a collaborative research group dedicated to the development of effective AAC technology. Augmentative and alternative communication (AAC) refers to ways (other than speech) that are used to send a message from one person to another. Research Project R1-A: Literacy Support Technologies for AAC Users has a number of resources outlining types of literacy supports for AAC users.

<http://aac-rerc.psu.edu/index-61327.php.html>

### **BrainConnection**

The concepts important for teaching reading in the classroom have been revealed by decades of research in both education and cognitive psychology. What are they and how can a better understanding of how they connect with one another improve reading instruction?

<http://brainconnection.positscience.com/library/?main=eduhome/reading-language>

## Chapter 7 – Assistive Technology for Reading

### **CAST (Center for Applied Special Technology)**

A resource for NIMAS, NIMAC, Universal Design for Learning, and a support for school teachers and administrators through professional development, consultation, publications, and online resources.

<http://www.cast.org/index.html>

**CAST Strategy Tutor** is an online multimedia program that provides adolescent learners with customizable mentoring and support as they conduct Internet research, and teachers with supports for using Web-based resources more effectively in the classroom. Strategy Tutor helps students read, research, collect and understand information better and more efficiently.

<http://cst.cast.org>

### **CITEd**

Home of the TechMatrix 2.0, an initiative of the National Center for Technology Innovation and the Center for Implementing Technology in Education. Users create a customized matrix by subject and/or learning support such as access to multiple representations of text, notation and symbols or access to electronic resources, means to organize and plan, opportunities to learn concepts and other reading, writing, math and assistive technology supports.

<http://www.techmatrix.org/>

### **DAISY**

An introduction to DAISY books and what they are.

[http://www.daisy.org/about\\_us/](http://www.daisy.org/about_us/)

### **ECB (Educational Communications Board) Educational Resources: Surf Report**

Public resource for Wisconsin Educators. The Literacy Center is full of ideas and strategies for developing literacy skills. There are some e-books, but primarily the site is a good resource for supplemental reading activities which may or may not need adaptations for access.

[http://explore.ecb.org/surf/surf\\_report?subject=0](http://explore.ecb.org/surf/surf_report?subject=0)

### **F.A.C.E.S. (Functional Academic Curriculum for Exceptional Students) Curriculum**

The primary purposes of the F.A.C.E.S. curriculum are to teach meaningful, age appropriate skills within school and non-school settings and to systematically evaluate students' progress within those settings. Functional literacy skills are included in the curriculum.

<http://www.esc12.net/faces/documents/LanguageArts/default.html>

### **Florida Center for Reading Research**

This research site includes a chart that describes types of reading programs (core, supplemental, tech based, remedial, implemented by tutor); reading components; empirical research, and misc. notes. Each of the reviewed programs included a pdf narrative.

<http://www.fcrr.org/FCRRReports/reportslist.htm>

### **Free Reading**

An open source Website where teachers can access a free, sequential, research-based reading intervention program for grades K-1. Free-Reading.net offers a complete intervention program in phonics and phonological awareness for grades K-1 with plans to expand to include vocabulary

and comprehension. Teachers can follow the full 40-week scope and sequence of lessons or tailor materials to individual students' learning needs. The expansion and evolution of the site will be guided by an Advisory Board of leading reading researchers.

[http://freereading.net/index.php?title=Main\\_Page](http://freereading.net/index.php?title=Main_Page)

### **Learning Through Listening**

From Recordings for the Blind and Dyslexic. Educators can download subject/grade level lesson plans, research articles and other materials for free even if the school doesn't subscribe to the service.

<http://ltl.rfbd.org/>

### **Literacy Profile for Students with Physical Impairments**

The purpose of the Literacy Profile for Students with Physical Impairments is to provide a guide to the teacher of students with orthopedic impairments in making literacy decisions.

<http://education.gsu.edu/PhysicalDis/mono.html>

### **Never Too Late: Approaches to Reading Instruction for Secondary Students with Disabilities**

Part of OSEP's IDEAs that Work documents for Instructional Practices. Gives two different models for helping older students with reading disabilities increase their skills. Document can be downloaded & printed

[http://www.osepideasthatwork.org/toolkit/InstPract\\_never\\_to\\_late.asp](http://www.osepideasthatwork.org/toolkit/InstPract_never_to_late.asp)

### **Nonverbal Reading Approach**

The Nonverbal Reading Approach is a reading strategy designed for students with severe speech and physical impairments. It provides nonverbal students a strategy to sound out words. It also provides a way for teachers to assess if the student can read targeted words.

<http://education.gsu.edu/PhysicalDis/mnon.htm>

### **Project Forum**

Identified 15 critical topics within the field of special education and conducts policy analyses on these topics. NIMAS and Reading First initiatives are topics in 2007.

<http://www.projectforum.org>

### **Project LITT: Literacy Instruction through Technology**

Focuses on the role that technology can play in improving the reading skills of students with learning disabilities, specifically "talking books".

[http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content\\_storage\\_01/0000019b/80/16/13/66.pdf](http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/16/13/66.pdf)

### **Reading Rockets**

From LD online. Takes teachers and parents through a series of questions about a student's reading problems. Describes the process & explains it from the student, parent and teacher perspective. Then gives tips for all three how to help.

<http://www.readingrockets.org/helping/target>

## Chapter 7 – Assistive Technology for Reading

### **Tech Matrix**

NCTI and CITED sponsor technology matrices that compare different features for a number of products. Search by areas such as “Providing Electronic Resources’ or “Providing text in alternative formats”, etc.) The site also contains a comprehensive literature review of the impacts of technology on students with reading disabilities. “*A Review of Technology-Based Approaches for Reading Instruction: Tools for Researchers and Vendors*”.

<http://www.techmatrix.org/>

### **The Industry Profile on Education Technology: Learning Disabilities Technologies and Markets**

A comprehensive profile of educational and assistive technology, products for students with learning disabilities in reading, writing and math.

<http://www.nationaltechcenter.org/index.php/2007/04/25/industry-profile-on-education-technology/>

### **Wayne RESA (Regional Area Service Agency)**

Wayne Co., MI resource page has a number of pdf. documents that can be downloaded including digital text lists, online books for reading, tips and supports for struggling readers and writers and more.

<http://www.resa.net/teacherresources/materials/>

### **Zamzar**

A free online file converter for pdf files to documents. With the free version, you submit the pdf file and Zamar emails the document to you, generally within 24 hours.

<http://zamzar.com/>