"Reading with Your Ears" and Other Uses of Technology to Build Vocabulary

by Alexis Filippini

Literacy is about making meaning and concerns access to information, self-expression, and even justice. Meaning is made through the "interaction between the learner and the reading or writing context" (Lipson & Wixson, 2009, p. 9) and contexts are changing rapidly as technology evolves and new communication modes arise. In the era of new literacies, many children (and most adults) use computers, phones, smart boards, e-readers, and even watches to access information on a daily basis.

These "everyday" technologies offer new ways to increase access to information, support independent word learning and word use, and develop students' own unique and powerful voices. For those with dyslexia and related learning disabilities, the ubiquitous nature of technology is also changing the context of *assistive* technology. Assistive technology (tools that accommodate, bypass, or compensate for a disability), is no longer bulky, expensive, and uncommon, and in fact is often embedded in commonly used software.

This article illustrates how technology can enhance vocabulary development for the whole class (universally) and also through accommodations that support individual learning needs.

Building Vocabulary Through Wide Reading

Not Everyone Benefits

Children who are avid readers develop better reading skills, larger vocabularies, and more world knowledge (Cunningham, 2005; Nagy & Scott, 2000). Their reading comprehension and vocabulary increase, reading becomes easier and more interesting and thus a highly reinforcing activity, so they read more and more and understanding continues to increase. In contrast, children who find reading difficult or rarely read (such as many identified with dyslexia) may encounter fewer new vocabulary words and less general information, therefore comprehending text more poorly than their peers and developing smaller funds of word knowledge (*Matthew Effects;* Stanovich, 1986). Attempting to mitigate the decoding difficulties, "teachers are often left with regrettable options such as over-simplifying important passages in the texts" which can lead to reduced comprehension (Boyle et al., 2003, p. 204).

A Focus on Meaning

Technology to Bypass Decoding

As an alternative, students who "read with their ears" are exposed to grade-level vocabulary and content by bypassing slow and inaccurate decoding. Listening to audiotext allows learners to engage in wide reading, using listening comprehension skills to expand their semantic networks, develop background knowledge, and experience the vocabulary used in different registers; thus "Matthew Effects" of disparities in wide reading are reduced. Thanks to technology, this approach no longer requires another person to do the reading out loud.

Examples of Audiotext to Promote Wide Reading

Advances in technology and advocacy have made audiotext more accessible and often free (e.g., "Overdrive Partner Portal," a public library resource), and many non-dyslexic readers enjoy the conveniences of audiobooks on commutes or long family drives. Today's casual or "power" user has many hardware and software choices including "natural" human voices and synthesized voices that can be played at faster rates. Audio formats are available through public commercial avenues, such as *audible.com*, and through services for individuals with qualifying disabilities such as *bookshare.org*, *learningally.org*, or the National Library Service *(http://www.loc.gov/nls/)*. Simple text-to-speech software (TTS) can also turn any computer or gadget into a talking book, such as the Chrome browser's built-in "Speakit!" app, or the Kindle's native software.

Audiotext in Action

Audiotext frees cognitive resources from decoding demands to focus on meaning making. Consider an adolescent learner who is reading at a late elementary grade level: she is not encountering enough morphologically complex words on her own to practice and build an age-appropriate reading vocabulary. However, by turning on the TTS feature in Microsoft Word she can hear text on a page read aloud, perhaps with one earbud discreetly tucked in her ear. Using TTS to read a digital handout or activity, she can first listen to the directions, then listen to each prefix and base read aloud, before moving on to defining and combining word elements.

Rather than being bogged down by decoding, this student is building skills and confidence by working independently. She is also receiving multiple opportunities to engage with morphology, meaning, and word analysis, far more than she would be in the same amount of time with print only. It is also likely that she is more on task, because she is not avoiding work that seems impossibly difficult. Promoting this student's independence also improves the classroom climate for all students, as the teacher focuses on teaching literacy rather than redirecting challenging behavior due to a skill mismatch.

"Look and Listen": Integrating Print and Audio. Some recent research has highlighted the importance of visual-spatial cues in readers' comprehension. However, effects of paper compared to digital and audio presentations, or compared to processing information through verbal and visual channels simultaneously, are still unclear. It can be valuable, particularly for expository/non-fiction work that includes figures and charts, for learners to have the printed text available as they read.

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Many computer-based audiotext software programs offer built-in "look and listen" features such as dual highlighting of a word and a sentence or line while it is being spoken. See Shamir, Korat, and Fellah (2012) for examples of multi-modal, highlighted text use for vocabulary learning. Readers following along on print can also annotate and use post-it notes along with the rest of their class, as well as look back to the text to find information.

Talking Dictionaries. Many everyday (e.g., Kindle) and assistive (e.g., Kurzweil) digital reading platforms have built-in glossaries that also speak the definition of a highlighted word. Some, like vocabulary.com even have homophone checkers and up-to-the-day current usage examples pulled from authentic texts, such as a *New York Times* article. Online dictionaries offer specialized or more detailed information, such as etymonline.org for word origins. Many have audio embedded, but with TTS enabled on a browser, any online resource can become both audiotory and visual. Talking dictionaries can provide critical support, but whether the source is a paper or electronic dictionary, "knowing a word can not be identified with knowing a definition" (Nagy & Scott, 2000, p. 273). This knowing requires active engagement to build both depth and breadth of word knowledge.

Beyond the Definition

Technology for Deep Vocabulary Development

Whether a student is reading with their ears (listening) or their eyes (decoding), technology is a powerful tool to deepen vocabulary knowledge beyond definitions: through analyzing word structure and meaning in a scientific manner, expanding breadth by digitally organizing students' growing network of words, and putting those words to use in meaningful social contexts.

Analyzing Structure and Meaning

Students are able to make sense of the patterns in English rather than grappling with an unmemorizable amount of arbitrary rules when relationships among word meanings and their written and oral representations (vocabulary, spelling, and prononciation) are made visible. Indeed, morphological instruction, which connects form and meaning in this way, is even more effective for readers labled as at-risk or less able (see Bowers, Kirby, & Deacon, 2010 meta-analysis).

While digital technology is not strictly required, it greatly facilitates the task of analyzing meaning and structure to build vocabulary. For example, morphological matrices are concrete visual representations of underlying structures (see Figure 1). This matrix illustrates how words that share the same base element are related, including prefixes and suffixes. It can be created by hand, but is more easily generated using the online Mini Matrix Maker online tool *(http://www.neilramsden.co.uk/spelling/matrix/)* or the Sound Literacy *(http://soundliteracy.com/matrix-with-tiles-drawing/)* iPad app. In order to build a matrix, online reference tools such as *www.etymonline.com* for word origins can supplement or supplant heavy reference texts. Etymonline plus the Word Searcher *(http://www.neilramsden.co.uk/spelling/searcher/index.html)* allow for faster and deeper investigation of orthographic patterns and relationships among word meanings.

Through ongoing investigation of many words, students develop a deep understanding of how spelling communicates meaning. In one experimental study, students learning vocabulary in this structured word inquiry approach not only learned the words they were taught, but also learned to analyze and understand new words that shared the same bases (Bowers & Kirby, 2010). Technology greatly facilitates creating visual representations of words' underlying morphological structure and connecting it to meaning. Thus, students develop tremendous depth and expand their breadth of word knowledge.

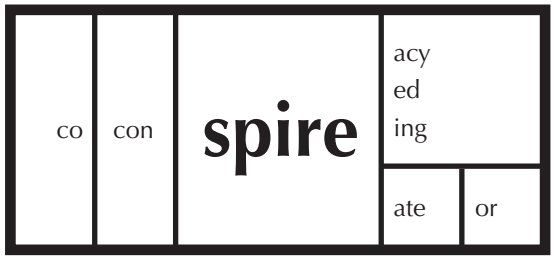

Figure 1. Word Matrix

Organize Students' Growing Lexicon

As students' breadth of word knowledge increases through wide reading, structured word inquiry, visual supports, talking dictionaries, and more, technology can support them in organizing and connecting their rapidly growing bank of words. For example, mind mapping software such as Inspiration or Kidspiration, or a visual thesaurus such as Visuwords, visually represent semantic networks, or the relationships among word meanings. Personal dictionaries can go high tech with tools such as Notability or Evernote that can embed images like the matrix in Figure 1, as well as audio files. For example, an Evernote might include the traditional elements of a Frayer model with the word, definition, example, and a drawing or clip art, along with example sentences, the etymology, and a link to the relevant word matrix in its own Evernote. In all of these cases, the technology offers greater opportunities for students to independently grapple with complex words and word networks, while also acting as a scaffold.

Social Media Platforms to Enhance Vocabulary Learning

One of the critical components for building vocabulary is actually using vocabulary. Social media platforms, such as *Schoology.com*, provide a student-friendly medium for accomplishing this. For example, a teacher provides a compelling topic ("How would you rewrite the school dress code?") and asks students to discuss it on each other's pages. The vocabulary twist is that they are required to use vivid adjectives and perhaps even compete in teams for the total number of different adjectives used.

Todaysmeet.com is another example of a digital platform that could be used to harness students' interest in communicating with each other in a way that meets learning objectives. This web-based platform for backchannel conversations (similar idea to a twitter hashtag at a conference) allows students to post comments or questions in a private "room," and can be moderated by the teacher. This platform can augment nearly any class structure and affords ample wait time for students with word finding difficulties or speech and language limitations. In any given discussion, teachers can prompt students to use specific vocabulary, or to post sentences or paragraphs on which they would like peer feedback. As part of a word hunt, students might post quotations from a text illustrating uses of vocabulary found throughout their day, or during a specific in-class activity.

Considerations in Choosing Technology

Whether using technology for remediation, compensation, or enrichment, teachers can avoid a "technocentric" strategy by implementing technology based on students' learning needs relative to curriculum-based standards (Harris, Mishra, & Koehler, 2009 p. 395). Universal Design for Learning (UDL) offers a framework for backwards planning curriculum in a way that reaches all learners and includes universal access to technology and other tools (Messinger-Willman & Marino, 2010). In this framework, all students receive multiple means of input and have multiple ways to express their learning, while engaging in meaningful work. A small number of students will require an assistive technology to truly demonstrate or develop their vocabulary knowledge.

When Readily Available Technology Becomes Assistive

As technology advances rapidly and becomes ever more readily available, the line between assistive and everyday technology is fluid and context dependent. Many everyday technologies have built-in, standard issue "accessibility" options that take them from everyday to assistive applications that complicate the categorization (McKenna & Walpole, 2007). Business executives can turn on the standard dictation feature in their smartphone or standard word processing program and compose emails while driving from meeting to meeting, but a student must have an Individualized Education Plan (IEP) team decide to allow its use on a school test.

Though detailed discussion of technology and IEPs is beyond the scope of this article, it is important to consider that when assistive technology is identified as an accomodation on a student's IEP it can smooth the way for the student's use of technology later in their academic or professional careers. Therefore, even if incorporating technology into vocabulary development for the whole class in a UDL manner, it should be explicitly considered in an IEP meeting when used by individuals with disabilities. Of note, the current reauthorization of federal special education legislation requires that teams consider assistive technology for all children with IEPs (Blackhurst, 2005).

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Resources

Talking Dictionary with Homophone Checker and Current Useage	*www.vocabulary.com*
Visual Dictionary and Thesaurus	*www.visuwords.com*
Audiotext Sources	*www.audible.com* *www.learningally.com* *www.bookshare.org*
Structured Word Inquiry Tools	Mini Matrix: *www.neilramsden.co.uk/spelling/matrix/* Word Origins: *www.etymonline.com/* Word Seacher: *www.neilramsden.co.uk/spelling/searcher/index.html*
Video Examples of Text-to-Speech Software	*http://headstrongnation.org/adults/tools*
Social Media Platforms	*www.todaysmeet.com* *www.schoology.com*
Note-Taking and Graphic Organizing Apps	*www.evernote.com* Notability: *www.gingerlabs.com* *www.inspiration.com* *www.kidspiration.com*
Overview of "21st Century Skills"	*www.p21.org/storage/documents/1.__p21_framework_2-pager.pdf*
Vocabulary Apps	Etymologic: *appcrawlr.com/ios/etymologic* MadLibs and The Opposites: *http://tinyurl.com/qcfeuww*

Vocabulary and Technology in the Future

As early as the end of second grade, children with the largest vocabularies know an average of twice as many words as do those with the smallest vocabularies (8,000, compared to 4,000; Biemiller, 2013). It is critical that students learn strategies for independent and generative word learning to grow their word knowledge rapidly. Technology, guided by a thoughtful teacher commited to literacy development, offers an unprecedented solution by making wide reading more accessible for students with dyslexia (and other difficulties accessing print) and by promoting depth and breadth of word learning for all students.

Twenty-first century skills such as collaboration, critical thinking, problem solving, and communication reflected in the Common Core Standards are embedded in the technology applications to vocabulary outlined in this article. The vocabulary examples presented here may be more efficient or more engaging through the technology, but the technology component is not strictly necessary for instruction with average readers though it does support those twenty-first century skills.

Moreover, the vast worlds of multimedia enhancements and Internet vocabulary open even more avenues for comprehension, beyond the scope of vocabulary, and twenty-first century skills. Readers are encouraged to explore *The Handbook of Research on New Literacies* to go deeper.

Even as technological advances outpace research, educators can make informed decisions about implementing assistive and everyday technology to support vocabulary development among learners with dyslexia and others by being student-centered through a UDL framework and by using evidence (see Torres, Farley, and Cook, 2014, for a guide to successfully implementing evidence-based practices). "As educators, we can passively wait until the future becomes the present, or we can work to actively influence the future" (Edyburn, 2013, p. 18). Using technology to promote vocabulary development supports students in independently accessing information, expressing themselves vividly and clearly, and in achieving more equal opportunities for academic and career success. The child with a robust vocabulary and skills for independently growing that vocabulary becomes the adult with many tools to shape his or her own future.

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