Technology *in Action*

Creating Your Own Electronic Text to Support Text Comprehension by Students with Moderate to Severe Disabilities

Karen H. Douglas and Kevin M. Ayres
The University of Georgia

Electronic text allows students with severe cognitive disabilities to interact with and gain meaning from text. This *Technology in Action* explains how e-text can be created, augmented, and used in the classroom, home, and community.

Technology and Media Division

Kim is a 16-year-old trying to access the text of a recipe to prepare a spaghetti dinner. Since she is a nonreader with severe disabilities, she is basically looking at the pictures to guide her. The pictures provide a visual aid, but Kim still does not always know how much of an item she needs or how to mix the different ingredients together. She requires additional support to become completely independent at this task.

This brief anecdote illustrates how students with moderate to severe cognitive disabilities need more than printed text and pictures to access printed material when they are nonreaders. Considering the learning characteristics common to many of these students, such as weaknesses in short-term and working memory, comprehension and functional use of text may be limited without assistive technology (AT) supports. These students need technology tools and strategies to interact independently with and comprehend the text.

As students with moderate to severe disabilities participate in more literacy-rich environments and activities, technology supports can help provide greater access to the world around them and help them experience events that may have been out of their reach previously. Students now can interact with literacy materials in a functional, leisure, or academic capacity. The technology supports can provide both visual images and sounds that may help them pay closer attention to salient features of story lines or task directions. These technology solutions can help students improve their understanding of the material presented in an electronic format. The use of supported electronic text (e-text)

shows promise in helping students gain meaning from the text and increase their literacy skills.

The purpose of this *Technology in Action* is to provide an overview of e-text and how it can be incorporated into the classroom and the home. Readers will learn why e-text is beneficial, how to create e-text, how to augment e-text, how to teach students to use e-text, and how to evaluate student use.

Why Use E-text?

E-text allows students to interact with text they previously may not have been able to access independently. Specifically, e-text is the presentation of textual material on a computer or other electronic device such as an iPod, iPhone, or PDA (Anderson-Inman & Horney, 2007). Most programs utilizing e-text allow customized changes to be made to meet the needs of the individual student. E-text allows changes in font style, size, and color to be made quickly and easily. Other features include hearing the text read aloud (i.e., auditory supports) and highlighting words that are linked to a definition, pictorial glossary, or video (i.e., visual supports). These supports, in addition to the e-text, help students compensate for their lack of background knowledge and begin to increase their understanding of the text.

As students gain access to literacy materials and improve their comprehension, they become more involved in their community, increase their communication with others, expand their means for personal expression, and interact with a variety of text-based material (Kaderavek & Rabidoux, 2004). In addition to these benefits, e-text is an age-appropriate, nonstigmatizing approach to literacy instruction and activities. The portability of the electronic devices with e-text provides all individuals, regardless of age, with access to literacy material wherever they are. They can interact with the e-text while riding in a car or bus, waiting for their laundry at a laundromat, or following a schedule at work. The use of e-text provides many new opportunities for individuals with disabilities to explore text in alternative formats to printed material.

E-text Programs	
Low-tech E-text Programs	**High-tech E-text Programs**
Microsoft Reader – free – converts Word documents into e-books – can easily change font size – options for text-to-speech, highlighting, and bookmarking	Read & Write Gold – highlights and reads words, sentences, or paragraphs – human sounding voice – 180,000-word talking dictionary – can save an audio file of selected text
Photo Story – free – creates e-books, incorporates photographs, e-text, human voice recordings, and music	SOLO Read:OutLoud – reads e-text – creates an outline of the text – incorporates reading strategies to support the learner – provides a talking dictionary
PowerPoint – creates multimedia e-books – e-text with human voice recordings – can insert pictures and videos – allows changes in background design and font style, size, and color – hyperlinks to websites, definitions, or images	WYNN – reads text while highlighting words – scans pages to convert into e-text – natural sounding voice – reads text on the Internet
Clicker 5 – creates e-books - text-to-speech with human-like voice – allows human voice recordings – can add pictures and videos – includes writing tools	Kurzweil 3000 – reads and highlights text printed, electronic, or on the web – humanlike, synthetic speech – audible spell checker and word prediction

How Do You Create E-text?

First, the electronic materials must be gathered or created. If the materials are currently in print format, they can be scanned into the computer or retyped. There are websites that provide public domain books electronically, such as Project Gutenberg (**www.gutenberg.org**) or the Literature Project (**www.literatureproject.com**), which may help in gathering the necessary materials. Time for Kids (**www.timeforkids.com**) is a great resource for news articles for students up through the sixth grade.

Next, choose a computer program that will be most beneficial for your student. Not only do you want a program that presents the text in an electronic format, but you want text-to-speech options that are appropriate for your student. Since students respond differently to the different types of voices, you will need to choose a program that includes a voice your student understands.

How to Create a Microsoft Reader E-book

1. Download MS Reader from **www.microsoft.com/reader/downloads/pc.mspx**
2. Download MS Reader add-in **www.microsoft.com/reader/developers/ downloads/rmr.mspx**
3. Create a Word document with the text to be turned into an e-book.
4. Press the MS Reader button on the Word toolbar.
5. A pop-up window appears where the title and author of the e-book are entered.
6. Press OK to convert the document into an e-book.
7. Open MS Reader and the e-book is listed in the library.
8. Click on the title to open the book and hear it being read.

You will need to determine if your student can understand synthesized (computer-generated) speech, or if more "human-like" digitized speech is needed. The answer to this question will help you determine which computer program to select. Computer programs vary in offering synthesized speech, digitized speech, or both. You also will want to determine if the program allows you to record your own voice. PowerPoint, Clicker 5, and Photo Story are a few programs that provide this option. Most programs also offer both male and female voice options.

There are many software programs that have e-text and text-to-speech capabilities, and they vary greatly in price. Options that range between $645 and $1,500 include Read and Write Gold, SOLO, WYNN, and Kurzweil 3000. These programs read the text aloud. There are choices offered within each of these programs to read word by word, by sentence, by paragraph, or by selected passage. In each case, words are highlighted as they are read. Other benefits include a talking dictionary, screen-shot reader, pronunciation tutor, and writing and study skills support such as word prediction, automatic outlines, and audio files that can be downloaded to an MP3 player or iPod.

How to Create an E-book in Photo Story

1. Download Photo Story 3 from **www.windowsphotostory.com**
2. Open Photo Story.
3. Import pictures for each page of the story.
4. Click Next to add text to each picture.
5. Click Next to record the text being read.
6. Click Next to add music. (Optional.)
7. Click Next to preview the story.
8. Click Next to save the story.

Less expensive or free options include Microsoft (MS) Reader, Photo Story, PowerPoint, and Clicker 5. MS Reader is a free software program that converts a Microsoft Word document into an electronic book (see Figure 1). It has text-to-speech, highlighting, and bookmarking options. The voice that automatically reads the text is a synthesized voice, but the speed of the text can be adjusted inside the control panel of the computer. Additional e-books can be purchased on-line to be read through MS Reader. A drawback of this program is that it is currently only available for PCs.

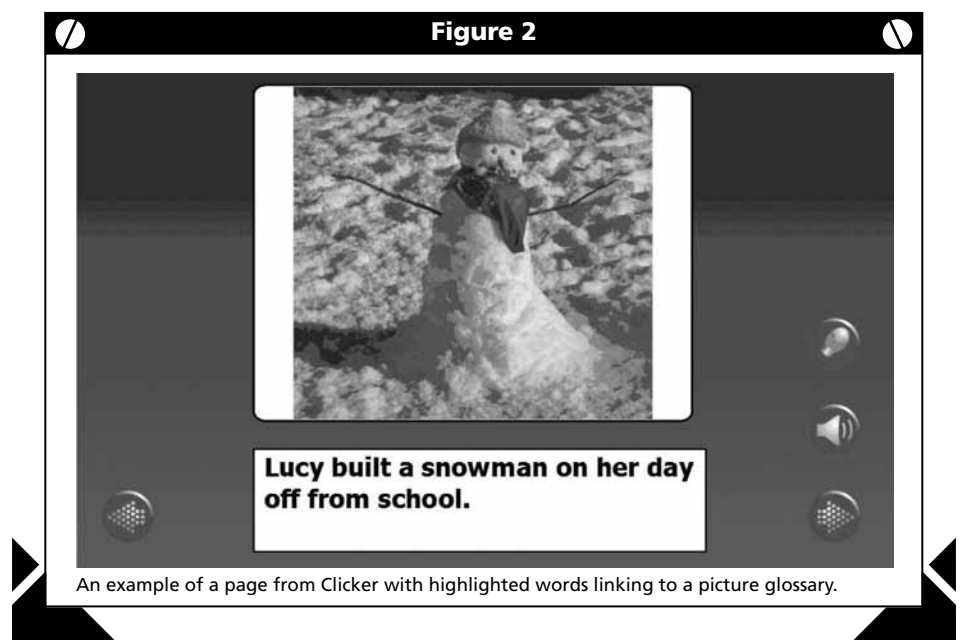Photo Story is another free option that allows personal photos to be inserted into a storyline. Text and a human voice recording then can be added to each photograph. When the story is complete, it can be read to the student automatically. Music also can be played in the background.

PowerPoint, a moderately priced program that is compatible with most computers, can be used to create talking books with or without student interaction. The books can have action buttons for students to press to turn the page, or they can be read automatically and continuously without any pauses. Other components of PowerPoint that can assist with comprehension include the ability to insert hyperlinks, videos, and pictures. These additional supports can provide needed visual aids or additional information to help students understand the text. PowerPoint also includes a sound recorder, which allows the text being read aloud on each slide to be recorded. A program called Power Talk, which can be downloaded for free, allows PowerPoint to automatically read the text on the slide.

Finally, Clicker 5 is a software program that costs about $125. It creates talking books with audio and highlighting supports after the text is typed on each page of the book. Clicker will automatically read the text, or you can record your own voice. Videos and pictures also can be incorporated into the book. An example of a page from a Clicker book is shown in Figure 2.

When deciding on a computer program, it is important to consider the text-to-speech options, feasibility in creating the e-text, and price, along with the accommodations needed for the student. You then can create your e-book by importing or typing the

Figure 1

▾ robots6

Georgia Tech music teacher Gil Weinberg has been jamming at concerts all over the world with his invention, Haile the drum-playing robot.

An example of a page from MS Reader with highlighted words linking to a picture glossary.

Figure 2

Lucy built a snowman on her day off from school.

An example of a page from Clicker with highlighted words linking to a picture glossary.

text into the program of your choice and selecting the text-to-speech option that best suits your student.

How Do You Use Images to Augment E-text?

When many students are able to hear and see the text being read to them, their comprehension increases; however, this is not always the case for students with moderate to severe disabilities. Students with more severe disabilities may need additional supports that augment the e-text in order to comprehend the material.

Incorporating images (e.g., photographs, pictures, or symbols) is one way to augment e-text. Picture prompts have been used widely to visually augment the acquisition of a variety of functional skills for students with intellectual disabilities (Alberto, Cihak, & Gama, 2005; Carson, Gast, & Ayres, 2008; Cihak, Alberto, Taber-Doughty, & Gama, 2006; Lancioni, O'Reilly, Seedhouse, Furniss, & Cunha, 2000). Pictures are a compensatory tool that can provide the user with a visual reminder of how to complete a task or what a story is about.

E-text can be augmented with one image to represent a summary of the text, a few images above key words within the text (see Figure 3), or by providing images above each word of the text. E-book developers can insert

these images themselves or they can use a program such as Writing with Symbols that inserts pictures as each word is typed. Boardmaker is another symbol-based program that allows the same symbols to be included in an e-book and on a student's communication device. Once again, the student's needs should be assessed to determine which method and type of image is best.

In addition to augmenting e-text with pictures, students may benefit from the use of a graphic organizer. Graphic organizers are supplemental tools that visually display relationships among key concepts taken from the task or text (Ausubel, 1960) and aid students in their recall of related information (DiCecco & Gleason, 2002). Pictorial graphic organizers may be necessary for students with

moderate to severe disabilities in order to account for nonreading or early reading levels. Students can use the pictorial graphic organizers to help make connections with the text and remember the content of the text. Figure 4 shows an example of a pictorial graphic organizer that helped students with intellectual disabilities comprehend e-text recipes and make a recipe (Douglas, Ayres, Langone, & Bell, in review). Other graphic organizers could include the 5 W questions (i.e., who, what when, where, and why) or a story web (i.e., characters, setting, plot, and actions).

Another way to augment e-text is by including video clips of the story or task. When incorporating short video segments into a story, you can begin the e-book with a video prompt of what is going to occur,
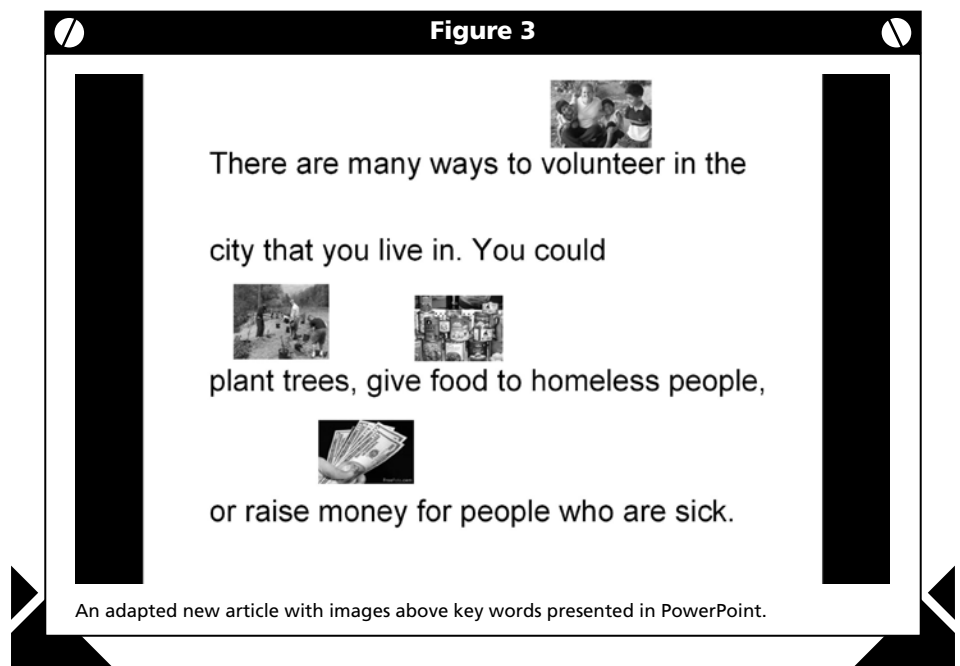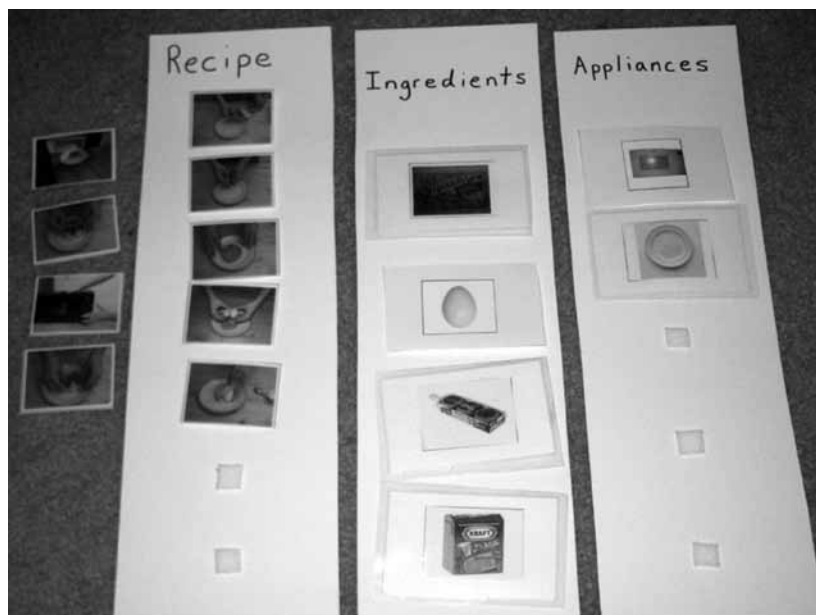

Figure 3

There are many ways to volunteer in the

city that you live in. You could

plant trees, give food to homeless people,

or raise money for people who are sick.

An adapted new article with images above key words presented in PowerPoint.

Figure 4

An example of a pictorial graphic organizer.

or you can incorporate video clips within the storyline to reinforce what the student just heard. When incorporating video into an e-text presentation of a task analysis, you can provide a video model of the entire task or you can provide a separate video clip for each step of the task. The latter option is known as video prompting, which has been an effective strategy with students with severe disabilities (Cannella-Malone, Sigafoos, O'Reilly, de la Cruz, Edrisinha, & Lancioni, 2006; Graves, Collins, Schuster, & Kleinert, 2005). Window Movie Maker and iMovie are programs that provide easy methods of downloading and editing video. They are available on most PC and Macintosh computers. You also can use these programs to capture photographs from a video.

No matter which supplemental tools are used in conjunction with the e-text, students must be taught how to use the supplemental tools before they can improve their comprehension of the e-text.

How Do You Teach Students to Use E-text?

Modeling is an effective instructional strategy when teaching students with moderate to severe disabilities how to use the additional e-text supports. Students need to observe how to use the tools so they can imitate the behavior. The teacher should model the behavior, and then the student should immediately imitate what the teacher did. Once the student begins to learn how to utilize the supports, the teacher can provide a model prompt if the student is responding incorrectly or is nonresponsive. Students need multiple opportunities to practice using the tools throughout the day in order to become comfortable with them and to see improvements in comprehension.

Students also are more likely to generalize their comprehension skills when they are presented with e-text from a variety of relevant genres and with subjects of high interest. Imagine providing reading opportunities for a high school student with moderate intellectual disabilities. The student would certainly be more motivated and less stigmatized reading *Harry Potter* or the latest teen fiction than material on his or her presumed reading level (e.g., first or second grade). Additionally, students become more motivated to learn when they see the relevance to their own lives (e.g., reading a shopping list, recipe, or jobsite to-do list, or a leisure topic of interest such as the sports pages from the local paper). Students should come in contact with literacy material that is meaningful to them and that occurs naturally in settings such as the classroom, home, community, or place of employment.

How Do You Evaluate Students' Progress Using E-text?

Once students learn how to use the programs that present the supported e-text, their comprehension should be assessed to determine if the tools are helping them. There are multiple ways to evaluate student comprehension skills. One way is to ask open-ended questions where students must provide a verbal response. These questions may require an implicit or explicit answer. Another way is to ask multiple choice questions where students must select the number or letter that corresponds to the answer. A third way is to ask students to retell as much as they remember about the text or to draw a picture or write a summary of the text.

All of these are possible assessment options. However, when working with students with moderate to severe disabilities, their physical and cognitive abilities also must be considered. Students who are nonverbal may need to make selections from pictures or words that illustrate their comprehension skills. Student with physical disabilities may need to respond verbally or use a single switch to make a selection on the computer. Students who are nonreaders must have the questions read to them and have the option to provide a verbal or pictorial response. In addition, students with severe disabilities may need to have instruction in how to answer multiple-choice questions, since the process is not a natural one for them.

It does not matter how students are evaluated as long as the assessment tool is an accurate measure of their comprehension skills. Appropriate assessment measures should be selected on an individual basis, just as when selecting e-text presentation programs and augmenting text with supplemental tools.

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E-text Resources

Project Gutenberg
www.gutenberg.org/wiki/Main_Page

Literature Project
www.LiteratureProject.com

Time for Kids
www.timeforkids.com

Kurzweil 3000
www.kurzweiledu.com

WYNN
www.freedomscientific.com

SOLO
www.donjohnston.com

Read and Write Gold
www.texthelp.com

Microsoft Reader
www.microsoft.com/reader/downloads/pc.mspx

Photo Story 3
www.windowsphotostory.com

Clicker 5
www.cricksoftware.com

Power Talk for Microsoft PowerPoint
http://fullmeasure.co.uk/PowerTalk/

Writing with Symbols
www.mayer-johnson.com

Boardmaker
www.mayer-johnson.com

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