

Identifying the Right Tool:

A Reference List of Technology Supports for Struggling Readers

A collaborative project of the Texas Education Agency and the Inclusion in Texas Network





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Introduction and Purpose

Identifying the Right Tool: A Reference List of Technology Supports for Struggling Readers is a resource guide adapted from the Assistive Technology in Texas Schools Series originally developed by the former Texas Assistive Technology Network (TATN). It addresses the process of determining appropriate low-technology (low-tech) and high-technology (high-tech) tools that will assist in acquiring and practicing specific skills needed when learning to read. This resource is not meant to be a comprehensive assistive technology (AT) resource guide. It is a resource tool for professionals, students, and parents working with technology to help mitigate long-standing equity and accessibility gaps in line with the National Education Technology Plan (NETP) and to support reading progress for all students. Reading aligns with the five research-based components of effective phonics-based reading programs: phonemic awareness, phonics, vocabulary, fluency, and comprehension.

Low-tech and high-tech tool options specific to each of the skill areas are provided in each section. It is considered best practice to offer a continuum of technology intervention through both low-tech and high-tech tools. Additionally, every student should have a backup option when technology fails. The tools and strategies provided are not intended to be an endorsement, but rather a compilation of current tools to support the decision-making process when considering options using low-tech and high-tech tools and features to support reading progress.

It is important to include in this reading technology/assistive technology (AT) decision-making process a multidisciplinary team consisting of individuals who are familiar with the student, those familiar with the curriculum, and others familiar with both common and specialized tools available through the Local Education Agency (LEA). It may also be appropriate to include team members who are not familiar with the student to ensure an unbiased perspective.

This resource is designed for use with team members involved with decision-making and with students who have identified reading disabilities or with struggling readers which can include but are not limited to the following students:

- Students with a specific language learning disability
- **Emergent Bilingual Students**
- Students who are deaf/hard of hearing
- Students with cognitive impairments
- Students with physical impairments
- Students with vision impairments
- Students with combined sensory impairments
- Students requiring Augmentative and Alternative Communication (AAC) to communicate

Along with the students, team members (in some cases mandated by law) involved with decisionmaking may include but are not limited to the following:

- Parent/guardian
- Teachers
- Assessment personnel
- Campus technology representative
- Assistive technology representative
- Administrator
- Related service provider
- Librarian
- Curriculum specialists
- Reading specialists
- Vertical and lateral grade leadership

As the needs for AT are not simple and straightforward for many students, the AT decision-making process might be required through an AT assessment. According to the Wisconsin Assistive Technology Initiative (WATI, 2017), the AT assessment requires information-gathering, an AT decision-making process such as the Student, Evaluation, Tasks, and Tools (SETT) Framework, and an AT implementation plan, which includes teamdetermined trials. The SETT Framework is a tool developed by lov Zabala to help teams gather and organize information.

Using the SETT Framework, for the purpose of this guide, information will be specifically gathered in the area of reading. To begin this process, the multidisciplinary team should assign a team lead to coordinate information gathered. The team collects and reviews information on student needs and interests based on environments and reading tasks to gain a shared understanding of the tools and supports that will promote reading success.

Once information is gathered, the team should discuss and prioritize the task list based on the impact each one has on student independence and reading progress. Choose one or two tasks to focus on initially.

Decision Making Process Considerations

Student:

- Current reading level
- Reading assessment results
- Reading strengths, looking at all five components of phonics reading instruction
- Reading weaknesses, looking at all five components of phonics reading instruction
- Level of independence
- Current and previous accommodations and modifications
- What was successful? What was not? Why?
- Strategies that successfully support the student
- Interests and reading preferences
- History of instructional technology and AT use, including successes and failures
- Executive function (distractibility, fatigue, organization)

Environment:

- Everywhere reading takes place, including instructional and noninstructional settings
- Curriculum
 - Robust and age-appropriate
 - Standard
 - Modified
- Classroom support (available to student, teachers, and paraprofessionals)
- Classroom setup (room arrangement, lighting, student grouping, background noise)
- Available reading materials
- Access to reading materials
- Operating system, learning management system (LMS), and campus technology tools *Check for compatibility between operating systems, LMS, software, and tools
- Campus/district library and software subscriptions
- **Training requirements**
- Condition and maintenance of technology tools

Task:

- What tasks are expected in the classroom that most peers accomplish?
- What specific tasks does the student need to complete to increase reading independence?
- What are the student-specific reading objectives?
- Does the student use modifications or accommodations to complete the same tasks as peers?
- What academic tasks can be completed independently?
- Is there a teacher or staff member who supports an increase in task completion on grade-level work?
- Does the student perform the same across environments and throughout the day?
- Does time of day, medication, or fatigue affect task completion?

Tools:

List all tools and strategies available (even if they have already been tried), tools and strategies that require investigation, and training needed to successfully implement the tools or strategies.

Once the information is gathered by the team, the team needs to develop an implementation plan. The implementation plan should identify the following:

- Student information
- Team member names and roles (who is doing what)
 - Lead
 - Training personnel
 - Procurement personnel
 - Maintenance personnel
 - Inventory
 - Update software/firmware
 - Download
 - Charge
 - Clean
 - Store
- Types of trials needed (number and length)
- Services available and services needed
- Procurement of materials
- Training needed
- Trial completion

Delineate data-collection processes, intervals, and review:

Timeline to review plan as a team

Implementation Plan								
Student information (name, date of birth, current date, contact, or location)								
Reading Objective	Tool/ Feature	Person Responsible	Training Needed	Start Date	Stop Date	Results		
Follow-Up Plan								

The Wisconsin Assistive Technology Initiative (WATI) provides resource guides and model forms to support this process of gathering information and conducting trials. Examples of forms can be found at http://www.wati.org/free-publications/.

Please review AEM: Digital Reading Technologies (cast.org) for a detailed explanation of reading and study support available (hardware, software and apps) when using digital content.

Overview of Phonics Literacy Instruction

Phonological awareness is the ability to understand and hear that a word is made up of a series of discrete sounds, or phonemes. This area deals with the ability to hear sounds. For example, a student may be given a list of words and are asked to identify the words that begin with the same sound. This skill may be expanded to ask students to blend the sounds together to make a word. Research shows that phonological awareness is a strong predictor of early success in reading. Phonological awareness skills develop along a continuum that progresses in difficulty as seen below:

- a) Rhyming: Matching the ending sounds of words starting with the vowel sounds (cat, bat, hat, that)
- b) Alliteration: Producing groups of words that begin with the same sound (Two tired turtles tried to take a trip.)
- c) Sentence Segmentation: Segmenting sentences into spoken words. The following sentence can be segmented into six words: "The girl ate two candy bars."
- d) Syllable Blending and Segmentation: Blending syllables to say words (/pan/ /cake/ blends to pancake; cactus segments to /cac/ /tus/)
- e) Onset-Rime Blending and Segmentation: Separating the initial consonant or consonant cluster (the onset) from the vowel and consonant sounds that come after it (the rime). 'Shirt' segments into its onset 'sh' and its rime 'irt.'
- f) Phoneme Blending, Segmentation, and Manipulation (Deletion): Blending phonemes into words (/m//a//n/ blends to man); segmenting words into individual phonemes (cat segments to /k//a//t/); and manipulating phonemes in spoken words (/b/ substituted for /k/ in cat makes bat)



Technology can support phonological awareness through auditory feedback so students can do the following:

- · Independently explore sounds and word families
- Recognize letters or words by sounds
- Put sounds together to make words
- Break words apart into sounds
- Count syllables in words
- Convert words by isolating and changing sounds
- Visually discriminate patterns that make up words (-at, -in, -it, -an)
- Recognize patterns in challenging word families



Low-Tech Tools:

- Word wall: A systematically organized collection of words displayed in large letters on a wall or other large display place in the classroom
- Manipulative word tiles (paper, bricks, magnets)
- Letter/blend tiles
- Labels
- Personal dictionary
- Highlighter markers/tape
- Pens
- Tape
- Flash cards

⟨∰ High-Tech Tools:

- On-screen keyboard accessed with mouse/joystick/trackball, single switch, touch screen, etc.
- Apps and extensions
 - Provides options to manipulate sounds
 - Provides options to collect discrete data to maximize progress
- Digitally recorded text
- Text-to-speech
- Text reader
 - Assists student in exploring sounds in letters, words, rhyming, and stories
 - Provides text-highlighting to encourage student to follow words from left to right as they hear them read aloud
 - Provides customizable auditory options: voice, speed, volume
 - Provides customizable font color and size



Phonics

The phonics that is mentioned in this section is not just the rule-based phonics with which many of us are familiar. It is the teaching of the relationship between the letters of written language and the individual sounds. It helps students realize that the relationship between the written letters and letter sounds is systematic and predictable. Research on phonics indicates that phonics needs to be systematically introduced to the students. Individuals need to be taught the relationships between the letters (grapheme) of written language and the individual sounds (phonemes) of spoken language. Students can then use some of those strategies when they encounter a word they do not know, and they can decode that word using the letter sounds. Students also benefit from this when they are asked to spell a word so they can write the word as it sounds. Phonics instruction in isolation is not a complete reading program for beginning readers. Along with phonics, students should be solidifying their knowledge of the alphabet, engaging in phonological awareness activities, and listening to stories and informational texts read aloud. They should also be reading texts (both aloud and silently) and writing letters, words, messages, and stories.

Instructional Focus During Elementary School: (Alphabetic understanding, word study, and spelling) Sound-symbol correspondence, the ability to associate a speech sound with an alphabetic letter. Instruction in how the sounds of spoken language are represented by letters and spelling helps children learn the relationships between the letters of written language and the sounds of spoken language.

- a) Letter sounds: Association of a sound with a letter and letter combination in a written word
- b) Decoding regular words: Process of identifying unknown words using knowledge of letter-sound correspondence and blending
- c) Spelling regular words: Using letter sounds and segmentation to spell words the way they sound
- d) Spelling/reading irregular words: Recognition of irregular words focuses on words in which some or all of the letters do not represent their most common sounds or word families (e.g., one, none, done)
- e) Sentence reading: Practicing reading regular and irregular words and then reading them in the context of a sentence

Instructional Focus During Middle/High School: The process of combining letter-sound correspondence and structural analysis to identify regular and irregular words of one or more syllables. Structural analysis consists of compound words, contractions, syllables, root words, affixes, and Greek and Latin morphemes.

- a) Letter/sound correspondence: Ability to say the sounds for each letter or letter combination that is targeted
- b) Structural analysis: Analysis of compound words, contractions, syllables, root words, affixes, and Greek and Latin morphemes



Technology can provide auditory, visual, and animation to support a student learning to do the following:

- Match and identify letters
- Increase accuracy in phonics tasks through practice
- Hear letter sounds Match sounds to letters
- Put letters together to produce words
- Identify and highlight words
- Sort words by word family
- Hear text read aloud (words, sentences, paragraphs, passages)
- Identify and manipulate root words, prefixes, and suffixes
- Practice sounding out and identifying sight words
- Record sentences being read for immediate playback
- Adapt reading strategies as immediate feedback is received

Low-Tech Tools:

- Word wall/portable word wall
- Dry erase boards
- Sentence strips
- Magnetic letters, letter tiles
- Alphabet arc
- Word tiles
- Word strips
- Sticky notes
- Labels
 - Environmental print
 - Signs
 - Menus
- Spinner
- Dice
- Checklists
- Graphic organizers/word webs
- Flash cards



High-Tech Tools:

Technology provides letter-sound correspondence: supports sounding out all of the letters or breaking the word into syllables to read and blend back together.

- Scanning/reading pen
- On-screen keyboard accessed with mouse/joystick/trackball, single switch, touch screen, etc.
- Apps and extensions
 - Provides options to manipulate sounds and letters
 - Provides options to collect discrete data to maximize progress
- Text reader or text-to-speech
 - Assists student in exploring pictures, letters, words, and stories
 - Provides text-highlighting to encourage student to follow words from left to right as they hear them read aloud
 - Recognize the parts that make up the word
 - Highlight context clues to assist in interpreting meaning
 - Provides customizable auditory options: voice, speed, volume
 - Provides customizable font color and size

Fluency

Fluency is the ability to read text accurately and quickly. When fluent readers read silently, they recognize words automatically. Fluent readers focus their attention on making connections among the ideas in a text and between these ideas and their background knowledge. Therefore, they are able to focus on comprehension. Fluent readers read with expression as they divide the text into phrases and chunks. Less fluent readers must focus their attention primarily on decoding individual words. Therefore, they have little attention left for comprehending the text. Less fluent readers may read in a monotone. Many of us could become less fluent readers if we were introduced to a complex medical passage, because we would need to slow down to decode the unfamiliar multisyllabic words.

- a) Automaticity of letter sounds: Quickly recognizing letter sounds as a precursor to blending, word reading, and passage reading
- b) Automaticity of words: Accurately and quickly identifying regular words
- c) Connected text: Sounding out each word and then reading them together



Technology can support increased fluency through various activities including:

- Self-directed reading
- · Practice reading aloud and record as the student reads
- Time their reading and set goals to increase accuracy or speed
- · Imitate passages read
- Independently critique their own read-aloud
- Identify missed words when reading
- · Participate in independent repeated reading
- Listen to prerecorded passages as a reading model



Low-Tech Tools:

- Human reader
- Masking strips/reading guide
- Sticky notes
- Highlighter markers/tape
- Chunking
- Bookmarks



High-Tech Tools:

- Scan-and-read software
- Text-to-speech
- Masking
- Digital highlighting
- Audiobooks

Vocabulary

Research shows that people utilize four different vocabulary sets. We use one set when we're listening, another set when we're speaking, another set when we're reading, and yet another set when we're writing. The majority of vocabulary is learned indirectly from listening to others use language or reading something in print. Some vocabulary needs to be taught directly so that students can comprehend the material they are reading and so they understand that some words have multiple meanings (Such as "It's cool outside" or "Wow, that's cool!").

- a) Recognizing and understanding words: Introducing new vocabulary/targeted words and basic concepts
- b) Synonyms and antonyms: Learning words that have similar and opposite meaning to the target word
- c) Definitions: Using categories and descriptors to define targeted words
- d) Elaboration: Using descriptive words to describe objects and actions
- e) Context: Using the words surrounding an unknown word to determine the meaning of the new word
- f) Academic/subject specific vocabulary: Referring to specialized words traditionally identified from a collection of academic texts related to a particular academic discipline



Technology can support vocabulary development as students:

- Read/pronounce unfamiliar words
- Explore words and word meanings
- Independently learn new words
- Clarify homophones
- Provide information on word parts (suffixes, prefixes, base words)
- Explore new words and highlight context clues to determine meaning
- Categorize words
- Review
- Elaborate on immediate vocabulary
- Transfer words
- Hear and use words in repeated activities
- Spell checker that provides auditory feedback
- Hear complex oral language in passages read aloud



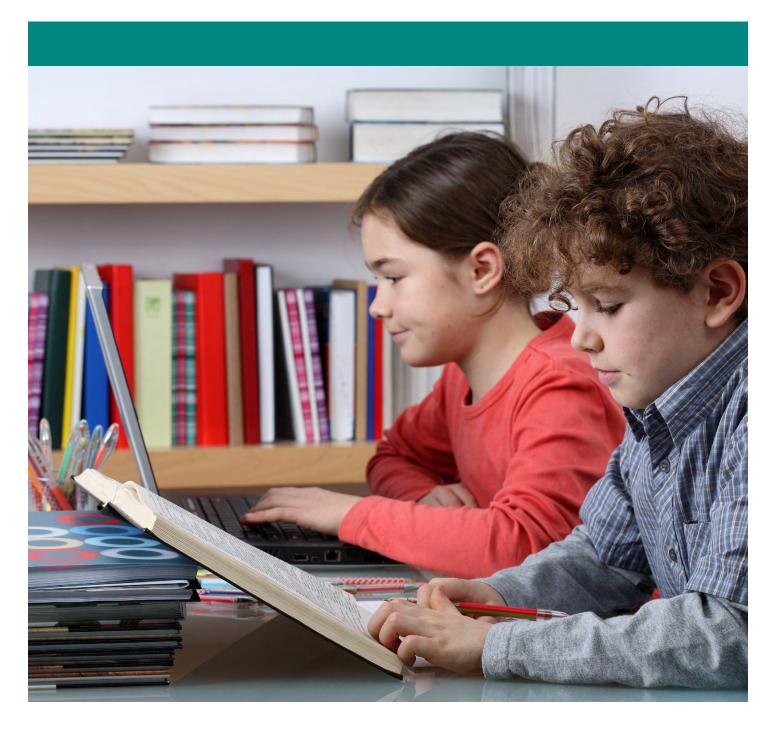
Low-Tech Tools:

- Dictionary
 - Picture
 - Personal
 - Topic
- Thesaurus
 - Synonyms
 - Antonyms
- Graphic organizers
- Environmental print books
- Magnetic poetry
- Sticky notes
- Correction fluid/tape
- Highlighter markers/tape
- Flash cards
- Checklists
- Bookmarks

High-Tech Tools:

- Label maker
- Digital highlighter
- Scan-to-read pen

- Electronic dictionary
 Talking dictionary
 Word/text simplifier
 Browser or app-based software



Comprehension

Comprehension is the process of being able to make meaning out of the printed word. Comprehension develops through a series of reading strategies such as using prior knowledge by previewing a story and having the students do a "walk through" to make connections between the story and what they already know. They are taught to make predictions based on what they are currently reading. Students learn to ask questions that will assist them in focusing their attention on the text. It is important for readers to be able to monitor themselves, see where the breakdown occurs, and then determine what strategies they need to use to resolve the problem. If a child says they don't understand what this means, that shows they are thinking about their reading.

- a) Literal comprehension: Understanding what is explicitly stated or clearly implied in the text
- b) Implicit comprehension: Understanding a meaning that is intended or suggested by the author but not stated
- c) Story retell: Recalling events from a passage and retelling it
- d) Story grammar: Understanding story grammar elements (main characters, setting, problems, important events, solutions, and themes)
- e) Sequencing: Sequencing events in short, decodable passages
- f) Main idea: Determining the main idea of a passage



Technology can support comprehension as students do the following:

- Repeat and review read passages
- Modify text for understanding
- Look up meanings of difficult words or unfamiliar phrases
- Utilize picture supports to figure out words and concepts
- Make specific text stand out
- Identify start and stop points
- Identify details
- Sequence events in a story
- Map out ideas in a visual diagram
 - Story maps
 - Concept maps
 - Webbing
- · Discriminate the parts of a passage
- Make specific text stand out with highlighting
- Remind students of important facts and strategies
- Increase access and independence
- Ask questions and highlight answers
- Maintain focus on the text read

Low-Tech Tools:

- Highlighter markers/tape
- Correction fluid/tape
- Sticky notes
- Page tabs
- Reading guide/masking strips
- Graphic organizers
- Labels
- Adapted books
- Graphic novels
- Leveled reader
- Human reader

High-Tech Tools:

- Scan-to-read pen
- E-reader
 - Software or stand-alone device
- Audiobook reader
- Scan-and-read software or optical character recognition (OCR) reader
- Text-to-speech tools
- Text-to-speech with synchronous highlighting and masking
- Talking word processor
- **Bookmarks**
- Translator
- Accessibility features within the operating system of a computer, tablet, or phone
- Digital books
 - DAISY (Digital Accessible Information System) and DAISY audio
 - BRF (Braille Refreshable Format)
 - MP3
 - EPub (Electronic Publication)
 - PDF

The PAR (Protocol for Accommodations in Reading; DeCoste & Bastiani Wilson, 2014) is a formative assessment that supports the decision-making process by identifying the most appropriate of three possible reading accommodations for the student. The student orally reads a provided passage; then an adult reader reads to the student; finally the student listens to a passage read through a text reader. Following each passage, the student is expected to answer comprehension questions. The results provide the optimal reading method from the three options, which can then be documented by the student's Admission, Review and Dismissal (ARD) committee in the Individualized Education Program (IEP).

PAR One-on-One Request Form #1 | Don Johnston

For more resources, visit: Inclusion in Texas.

Features to Look for in Instructional and Assistive Technology

Specific features are embedded in technology that can be utilized to benefit student learning. Teams should review features and combinations of features and test them with the student based on the student's unique learning profile. This process only works when the team has identified what the student needs in each reading environment. Students should be introduced to the various features through trials to determine whether they are useful. Data should be collected and documented to support the decision-making process. Once appropriate features are determined to meet the needs of the student, the student should be taught to access and utilize the features as independently as possible. Features can and should be readdressed and adjusted to meet the needs of individual students as they move from grade to grade or advance in their curriculum.



Specific features include but are not limited to:

- Translation
- Captioning
- Audio accommodations
 - Voice (Many apps offer free previews before purchase.)
 - Human narration
 - Rate
- Visual accommodations
 - Contrast
 - Font size and color
 - Spacing between lines
 - Masking lines above and below
 - Spacing between words
 - Reducing clutter
- Magnification
- Scanning with optical character recognition (OCR) to convert images to text
- Camera
- Talking/picture dictionaries
- Highlight and extract text
- Bookmark
- Annotate
- Interactive readers
- Option for text/voice notes
- Inclusion of hyperlinks to enhance background knowledge
- Data collection tools
- Screen recording
- Timers
 - Visual
 - Auditory
 - Tactile



Modifications:

- Reduce complexity of text
- Summarize text
- Substitute vocabulary

Access

Although the main purpose of this guide is reading. Access as it interfaces with the reading process should be considered when analyzing the barriers that occur while students read.



Low-Tech Tools:

- Page fluffer
- Hefty tabs
- Wax-covered yarn
- Book binder
- Laminated pages
- Book stand
- Easel
- Handheld/bar magnifier (must ensure clarity)
- Masking/tracking window
- Enlarged text
- Specialized font



- Page turner
- 3-D Printing Pen or Tactile Cues
- Electronic magnifier
- Noise-canceling headphones
- Headphones
- Microphone
- Touch screen
- Switches with switch interfaces
- Adapted mouse
- Trackball
- Joystick
- Head mouse
- Eye gaze
- Augmentative and alternative communication (AAC) device

Conclusion

A range of technology supports have been provided. Some of the features and tools may benefit more than one component of reading. First look at the available features and existing tools and supports within your own district. Determine the student's areas of weakness, and then look at what supports would assist the student in the reading process. Implement the features, tools, supports, and services. Collect data regularly to determine whether the supports provide a meaningful benefit to the student. Address the student's progress with those tools at every ARD committee meeting.

Resources

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