Enhancing Reading Comprehension In the Elementary Grades Using Assistive Technology

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BRIDGING RESEARCH AND PRACTICE

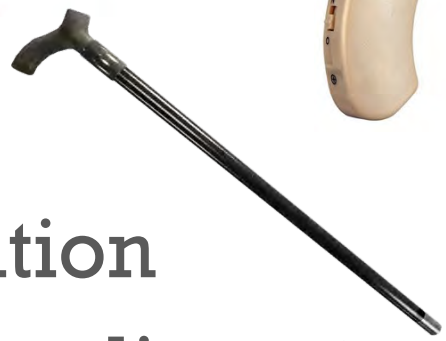
You should be able to explain why

- Decoding words can take brain power away from comprehension
- AT use at a young age can be beneficial
- AT does not replace the skill of independent reading

A New Pope - 2005

And 2013

What is Assistive Technology?



- Very broad term
- Physical Augmentation
- Communicative Augmentation
  - Speech/articulation impediments
  - Hearing impediments
  - Reading difficulties
  - Writing difficulties

Why Use Assistive Technology?

- Help to work around a deficiency or improve efficiency
- Persistence of difficulty across life span
- Whole-life competency
- Independence
- Benefits of AT are demonstrated in research

Changes in Task Demand

Learning to Read vs. Reading to Learn

- At about 3rd grade, many schools stop teaching reading
- 3rd graders are expected to learn information by reading
- The Common Core State Standards emphasize expository reading and citing text as proof

A few of the 4th grade demands

From Common Core State Standards

- Refer to details within a story
- Determine a theme
- Explain the text by referring to specifics within the text
- Explain how the author uses supporting evidence
- Read for information
- Compare two texts on the same topic
- Draw inferences

AND “Decode multi-syllable words based on word knowledge!”

The Dyslexic Reader: Text to Speech versus Reading

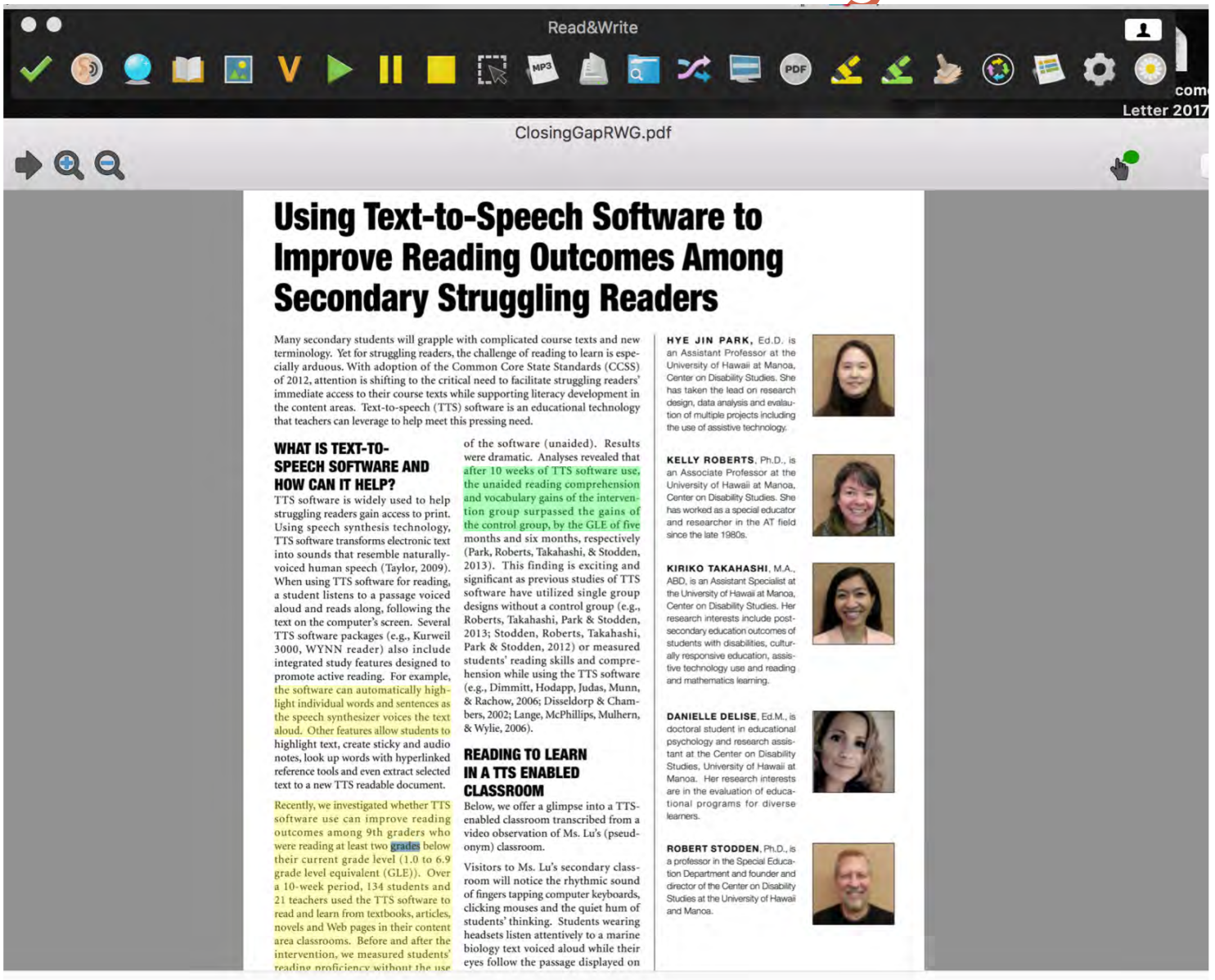
Text to Speech	Reading the Book
Listening and seeing while connecting auditory to visual	**Connect sound to symbol at a rapid rate**
Visualizing concepts, action	Visualizing concepts, action
Re-listening and re-watching to make sense	Re-reading to make sense
Connecting to what came before	Connecting to what came before
Anticipating what will come next	Anticipating what will come next
Can refer back	Can refer back

Many Solutions…

- **Read & Write – www.texthelp.com**
- **Speechify – https://getspeechify.com**
- **WYNN – http://lsg.freedomscientific.com**
- **Kurzweil 3000 - www.kurzweiledu.com**
- **Natural Reader – https://naturalreaders.com**
- **Read:Outloud/Snap & Read - www.donjohnston.com**
- **WYNN - www.freedomscientific.com**
- **WordQ/SpeakQ - www.goqsoftware.com**
- **Wrise – www.assistiveware.com**
- **ClaroRead – www.claroread.com**

https://www.understood.org/en/school-learning/assistive-technology/finding-an-assistive-technology/software-programs-for-kids-with-reading-issues

Read & Write for Reading



Using Text-to-Speech Software to Improve Reading Outcomes Among Secondary Struggling Readers

Many secondary students will grapple with complicated course texts and new terminology. Yet for struggling readers, the challenge of reading to learn is especially arduous. With adoption of the Common Core State Standards (CCSS) of 2012, attention is shifting to the critical need to facilitate struggling readers' immediate access to their course texts while supporting literacy development in the content areas. Text-to-speech (TTS) software is an educational technology that teachers can leverage to help meet this pressing need.

WHAT IS TEXT-TO-SPEECH SOFTWARE AND HOW CAN IT HELP?

TTS software is widely used to help struggling readers gain access to print. Using speech synthesis technology, TTS software transforms electronic text into sounds that resemble naturally-voiced human speech (Taylor, 2009). When using TTS software for reading, a student listens to a passage voiced aloud and reads along, following the text on the computer's screen. Several TTS software packages (e.g., Kurweil 3000, WYNN reader) also include integrated study features designed to promote active reading. For example, the software can automatically highlight individual words and sentences as the speech synthesizer voices the text aloud. Other features allow students to highlight text, create sticky and audio notes, look up words with hyperlinked reference tools and even extract selected text to a new TTS readable document.

Recently, we investigated whether TTS software use can improve reading outcomes among 9th graders who were reading at least two grades below their current grade level (1.0 to 6.9 grade level equivalent (GLE)). Over a 10-week period, 134 students and 21 teachers used the TTS software to read and learn from textbooks, articles, novels and Web pages in their content area classrooms. Before and after the intervention, we measured students' reading proficiency without the use of the software (unaided). Results were dramatic. Analyses revealed that after 10 weeks of TTS software use, the unaided reading comprehension and vocabulary gains of the intervention group surpassed the gains of the control group, by the GLE of five months and six months, respectively (Park, Roberts, Takahashi, & Stodden, 2013). This finding is exciting and significant as previous studies of TTS software have utilized single group designs without a control group (e.g., Roberts, Takahashi, Park & Stodden, 2013; Stodden, Roberts, Takahashi, Park & Stodden, 2012) or measured students' reading skills and comprehension while using the TTS software (e.g., Dimmitt, Hodapp, Judas, Munn, & Rachow, 2006; Disseldorp & Chambers, 2002; Lange, McPhillips, Mulhern, & Wylie, 2006).

READING TO LEARN IN A TTS ENABLED CLASSROOM

Below, we offer a glimpse into a TTS-enabled classroom transcribed from a video observation of Ms. Lu's (pseudonym) classroom.

Visitors to Ms. Lu's secondary classroom will notice the rhythmic sound of fingers tapping computer keyboards, clicking mouses and the quiet hum of students' thinking. Students wearing headsets listen attentively to a marine biology text voiced aloud while their eyes follow the passage displayed on

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Ideal Text-to-Speech Candidate

- Good auditory comprehension- "discussion smarts"
- Understands vocabulary spoken to them (may have retrieval issues)
- Poor decoding skills

Key Question: What else could be holding up comprehension?

- Auditory Memory
- Vocabulary
- Syntax
- Prior Knowledge

Continuing to teach DECODING while teaching ASSISTIVE + TECHNOLOGY

IS THE 1-2 PUNCH!!!

"Reading is a Civil Right" Question:

Why stay at intellect level for comprehension?

Students deserve to be challenged at the level of their **understanding**, not at the level of their **decoding!**

Research shows that AT does not inhibit reading development

University of Hawaii at Manoa
(Park, Roberts, Takahashi, & Stodden, 2013)

- 134 9th graders and 21 teachers used TTS software in content area classrooms for 10 weeks
- Intervention group was reading at least 2 grades below their current level
- Unaided reading comprehension scores and vocabulary gains surpassed the gains of the control group, by the GLE of 5 months and 6 months, respectively

Howard Stats

- Lower school class, students ages 10 - 11
- Students shifting from "learning to read" to "reading to learn"
- 6 in study group given WYNN and laptops, 6 in control group given laptops
- Pre and post tests (QRI, WIAT, School Satisfaction Surveys)
- Integrated into class and homework

Results: Control Group

	Fall	Spring
ER	**4** Inst/Inst	**5** Inst/Ind
NC	**UMS** Fr/Inst	**UMS** Fr/Ind
KB	**4** Fr/Inst	**5** Inst/Ind
CO	**4** Fr/Inst	**5** Inst/Ind

Ind: Independent
Inst: Instructional
Fr: Frustrational

Results: Study Group

Ind: Independent
Inst: Instructional
Fr: Frustrational

	January With	January Without	May with	May Without
WT	**4** Instr/Ind	**4** Fr/Instr	**UMS** FR/IND	**UMS** Fr/Fr
MT	**4** Instr/Ind	**4** Instr/Ind	**UMS** Inst/Inst	**UMS** discharged
TB	**3** Instr/ind	**3** Fr/inst	**UMS** Inst/Ind	**UMS** Ind/Ind
SW	**5** Ind	**5** Fr/Fr	**UMS** Fr/Inst	**UMS** discharged
SL	**5** Inst/inst	**5** Fr/Inst	**UMS** Ind	**UMS** Inst/inst
JR	**5** Fr/Inst	**5** Fr/Inst	**UMS** Fr/Inst	**UMS** Fr/Fr

The Great Voice Debate

(Found no images of two women debating – this has to change!)

The Voice Debate

Human Voice	Digital Voice
Speed	Adjustability/customization
Prosody	Punctuation helps
Sounds weird	Improvements/can correct
Pausing	Control
Ask for repetition, can tell when has not understood	Forced to read or re-read when the voice is not perfect
Immediate understanding	Students acclimate to the digital voice

Working Towards Independence

As soon as students are able to read independently, they do!

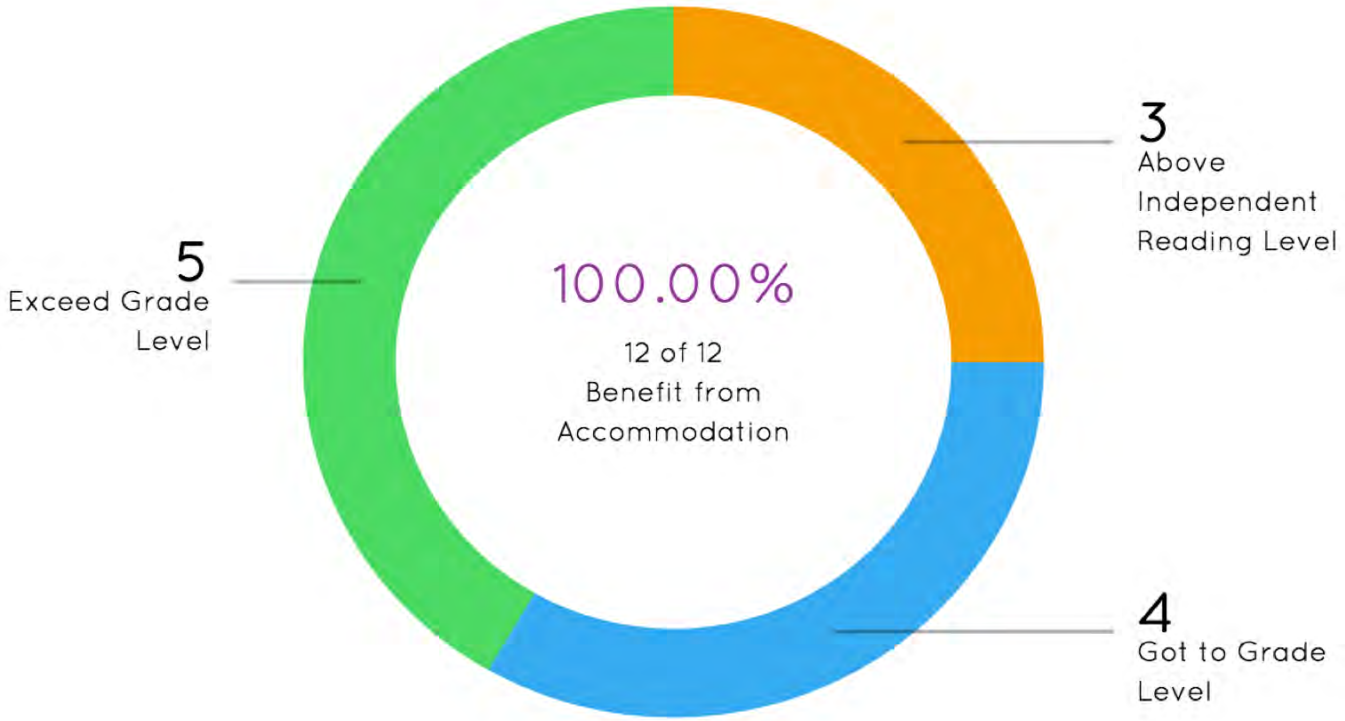
- The printed word is ubiquitous
- We expect a "smorgasbord" approach
- We continue to teach decoding
- Kids will always take the path of least resistance

Kids using AT – flipped class lesson

What to tell parents

- Your child deserves to learn at the level of understanding, not at the level of decoding.
- Through TTS, your child will be exposed to higher level vocabulary and sentence types in expository and narrative text. (Higher than spoken, and higher than their decoding level.)
- You don't want your child to lose the love of reading.
- Decoding skills can be improved through the use of assistive technology.
- Your child will read without the assistive technology as soon as he or she can.
- There may continue to be a discrepancy between what your child can decode on his own and what are child can read using assistive technology.

How do we identify? Universal Screening (uPAR)



Individual Results:

Completed Date: 2017-09-14

Grade Level	Silent Read	Human Audio	Text Reader
12			67%
11			83%
10			83%
9			
8			92%
7			
6		67%	92%
5	100%		
4			
3			
2			
1			

Story Type: Informational

- Grade Level
- Independent Reading Level
- Upper Quartile
- Middle Two Quartiles
- Bottom Quartile
- Incomplete

Access to Electronic Materials

- Bookshare www.Bookshare.org
- Accessible Book Collection www.accessiblebookcollection.org
- Bookflix/Trueflix http://teacher.scholastic.com/products/bookflixfreetrial/
- Learning Ally https://www.learningally.org/
- In-house scanning
- AMAC www.amac.gatech.edu
- Apps: Read2Go, Voice Dream

Questions?

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