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Options: Turn Them On for Learning

By: National Center for Technology Innovation and Center for Implementing Technology in Education (2006)

This article provides brief research summaries on the benefits of providing students access to optional features in consumer electronics followed by practical suggestions on how to integrate these features into instruction and studying.

The pace of innovation in consumer electronics has brought many optional features into more of our personal technology experiences. We take if for granted that we can zoom in on the small print or increase the font size or contrast to meet our current needs. Research is beginning to catch up to show the added benefits of providing students access to these capabilities in their learning environments. Here we offer brief research summaries followed by practical suggestions on how to integrate these features into instruction and studying.

Text to speech (TTS)

A speech engine that can read digital text aloud (usually available in multiple voices) with highlighting is quickly becoming a common feature of operating systems, some web sites, and is available as downloadable programs. TTS can deliver proven multi-sensory literacy strategies, such as repeated reading and neurological impress method (NIM) in a digital environment. Matching these instructional methods with the technology features of simultaneous highlighting of the spoken text draws students' attention and helps them stay in sync with the reader. The value of this simultaneous presentation has been shown for improved word recognition and retention. TTS additionally relieves the attention burden of decoding for struggling readers by providing the spoken text, allowing them to focus on comprehension and improving their "endurance" for completing reading assignments.

It is no surprise that struggling students need more engagement with print. Providing TTS is a natural support to facilitate more reading. For early readers and young learners of English, digital storybooks provide a fun and interactive engagement with books. Older readers can utilize TTS to access motivating and content-specific texts on the Internet and textbook-related Web portals that are so important to vocabulary and background knowledge development. Much classic literature, which presents great difficulties for struggling readers, can be downloaded as e-books and read with TTS. E-book software can facilitate studying with tools such as annotation, highlighting, and linked dictionaries. All writers can benefit from listening to their compositions read aloud as a proofreading process. Compare a variety of commercial and free programs through the Reading Matrix at **www.techmatrix.org**.

Speech recognition

Speech recognition software can transcribe spoken language to digital text or act upon spoken computer commands 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 have dramatically decreased in the past few years. Speech recognition not only provides access to computer users who have physical disabilities, it also allows struggling writers to address issues of fatigue, poor handwriting, spatial organization or spelling. Speech recognition, moreover, is a powerful example of immediate constructive feedback, one of the key

benefits attributed to well-designed computer assisted learning. Research has shown the learning value of using speech recognition to compose as well as to proofread writing.

Speech recognition can help motivate struggling writers and spellers to get their ideas onto paper and reinforce literacy skills in the process. The immediacy of the dictation process reinforces the vocabulary and use of writing conventions and punctuation. Special programs can help struggling math students dictate and organize mathematical expressions, and, when paired with TTS, to decode those expressions. Vastly improved capabilities, reduced training requirements, and increasingly free versions in operating systems, mean many more students may benefit from interacting with the computer in this manner. Improved, too, is the sensitivity and quality of microphones available at very reasonable costs allowing for increased classroom and lab applications.

Graphic organizers

A third technology application that has received research attention is computer-based graphic organizers. These tools facilitate brainstorming, concept mapping, and outlining in much the same way as teacher-led instruction, but with obvious advantages. Digital graphic organizers have word processing and TTS support, the ability to rearrange elements easily, and switch between outline and map view. Students taught to use these tools strategically have been shown to write more complete and sophisticated essays and improve their reading comprehension.

Graphic organizers of all sorts are becoming more common in education. They tap into students' visual and spatial abilities, strengthening the connection between language and these ways of knowing. 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 demonstrate writing and reading comprehension strategies. Individuals find the programs valuable for annotations during reading or prewriting brainstorming, and the ability of most of the software packages to switch between map and outline views supports students' progress through the writing stages.

Visual representations and resources

Allowing students to "see" relationships and sequences can make key concepts come to life and be more comprehensible. In mathematics, the use of virtual manipulatives and online dictionaries has grown to mainstream usage as a powerful means to help students improve their conceptual knowledge of mathematics. Imagine how helpful an animated illustration of the relationship between fractions, percentages, and the number line could be to struggling students. The ability to manipulate and examine the results of the changes increases students' engagement and understanding. See a collection of sites at **www.cited.org**.

Online dictionaries, encyclopedias, and thesauruses not only bring TTS but supporting visuals to reference materials, notoriously difficult print texts for struggling students. Online dictionaries offer spoken pronunciations and instant word finds. Online thesauruses can help illustrate word study concepts and relationships between meanings. See a collection of sites at **www.literacymatters.org**.

The plethora of reference and resource material available on the Internet these days is astounding. Educators should insist that all their students know and use these resources that provide "just in time" and "just in case" support to help address vocabulary and background knowledge gaps, to provide translations, answer burning and/or tangential questions and support learners. Coupling reference guides with TTS allows definitions and supportive materials to be read aloud, a boon to students learning English or struggling with reading and writing.

As this brief review indicates, educators and parents should not hesitate to integrate these and similar technology features into instruction and study so students use technology creatively and effectively as learning tools. The added value these multi-sensory interactions provide is reflected in the growth of underlying literacy skills.

Endnotes

A "Tech Works" brief from the **National Center for Technology Innovation** (NCTI) and the **Center for Implementing Technology in Education** (CITEd).

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