

Assistive Technology Options

Assistive technology (AT) will always have a role in the education of some students with disabilities. There will undoubtedly be students who will need specific AT devices and services to overcome learning barriers. When technology is embedded as an integral part of a curriculum, this benefits all students. This same technology may be labeled assistive technology when it is included on a student's IEP. Conversely, highly specialized forms of technology, such as communication devices and dedicated software, may not benefit all learners, but will need to be implemented to meet the goals of the student's IEP.

Prior to making recommendations regarding low or high tech solutions, it is essential to understand a student's learning strengths and needs. When assistive technology decisions are based on a student's profile of needs, then AT tools can be put to good use. The following lists of no-tech strategies, as well as low and high tech AT tools must be carefully considered in light of the student's IEP goals and learning objectives.

No-tech strategies do not require an off-the-shelf or customized tool or device. Many of these teacher strategies are examples of differentiated instruction that when integrated into curriculum are in keeping with UDL. Low-tech strategies usually rely on some off-the-shelf or customized tools that do not require significant technical skills to operate. High-tech strategies usually require technical and/or computer skills. It is important that no-tech and low-tech strategies be considered before high tech options as no and low-tech options are more often "least restrictive." First consider strategies that provide the least amount of scaffolding, allow for as much independence as possible, and retain the learning content and conceptual challenges. While AT provides access to learning and can help students overcome learning barriers to participate in the general education curriculum, it does not guarantee progress. AT still needs to be combined with good teaching to ensure learning.

Methods and Materials to Support Handwriting and Keyboarding

No Tech Options:

- Worksheets magnified on the copy machine, or worksheet sections cut, separated and recopied/magnified to help students with handwriting difficulties
- Use highlighters to help frame sections of a worksheet
- Have the student write on every other line to increase legibility
- Reduce far point or near point copy work
- Allow single word or short answers
- Allow extra time on assignments
- Double grade papers for content and presentation to encourage neatness while crediting the student for appropriate content

Low Tech Options:

- Pencils of various widths to assist with pencil grasp
- Pencils with softer lead for students who have difficulty with pencil pressure
- Pencil grips and adapted pencil holders
- Pens with different grips
- Pens that provide a light as the student writes to help focus on the lines of the paper
- Laminated copy of the alphabet to guide letter formation
- Full page handwriting guides or sentence window cut-outs to help stay within a designated writing space (www.onionmountain.com)
- Place Wikki Stix™ on paper to form a physical baseline to help keep the student's writing within a designated space
- Clipboard to keep the paper from moving as the student writes
- Slant boards to angle the paper for students
- Letter and number stamps for young writers who cannot yet form letters and numbers
- Stencils for young writers who cannot yet form letters and numbers
- Customized signature rubber stamp for students who cannot write their name using cursive writing
- Magnetic letters and board for young writers who cannot yet form letters and numbers
- Selection of specially lined papers (raised lines, colored lines, extra space between lines, graph paper)
- Highlighters (permanent or erasable) to highlight key vocabulary or main ideas to reduce the need for recopying information
- Correction tape or correction fluid pens for students who have difficulty erasing
- Tape recorders for recording selected content lectures
- NCR paper notes or copies of peer notes
- Limited, strategic use of oral dictation to demonstrate mastery of content
- Provide lecture notes to the student in advance and require the student to highlight key points during the lecture

- Change the format of worksheets or tests to formats that require handwriting, e.g. multiple choice, cloze format, fill in the blank, match words to a word bank

High Tech Options:

- Portable word processors/text output devices as a writing alternative (e.g., Alphasmart, [Dreamwriter](#))
- Keyguards on a keyboard to help students with keystroke accuracy
- Slant boards for keyboards to help students with keystroke accuracy
- Enlarged adhesive letters on the keyboard to more easily locate keys
- Folding keyboard attached to a student's PDA for students who need a writing alternative that can be transported and downloaded at home and school locations
- Typing programs to teach touch typing or increase keyboard familiarity
- Accessibility options in computer control panels to adjust repeat rates, mouse speed, to assist with double click or click and drag
- Control panel changes to enlarge the cursor or change display options
- Create a document template for a student to set background color, font, bold text, text size and spacing features
- Screen magnifiers or magnification through computer zoom features for students with visual impairment
- Alternative access (mouthsticks, headsticks, scanning with switches, Morse code)
- Track balls or track pads for students who difficulty using a mouse
- Alternate keyboards for students who cannot access a traditional keyboard
- On-screen keyboarding for students who cannot access a traditional keyboard
- Keyboard shortcuts for (e.g., F7 to check spelling)
- Software with word pallets for young writers to structure simple sentences
- Talking word processors (with voice output) to help students process what they have written (e.g., IntelliTalk II, Write:OutLoud)
- Word prediction to help students with spelling difficulties, who can recognize correct spellings from a list of spelling options (e.g., Co:Writer)
- Outline/graphic organizing software to help students with prewriting and organization (e.g., Kidspiration, Inspiration)
- Interactive writing software to prompt reluctant writers
- Drawing or software with graphics to prompt reluctant writers
- Structured writing software to step students through the writing process (e.g., DraftBuilder)
- Allow alternate methods for reporting and making presentations (e.g., PowerPoint software)
- Worksheets scanned into text files to create digitized worksheets for students with illegible handwriting (e.g., Kurzweil, WYNN, TestTalker)
- Voice recognition (speech to text) software for students who cannot handwrite or use a standard keyboard, or who have severe spelling deficits, but who have adequate reading skills and understand the components of process writing.

Methods and Materials to Support Writing Traits

Six Trait Strategies Reference: Spandel, V. (2001). *Write Traits: 6 Trait instruction and assessment*. Wilmington, MA: Great Source Education Group, Houghton Mifflin

No Tech Options:

To help students learn to generate ideas:

- Use pretend binoculars to teach “focus”
- Use literature that illustrates good ideas
- Teach students to discriminate intriguing, interesting ideas from irrelevant or overly-general ideas
- Help struggling writers gather-collect-list their ideas and select the best ones that provide focus and clarity
- Teach students how to ask questions to develop ideas

To help students organize their writing:

- Teach students to discriminate good leads from not-so-good leads
- Mix up the steps in a recipe. Reorder them and discuss the importance of good sequencing
- Have students sequence the events in a story
- Have students write 3 or 4 different endings and discuss which one is best and why
- Model a piece of writing that has sentences with unnecessary fillers.
- Teach students how to group ideas
- Replace “And then”; teach transition words

To help students learn to write for an audience and to strengthen their voice as writers:

- Read aloud from books that have a strong voice
- Match writings to their intended audiences (e.g., letter to a friend, business letter)
- Play “who’s voice is it?” matching the voice of the text to popular characters from television
- Have students write an event from different perspectives e.g., (a house fire from the perspective of a child, an adult, a fireman)
- Attach a “voice” to people in photographs
- Write letters of complaint

To help students expand their choice of words:

- Word walls of favorite lively words
- Burying tired, overused words
- Read aloud from books with strong, powerful words
- Write a simple description of an object, then rewrite it with stronger words
- Write about a color but don’t use the name of the color.
- Replace the verbs to make a paragraph stronger

To help students learn sentence fluency:

- Teach students how to combine short choppy sentences
- Find run-on sentences and fix them
- Have the students count the number of words in their sentences, and write the first word in each sentence to see if there is a variety of sentence beginnings.
- Teach a variety of sentence starters
- Teach connecting words such as “however”, “therefore”
- Use early emergent books and rewrite them to improve sentence fluency.

To help students learn writing conventions: (Spelling, grammar, punctuation, capitalization)

- Teach conventions based on what kids need to learn given their age and ability
- Conventions need to be focused upon one at a time, at a minimum of 3 times per week, in short 15-minute lessons with repetition and practice.
- Teach basic editing symbols
- Don’t ask students to edit all conventions at once
- Students below 4th grade need to revise one trait at a time. Struggling writers who are older than 4th grade should focus on only 2-3 traits at a time.
- Personal spelling dictionaries of commonly misspelled words
- In advance of writing, provide a list of key words for that writing assignment

More No and Low Tech Options:

- Use discussions to activate background knowledge
- Provide time for brainstorming prior to beginning writing
- Classroom charts that specify tasks to structure the writing process
- Daily in-class writing opportunities
- Provide extra time for writing assignments
- Provide models of what writing projects should look like
- Provide checklists to prompt the use of targeted writing traits
- Provide charts that post rules for punctuation, capitalization, spelling
- Teach proofreading and editing at the students’ level of ability
- Use highlighters or colored pencils to focus on specific conventions (e.g., parts of speech, punctuation, capitalization)
- Peer editing or older student mentors
- One-to-one writing conferences to focus the revision of one or two traits at a time
- Prior to writing, the student dictates key ideas in the form of words or phrases to an adult who writes these on individual sticky notes. The student works with the adult to organize these and then writes independently.

High Tech Options:

- Outline/ graphic organizing software (e.g., Kidspiration, Inspiration)
- Structured writing software (e.g., Draftbuilder)
- Document templates that are structured for different writing tasks (timelines, who-what-where-when-how, paragraphing: main idea-supporting idea-details)
- Use thesaurus features to prompt the use of stronger verbs, adverbs, adjectives

- Talking word processors to provide feedback on what was written

Methods and Materials to Support Spelling

No Tech Options:

- Explicit spelling instruction based on analysis of spelling error patterns
- Daily reading to reinforce the spelling of high frequency words
- Mad minutes for practice spelling high utility words
- Practice proof reading for spelling errors
- Mnemonic techniques to retain word spellings

Low Tech Options:

- Word walls or words commonly misspelled on cards or organized alphabetically on a folder
- Personal spelling dictionary using alphabetized dividers or address books
- In advance of writing, provide a list of key words for that writing assignment
- Pocket dictionaries
- Electronic talking dictionaries and spell checkers
- Peer editing for spelling errors
- Double grade assignments with spelling factored in and out

High Tech Options:

- On-screen word banks of content vocabulary
- Word prediction software to help students with spelling difficulties, but who can recognize correct spellings from a list of spelling options (e.g., Co:Writer)
- Spell checking tools on computers (including right click on misspelled words in MS Word)
- Writing software that cues misspellings
- Automatic correction features in word processors
- Talking word processors to cue misspelled words

Methods and Materials to Support Reading

No Tech Options:

- Provide reading previews to activate prior knowledge and give students an overview of the content
- Teach previewing strategies (e.g., SQ3R, K-W-L, STAR)
- Have students independently read smaller amounts of text at a time
- After reading, have the student retell what was read to an adult or write a brief summary
- Provide extra time for completing reading assignments
- Teach strategic reading to locate main ideas
- Model metacognitive strategies (e.g., think alouds) to encourage students to analyze what they are reading
- Encourage the student to read with specific tasks to do as the student reads
- Provide chapter outlines to reinforce key ideas
- Provide story mapping to reinforce story elements (character-setting-problem-solution; who-what-where-when-how)
- Use teacher-student dialogue journals to check on understanding
- With expository text, have student keep a fact log

Low Tech Options:

- Full page color transparencies or acetate to increase visual contrast
- (www.seeitright.com)
- Color transparency strips as reading rulers (www.readinghelpers) to assist with visual tracking
- Enlarged print or text magnified via the copy machine to help students with severe spatial perceptual deficits or students with visual impairments
- Magnifier bars to help students with severe spatial perceptual deficits or students with visual impairments (www.onionmountain.com)
- Use a penlight to light up each word when reading to assist with visual tracking
- Sentence template cards with a cut out area to isolate one line of reading at a time
- Write unknown or new words on index cards and draw a picture to represent the meaning of the word
- Use sticky notes to flag text for key points or for information they do not understand
- Books on tape/CD with the accompanying text to promote reading skills
- Keypoints highlighted in the text using highlighter tape (www.onionmountain.com)
- AutoSummarized versions of digitized text

High Tech Options:

- Speaking spell checkers or dictionaries to assist with word recognition
- Electronic reading pens to read occasional single words the student cannot recognize
- Instructional software to remediate basic reading and comprehension skills

- Text scanned into a talking word processor so the student can hear and see the text as it is read
- Text imported from websites into a talking word processor so the student can hear and see the text as it is read
- Commercial books on CD or E-books with the accompanying text to promote reading skills
- Digital text imported into reading software (e.g., Kurzweil, WYNN, Read and Write Gold)
- Convert digital text to MP3 files for reinforcing reading comprehension at home

Methods and Materials to Support Math

No Tech Options:

- Reduced workload, e.g., solve every other math problem
- Minimize the number of problems per page
- Provide extra time to complete math tasks
- Peer or an adult reads the problem and records the student's answer

Low Tech Options:

- Number line
- Create math worksheets that have additional space between math problems for students with handwriting deficits
- Enlarged / magnified worksheets for students with handwriting deficits and visual impairments
- Graph paper to keep number problems lined up
- Math facts charts for students with memory deficits
- Calculators (with print out, large keys or speech output)
- Highlight math signs and instructions
- When solving math problems, have students highlight the numbers and key words
- Tape record answers to math problems, formulas, etc.

High Tech Options:

- Computer-based calculators
- Software which creates math worksheets for demonstrating math functions (e.g., MathPad, www.donjohnston.com)
- Instructional software to remediate math skills
- Software for writing higher level math problems (*i.e.*, www.ScientificNotebook.com)
- Graphing calculator with built-in keyboard for students who cannot handwrite text-based answers legibly

Methods and Materials to Support Learning and Studying

No Tech Options:

- Post assignments in the same location
- Provide time during class to copy down assignments
- Each week have one student responsible for logging in homework assignments and lecture notes into a class notebook which all students can refer to when absent or in need of clarification
- Break down assignments to include preparation items (e.g., study for quiz, read chapters, work on segments of long term assignments)
- Teachers sign-off in student's assignment book
- Provide phone numbers of students who are willing to explain assignments to a student
- Provide an outline for long range assignments
- Checklists of required work requirements
- Evaluation checklists
- Rubric and criterion checklists
- Individualized student contracts for completing assignments with reward choices
- Request or check homework completion at the same time each day during class
- Collect even unfinished assignments by the due date
- Call parents if more than 2 assignments are missing

Low Tech Options

To organize assignments:

- Picture reminders or picture schedules
- Pocket schedules or reminders
- Locker checklists of what needs to go home each day
- Electronic, multiple message voice output reminders
- Using a binder with sections for each subject
- Using a 12 section accordion folder
- Color coded subject folders
- The Monday (or Friday) assignment folder which is sent home with the assignments for the week ahead
- 4 pocket folders labeled as "Do", "Fix", "Turn in", Take home"
- Weekly NAT assignment sheets with 3 sections for each assignment:
 - Needs: what is needed to work on the assignment
 - Assignment: what the task is
 - Turn in: due date
- Do-Due worksheets which break down assignments into subtasks
- Use of Post-It Notes to flag important papers
- Tape record assignments
- Send work and assignments to and from home via fax machine
- The student calls home and leaves him/herself a reminder message
- End of the day list of things to do that night with an "I did it!" checkbox to reinforce success the next day

- Kitchen time (with bell) or TimeTimer (no bell, www.onionmountain.com) to help student gauge time for the completion of assignments

For studying:

- Use small post-it notes to cover answers on study sheets
- Use removable, reusable highlighting tape to highlight important information in a text
- Provide outlines of key points for studying; left justify the main ideas, and right justify the details so that the student can fold the paper in half lengthwise to use as a study guide
- Tape record key information for tests or key segments of text for students to review
- Students who are given copies of class notes as accommodations are responsible for reading them and highlighting key information
- Provide lecture notes with occasional blanks for the student to fill in
- Teach test taking strategies (e.g., use of clue words, smart guessing strategies, essay test strategies)

For listening:

- For students with auditory processing deficits, present visual input along with auditory input (e.g.. video examples of concepts, overhead projector outlines of key ideas, close captioning on TV presentations)
- Use visual aids (picture cues, diagrams, mind maps) to illustrate key points
- Preferential seating
- Use teacher proximity to prompt students' attention
- Break directions into smaller steps or segments
- Use cueing gestures to alert student to key information, to new directions or to upcoming transitions
- Preteach vocabulary for new teaching units
- Audiotape verbally presented information for repeated presentation

For communicating:

- Provide questions in advance for students who are reluctant to interact
- During oral presentations, allow students to use alternate presentation methods (e.g., posters, slide handouts, photos, written outlines, multimedia presentation tools such as PowerPoint, website design tools)

High Tech Options:

- Send work and assignments to and from home via email attachment
- Call parents if more than 2 assignments are missing
- Digital voice recorders which record multiple reminder messages
- Electronic reminders using pagers or cell phone functions
- Electronic organizers or PDAs
- Personal amplification systems
- Graphic organizing software to breakdown assignments or to serve as a study guide (Inspiration)

- Software that allows a student to highlight key ideas in digitized text and then extract these for use as a study guide (e.g., Kurzweil, WYNN, Read and Write Gold)
- Allow students to use PowerPoint or other presentation methods
- Use on-line grade books to post student assignments

Decoste, D. *A Handbook on Universal Design for Learning and Accessible Technology*,
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