

Getting Started with Assistive Technology

by Heidi Silver-Pacuilla

The driving idea behind assistive learning technologies is that they can provide critical supports that increase learners' learning independence and allow learners to access and master general, age-appropriate curricula. The promise of computer technologies to address the academic and productivity needs of people with learning disabilities (LD) has been greatly anticipated and studied for many years. Researchers and developers have worked to create assistive technologies (AT) that can alleviate learners' struggles with decoding, spelling, handwriting, planning and organization, and studying, and decrease their reliance on accommodations such as reading aloud or note taking by others for the learner with disabilities. The development of AT, coupled with the general explosion of consumer technologies, has resulted in many products that are reasonably priced or free; some assistive features have even made their way into mainstream technologies where they can assist many more learners. The days of students with LD having to travel to a separate lab to use

expensive equipment are fading. Shared here are some of the most common categories of AT that support literacy and language development.

Text to Speech

Text to Speech (TTS), a speech engine that can read digital text aloud (usually available in multiple voices and with controllable reading speeds or rates) is becoming a common feature of computer operating systems and some Web sites. It is available in downloadable programs or bundled in assistive reading software. TTS, paired with digital text highlighting each word as it is spoken, can create multisensory literacy strategies, such as repeated and choral reading. Simultaneous highlighting of the spoken text draws learners' attention and helps them stay in sync with the reader allowing them to focus on comprehension. Simultaneous presentation has been shown to improve word recognition and retention and is a valuable tool in teaching reading to youth and adults (Boone & Higgins, 2007; McKenna & Walpole, 2007; Edyburn, 2007; Anderson-Inman & Horney, 2007).

In the classroom, computer lab, and on learners' own computers, TTS can encourage more reading. Learners

can utilize TTS to access motivating and content-specific texts on the Internet. By reading along with texts more challenging than they could decode on their own, learners can explore and develop the vocabulary and background knowledge that is important to academic development. Learners of English for speakers of other languages (ESOL) benefit from hearing a text read aloud, and can use the software to listen to text multiple times. Assistive reading software has on-screen tools such as annotation, highlighting, commenting features, and linked dictionaries that facilitate studying. And TTS enables writers to listen to their compositions read aloud as a proofreading process.

Animated digital storybooks on CD-ROM or online is another form of TTS. They can add excitement to a family literacy event, enabling parents and children to listen and interact with the animated literature and characters together, eliminating the need for the parents to be able to read the story aloud independently.

Speech Recognition

Speech recognition software can transcribe spoken language to digital text or take computer commands through speech. All speech recognition programs are now paired with high quality TTS engines that will read back what has been transcribed. Speech recognition has been available as commercial software for years and is increasingly being built into operating systems and other programs. The accuracy of these programs has increased and training requirements

Tech Matrix

Find and compare a variety of commercial and free TTS, speech recognition, graphic organizer programs, writing programs, and e-resources at the www.techmatrix.org. The TechMatrix allows users to search by subject (reading, writing, mathematics, or AT), by learning support, or by features (such as text-to-speech and voice recognition). Product information such as grade-level appropriateness, compatible platforms, and price range is provided as well as links to the vendor Web sites. Supporting research (for K-12 learners) is also categorized and linked on the site. ❖

have dramatically decreased in the past few years. Improved, too, is the sensitivity and quality of reasonably-priced (\$20 to \$35) microphones, making it possible to use the software in classrooms and computer labs.

Speech recognition not only provides access to computer users who have physical disabilities, such as carpal tunnel or quadriplegia, but by creating a clean, organized document also allows struggling writers to address issues of fatigue, poor handwriting, spatial organization, or poor spelling. Speech recognition, moreover, is a powerful example of immediate constructive feedback, a hallmark of well-designed computer assisted learning. When learners use speech recognition, they dictate and watch their words transcribed on the screen: this provides awareness of articulation and speech patterns.

Speech recognition can be used as a language experience approach that puts the responsibility for transcription not on the tutor or teacher but on the learner to ensure the correct words are transcribed for later editing and revision. The use of the software also reinforces the vocabulary and use of writing conventions and punctuation by requiring that they be "commanded". For example, users have to tell the program "Indent that" or "Capitalize that" or make those edits to their document using the keyboard. Seeing and listening to the transcribed dictation on the screen without punctuation really shows learners the function of punctuation. "Why won't it stop [reading]?" one of my learners asked of a read-back of her writing that had no punctuation except commas. "What would tell it to stop?" I prompted, and she realized that she needed to go back and include

periods, exclamation points, and question marks.

Speech recognition can help motivate struggling writers and spellers by allowing them to circumvent the

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physical tedium of writing or anguish of spelling to get their ideas onto paper and reinforce literacy skills in the process. Research has shown the learning value of using speech recognition to compose as well as to proofread writing (Higgins & Raskind, 1995; Raskind & Higgins, 1999; Raskind & Higgins, 1995). Special programs can help struggling math learners dictate and organize mathematical expressions, and when paired with TTS, to decode those expressions.

Graphic Organizers

Graphic organizers provide visual ways to represent ideas via tools such as brainstorming webs or Venn diagrams. Computer-based graphic organizer programs can create these graphics on the screen to facilitate brainstorming, concept mapping, and outlining. Computer-based graphic organizers have word processing and TTS support, the ability to rearrange elements easily, and switch between outline and map view.

Computer-based graphic organizers can be used with whole class instruction to make visible the connections between big ideas in the content areas as well as to demonstrate writing and reading comprehension strategies. Learners find the programs valuable for annotations during reading or prewriting brainstorming. The ability of most of the software packages to switch between map or web and outline views supports learners' progress through the writing stages by preserving the webs made during brainstorming, switching easily from the webs to an outline, and linking seamlessly to a word processor to begin drafting the composition.

Visual Representations and Resources

Visual representations and resources help learners see relationships and sequences and make key concepts less abstract. In mathematics, teachers are realizing the value of virtual manipulatives and online, animated dictionaries. An animated illustration of the relationship between fractions, percentages, and the number line helps convey abstract concepts. See examples of virtual manipulatives on the National Library of Virtual Manipulatives at nlvm.usu.edu/en/nav/vlibrary.html, which has resources in English, Spanish, and French. Using online resources as class demonstrations can help introduce a lesson, and learners can be shown how to access the same manipulatives on their own for further exploration.

Online dictionaries, encyclopedias, and thesauruses not only bring TTS but supporting visuals

to reference materials, notoriously difficult print texts for struggling learners. Digital reference materials also provide the facility to instantly find the target word. Online dictionaries offer spoken pronunciations and linked definitions so learners can pursue related ideas and words for greater word study. Online thesauruses can help illustrate word study concepts and relationships between meanings. Learners motivated to improve their vocabulary can sign up for a word of the day e-mails. Adult learners should be comfortable using the vast array of free information sources as learning supports to address vocabulary and background knowledge gaps, to provide translations, and pursue their interests. See a collection of digital reference sites at www.literacymatters.org/content/research/find.htm#research.

Videos can build background knowledge, introduce vocabulary, and reinforce language skills in ways that print and teacher talk alone cannot and greatly enhance learner's understanding of new concepts. Use videos as introductions to whole class presentations, and teach learners how to access the videos themselves to watch on their own. Viewing videos with the captions visible adds print to the experience and reinforces literacy. Thousands of free, captioned videos are available at the Described and Captioned Media Program, www.dcmp.org. Teacher Tube (www.teachertube.com) is a growing site of teacher-submitted videos on topics from algebra function raps to classroom management.

Mobile Applications

Consumer electronics such as cellular phones, personal digital assistants (PDAs) such as Palms, Blackberries, or Treos, and hand-held MP3 players are also beginning to have the capacity to act as personal AT. If learners already have cell phones or

iPods, teachers can help them use these devices strategically as learning supports.

Cellular phones can be used as calculators; to set a visual or auditory reminder to take a medication

or keep an appointment; to record audio reminders, vocabulary words, or instructions; and to provide spelling support with a mobile dictionary or the predictive word processing of text messaging. A free download from Google can turn a mobile phone into a global positioning system (GPS) tool helping users navigate neighborhoods, build confidence, and enhance independence (www.google.com/gmm).

iPods are being used across the globe as more than music players. Use an iPod to create opportunities for learners to podcast and direct their own radio shows, interview family and community members, learn phonics or math

facts with downloadable games, and to record assignments. Thousands of free downloadable audio podcasts on all topics imaginable and in many languages are available at the iTunes stores. iPods also transform into AT through a built-in compatibility with audio (recorded) books, study guides, and GPS maps. These materials, free or low cost, are available for MP3 players at the Apple Store (www.apple.com/itunes/store/audiobooks.html by signing up for a free account to access the directory) or Audible.com (www.audible.com). Video iPods or similar devices can allow learners to view educational

videos and build background knowledge and vocabulary. Find how-

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to information on consumer electronics in the user manual or look up the product online where manuals are often available to download. CNET (www.cnet.com) provides detailed information as well as Web site links for many popular products.

Teach the Tools

A key ingredient to successful use of AT for learning is the learner's ability to use the technology effectively. The use of the tool must be taught alongside the content. This is critical for learners who will be using AT on high-stakes assessments such as the tests of General Educational

Development (GED), Test of

English as a Foreign

Language (TOFEL),

or community college

placement tests or

requesting the tool as an

accommodation in their

workplace. Learners

must be comfortable with

the technology so that it is

a support, not a distraction.

Even for mainstream

applications that are being

used as AT, explicit

instruction in the use of the tool is

often overlooked. The Internet is a

prime example of a mainstream

application that could benefit from

explicit instruction. Teach learners how

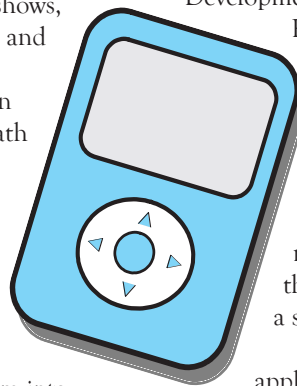
to use search engines: how to read the

search results and what the URL

extensions signify (for example, .gov is

probably less commercially biased

than .com). Teach navigation on the




Web explicitly so learners can manage multiple windows, bookmark favorite sites, or sign up for RSS feeds that aggregate news of interest to them without distracting ads and pop-ups. Show learners how to use mapping software, online calendars and datebooks, online Yellow Pages, e-mail programs, and blogs. Stress the importance of improving keyboarding. Many free or low cost typing programs are available for learners can use on their own time. Becoming more proficient on computers is critical to academic and increasingly, workplace success. Empowering learners with knowledge, skills, and strategies will improve their productivity and independence.

Most people don't know how many ways they can configure a computer to have a more comfortable and effective learning experience. Simply enlarging the text size may provide a significant boost for someone with low vision or a learner who is discouraged or overwhelmed by a large amount of text on a page. Changing the background colors or the color scheme, adjusting the sensitivity of the mouse and click functions, increasing the size of the icons, or changing the tone or volume of audio feedback: all of these are simple customizations that may make working on a computer more enjoyable and efficient for a learner. Providing customized logins on public computers (such as in a lab) allows users to save their preferences. Teach these customizations to learners to promote independence; they may be able to share their knowledge with their family and friends. Find more customizing tips (under "Accessibility Tutorials") at www.microsoft.com/enable/.

Finding a collaborating organization in the community may be the first step to becoming informed. Vocational rehabilitation offices work under the mandate to assist adults with disabilities find and keep employment, and AT is often part of the solution. Local community colleges have Offices of Disabled Student Services (or an equivalent name) where enrolled

students can access technology and tutoring services. Public libraries also serve the community, providing technology and referral services. Making personal connections between staff at any or all of these partner organizations may bring expertise that adult basic education staff may not have. Above all, AT is about helping people achieve and stretch their goals. Adult learners with disabilities have the same goals as other learners: to improve their literacy and language skills, improve their employability and work skills, enrich their family

lives, and contribute to their community. AT can help. 

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Legally Speaking

Under the Americans with Disabilities Act (1990) and the Vocational Rehabilitation Act, Section 504 (1973), federally funded educational agencies are mandated to provide non-discriminatory service to adults with disabilities. This means that agencies must consider how they are recruiting, welcoming, orienting, instructing, assessing, and referring adults with disabilities. Questions to consider include:

- Are your information materials available in multiple formats such as large print, audio recordings, or Braille (just as you probably have versions in the native languages you serve)?
- What process is in place for learners to identify their needs in a confidential manner? How is it communicated to learners?
- How are teachers informed about best practices for instructing students with disabilities? Where can they find more information?
- What processes are in place for testing accommodations? What arrangements have been made for students with motor, sensory, and cognitive disabilities? How have testers been informed? How are the procedures communicated to learners?

Additionally, consumers (i.e. learners) with documented disabilities have the right to request reasonable accommodations which must be provided in a timely manner. These should be requested in advance of needing them. Accommodations are to be negotiated between the student and the provider. Make it a friendly process. The student/consumer doesn't have the final say and neither does the service provider. Most important is to make an effort to meet the stated needs as well as possible. Questions to consider include:

- What is your policy on advance time and how is it communicated to the learners? Make sure that the time limits are clear and realistic for both student and provider.
- What is your menu of accommodations that you can provide within that time frame?
- How does your staff find information and accommodations beyond your usual scope in a timely manner?

For more information about your program's responsibilities and learners' rights, see www.ed.gov/about/offices/list/ovae/pi/AdultEd/dislearning.html ❖

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About the Author

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Resources

For more about the research and policy behind the learning benefits of these tools, go to in "Assistive technology and adult literacy: Access and benefits," a chapter in NCSALL's *Review of Adult Learning and Literacy*, available at www.ncsall.net/fileadmin/resources/ann_rev/silver-pacuilla-04.pdf. ❖

