Assistive Technology Resources for Children and Adults with Disabilities

Closing The Gap

Solutions

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Read it to Me - On the Fly! (Part II)

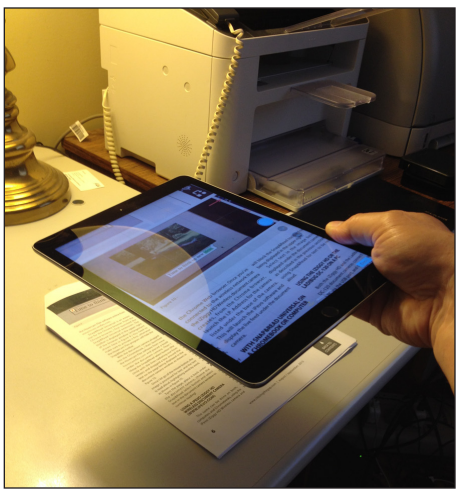
In Part 1 of this article (August/ September, 2015 issue of Closing The Gap), I discussed how document cameras can be connected to computers or Chromebooks, and when paired with Chrome extensions or software programs, can be used to select text on a page displayed under the document camera and read it aloud. In this follow-up, I'll discuss how you can use an iPad or Android tablet (as well as iPhone or Android phones) to snap a picture of a printed page and have it read aloud. This makes the solution a portable one that can be used anywhere - from the classroom, reading menus at a restaurant, posters on a wall or sitting down at the library with a magazine.

No matter what platform (IOS or Android) you use, there are a few things in common that control the quality of the scan and text-to-speech process. First, there is the camera lens on the device you are using. The iPad 2 only came with a .92mp rear facing camera built in that was nowhere near good enough for consistent, reliable scanning - in this case taking a picture of the page and then having an app process it. The iPad 3 has a 5mp camera and the iPad Air 2 not only has an 8mp camera, but is nearly twice as fast as the other iPads - similar to having a fast computer. The iPhone 6 has an 8mp camera, the same as my iPhone 4s, but the iPhone 6 is also so much faster.

The same can be said for the Android tablets. I have an older Nexus 10 that has a 5mp camera, which compares to an iPad 3. However, some of the newer models, such as the Galaxy Tab S or Pro, range from 8mp to over 12mp. So when comparing and discussing, remember, it comes down to many pieces, not only the camera, but the speed and processing power of the device it is attached to and the apps you use with them.

The students who would benefit the most from technology are usually the ones who get the lowest quality devices. If you ignore the last two paragraphs and get handed something that you are told is "good enough" from their perspective, don't expect quality. Remember, they are not the ones using it to compensate for a reading disability. If that is what they needed their device to do, how often would "what was good enough for your student" be good enough for them?

Let's get down to it, a walk-through using an iPad Air 2, together with the apps Prizmo and Claro PDF! Prizmo is currently one of the best apps I've found



for taking a picture of a printed page, processing it and reading it aloud. It has a lot of features and there are times you do not need most of them. In this example, you'll see what can be done, and in the next example, what can be done if you just need to cut to the chase with one click.

I began by launching the Prizmo app on my iPad and taking a picture of the printed page as shown in figure 1. Lighting and the quality of the print on the page all factor into the process. Prizmo then displays the page within the app as shown in figure 2. Clicking the Recognize button begins the OCR

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process, where the app looks at the image and tries to determine what is text and what are pictures on the page.

Once the image has been processed, you see the areas, shown in figure 3, that the app considers to contain text and, below the image, the text it is believed it to be.

At this point, you could touch on any zone and click the Remove button at the bottom of the screen to delete anything you don't want the program to try to read - in this case, it may simply be the text inside one of the pictures that the program saw, but would be irrelevant to the reading of the article.

In figure 4, you see I've deleted some zones, and what is left of the resulting text is at the bottom of the screen. When I now choose the Export icon at the top of the screen, I'm presented with choices as shown in figure 5. The first choice is Read Text Aloud. Choosing that option brings the text into a reading window as shown in figure 6. The text is 100 percent accurate when compared to the original page. Notice, about two thirds of the way down, the single sentence and the Figure reference - that was text the program found in one of the images, which I could have cleared by deleting the zone or deleted in this window, or I could just ignore it and pause the reading, put the cursor below it and click the play button to resume reading.

The program has extracted the text from the page and left the images behind when reading aloud. However, if you wanted to keep the page intact so that you see what it looked like, images and all, and have that read aloud, it is very easy to do by using Claro PDF with Prizmo.

Claro PDF is another app that I can export the image Prizmo captured and processed into. That step was an extremely important piece, as it turned the image into an editable PDF file rather than just a "picture of the page," which is what 90 percent of the other apps do that claim to create a PDF file from a picture.

Figure 2

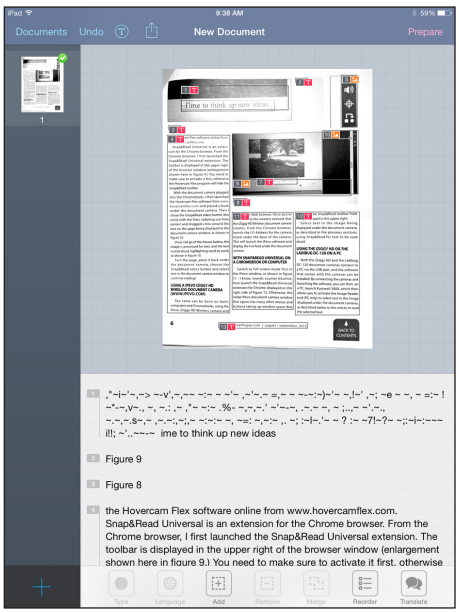

Figure 3

Figure 4

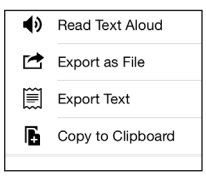

Figure 5

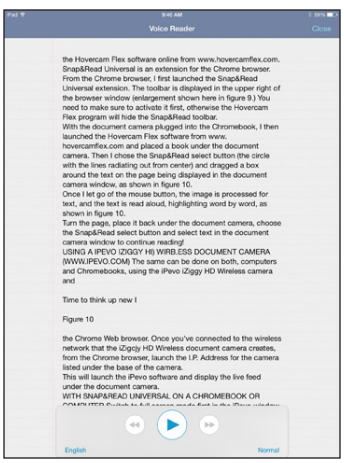

Figure 6

If, after taking the picture with Prizmo, I had chosen Recognize, then clicked Export and chosen Claro PDF, it would have then imported the file into it. I can now put my cursor anywhere in the image, and Claro PDF will read it aloud, highlighting word by word as it does (Prizmo does this also) as shown in figure 7.

I can pause, stop and go into the settings to change the voice, speed, highlight color and more. I can also record my own voice, and it will save it as a sound file in the document and even record a

Figure 7

video, which I can then place anywhere on the page, as shown in figure 9.

Notice the arrow on the right side of the play button in figure 8, allowing me to scroll to (or display) the video after playing the sound file. I had recorded an audio file also for the page. If I add multiple audio and video files, it will display one at a time on the page, and clicking the scroll arrow will scroll through and display the other files.

Now I have the best of both worlds. Do I just want Prizmo to snap a picture, process and read it, or export out to Claro PDF and work with the original page layout. There is also a set of tools in Claro PDF to annotate on the document, including draw tools, type text on the page, insert images from the camera or photo library onto the page (images can be resized and placed anywhere), erase items you added or drew, add comments, highlight text, as well as pinch and zoom within the document.

Imagine what I could do! Create a worksheet with fill-in-the-blank questions, such as find a cat, and the student takes a picture of the page, exports to Claro PDF, chooses the insert image option, takes a picture of a cat and places the image on the fill-in-the-blank line. Hmmm, has your imagination taken off yet?! How about steps in a science experiment, identifying different leaves and inserting the pictures next to the definition.

Just click and read. If all you need is to click and have it read the text on a page, then an app such, as the knfbReader (lists for iPhone only but will run on iPad Air 2), might be just what you need. It strips out the images and you are left with just text. It is fast and accurate and works best on pages such as what you find in a paperback book - one column, mostly text - or textbooks, although it does fine with multi-column pages as long as you don't mind that the text is then displayed as one column. You can adjust the voice, speed, color of the highlighting, text size and more.

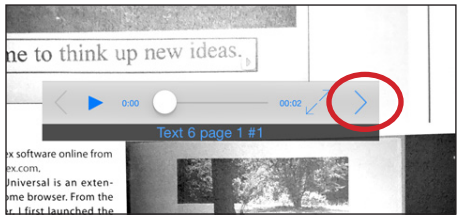

Figure 8

Figure 10

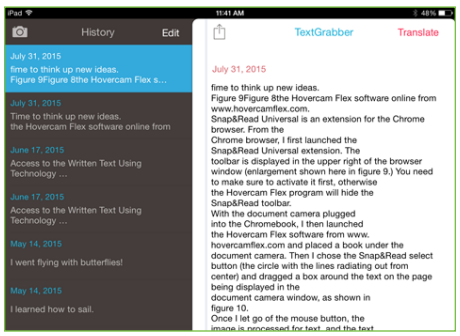

Figure 11

Text Grabber + Translator by ABBYY does a good job of processing the image, although it also strips the text out of the original document to read. In figure 10, you see the exact same page I scanned with Prizmom, now using Text Grabber.

When I choose Read at the bottom right of the screen, it performs OCR on the image, and in figure 11, you see the

Figure 9

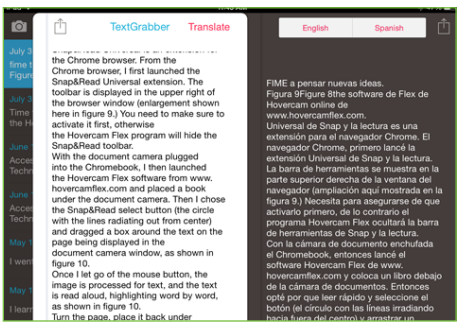

Figure 12

reading window. However, there is no text-to-speech built in, so you need to turn on Read Selected Text in the iPad System Settings and select the text you want read aloud.

Text Grabber also has translation built in. You can translate to another language by clicking the Translate button in the upper right, and the translation is shown to the right of the original text, as shown in figure 12.

Office Lens (free) does a good job of taking the picture of the page and saving it as a PDF file, which you would then export to Claro PDF for reading aloud. You need Internet access to use it and a Microsoft Log-in (also free), but you can also export the file to OneNote,

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Word, OneDrive or even email it. The key feature is that it saves it as a true editable text PDF that can be exported directly to Claro PDF by choosing the Export icon, and you end up viewing the original page, not just a page of text stripped out of the original image.

ANDROID OPTIONS

Office Lens on an Android will save the image to either the Gallery, the Android equivalent to Photos on an iPad, or to Word, OneDrive or save it as a PDF. Once it is saved as a PDF, you can then open it in apps, such as ezPDF Reader, and use that app's text-to-speech capability to read it aloud. Figure 13 shows the PDF image saved and exported from Office Lens to ezPDF Reader. Displaying the Navigation bar shows the Speech icon at the lower right.

Choosing it (in the image I am pointing to it) opens the reading tools to read, pause or stop. You can adjust the highlighting color, speech rate, the speech engine, etc.

TextGrabber + Translator by ABBYY will allow you to take a picture, choose the Read button that will process the text and open it in a new text window, as shown in figure 14. Once there, I can use an app, such as Talk Text, which, when text is selected on the screen and is copied to the clipboard, will be read aloud. However, it doesn't highlight word by word.

You can also export (called Share in many apps on Android) to an app, such as Voice Read Aloud, shown in figure 15. Voice Read Aloud has text-to-speech tools for reading, pausing, text size and TTS settings. However, we miss seeing the page in its entirety, as was the case using Office Lens, saving as a PDF and importing into a PDF reader with text-to-speech capability, such as ezPDF Reader .

Text Fairy (OCR Text Scanner - free) This app will allow you to take a picture, perform OCR, select the zones of text you want in your final document, and read it aloud using text-to-speech, but it doesn't

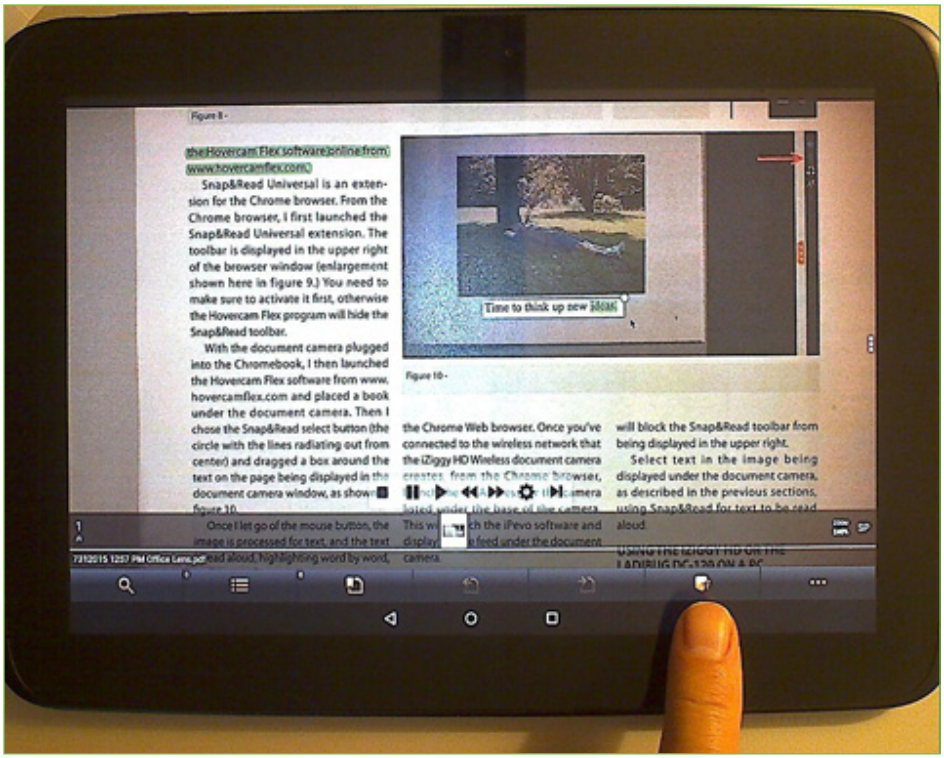

Figure 13

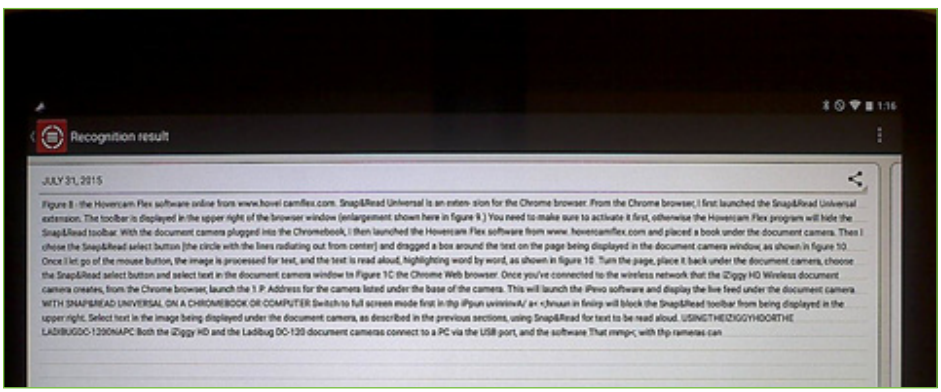

Figure 14

highlight word by word as it reads. Once the process is completed, the accuracy is very good. You can also save the original image as a PDF and export to ezPDF Reader for TTS within the original image rather than extracted text.

Another option is to download and install Read&Write for Android that will allow you to use the Read&Write keyboard containing a Read button that can be used when documents with selectable text are opened. Use Text Fairy to scan the document, perform OCR, extract the text into a new text window, and then use the Read button to read aloud, highlighting word by word. The only issue with Text Fairy is that you need to use crop tools to select the area of the image you want it to process. This adds one more step for a student to have to do.

Figure 16 shows the zones I am selecting in the original image, figure 17 shows the page being processed and,

finally, in figure 18 I've opened it in the Read window of the app.

In the upper right, you can see the Read button, but in this case, I'm choosing the read button on the Read&Write for Android keyboard so that my text will be highlighted, word by word, as it is read aloud.

What I look for first is ease of use for the student and quality of the scan. When we look at the iPad, using Prizmo stands out, not only for its quality, ease of use and integration of TTS, but also the ability to just quickly scan and send right to Claro PDF for a much better reading experience. On the Android side, using Office Lens and ezPDF Reader work well, but there are a few steps for the student, while using Text Fairy did a good job, there were multiple steps for the student. However, for just click and read the text, ABBYY Text Grabber is a good solution. You will find there are many other "scanning" and "scan to PDF" apps for both iPad and Android out there, and you're welcome to make your way through them as I did.

One last thing to note is that the focus of the article is on the student's immediate use. As an educator, I could be using the iPad, for example, as a portable scanner and use a program like Prizmo to quickly take multiple pages in seconds, process and save for later for the student to open - all ready to go. I have everything I need in my hand. Perhaps I'm sending the PDF I just created to Kurzweil 3000 for access to a much more extensive set of tools to use with it, or to a Google Drive folder for use later. In any case, what used to take a flatbed scanner connected to a desktop computer to do, can now sit in the palm of my hand! See app list on page 8.

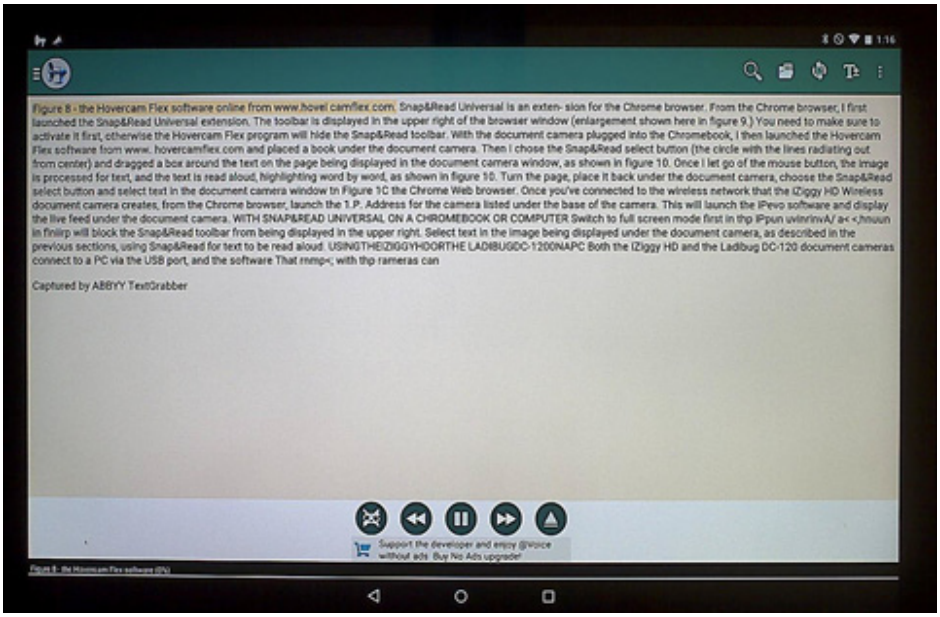

Figure 15

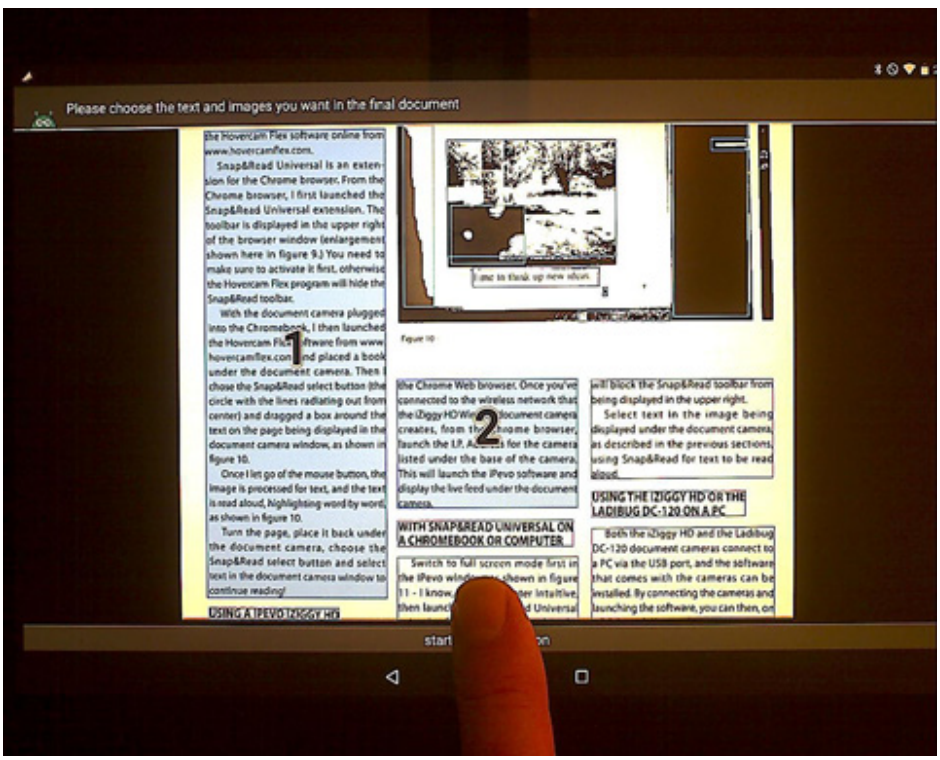

Figure 16

IPAD APPS FROM THE ITUNES APP STORE

- Prizmo - $9.99 plus $2.99 for each voice
- Office Lens - free
- Text Grabber + Translator - $4.99
- knfbReader - $99.00
- Claro PDF - $3.99 plus $1.99 for each voice
- Lectio - $4.99, does a very good job of taking the image, processes using OCR, keeps original image intact, student taps on an individual word they don't know to hear it read aloud, tap and hold on any word and a dictionary definition will pop up.

ANDROID APPS FROM THE GOOGLE PLAY STORE

- Read&Write for Android (free trial/ subscription)
- Text Grabber & Translator by ABBYY - $4.99
- Text Fairy - free
- Office Lens - free
- ezPDF Reader - free/$3.99 plus in app purchase for voices
- Voice Read Aloud - free
- Talk Text - free ■

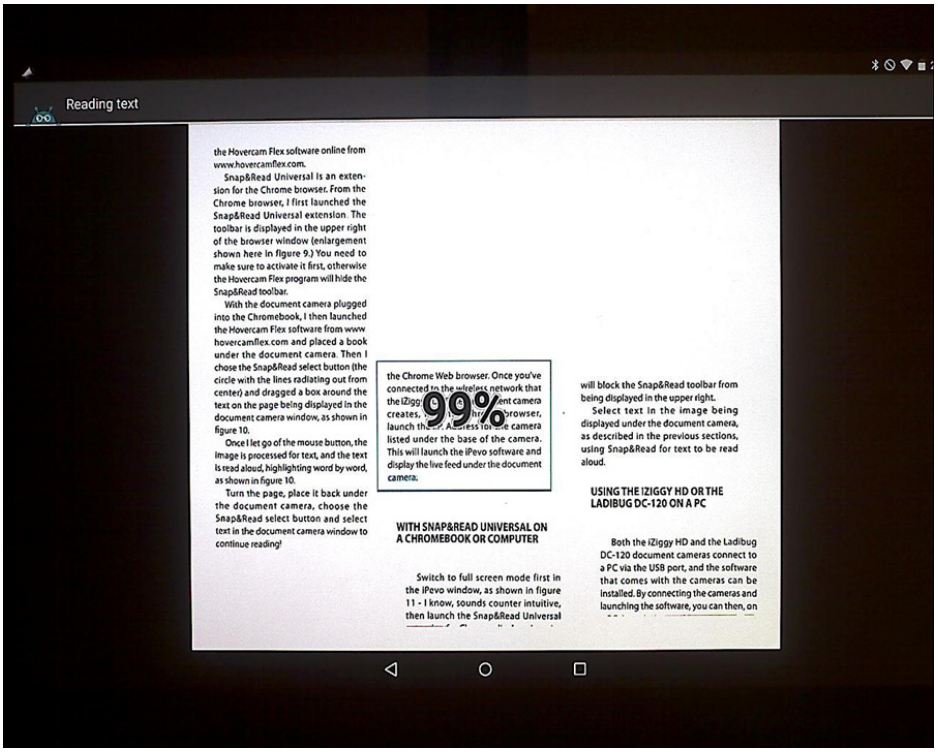

Figure 17

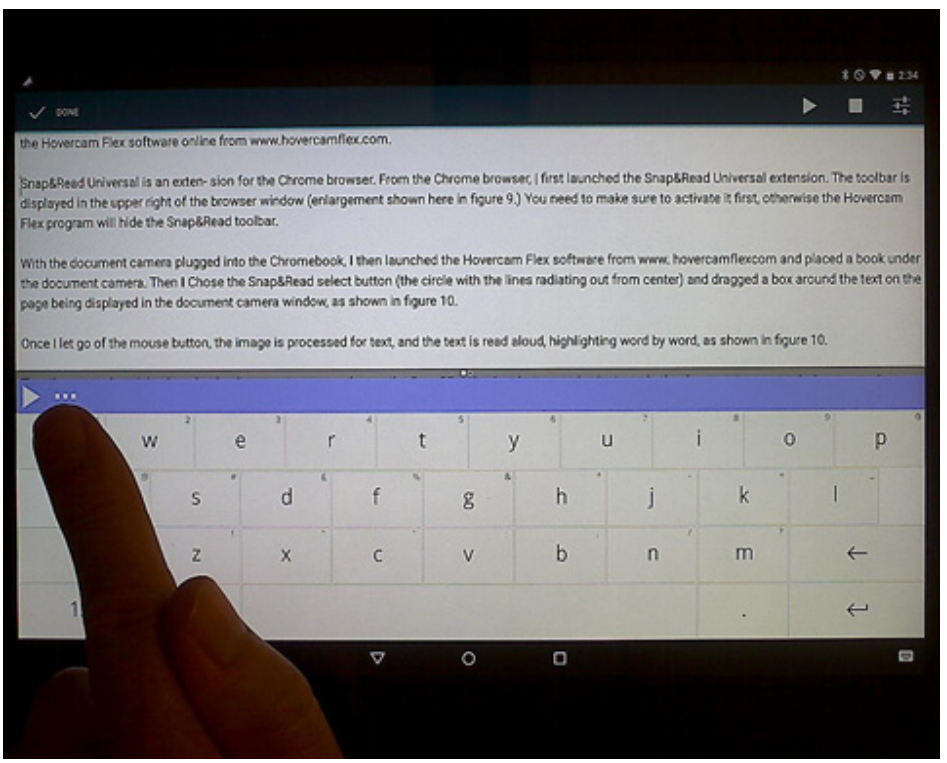

Figure 18

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Accessible Educational Materials in the IEP (Part II)

Accessible educational materials (AEM) can play a vital role in students with disabilities being able to actively participate and progress in the general education curriculum. IDEA requires that students with disabilities who need accessible materials are provided with these materials in a timely manner. As the IEP is the blueprint for the provision of special education services, it is critical that a discussion of a student's possible need for accessible materials be included in the development and revision of the IEP and that what is needed is written in the IEP.

In Part 1, we discussed including AEM in the

- Summary of Evaluation Results,
- Present Levels of Academic Achievement and Functional Performance, and
- Special Factors.

In Part 2, we will review including AEM considerations in

- Measurable Annual Goals;
- Special Education and Related Services, Supplementary Aids and Services, and Modifications and Supports;
- Statewide Assessment Participation; and
- Transition Services.

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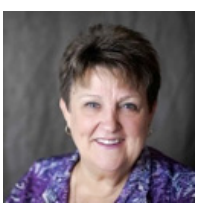

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JOANNE KARGER, J.D., Ed.D., is the former Policy Analyst and Research Scientist at CAST in the areas of accessible education materials (AEM) and Universal Design for Learning (UDL).

MEASURABLE ANNUAL GOALS

IDEA requires that IEPs include measurable annual goals, including academic and functional goals, designed to enable the student to be involved and make progress in the general education curriculum. IEP goals lay the foundation for a student's educational program and provide a roadmap for their teacher(s). It is, therefore, important for the IEP to describe how the student's use of AEM will support reaching these goals and enable the student to be involved and progress in the general education curriculum.

REQUIREMENTS IN IDEA

The IEP must:

- State measurable annual goals, including academic and functional goals.
- Describe how the goals will meet the student's disability-related needs in order to enable the student to be involved and progress in the general curriculum.

20 U.S.C. § 1414(d)(1)(A)(i)(II); 34 C.F.R. § 300.320(a)(2)(i)

AEM CONSIDERATIONS

- For which goals will AEM be needed to support achievement of IEP goals and progress in the general education curriculum?

EXAMPLE IEP STATEMENT FOR MEASURABLE ANNUAL GOALS

By May, 2015, when using a digital text format of the seventh grade social studies textbook and other materials, Sean will identify examples of sequential, comparative and causal presentations of information in text with 80% accuracy.

SPECIAL EDUCATION AND RELATED SERVICES, SUPPLEMENTARY AIDS AND SERVICES, PROGRAM MODIFICATIONS AND SUPPORTS

The requirement that the IEP include a statement of the special education and related services, supplementary aids and services, program modifications and supports for school personnel provides another opportunity to specify the particular AEM format or formats that a student will use to be involved and progress in the general education curriculum. This part of the IEP also specifies the accommodations, assistive technology and other supports and services that are necessary to assist the student's use of the specialized formats and delivery technology.

REQUIREMENTS IN IDEA

The IEP must:

- State the special education and related services and supplementary aids and services, based on peer-reviewed research to the extent practicable, to be provided to the child, or on behalf of the child, and
- State the program modifications or supports for school personnel that will be provided for the child:
  - To advance appropriately toward attaining the annual goals,
  - To be involved and progress in the general education curriculum,
  - To be educated and participate with students with and without disabilities.

20 U.S.C. § 1414(d)(1)(A)(i)(IV); 34 C.F.R. § 300.320(a)(4)

AEM CONSIDERATIONS

- How can AEM help the student be involved and progress in the general education curriculum?
- Is AEM needed as a part of special education and related services?
- What supports will help the student use AEM?
- Who will help the student use AEM?
- What training related to technology and/or specialized formats will be needed for the student, educators and/or family?

EXAMPLE IEP STATEMENT FOR SPECIAL EDUCATION AND RELATED SERVICES, SUPPLEMENTARY AIDS AND SERVICES, PROGRAM MODIFICATIONS AND SUPPORTS

Sean will use a tablet computer and/or other device that provides simultaneous visual and auditory output to support perception of and interaction with a digital text format of grade-level printed materials across content areas.

Sean will receive training in how to use the digital text format and technology for participation and achievement.

Sean's teachers and parents will receive training to support his use of the materials and technology.

Sean will require headphones and preferential seating in a quiet area of the classroom when he is reading with text-to-speech.

NOTE TO IEP TEAM:

In order for a student to be able to use accessible materials and AT for effective educational participation and achievement, the team should determine the types of supports that are needed. Supports typically fall into the following categories:

- What technology may be needed for the student to use the materials effectively?
- What training for the student, educators and family may be needed?
- What instructional strategies may be needed?
- What support services may be needed?
- What accommodations and/or modifications may be needed?

For further information, refer to the AEM Navigator http://aem.cast.org/navigating/aem-navigator.html (online or print version) and review the Supports for Use section.

PARTICIPATION IN STATEWIDE ASSESSMENTS

Under IDEA, all students with disabilities must be included in general state and districtwide assessments with appropriate accommodations or alternate assessments as specified in their IEPs (20 U.S.C. § 1412(a)(16); 34 C.F.R. § 300.160(a)). Best practice suggests that assessment accommodations align with the accommodations and supports that a student receives during classroom instruction. There is a danger that overly restrictive assessment policies may have an adverse impact on instructional decisions made by IEP teams, including the provision of AEM and other accommodations. It is therefore important for IEP teams to be cognizant of the relationship between assessment accommodations and student use of AEM in the classroom in order to ensure consistency across settings.

REQUIREMENTS IN IDEA

The IEP must:

- Include a statement of individual, appropriate accommodations that are necessary to measure the academic achievement and functional performance of the child on state and districtwide assessments.
- If the team determines that the student needs to take an alternate assessment, state why the student cannot participate in the regular assessment and why the particular alternate assessment selected is appropriate.

20 U.S.C. § 1414(d)(1)(A)(i)(VI); 34 C.F.R. § 300.320(a)(6)

AEM CONSIDERATIONS

- What accommodations are needed in assessment for a student who uses AEM and AT?
- How do these accommodations relate to the AEM and AT that the student uses in the classroom?

EXAMPLE IEP STATEMENT FOR PARTICIPATION IN STATEWIDE ASSESSMENTS

Consistent with the accommodations that Sean is using in the classroom, he will receive the following accommodations on statewide assessments:

- Read-aloud: Simultaneous visual and auditory access to text through the independent use of text-to-speech for all allowable parts of the assessment
- Scribe: Text input through independent use of word prediction software for all allowable parts of the assessment

NOTE TO IEP TEAM:

When selecting the assessment accommodations that will be provided to a student, it is important for IEP teams to review accommodations frequently used in the classroom that enable the student to demonstrate and express knowledge on a daily basis. Although all classroom accommodations may not be allowable in high-stakes testing, testing accommodations should, to the greatest extent possible, mirror accommodations frequently used in the classroom.

Because so much rests on the outcomes of large-scale assessment, there is a tendency, in some places, to restrict the accommodations used during instruction to the accommodations that are allowable in large-scale assessment. Such limitations can constrain a student's opportunity to learn, to develop greater independence and to show what they know and are able to do.

POSTSECONDARY GOALS AND TRANSITION SERVICES

The transition planning process that begins when a student turns 16 (or earlier, if determined appropriate by their IEP team or required by state law), allows the IEP team to develop measurable postsecondary goals and transition services to be included in the student's IEP. The Summary of Performance (SOP) provides the student with a summary of his or her academic achievement and functional performance and includes recommendations as to how the student can be assisted in meeting their postsecondary goals.

It is important to consider AEM during the transition planning process; when students with disabilities exit special education, they are no longer entitled to services under IDEA. As a result, they have to be able to advocate on their own behalf in other settings, including postsecondary education and the workplace. At the postsecondary level, students with disabilities must be able to communicate information about the nature of their disability in order to request particular aids or services. Therefore, as part of the transition planning process, their team should make it a priority to help the student understand his or her own disability in relation to the need for AEM and supporting technology.

REQUIREMENTS IN IDEA

The IEP must include a statement of:

- Appropriate measurable postsecondary goals based on age-appropriate transition assessments
- Transition services (including courses of study) needed to assist the student in reaching their goals

20 U.S.C. § 1414(d)(1)(A)(i)(VIII); 34 C.F.R. § 300.320(b)

The LEA must develop a Summary of Performance (SOP) of the student's academic achievement and functional performance, including recommendations on how to assist the student in meeting postsecondary goals.

20 U.S.C. § 1414(c)(5)(B)(ii); 34 C.F.R. § 300.305(e)(3)

AEM CONSIDERATIONS

- What opportunities and supports will be provided for the student to develop self-determination skills needed to advocate for his or her own needs in relation to AEM?
- What supports will be provided to help the student plan for the use of AEM and related technology in postsecondary environments?

EXAMPLE IEP STATEMENT FOR TRANSITION PLANNING GOALS

Sean will learn to advocate on his own behalf in determining when he needs to use a specific specialized format and what technology works best for him in different contexts.

Sean will build the self-determination skills needed to advocate for his needs in postsecondary environments by leading discussions during IEP development.

NOTE TO IEP TEAM:

It is essential to build students' self-determination skills so that they can advocate for their own needs throughout their lives. AEM and related technology needs to be explicitly included in the transition planning process. Without this direct focus and the student's ability to advocate effectively, there is a good possibility that the use of accessible materials will be overlooked in postsecondary environments.

For an example of the importance of self-determination skills and independence for students related to their use of AEM, see the video series Meet Juna: Leveling the Playing Field with AIM http://aem.cast.org/supporting/junas-story.html. Explore the story of Juna Gjata, a student who has a visual impairment that prevents her from reading standard print materials, and learn how she - with the help of supportive teachers, assistive technology and accessible instructional materials - has been able to excel academically. In the segment Paving the Way to Harvard, observe how Juna's team supported the building of her independence and self-determination over time so that she was well prepared for college.

CONCLUSION

There is no specific requirement regarding the exact location where the use of AEM and related technology is to be included in an IEP. However, when AEM is explicitly incorporated into a student's IEP, the likelihood is increased that the student's use of AEM will become an effective and integrated part of the learning process. This resource has highlighted several components in the IEP in which it might be appropriate to refer to a student's use of AEM. Clarity and consistency are enhanced when SEAs and LEAs provide guidance to IEP teams on the various ways in which student use of AEM can be included in an IEP document.

While the mandate in IDEA to provide textbooks and related core instructional materials in specialized formats only applies to materials that have a print-based source and are provided in the form of print on paper, SEAs and LEAs are increasingly utilizing and requiring digital learning materials for use in early learning and elementary and secondary education. Two federal civil rights acts, Section 504 of the Rehabilitation Act and Tittle II of the Americans with Disabilities Act (ADA), prohibit discrimination on the basis of disability and speak to the obligation of public schools to provide accessible educational materials to students with disabilities who need them.

In keeping with the changing landscape of educational materials from 2004 to the present, the Office of Special Education Programs of the U.S. Department of Education expanded the definition of AEM to include both print and digital learning materials under the recent Department of Education Priority, Educational Technology, Media and Materials for Individuals with Disabilities - National Center on Accessible Educational Materials for Learning. The updated language is "Accessible educational materials means print- and technology-based educational materials, including printed and electronic textbooks and related core materials that are required by SEAs and LEAs for use by all students, produced or rendered in accessible media, written and published primarily for use in early learning programs, elementary, or secondary schools to support teaching and learning" (Footnote 10, Federal Register / Vol. 79, No. 90 / Friday, May 9, 2014 / Notices, page 26728).

For more information on legal issues, please visit the Policies and Systems section on the AEM Center website http://aem.cast.org. You may also want to visit the PALM Initiative http://aem.cast.org/navigating/palm.html to learn more about purchasing accessible digital learning materials. ■

University of Wyoming ECHO in Assistive Technology:

A promising practice for capacity building in education to improve student outcomes

Jack is an engaging six-year-old who is just beginning kindergarten. He likes red trucks and he sometimes helps his mother care for his younger brother and sister. Nathan, who is 17, has a summer job at the local grocery store and, like many boys his age, spends time thinking about cars and having a driver's license. Both live in rural Wyoming towns, miles and mountain ranges away from specialists of any kind. Jack is blind and Nathan has a specific learning disability, so their educational plans include related service providers and assistive technology.

Jack's and Nathan's educators worked with the faculty and staff of Wyoming's Assistive Technology Act program, Wyoming Assistive Technology Resources, where they attended trainings, received technical assistance related to specific devices and contracted for on-site assistive technology assessments. In rural Wyoming and in similar and even urban communities, an other nations addressing assistive technology one student, one school or one district at a time can be effective for the students of focus, but is inefficient and unsustainable for school districts.

Wyoming Institute for Disabilities at the University of Wyoming offers an innovative approach to building professional capacity in assistive technology in order to improve student outcomes. UW ECHO in AT's hub-and-spoke knowledge-sharing network links a "hub" of multidisciplinary specialists with educator, administrator and service provider school "spokes" for weekly video conference training and mentoring based upon student case discussions. UW ECHO in AT is a translation of the successful Project ECHO® model, developed by Dr. Sanjeev Aurora at the University of New Mexico, for building professional capacity to meet underserved health care needs

and provide best-practice treatment to reduce disparities of care. Similar to Project ECHO, UW ECHO in AT delivers lifelong learning and guided practice that exponentially increases workforce capacity to provide assistive technology

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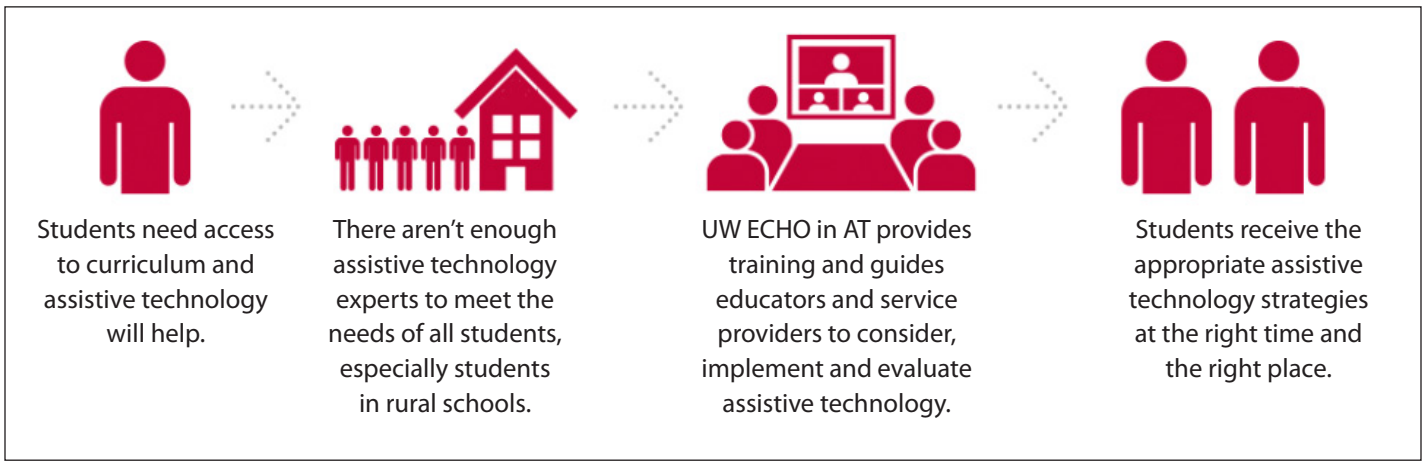
for students to ultimately reduce inconsistencies in student achievement.

Wyoming Institute for Disabilities applied the four key Project ECHO components during the year-long study of UW ECHO:

- distance technology to leverage scarce resources
- didactic training in best practices,
- co-management of student cases through Web-based conferencing
- outcomes measurement

Ninety-minute UW ECHO in AT sessions are conducted through a video and Web conferencing platform, Zoom (https://zoom.us). Each session begins with introductions, participant announcements and then we provide a didactic training on a specific assistive technology topic with time for questions from the UW ECHO in AT community. Following didactic training, "spoke" sites present de-identified student cases that include their questions about the continuum of assistive technology services for each case. The multidisciplinary "hub" team of specialists and those participating at the school "spokes" discuss each case and make recommendations for the local team to consider. The hub team includes University of Wyoming professionals and faculty members in assistive technology, audiology, communication disorders and psychology joined by experts in vision, hearing and occupational, physical and speech therapy elsewhere in the state, along with the lead and other nationally known assistive technology trainers throughout the country. Participants at the school "spokes" include general and special educators, principals, case managers, related service providers and, in some sessions, the student and the student's parent. As a follow up to the presentations, the UW ECHO in AT team compiles the evidence or research-based suggestions, supported with associated resources, including access as necessary to assistive technology devices available



UW ECHO in AT can be further understood this way.

through Wyoming Assistive Technology Resource's device loan program. This information is provided in writing to each presenter within two weeks. Updates on cases presented are shared and discussed with the UW ECHO in AT community in subsequent sessions.

Ellen Holzmann, Nathan's speech-language pathologist with 23 years of experience in a variety of settings, had been involved in various training opportunities as part of her school district's assistive technology team and through Wyoming Assistive Technology Resources at the University of Wyoming. She wanted to expand her knowledge in assistive technology to identify strategies or technologies to help Nathan and students with other learning challenges become more successful in school and life. When she contacted Wyoming Assistive Technology Resources for more information, she learned about their innovative professional development program and student co-management model, UW ECHO in AT.

For Nathan, it is difficult to complete reading and writing tasks due to poor

decoding skills. At the beginning of his sophomore year, his proficiency scores in reading, math and written language ranged from second to fourth grade levels. He had several accommodations

in place, including an adult reader, text-to-speech and, in some instances, a scribe. If grade level text was read to him by an adult or text-to-speech reader, he demonstrated good overall comprehension and his ability to answer questions across topics was typical of students in his age range. His teachers and service providers were eager to learn about assistive technologies to help him become more successful and independent.

Jack's mother talks about assistive technology "putting Jack in the driver's seat so that he makes his own decisions and his disability doesn't make decisions for him." His teachers needed assistance in preparing for him to begin kindergarten. During the expanded pilot, three didactic and two case presentations were dedicated to low vision and blindness. Jack's educational team from the developmental preschool and the school district attended the sessions and learned about evidence-based practices, as well low- and high-tech solutions from vision specialists who are members of the UW ECHO in AT hub team. His team is implementing recommendations from the sessions and will soon report back on his progress. What UW ECHO in AT means for Jack is that his teachers, most likely new each year, can strategize with a multidisciplinary team of specialists every week about assistive technology to help improve his academic outcomes now and in the future.

Ellen presented Nathan's case during a UW ECHO in AT session in order to "gain strategies to enable Nathan to access grade-level curriculum as independently as possible and to assist in the beginning stages of transition from secondary to post-secondary education." The coaching model, central to the co-management of cases, provided recommendations, such as writing apps, text-to-speech programs, self-determination skills and assistive technology strategies that Ellen could bring to Nathan and his teachers. His educational team implemented suggestions that same week. Ellen also presented another student case at a UW ECHO in AT session during the same semester. She described her UW ECHO in AT experiences as "eye opening". Gaining the perspectives of the multidisciplinary team members provided her with "a different look at each student but in consideration of the 'whole' student."

As a result of her participation in UW ECHO in AT and the team's suggestions, Nathan completed the paperwork to become eligible for Accessible Educational Materials (AEM, 2015) and registered for an accessible online library for individuals with a print disability. Like all students at his high school, he received a Chromebook this year. In addition, Nathan was provided with a mouse, a portable microphone and headset that allow him to write in-class assignments using speech-to-text software. He was introduced to two apps for the Chromebook that offer word prediction and additional literacy support tools for struggling readers and writers. What UW ECHO in AT means for Nathan is that he can work toward being an archeologist or paleontologist because his educators will help transition him with the appropriate assistive technology for post-secondary education.

As is the case with Nathan's and Jack's schools, as well as other rural school districts, complete teams of assistive technology specialists are rare, but there are several professionals who have interests in learning more about how to implement appropriate strategies and devices. Ellen suggests,

"UW ECHO in AT provides me a clear sounding board. Having a panel of experts provide me, my student and his parent the additional information and suggestions ensured me that I was on the right track with Nathan's assistive technology needs. It's great to have this group of individuals review all the information regarding my students' strengths, abilities and struggles. UW ECHO in AT supplies me with a variety of options and an all-inclusive list of solutions that can be applied to not only Nathan, but other students in our districts. " She adds,

"The UW ECHO in AT team enabled me to do my job more efficiently and makes certain that I can provide a totally comprehensive assistive technology package for each individual student. It is an invaluable resource to our state."

Ellen reported that having eBooks for literature and textbooks has enabled Nathan to access his grade level curriculum independently. Having text-to-speech has significantly cut down on the amount of time he spends reading his classroom and homework assignments. His teachers were supportive throughout the process and were willing to provide the guidance and instruction needed in order to utilize AT to the fullest. Ellen's next steps are to assist him in building strong self-determination skills that will help him make the transition to a post-secondary educational setting and maintain continuity of his AT use through continued support to the new teachers who are invited to ECHO to brainstorm

Gayl Bowser, UW ECHO in AT Lead Trainer and nationally recognized expert in the assistive technology, explained the significance of UW ECHO in AT as a model for the nation.

Gayl Bowser

"While a UW ECHO in AT session can sometimes feel as comfortable as an informal conversation in a teachers' lounge, the depth of knowledge shared makes it one of the most valuable and exciting ways to explore students' assistive technology needs that I have ever encountered. UW ECHO in AT combines the best aspects of an expert assistive technology assessment model with the strengths of a model focused on services provided by local assistive technology teams. Local case presenters, who have an in-depth knowledge of the students, environments and educational tasks for each case, have the ability to access expert knowledge about the specific assistive technology tools and strategies that may be most appropriate for each case presented. The assumption that each team member has an important piece of the assistive technology puzzle appears to me to lead to better implementation of assistive technology plans and the likelihood of more sustained assistive technology use over time."

any challenges that may arise along the way.

The information the educators receive is current and rooted in research or best practices. Also, the information is shared to all participants and has the potential to be relevant for many other students. Project ECHO describes this phenomenon as "forced multiplication: a logarithmic improvement in capacity to deliver best practice care for underserved populations" (Arora, 2013).

Professionals like Ellen need access to the latest research and technologies in order to consider and implement assistive technology strategies to meet the emerging needs of Nathan, Jack and all students in their schools. They need a platform to discuss how to implement evidence-based practices in context with specific student needs and to be allowed to brainstorm with professionals across the state and nation. UW ECHO in AT is that platform. UW ECHO in AT is building the capacity of educators to disseminate and implement best practice within their communities to improve the outcomes of students in Wyoming and beyond.

We will further discuss UW ECHO in AT's fidelity to the Project ECHO model, the growing number of partners from within and outside Wyoming, and the external evaluation results from our of the year-long study of UW ECHO in AT in the December 2015-January 2016 edition of Closing the Gap Solutions.

For more information about the project, participating in a session, or replicating UW ECHO in AT, please visit the project website: http://www.uwyo.edu/wind/echo/.

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Switch On Learning

On the topic of computer and iPad access, there is a great deal of technical information, product information, vendor webinars, YouTube tutorials, professional development within the schools and at conferences. The recipe for success is a complex one, requiring knowledge, tools, time, trial and error, practice, failure and success, patience, communication and implementation. The timeline for a student to obtain success may be several months to a couple of years. Attainment of success with one goal is met with new possibilities and new goals and it is ongoing and never ending as the student makes progress. New tools and activities need to be added to the recipe as time goes on, which then requires more knowledge, practice, trial and error, implementation and training of staff. Though I refer to a recipe, it is far from a cookbook recipe and more like a mystery, with one clue leading to the next that must be problem solved before moving on.

Let's start with a story of my student, Kaitlyn. Kaitlyn is a very happy, social, fourth-grade student with quadriplegic cerebral palsy. She has wonderful facial expressions, demonstrating smiles, laughter and a few tears, but she is nonverbal. Two days a week, OT and speech co-treat Kaitlyn with the ultimate goal of switch access for a communication device.

Very early on in this journey, Kaitlyn was introduced to switch toys and activities, with many hurdles along the way. Kaitlyn understood the concept of cause-and-effect, she would reach for the switch every time and there she would be stuck on the switch. We tried different positions for the switch and the student, we tried using other body parts to activate the switch, we tried different switch settings with delays,

we tried different switches, we talked and problem solved with the vendors. Positioning was our main focus for a very long time, but we continued to plug away on cause-and-effect activities.

Then it happened - she got her hand stuck behind the switch one day and was able to activate and release the switch with her thumb! We had

CINDY NANKEE is an Assistive Technology Professional and a Registered Occupational Therapist with 30 years of school-based practice. Author of switch technology chapter in Handbook of Research on Human Cognition and Assistive Technology by Soonhwa Seok and Assistive Technology Internet Modules (ATIM) from Ohio Center for Autism and Low Incidence (OCALI) on computer access and mobile device access. Cindy presents at state, national and international conferences.

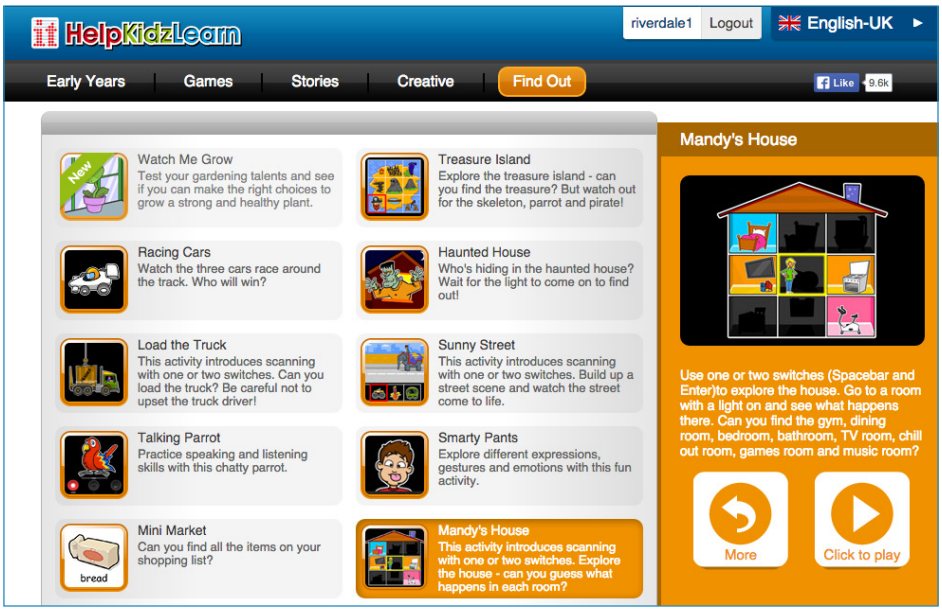
found the access point, and this was now duplicated in following sessions. We had to diligently practice not interrupting her with verbal encouragement as this would cause a distraction with ultimate reset and restart of her motor process. At this point, we started to collect data and her response time was 30 to 40 seconds. A very light motor cue to her triceps was productive in initiating the movement and the response time started to decrease. It was amazing to us the speed at which she was now progressing.

Now we needed more activities, we needed to progress from cause-and-effect and work on timing and hitting a target. We invested in a subscription to HelpKidzLearn that provided us with 80+ switch accessible games, activities and stories. Kaitlyn had good days and bad days but, overall, was becoming more consistent with her skills within the therapy room.

We were now moving into the second year of co-treating Kaitlyn, and the speech therapist was anxious to move on to communication. The iPad, with a simple choice board of four activities, was introduced. Kaitlyn's response time and difficulty in hitting a target resulted in failure and lack of interest.

More time and practice was spent on scanning activities from HelpKidzLearn, followed by the reintroduction of the iPad with a two-choice board. As success and consistency increased with a single switch, a second switch was introduced so that we had one for communication and the other for computer activities. The concept of two switches again caused a setback, but we were starting to see she really liked music and number and story activities.

Now Kaitlyn was making good progress, but we, the professionals, ran into the daily problems of technology, including dead batteries, the bluetooth connection conundrum,



Multi level switch accessible games, stories and activities.v

navigating multiple choice boards, setting up linked boards etc. We pondered how we would ever introduce Kaitlin's skills to the classroom, when we ourselves continued to have such problems. We spent time on the phone with vendors, we attended Ablenet University webinars, we tried other tools, we developed and posted a checklist for ourselves and we reorganized our choice boards and activities.

It was the end of year two and we were ready to implement in the classroom. We decided at this point to only implement the computer switch activities and keep it simple in the classroom. We ordered additional equipment that would remain with Kaitlyn and not be shared with the therapy department or other students. We started with demonstrations and training of staff in the therapy room so as not to add the distractions of the classroom. We moved on to working with Kaitlyn in the classroom during therapy time with ongoing demonstration and training to staff.

Kaitlyn's skills were met with awe and disbelief. "I can't believe she can do that." We had done a thorough job of training and implementation, we thought. At a visit to the classroom one week later, the switches were in a drawer. We provided more demonstration and training and we created an activity log. At the next classroom visit, the switches were present at the computer, but the activity log was missing. We had excellent support from the teacher, but getting Kaitlyn set up at the computer needed to be the classroom assistant's job. Once set up, it was an independent activity, requiring minimal time on any staff person's part. It was decided that the activity log would be done for one week to support our quarterly reports, and we were now able to see who needed more support from the comments on the activity log. We now had results and data to show that they were starting to implement in the classroom.

We continued to work with Kaitlyn in therapy to develop additional skills. Now that she was fluent in using a switch, amazing things seemed to happen every week. We knew she liked number activities and started using youtube videos for number and letter activities. I wanted to continue

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to increase switch hits and response time and asked her one day to count by tens using the switch to stop a numbers video at 10, 20, 30. I had no idea that she understood this concept, but she proceeded with the activity to 100. We watched with our jaws dropped and tears in our eyes.

This story demonstrates the journey of two fairly well-versed assistive technology professionals. I have attended and taught and written a great deal on the topic of switch access but want to convey that, even for the well-trained professional, this is not an overnight trip but a very long journey.

CONSIDERATIONS AND RESOURCES

When considering switch access, it is important to determine:

- The type of switch appropriate for the person's skill level.
- Are they visually and motorically able locate the switch.
- Are they capable of a momentary hit, a sustained hold or a quick release.
- Are they able to cognitively and motorically time a switch hit, as needed for scanning row and column.
- The location of the switch for the most efficient and effortless access. This involves finding a consistent, controlled movement that can be easily repeated, many times, without causing fatigue or pain. Typically, upper extremities are considered first, then the head, the mouth and then lower extremities.
- The switch itself should not be the activity. It should be a means to participate in something interesting and motivating on the computer or iPad. Use appropriate prompts, such as "turn the page" or "choose the color." Do not prompt by saying "hit the switch."

Create interactive counting activities using YouTube videos. Count by 5's and 10's using switch access for play and pause.

METHODS OF ASSESSMENT MAY INCLUDE THE FOLLOWING:

- Some tools and forms to assist in assessment and determining computer or iPad access include the WATI Decision Making Guide for Mobile Device and the WATI Decision Making Guide for Computer Access. The SETT Scaffold for Tools Selection is designed to assist the team with the feature match process.
- Observation - An observation should be conducted in the environment that the equipment will be used, when possible.The WATI Environmental Observation Guide may be used to assist with an environmental observation.
- Extended trial - The WATI Trial Use Guide may be used to document an extended trial and help to more accurately determine the tool's

success in various environments and situations.

- Every Move Counts, Clicks and Chats (EMC3) (Korsten, Foss & Berry, 2008) - EMC3 may be helpful to determine what motivates the student. EMC3 is a non-traditional, sensory-based communication and assistive technology assessment and evidence-based intervention strategies for individuals with severe and profound sensorimotor differences.

- SENSwitcher is a suite of teaching and assessment tools programed by Inclusive Technology. It is an online switch-enabled application that targets skills, from experiential through cause-and-effect, switch building, timed activation, targeting and row scanning.

- Compass Access Assessment Software (Koester Performance Research, 2007) provides a computerized assessment intended to measure the user's skill with various types of computer interaction. There are eight skill sets in the categories of pointing, text entry and switch use.

SWITCH CHARACTERISTICS TO CONSIDER:

- How big is the switch target surface?

- Which areas actually activate the switch? The center? The edges?

- What does the switch feel like? Is it soft or hard? Does the student prefer or dislike a particular texture?

- How much pressure is required to activate the switch?

- Can the student easily release the switch?

- What type of feedback (if any) does the switch provide when activated?

- Is the student distracted or startled by a "click" sound?

- Is the switch durable? Can it withstand moisture/dirt?

- Is the switch easy to mount? Can it be positioned to accommodate the student in different body positions?

- Does the switch come in a wireless version?

- Many companies provide excellent information on types of switches, one resource is the Ablenet Switch Guide.

ACTIVITIES TO CONSIDER:

- Cause-and-effect toys - this can be rather limiting

- Computer activities - HelpKidzLearn subscription offers a wide variety

- iPad apps - check out Jane Farrall's list

- Music - use Pandora or iTunes radio!

- You Tube videos - search for for stories, numbers and songs

- Reading - audio books with a play button work with a switch

TOOLS FOR DATA COLLECTION AND IMPLEMENTATION

- WATI Trial Use Guide

- Data Collection form

- Classroom Activity Log

- www.universaltech4learning.com

ADDITIONAL RESOURCES

- www.universaltech4learning.com This is my website where you will find additional information, links to documents and forms.

- Youtube "How to Videos"
  - Siri, Safari etc.
  - Connecting Bluetooth
  - Row Column scan
  - Assistive Touch
  - Switch Accessible Apps

- OCALI - Assistive Technology Internet Modules (ATIM). ATIM is designed to provide high-quality information and professional development on assistive technology (AT) for educators, professionals, families, persons with disabilities and others. Each module guides you through case studies, instructional videos, pre- and post-assessments, a glossary and much more. ATIM modules are available at no cost. Fee-based certificate and credit options are coming soon.

For an in-depth study of computer and mobile device access, as well as many other topics, go to the "Using the WATI Assessment Process" tab. ■

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- ✔ **CEUS AND ACADEMIC CREDIT**

ADMINISTRATORS PARTICIPATE FREE

When any school district staff member registers for a preconference workshop or the conference, one administrator (Special Education Director, Principal or Superintendent) from that school district can attend the conference, Wednesday through Friday, and the exhibition preview, Tuesday evening, for **FREE**! Limits apply.

ONLINE REGISTRATION

Conference - Wednesday, Thursday, Friday, October 14-16, 2015 Includes Preview of Exhibits – Tuesday Evening, October 13

Registration Received	On or Before June 30	July 1 - September 10	September 11 - October 1	October 2 - Onsite
Standard Rate	**$440**	**$490**	**$515**	**$540**
Group Discount - 5 or more	Groups 5+ Deduct $30	Groups 5+ Deduct $30	Groups 5+ Deduct $30	Groups 5+ Deduct $30
Group Discount - 8 or more	Groups 8+ Deduct $50	Groups 8+ Deduct $50	Groups 8+ Deduct $50	Groups 8+ Deduct $50
All group registrations must be received at the same time.	Groups 20+ Deduct $70	Groups 20+ Deduct $70	Groups 20+ Deduct $70	Groups 20+ Deduct $70
Parent Rate *(A letter describing your child's disability must accompany registration)*				**$275**
Full-time Student Rate *(Proof of full-time student status must accompany registration)*				**$300**
Presenter Rate	**$350**			**$400**
Exhibitor Rate	**$350**			**$400**

Single-Day and Exhibit Hall Only Registration	Price
Thursday Only - October 15	**$275**
Friday Only - October 16	**$125**
Exhibit Hall Only - Tuesday evening through Friday, October 13-16	**$150**

Preconference Workshops - Monday and Tuesday, October 12-13, 2015 Includes Preview of Exhibits – Tuesday Evening, October 13	Price
Monday, October 12 *(Some preconference workshops carry an additional fee for materials)*	**$275**
Tuesday, October 13 *(Some preconference workshops carry an additional fee for materials)*	**$275**
BUNDLED PRICING! Monday and Tuesday Bundle ($60 savings)	**$490**

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LITERACY FOR SPECIAL NEEDS
The Impact of New Technologies

By Joan Tanenhaus

The concept of literacy, in current times, goes well beyond the simple teaching of reading and writing. We need to consider the foundations that are built in early preschool the need to combine traditional literacy with digital media literacy and the continual integration of listening, speaking, reading and writing, along with skills needed to interact with others and with the environment. Literacy becomes even more complex when we teach learners with special needs, especially those with communication disorders. Following is a wide range of new technology products (hardware, software, Internet resources and testing material) that can enhance the teaching and learning of literacy.

Sparkup Magical Book Reader (www.sparkup.com)

Sparkup Magical Book Reader (Sparkup: www.sparkup.com) This clever and well-designed book reader can be used to read aloud any picture book. It is based on camera technology - place the back cover of a picture book between the back cover clip-on and center it. When you press the start button, the built-in camera scans the picture and then records your voice reading the page. While recording, you can even personalize the book by talking to the child, asking questions, making comments, etc. When the child returns to hear the book later, it will be read back in the reader's voice and will read each page as the pages are turned. If the child skips pages, so will Sparkup. Beginning readers can record their own voices reading the story and then listen to their stories read aloud. For children with special needs, Sparkup is an easy-to-use device that provides accessibility to books that cannot be read independently. Good for both home and at school, the auditory-verbal stimulation encourages attention and focus. Sparkup can provide a positive experience with books and a feeling of confidence and independence. Within the classroom, independent book reading experiences can be individualized and customized to each child's needs. Sparkup contains up to four hours of audio and runs on three AA type batteries, with a usage time of up to 30 hours of playback. Stories can

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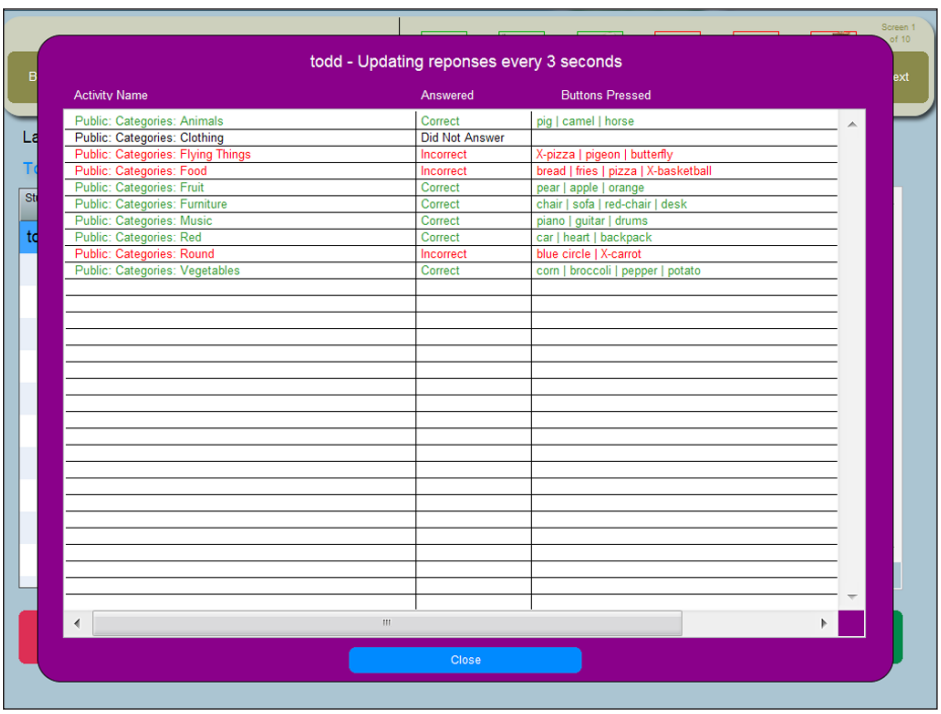
be backed up to your computer, using the included USB cable. In the future, teachers and parents will also be able to download pre-recorded books from the Sparkup website. Currently, it is difficult for Sparkup to read books with text-only pages, like chapter books. See the website for more information and video tutorials about Sparkup.

Classroom Connect (Judy Lynn Software: www.judylynn.com and at the App Store, Goggle Play and Kindle Fire Store) This new program from Judy Lynn Software introduces innovative technology and unique digital applications to literacy and special needs. Designed for early language and early literacy learning, this combination software program/app lets teachers transmit lessons and quizzes from their device (Windows or Mac computer or iPad) to an unlimited number of students' devices (tablets or computers) and monitor students' responses in real time. Students log in from anywhere there is Internet access (home or school) and then the teacher can send individualized lessons or quizzes and receive and monitor the students' responses, also in real time. The app comes with a variety of sample lessons and a library of over 400 pictures, and teachers can also create their own customized lessons and quizzes and upload additional graphics from the Internet or from their own graphics collections. Examples of lesson types include "information screen" (i.e., Food is what people and animals eat - six pictures of food items) and "question screen" (i.e., Choose the objects that are food - six pictures of food and non-food items; Choose the picture that is UNDER the dog; Which clock shows 5:00; 6+1 = ; etc.). Screens are transmitted either as Lessons (one page at a time) or as a Quiz (groups of pages with arrows to advance and go back). A Help button is present on all screens and it notifies the teacher that the student indicted help is needed. Accessibility options located on the student app allow students to use single switch auto scanning and two-switch step scanning. (Switch interface required.) Text-to-speech and switch access is available on the Mac and Windows versions, but currently not on the tablets. Data sent to the teacher includes the name of the activity, the students' responses and buttons pressed. This information is collected and saved from the last 100 sessions and can be emailed or printed to keep for future use. Customized lessons can be

Classroom Connect Student (www.judylynn.com)



Classroom Connect Teacher (www.judylynn.com)

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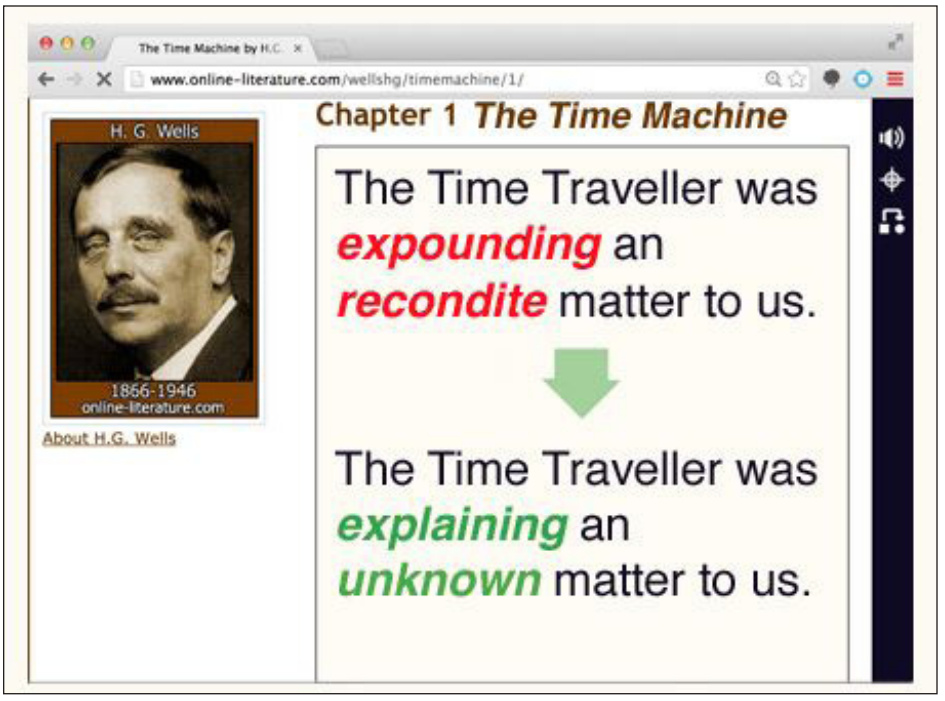
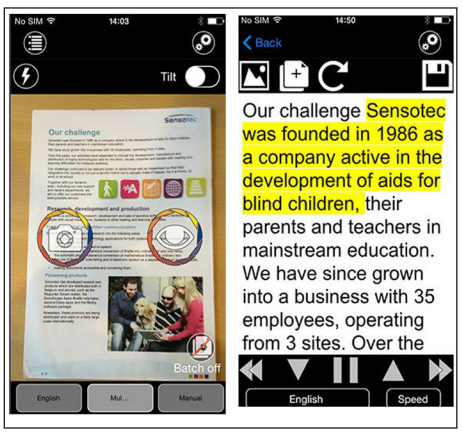
shared with other teachers. An on-screen comprehensive User Guide is provided within the app. Classroom Connect has a free student app and a free teacher's app (lite) that let you use the program with some of the sample lessons - download on two different devices, transmit lessons, do the activities and watch the data appear. With the free version, you won't be able to create your own lessons, but you will be able try the program with some of the ready-made samples and experience the new technology and see how easy and user friendly it is to use.

Snap&Read Universal for Chrome (www.donjohnston.com) This, too, is a new state-of-the-art program (Chrome extension) that works along with the Chrome browser on Chromebooks and on Macintosh and Windows computers using Chrome. It provides a reading accommodation that allows students to read text aloud directly from email, websites, PDFs in a browser, images containing text and Google Drive and also provides dynamic text leveling to assist comprehension of the passage when needed. To read text aloud, users click a speaker icon and then click again where they want to start reading. Snap&Read will then read the text, with highlighting, until the student clicks again to stop the speech. There are options for text color, word highlight color, language (US English, UK English, Spanish, French Italian, German, Japanese, Chinese and Korean), volume, speed and pitch. Inaccessible text that cannot be selected, as in a photo, can still be read aloud by clicking a designated icon and making a box around the text. Snap&Read will then automatically convert the text and read it aloud. Text leveling, the other function of Snap&Read, simplifies the text so that it is easier to understand, while retaining the original meaning. Options allow you to adjust the complexity level you desire. As with reading text aloud, users just select the passage they need simplified and then click the text simplifier icon. The simplified vocabulary will appear in italics and the user is able to toggle between the simplified text and the original with a click. Reading PDF from the desktop can be accomplished by changing the Chrome extension settings, restarting and then dragging the PDFs into the browser. The Snap&Read Universal resources section of the website (http://donjohnston.com/snap-read-resources) explains how to do this. The website also contains a series of Show-Me-How video tutorials that show how to use other program features.

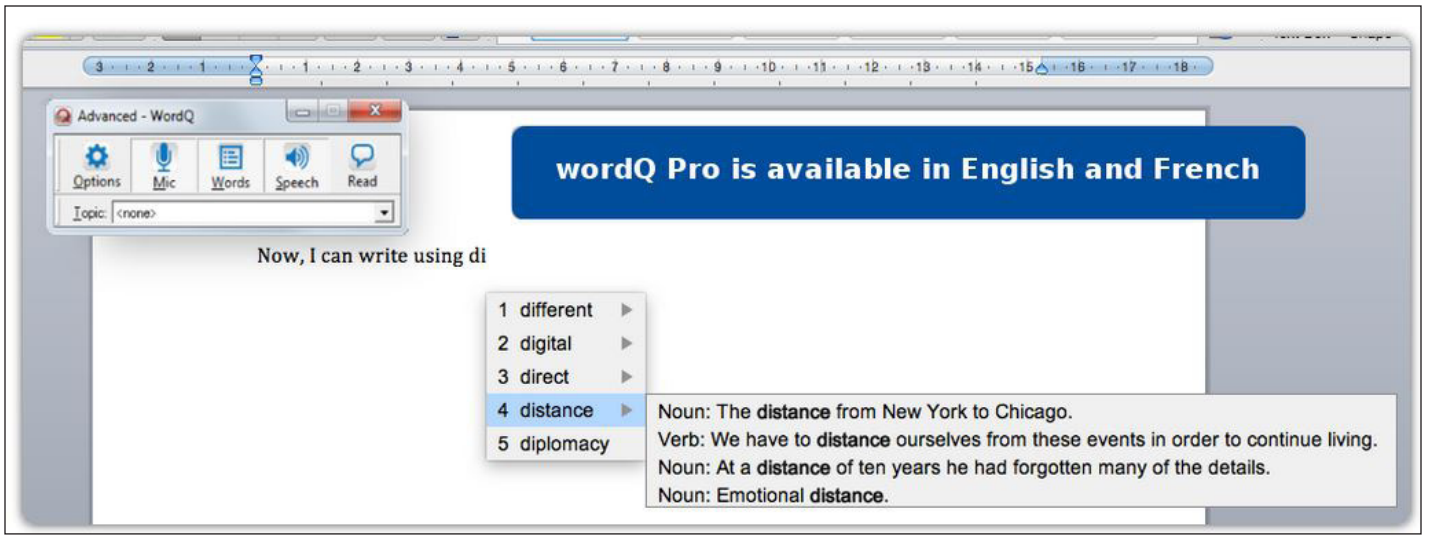


Snap&Read Universal for Chrome (www.donjohnston.com)



KNFB Reader (www.knfbreader.com)

KNFB Reader (www.knfbreader.com) Another unique digital application! This is an iOS print-to-speech application that works with the iPhone, the iPad and the iPodTouch. The app enables the camera to take pictures of printed material, rapidly convert the images to text and read the text aloud using high quality text-to-speech technology. Designed for those who are blind or visually impaired, it is also helpful for those with reading disabilities. KNFB can be used to read mail, receipts, class handouts, menus, business cards, boxes and many other types of documents. It is not designed to be used with handwriting or scrolling text. To begin, users hold the phone or iPad about 8-10 inches above the page and press the Field of View report button, which tells the user what edges of the page are visible. That helps you to adjust your distance and angle to get the best picture of your document. Then, the Take Picture button is pressed and the image is pro-



WordQ and SpeakQ4 Pro (www.goQsoftware.com)

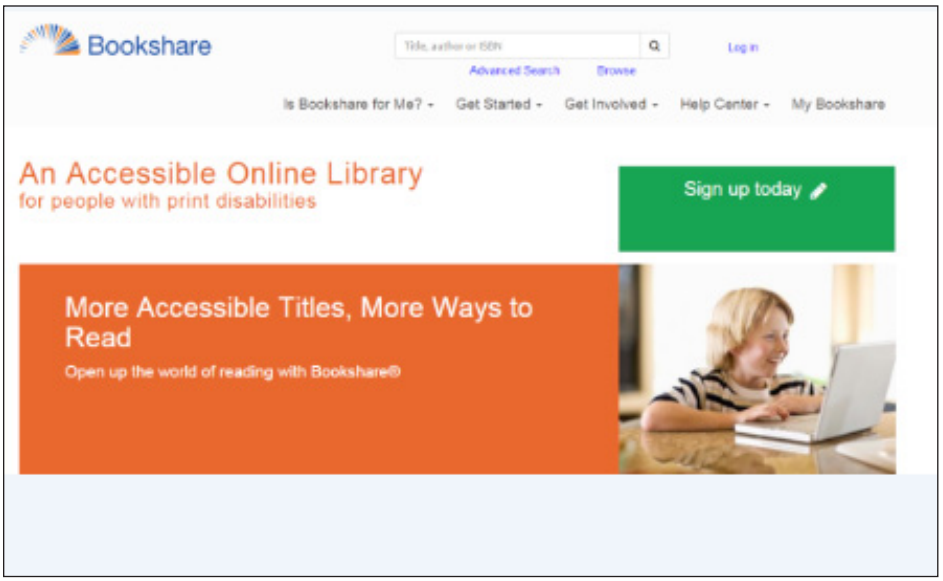
cessed for text. If any is found, the text is displayed and read aloud (formatting is lost, such as paragraphs, etc.). You can pause and resume reading, read word by word and go to next (or previous) sentence, using navigation arrows. There are many settings that allow the user to change font size and type, control speed of reading, text and background color, distance between lines, highlighting and highlight text and background color. You can also save documents, add pages, use Batch mode to process multipage documents, import PDF documents, open files from Dropbox and use airplane mode (allowing the app to be used during flight). There is a quick start guide, a manual and many options for individualizing the reading. There are several YouTube videos that demonstrate use and features of KNFB, and they are helpful in understanding the use and function of this excellent app. I recommend checking them out, for example: https://www.youtube.com/watch?v=6SXTC85Nuy0.

Here are a few more examples of how technology is changing the learning and teaching of literacy: TLDR (available from the Chrome Web Store) TLDR stands for Too Long Didn't Read. This is a free Chrome extension that creates a summary of any Web article without leaving the original page. Newsela (www.Newsela.com) This free website lets you select a topic and an article will appear. Users are able to a select grade level (4-12) in order to adjust the reading level of the article. Newsela makes it easy for an entire class to read the same content, but at a level that's just right for each student.

WordQ and SpeakQ4 Pro (www.goQsoftware.com) WordQ and WordQ Pro are powerful technology tools for literacy, with special focus on writing skills and assisted reading. The WordQ family of software is an intuitive literacy tool that has been assisting students with special needs for many years and continues to change and improve with new features. All WordQ programs provide speech feedback (talking word processor), word prediction and assisted reading and work along with any software, such as Microsoft Word, Pages, email, Web browsers, Facebook, Twitter and instant messaging. The original WordQ versions have dictionaries for Starter, Basic, Intermediate and Advanced users (k-12) and the new Pro version (available in English and French for PC and Mac) has the additional Pro dictionary that is appropriate for grades 11+ through college/university. There is also a new Exam Mode that can be turned on for a selected period of time (i.e.,1-6 hours). When using Exam Mode, options menu, abbreviation-expansions, pronunciation exceptions, synonyms, predictive phrases and next word prediction are turned off, and other features, such as word usage examples, single words added by user and topic words, are optional. Another new feature is the topic word extractor that quickly and easily extracts new words from any source placed on the clipboard. For example, copy several paragraphs from an online reading source, select New Topic in options, and WordQ will immediately populate the list with key words that would be needed for either taking notes or writing on the topic. Other new features include improved dictionaries with improved prediction, a simplified speech pronunciation editor and online registration. When using SpeakQ Pro, speech recognition is added to the program and can be used to write everything from single words to entire paragraphs or used only when needed to help with spelling or word selection. It can be trained to understand the speaker's voice, with no reading required. It allows you to mix typing and speaking as individually preferred and as needed. You can try WordQ+SpeakQ Pro free, for 30 days, by going to www.goQsoftware.com and downloading it. All the writing and dictating features of the full program are available, so you can see how

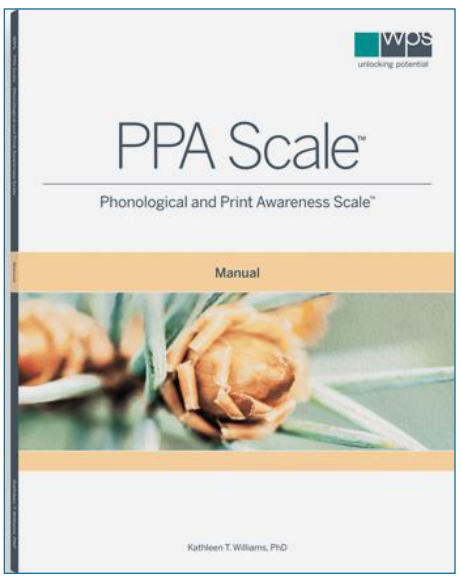
WordQ+SpeakQ work separately and together to improve writing skills. Visit the website to also view videos and tutorials on the use of these two very valuable programs for individuals with reading, writing and spelling difficulties. If you are an iPad user, iWordQ and the new iWordQ Pro are available for iPads from the Apple iTunes App Store in several different languages. There is also a new WordQ for Chrome, available for Chromebooks, PCs and Macs, and available on the Chrome Web Store in six versions.

Bookshare (www.bookshare.org) is the world's largest accessible online digital library for people with print disabilities. It strives to increase access to print materials so that individuals with print disabilities have the same ease-of-access to print material as people without disabilities. It is supported by the U.S. Department of Education, Office of Special Education Programs, has over 300,000 books and serves more than 300,000 members. Within the U.S., Bookshare operates under an exception in copyright law that allows them to make accessible digital books legally available to any person with a qualifying disability. Digital books are added to the library by volunteers who scan and upload the books to the site and by publishers who send digital versions of their books to the collection. Bookshare helps users read copyright books on tablets, smartphones, computers and other hardware devices, such as braille readers and MP3 players. Readers can adjust font size, have words highlighted and use voice options, including high quality text-to-speech with adjustable speed and choice of voices. They can also create physical braille or large print output. Bookshare® offers accessible ebooks to people with qualified print disabilities anywhere in the world. Agencies and schools that serve children and adults with print disabilities can also become members of BookShare. For more information on becoming a BookShare member, contact www.Bookshare.org.



Bookshare (www.bookshare.org)

Phonological and Print Awareness Scale (PPA Scale) by Kathleen T. Williams, PhD, (www.wpspublish.com) This evaluation scale is designed to measure early literacy skills, including phonological awareness (the ability to recognize and manipulate the individual sound structures of a whole word without any reliance on print) and print awareness (the understanding of the elements of print, including alphabet knowledge and concepts about print), in children ages 3 years, 6 months to 8 years, 11 months and allows examiners to track the development of these skills over time. Administration time is about 10-15 minutes, with the examiner reading items from an easel stimulus book and with the child providing nonverbal responses requiring them to point to the correct picture. The Evaluation Kit includes forms , response sheets and print easels for three parallel forms (A,B, and C), as well as a print manual and a print book - Building Early Literacy Skills and Phonological and Print Awareness Activities. An online activation code is included to print out response sheets to record answers offline during the evaluation and to later enter the answers online. The PPA Scale has 69 items representing six tasks (Rhyming, Print Knowledge, Initial Sound Matching, Final Sound Matching, Sound-Symbol and Phonemic Awareness). The author indicates, based on early literacy research, that the items were written "to provide a narrow focus on phonological and print awareness skills, without placing demands on other cognitive abilities (e.g., memory)." In addition, stimulus pictures were reviewed for fairness for use with both males and females of differing ethnic backgrounds. The included resource "Building Early Literacy Skills" offers age-appropriate intervention strat-



PPA Scale (www.wpspublish.com)

egies to improve the skills measured by the PPA Scale. See the website for further information about standardization and technical properties.

SIGN LANGUAGE RESOURCES

Learn & Master Sign Language (www.LearnAndMaster.com) This is a comprehensive course on 25 DVDs that teaches the learner to understand and use American Sign Language through step-by-step lessons. Starting with basics, such as gesturing, fingerspelling and learning greetings, and progressing to advanced concepts, there are over 49 hours of instruction that also include advanced techniques, everyday expression, cultural knowledge and more. Topics covered include: The Basics of ASL, ASL Grammar, Sign Language for Daily Activities, Expansion Techniques, Deaf Culture, Fingerspelling and Classifiers. Professional instructors, Dr. Byron Bridges and Stacey Webb, designed and teach the lessons with video demonstrations, quizzes, vocabulary video index, fingerspelling practice at three different speeds, a section in each lesson on varying numbers, narrative practice, dialogue practice and tips. There is also a detailed Lesson Book that follows the sessions with activities. Questions can be posted online and can be discussed with the Student Support Discussion Board. Visit the website to see a video introduction to the series and more information.

APPS TO ENHANCE LANGUAGE AND LITERACY

* means a lite or free version is available
A means an Android version is also available

Hamaguchi Apps For Speech, Language & Auditory Development (www.hamaguchiapps.com)
This company produces an impressive collection of well-designed and comprehensive apps created specifically to provide additional practice in areas of speech, language, auditory development and listening skills. They produce lite versions of most of their apps so you can try them. Also, video demonstrations are available on their website and on You Tube.

Listening Power Preschool HD	*	Designed to practice listening skills for preschoolers, with activities that are on 3 levels, with 2-4 picture choices and 50 questions per level. Correct responses animate. Activities include Listening for Descriptions; Directions; Grammar & Meaning; Stories with Pictures; and Stories without Pictures. Data is kept and scores are reported for each activity. Missed items can be repeated during the next session. Nice feature is the "Manually Show Choices" that lets the child guess what the correct response may be, before showing options. Auto advance increases level after a given number of correct responses.
Listening Power Grades 4-8+	*	The second app in the Listening Power series is appropriate for grades 4 and up and age appropriate for older students and adults with developmental disabilities. There are five activities, each with 3 levels and options for 2,3 or 4 choices. App addresses language processing (meaning and content) and auditory processing (way content is presented acoustically). There are 5 activities: Listening for Grammar (identify sentence that is grammatically correct); Listening for Fast Sentences (which spoken sentence matches the sentence spoken fast); Listening for Meaning (sentence with target vocabulary is spoken and student identifies a sentence that verifies auditory comprehension); Listening for Missing Sounds (student listens to sentence that is missing sounds and identifies what was said); and Listening for Stories (story followed by questions - can introduce background noise and/or visual distractions). Suggestions are provided on using this app for reading comprehension, expressive language, notetaking and writing practice. Data and progress tracking is available. Well done and very comprehensive app with a wide range of activities that will enhance listening skills, language and literacy for ages 8 and older.
		Listening Power will be available in other versions - Grades K-3 version coming next. They will be reviewed in the next DISKoveries

VIRTUAL SPEECH CENTER (www.virtualspeechcenter.com) This company has published a large group of excellent, well designed, and motivating apps for speech-language pathology and special education, for children and adults and for home and school use. All have many built-in options such as use with single or multiple students, data collection, ability to email audio recording features ans more.		
Question Hunt		Designed to help children practice answering yes/no and WH questions, this app is designed around different themes (i.e., beach, park, store, airport, etc.) and includes both receptive tasks (pick answer from multiple choice questions after they are spoken aloud) and expressive tasks (answer verbally). There are 60 yes/no and 360 WH questions that can be practiced within types (i.e. where questions, who questions, etc.) or with any combinations (when and where) or all at the same session.
Problem Solve It		This app was designed to help adults with cognitive impairments with situations and problems that are functional in nature and relate to social communication, financial issues, management of heath, education and personal thinking. The problems are presented with a written paragraph that is spoken aloud and ends with a question that encourages analysis, recall of information and problem solving. Question areas include "what would you do questions," math problems, problem solving based on case scenario, stating the reason of the problem, answering open ended "if" questions and more. Excellent and motivating higher level reasoning and thinking app that is also great for working on language and communication skills.
Auditory Reasoning		For students ages 6-up with central auditory processing, autism, receptive languge disorders and related language problems. All the tasks in this app are presented orally so students can work solely on auditory skills and processing. Activities include: which does not belong, associations, completing the series, identifying true/false statements, identifying fact/opinion, auditory resequencing, meanings in context, analogies, riddles, paraphrasing and drawing conclusions. All tasks contain 2-4 levels of difficulty, 20 activities each level and can be practiced with background noise, if desired.
Main Street Memory		Designed for both children and adults who need practice processing and recalling brief, complex auditory instructions. Set in a real life context - three different stores- so that users can see clearly how limitations and gains in these skills directly affect their lives. App also helps see the functional outcomes for community living tasks and vocational readiness. Options include ability to control length and complexity of direction, amount and type of background noise, and delay the presentation of stuimuli. Tasks include following directions with one, two or three items, without or with modifiers, in order or not. Items are displayed, customer places order, and user selects the items. When there is delay of presentation of stimuli, pictures of items are not shown until request is spoken, followed by delay, and then items appear. Record keeping, session report, email results and reward game are options.
Sequencing Post Office		For children ages 3 and up, there are 65 sequencing tasks that can be used as 2-step, 3-step and 4-step tasks. Use with single or multiple students, track correct and incorrect responses and email results.
Quick Artic Free	*	Free app with 566 images with ten most common phonemes in all positions of words. Scoring keeps track of correct and incorrect answers and automatically calculates the score. Good for quick articulation screening. Works on iPhone and iPad

SMARTY EARS (www.smartyearsapps.com)
This company has been a leader in creating high quality and a large variety of apps for speech-language pathologists. Excellent video tutorials on all apps. All apps have Report Cards for each session, full data collection, easy report writing and progress monitoring. Well done and very comprehensive apps. See website for videos and tutorials of all apps.

Prep Positions		With 15 levels, this app was created to encourage preposition use. Children are shown a picture and the task is to select the correct written preposition and place it in the sentence. Level 1 is for early readers (3rd grade) and includes: at, up, down, on and by. Level 15, for older students, includes: because of, close to, depending on, and up to. Many options are available to customize the app, including audio reward, prompts to play, background and others. Prepositions and sentences included in each level can also be selected or de-selected, according to individual needs. Multiple students can play together, each with different levels/goals.
Yes No Barn		Designed to teach and reinforce comprehension and sentence structure, this single or multi-layer app focuses on answering a wide range of yes/no questions, including basic questions, look and answer questions (look at picture to get information to answer the question), fact-based questions, variable answer question (no picture, but may require player to look around the room, at themselves or simply know the answer), compare questions (looking at and answering questions about two picture scenes). All questions are spoken aloud; there is immediate feedback, as well as data collection for each player.
Smarty Spell		Designed specifically to help students practice spelling skills, the words are separated by grade (K-6) or by theme (animals, numbers, colors, etc.). Customized word lists can also be created. Up to 5 students can play at one time with individual data taken for each. The parent/teacher can see how many times it took for student to spell the word correctly and how many times they have practiced each word. Visual hints can be turned on in settings so Smarty Spell will automatically put the first letter in place if there is an error. If the word is misspelled again, visual hints will continue to add the next letters until the word is spelled correctly. Words can be read aloud, font size can be changed, letters can be spelled as used, control of spelling order (left to right or any order).
Auditory Memory Club		With single- or multi-player modes, four activities designed to help attention, listening and recall of information. Tasks include: I Say You Do (auditory command followed by pause and then student completes the task - pause can be lengthened or shortened as needed. One-step increases to multiple steps.); What Was That (identify sound by pointing to picture); Remember for Amber (recall a series of words); and Let's Put In Order (recall a series in the correct order). Play in Spanish, English and Portuguese.
Articulate It! Pro		With about 1,000 built-in words - and the ability to add more - practice articulation at the word, phrase and sentence level. Can work on phonemes or phonological processes. There are flash cards, a matching game, a story game, homework sheets - and since the latest update, a new activity called "Guess What" (question and answer cards), along with new audio instructions.
Expressive		Easy-to-use AAC program for children and adults, using over 10,000 built-in images from the Smarty Symbols library. New update added many new features, including ability to add your own images, change background colors, lock feature, search button, male and female text-to-speech options, verb agreement support, landscape/portrait mode and more.

iSpeak4U (www.iSpeak4U.com)		
HandySpeech	A	Created by Eric Zeiberg, a 12-year-old who was inspired by his sister who has speech disabilities and is autistic, this app translates handwritten text into spoken language. Users write or print their message on the tablet screen, using a finger or a stylus, and the message gets converted into text and is spoken aloud in male or female voice. Words and phrases can be saved and then selected to be spoken at a later time. It speaks a large group of languages. Handwriting patterns are learned and common spelling errors are automatically corrected. User dictionary can be created and enabled.
SPLINGO (www.speechandlanguagestore.com) Series of apps designed to help children listen and understand spoken language. All star the animated alien character, Splingo.		
Splingo's Language Universe		Targets the understanding of concepts such as size, color, shape and positional words within different types of sentences of varying lengths. There are four levels - Level 1: main word (i.e. find the apple) suitable for children at developmental level of about 18 months; Level 2: main words (i.e. put the soap in the bag) - developmental level 2-3 years; Level 3: main words (put the little fork next to the school) - developmental level 3-4 years; and Level 4: main words (give the cat the little old car) with increased number of targets to choose from) - developmental level 4 years. The recent update of this program includes the addition of pause, record and repeat buttons; more actions; updates to animations; arrows for object placement and changes in orientation, and other features, bringing it in line with their other apps.
Pronouns With Splingo		Listen to Splingo's directions and drag and drop the objects to the correct place. 15 different pronouns within increasingly complex sentences, in 5 different scenes and with different objects. Children can't put the objects in the wrong place - they only stay in correct locations. Pause button lets you pause the activity to talk about pictures.
Actions With Splingo		Two animated pictures are shown, and children are asked questions such as "Who is verb+ing?" If correct answer is chosen, the picture is enlarged and the sentence and animation are repeated until new picture is chosen. An incorrect answer is followed by "mm-mm," and the child can pick again. Children can speak and record the sentences. Pause button lets you pause the activity to talk about pictures. Teacher can select the specific verbs to work on.
Categories with Splingo		Select two categories or sub-categories to sort: animals, transport (land, air, sea), clothing (warm and cold weather), food (vegetables, fruit, sweet), toys, instruments, furniture, body parts, sports, drinks. Sort the objects that appear below by dragging to the correct category picture. No wrong answers because objects only stay on the right picture.
Receptive Language Assessment with Splingo		Assesses a variety of word/sentence types at four increasing levels of complexity. Activity lets students trial items to allow them to become familiar with format, Other options let users include/exclude reward system and written sentences to accompany verbal directions. Automatically generates report, which can be emailed or printed.

For more information about the following apps, see above article on Literacy for Special Needs
CLASSROOM CONNECT (www.judylynn.com)
KNFB (www.knfbreader.com)
iWordQ & iWordQ Pro (www.goQsoftware.com)

JOAN TANENHAUS, M.A., CCC, Speech-Language Pathologist/Assistive Technology Specialist, is Founder and Executive Director of Technology for Language and Learning, Inc., a non-profit organization dedicated to advancing the use of computers and technology with children and adults with special needs. (email: ForTLL@aol.com) ■

Signing Math and Science

"An ecosystem has living and nonliving things. I did not know that before." "I found out evolution and change are almost the same."

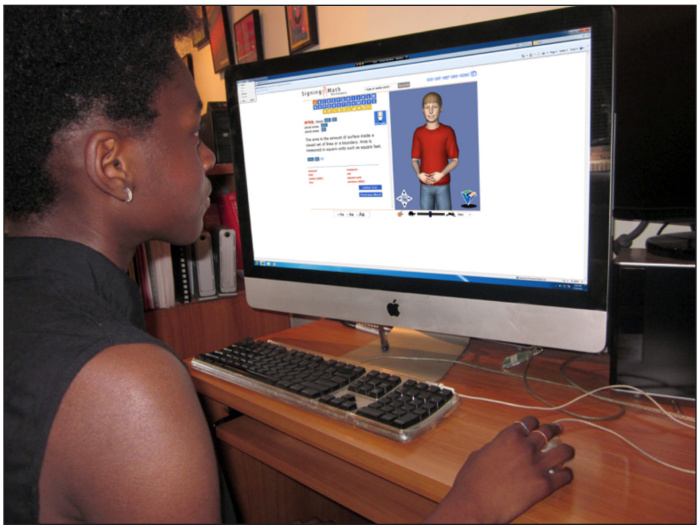
Are these students talking about what they learned from reading their science textbook, watching a video or taking a field trip? No, they are describing what they learned from the SigningAvatar® characters, the 3-D figures who appear in the Signing Math & Science dictionaries.

Developed by TERC and Vcom3D, the series of nine standards-based signing dictionaries offers K-12 students who are deaf or hard of hearing increased access to science and math content. Available as app and Web versions, they are:

K-4: Signing Science Picture Dictionary (SSP)
Signing Math Picture Dictionary (SMP)

5-8: Signing Science Dictionary (SSD)
Signing Math Dictionary (SMD)

9-12: Signing Earth Science Dictionary (SESD)
Signing Life Science Dictionary SLSD)
Diccionario de Señas de Ciencias de la Vida (DSCV)
Signing Physical Science Dictionary (SPSD)
Diccionario de Señas de Ciencia Física (DSCF)



WHAT LEARNING CHALLENGES DO DEAF AND HARD OF HEARING STUDENTS FACE?

Approximately 76,600 students in grades K-12 who are deaf or hard of hearing require services under the Individuals with Disabilities Education Act (U.S. Department of Education 2012). Although not necessarily considered "print disabled," those who acquire and use sign language to communicate tend to internalize a linguistic structure that differs greatly from English (Rose & Meyer 2006; Stillman 2007). This results

JUDY VESEL is a Principal Investigator at TERC. TERC, is a nonprofit research and development organization located in Cambridge, Massachusetts, and dedicated to the improvement of science, mathematics and technology teaching and learning for all students She has degrees in Biology, Linguistics, and Education. She was the Principal Investigator for the Leveraging Learning and Science for Today and Tomorrow projects (funded by NSF). She is the Principal Investigator for a body of work referred to as "Signing Math & Science"– funded by NSF and the U.S. Department of Education. Her experience as an educator and administrator extends from the primary grades through high school. She also leads another body of work that involves development of a series of inclusive iBooks that offer students in elementary and middle grades with sensory impairments opportunities to engage in activities that result in learning of core-based science content. Ms. Vesel has presented her work at many recent conferences including annual meetings of the American Association of Museums (AAM), Assistive Technology Industry Association (ATIA), and Closing the Gap.

in substantial literacy limitations that lead to the majority of students who are deaf leaving high school with reading levels at the fifth grade or below. In fact, the English vocabulary of the average 15-year-old student who is deaf is about the size of that of a 9-year-old child who is hearing and will not improve significantly (Karchmer & Mitchell 2006).

For these students, mastering standards-based science and math content is a considerable challenge. They often do not know the signs for terms encountered or, if they can mimic the sign, they do not understand its meaning. These obstacles become more problematic as the technical and abstract nature of the vocabulary increases with the study of more advanced topics (Solomon, Graham, Marchut & Painter 2013). Even if it were economically feasible, providing an interpreter for each student would not fully solve the problem. Many interpreters lack adequate preparation in STEM, and few are certified to teach science or math (Marschark, Lang, & Albertini 2002). Interpreters also may use signs that are conceptually inaccurate (Kurz 2005). This situation is in sharp contrast to the goal of science and math learning for all students - a fundamental principle underlying the Next Generation Science Standards (NGSS Lead States 2013) and the Common Core State Standards for Mathematics (National Governors Association Center for Best Practices 2010).

HOW DO THE SIGNING DICTIONARIES WORK?

The idea of signing science or math is simple, the reality effective and engaging. Students go to a Web page or open an app, identify a term and click an American Sign Language (ASL) or SE (Signed English) icon at the end of a term or text block. Upon request, one of several characters selected from the names in a pull-down list signs the term or definition. What the character signs depends on the student's request.

Figure 1: An SLSD Web page with Shaylin signing the term "cell."

With a click or a swipe, students can link to terms within definitions or to terms in other dictionaries in the series. They can zoom in or out and rotate the 3-D avatar character to give the best vantage point for every sign, change the background color by selecting a color from a palette to maximize viewing opportunities, open a picture that illustrates and conveys the meaning of the term, and speed up or slow down the signing. If they wish and are able, they can listen to audio recordings of the text rather than watch the avatar sign. One teacher speaks for many when she says, "My students just love the avatar characters. They can sign one word or a sentence a thousand times over if they want, select the terms they want to know and use the features they need - and all independently without having me there to sign for them. This frees up my time to focus on content and makes learning for everyone really fun!"

Figure 2: An SMD iPod page with Pedro signing the term "division sign."

WHAT DO FIELD-TEST DATA SHOW ABOUT CHANGES IN VOCABULARY AND CONTENT KNOWLEDGE?

A field test was conducted during development of each of the signing dictionaries. The tests incorporated a pre/post design in which the outcome of interest was measured for participants only. Findings addressed learning related to vocabulary knowledge as demonstrated by changes in students' ability to recognize the English text version of a

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term; to sign/fingerspell and/or voice the term; and to use the term in a sentence. Findings addressed learning related to content knowledge as demonstrated by students' ability to define or explain the meaning of a term.

The test procedure involved installing the dictionary in selected classrooms at the intended grade levels with students who were deaf or hard of hearing, who had a range of hearing loss and who varied in reading level and academic performance with respect to grade level. Some attended specialized schools for the deaf. Others were mainstreamed in public school programs. Prior to the start of the field test, teachers were solicited from a range of sources that included electronic discussion groups, solicitations at conferences and an existing database of sites. Selection was based on grade level, access to the requisite technology, content focus and school setting - specialized or mainstreamed.

The intent of the test was to examine effectiveness of the dictionary under normal-use conditions. Each teacher designated at least one science or math unit that was part of the curriculum to be taught using the signing dictionary. Each teacher also identified 5-10 terms that were important for developing an understanding of the content that was the focus of the unit. All terms selected had to be in the dictionary. Using a vocabulary-assessment form, teachers then assessed each of their students' pre- and post-use ability to recognize each term, sign/fingerspell and/or voice each term; use each term in a sentence; and explain its meaning and/or define it.

The pre/post-use change in the class's ability to recognize the English text versions; to sign/fingerspell and/or voice terms; and to use terms in a sentence was calculated as the mean pre- to post-use change for the number of positive (yes) responses out of the total possible. For example, if the teacher had identified five terms to use for assessment of students' vocabulary knowledge and the number of students in the class was 12, there was a possibility of 60 correct responses (5 terms x 12 students). Adding the pre-assessment scores for each student together and dividing by 60 gave the mean pre-ability for the class (41/60 = 68%). Adding the post-assessment scores for each student together and dividing by 60 gave the mean post-ability for the class (59/60 = 98%). Subtracting the mean post-ability from the mean pre-ability rendered the pre-to-post change (18/60 = +30%).

Figure 3: Four of the SigningAvatar® characters.

Using this methodology, for each signing dictionary and for each assessment parameter, the mean pre-to-post change, when calculated for the class, ranged from approximately 15% at the low end to approximately 90% at the high end, with the majority of groups clustered near 50%. These results indicate that use of a signing dictionary has the potential to contribute to increasing the math and

science vocabulary of students in grades K-12 who are deaf or hard of hearing.

For the pre/post-unit change in students' ability to explain the meanings and/or definitions of terms, information was provided as the average score for the class out of a possible 3. A score of 3 represented accurate and complete ability to explain the terms' meanings/definitions. A score of 0 represented no answer. A score of 1 represented familiarity with the terms but no knowledge of their meanings/definitions. A score of 2 represented incomplete knowledge of the meanings/definitions. For example, if the mean pre-ability of the class of 12 students to explain and/or define definitions was 0.6 out of 3 and their mean post-ability was 2.6, the mean pre-to-post change was 2.0 out of 3, or +67%. Using this methodology, for each signing dictionary, the mean pre- to post-use change, when calculated for the class, ranged from approximately 5% at the low end to approximately 80% at the high end, with the majority of groups clustered near 25%. Older students (grades 7-12) exhibited greater change with respect to this parameter than younger students did. These results indicate that use of a signing dictionary has the potential to contribute to increasing the math and science content knowledge of students in grades K-12 who are deaf or hard of hearing.

To examine field-test data for each dictionary in more depth, please go to the TERC publications site at http://signsci.terc.edu/publications/index.html

WHAT DO TEACHERS REPORT?

Teachers who have used all or some of the signing dictionaries describe content- and vocabulary-related gains and increase in their students' ability to work independently. One teacher writes, "With the definitions presented in ASL and SE, they see the information in their first language and are also exposed to English. I know they are learning the concepts because the discussions go into depth. They are better able to explain meanings and use the correct sign. This also helps with language development." Another teacher writes, "My students struggle to demonstrate their content knowledge, but the dictionaries do help them try instead of giving up." Still another teacher says, "Students no longer have to rely solely on the teacher to get vocabulary information. They can replay the signing avatar or reread the definition a hundred times if they want and work at their own speed. I don't have to explain vocabulary over and over again. It puts the responsibility for learning on the students' shoulders and gives them an avenue for independently trying to understand new concepts. Because they love using the dictionaries, they DO use them."

As an added benefit, the addition of signing appears to positively affect the ability of teachers to convey content for their students who are deaf or hard of hearing. One teacher comments, "Using the dictionaries as a preview of material makes the actual teaching of the content faster and smoother. They also free me up to work on clarifying questions rather than just interpreting material." Another teacher says, "I look up all of the words and meanings myself before I teach a unit. This helps me check the accuracy of the math and science signs I'm using. If there is vocabulary I'm not sure of, I check with an avatar. Too many teachers, especially for science and math, 'invent' signs or use an incorrect sign for the concept being introduced. The dictionaries can help standardize the signs we use within and across grades."

HOW DO WE OBTAIN THE SIGNING MATH & SCIENCE DICTIONARIES?

TERC and Vcom3D are the developers and publishers of the Signing Math & Science Dictionary series. Web-based versions are available from TERC as free downloads at http://signsci.terc.edu/. To see the avatar characters sign requires installation of the SigningAvatar® plug-in. The plug-in is available from TERC as a free download at http://signsci.terc.edu/plugin_installer.html. The Web versions require a Windows Operating System and Internet Explorer 6.0 or higher. Macintosh users must have VM Ware or Parallels installed to see the avatar sign.

App versions are available from Vcom3D at http://www.signingapp.com/index_desktop.html. This site offers free downloads of Teacher's Guides and introductory activities and links to iTunes, where the apps are available for purchase at $14.99 each.

Three of the Signing Math & Science dictionaries were supported in part by grants from the U.S. Department of Education: SSP (H327A080040), SMP (H327A100074) and SSD (H327A060026). Six of the dictionaries were supported in part by grants from the National Science Foundation: SSD (HRD-0533057), SESD (GEO-0913675), SLSD, DSCV, SLSP and DSCF (DRL-1019542). All opinions, findings, conclusions and recommendations expressed herein are those of the author and do not necessarily reflect the views of the funders.

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Managing Chrome Extensions and Apps for Accessibility and Efficiency

MONDAY, SEPTEMBER 28, 2015

1:00 PM - 2:30 PM CDT

Schools are incorporating Chromebooks into the classrooms to replace aging computer technology. This session will address issues educators need to understand; how this new approach to technology works, including how apps are the replacements for installed programs and extensions are the tools for providing accessibility, such as text-to-speech, zoom features, language translation and other supports; and how to customize and manage these resources.

DAN HERLIHY

Jam-PACT Ideas - the WHAT, WHY and HOW of Research-Based Instruction for Students with Disabilities

WEDNESDAY, OCTOBER 7, 2015

1:30 PM - 3:00 PM CDT

Complex students. Systematic teaching. Jam-PACT ideas! Reach and teach any learner using an evidence-based delivery system of instruction that focuses the brain on "what to learn" instead of "how to learn it." See multiple videos of students with moderate to significant challenges achieving success at two of the 18 research sites in North America for this brain-based framework called T.H.E. P.A.C.T. Get a free 10-page, lesson-planning guide – giving you the WHAT, WHY and HOW of each lesson – so you can drastically reduce your prep time and easily replicate this in your own geographic area using any tool of your choice!

PHYL T. MACOMBER

Interactive Video in the Classroom - Tools for All

MONDAY, NOVEMBER 2, 2015

1:00 PM - 2:30 PM CDT

Video cameras are incorporated into all tablets, computers, Chromebooks and other portable devices in the classroom. However, most educators are not aware of how easily video can be incorporated into the classroom, as both a teaching and learning tool, even allowing them to add quizzes to a video, and as a tool for students to demonstrate understanding of concepts and demonstrate learning. This session will provide participants with a variety of easy to use tools, apps and programs that can be used by all.

DAN HERLIHY

Getting Started with AAC for Students with Severe and Multiple Disabilities

THURSDAY, FEBRUARY 4, 2016

10:00 AM - 11:30 AM CDT

This session will describe components needed to get started communicating with all students, regardless of what tools you have available. A multitude of ideas and strategies will be demonstrated that support students' participation within classroom activities to help jumpstart their communication. Even students with the most significant disabilities can be a part of classroom activities and learn. Strategies for teaching a comprehensive communication program that aligns with core content standards will be shared. Ideas for communicating effectively with peers in the classroom, participating in class discussions and learning important core skills will be discussed.

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  By Susan Stokes
- ✔ **Using iTechnology as Evidence-based Practice! Visual Supports for Students with ASD**
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product spotlight

Mount'n Mover Features Help Meet Functional Needs

After a 2011 hockey accident left him paralyzed, Jack made it his mission to help others by starting the Jack Jablonski BEL13VE in Miracles Foundation. This charitable organization supports spinal cord injury recovery research.

Recently, Jack began experiencing neck pain from using his laptop on his lap and he knew he needed a mounting solution before heading back to college. The Mount'n Mover delivered. Now his laptop is secured in a more optimal position for access and he can adjust the position whenever he wants to.

"After using the mount for just one week, my neck pain has been reduced immensely," said Jack. "Plus it has multiple uses – I also use it for eating and holding my phone."

"It's so nice to see him sitting upright instead of hunched over when he's on his laptop," said his mother Leslie. "It's a game changer for sure!"

What features in a mount help meet functional needs?

What to ask during an assessment:

- Does the mounting system need to allow for daily adjustments for change in positioning, growth, fatigue; changes in the environment; and the ability to see and interact with others?
- Can the mount be moved, independently, by the user?
- Does the mount allow access to a variety of items, such as books, phones, keyboards, toys or hobbies?
- Can it provide multiple operating positions without the use of tools?
- Does it enable independent access to a communication device in all situations and environments at all times?
- Can the device be moved out of the way (i.e., for transfers, eating, pulling up to a table) rather than removing it entirely, protecting the device from being vulnerable to damage and loss?
- Does the mount provide consistent positioning with multiple lock positions for specific locations, providing easy set up for both the user and the caregiver?
- Can the mount move from chair to bed, thus eliminating the need for two mounts?

The Mount'n Mover does all this and more!

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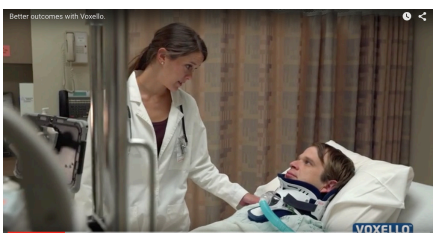
For Effective Care, Every Patient Needs to Communicate



In the U.S. alone, it's estimated that, at any given time, 33% of inpatients in the ICU and 9% of all others are physically unable to use a standard nurse call switch. Many of these patients are also unable to speak due to ventilation and paralysis.

In order for a hospital to provide effective care and prevent complications, the patient must not only be able to call a nurse, but also able to communicate his or her needs. The noddle™ gives patients that ability.

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AAC in Education – Profiles of Success

It takes a special person to teach in a special education classroom and Sarah Williams is just such a person.

After working in music therapy for several years, Sarah returned to school to earn a Master's in Special Education at Arizona State University. She now teaches in a self-contained special education classroom for kindergarteners and first-graders at Palm Valley Elementary School in Litchfield, Arizona.

During the 2013-2014 school year, Sarah was instrumental in implementing the AAC Classroom Language Screener and Language Acquisition Data Sheet, new augmentative and alternative communication (AAC) classroom tools and strategies that support academic and social development for children with speech disorders.

The need to improve her students' functional communication skills became evident to Sarah when she realized that, without these skills, the interactive communication essential to academic progress was being hampered. Many of the 12 students in her classroom were verbal, but poor articulation made it difficult for anyone but close family members to understand them. Others had severe communication challenges, and some seemed unmotivated to use the AAC speech-generating devices at their disposal.

"Several students had their own AAC devices and my classroom has an iPad for every student, preloaded with communication apps, such as TouchChat, LAMP Words for Life™ and GoTalk." But, she says, student adoption of the devices was sporadic and there was an ongoing challenge of training classroom aides on the programs and motivating them to use the devices with the students.

Teaming Up to Create Innovative AAC Solutions

To address the communication challenges in her classroom, Sarah worked with the school district's assistive technology coordinator, Jerolyn Allen, and Tamara (Tami) Taylor, a speech-language pathologist (SLP) who was then a Regional Consultant for PRC, a prominent provider of assistive technology solutions. The trio leveraged their professional experience and the free resources available from PRC's online AAC Language Lab to design AAC tools and teaching strategies.

"At the time, Sarah had a classroom of students who were ready to take off with language," recalls Tami, who now works for the Litchfield Elementary School District. "She just did not know how to take that next step to get them there."

"Jerolyn had a big part in creating the AAC Classroom Language Screener, which is based on Brown's five stages of language development," Sarah notes. "She wanted to make it simple and keep it to just one page, so busy teachers and classroom aides could use it quickly and easily to get on the 'same page' about each student."

The Language Screener is a simple form that helps the teacher assess the student's current stage of language and determine when they are ready to move forward to the next stage, based on the types of words used and communication behaviors.

"Using the Language Screener promotes the concept of acceptance, which is about meeting a child where they are with language development," Sarah says. "That acceptance is key to increasing student comfort with using their designated AAC systems. When students feel comfortable with their systems, they communicate more."

A second tool, the Language Acquisition Data Sheet, is used to record data required for each vocabulary-building activity to guide the teacher and instructional aides in targeting appropriate words to teach to each child.

Note: The AAC Classroom Language Screener and Language Acquisition Data Sheet have been presented at several conferences and were featured in the October/November 2014 issue of Closing the Gap. These tools can be found online at aaclanguagelab.com.

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A Wheelchair is Not Just a Wheelchair

The National Coalition for Assistive and Rehab Technology, NCART, is a national association of suppliers and manufacturers of Complex Rehab Technology (CRT) products and supporting services used by children and adults with significant disabilities and medical conditions.

CRT products include medically necessary and individually configured manual and power wheelchairs, seating and positioning systems and other adaptive equipment, such as standing devices and gait trainers. This specialized equipment requires evalua-

tion, configuration, fitting, adjustment or programming to meet the individual's medical needs and maximize function and independence.

In order to ensure access, NCART works with consumers, clinicians and physicians, along with federal, state and private policy makers to establish and protect appropriate coverage, coding, supplier standards and funding policies.

Our website is designed to provide a variety of information regarding CRT. This includes educational materials, alerts on federal and state issues that are impacting access and advocacy tools and resources. We hope you find the information on this site helpful and encourage you to get involved in protecting and promoting access to CRT. Contact us at info@ncart.us if we can be of assistance. Thanks for your interest and participation!

Introduction to Complex Rehab Technology Video

"Complex Rehab Technology- Essential for health. Essential for life." provides an introduction to Complex Rehab Technology from the perspectives of individuals who rely on it each day for their health and independence, physicians who prescribe it and consumer organizations that work to protect access. The video also highlights current challenges and changes needed to ensure adequate access.

Congress Must Protect Access to CRT Wheelchair Accessories

Representative Lee Zeldin (R-NY) has introduced H.R.3229 to protect access to complex rehab wheelchair accessories by preventing the inappropriate application of Medicare competitive bid pricing to these items. This bill will provide the necessary legislative technical correction to clarify that CMS cannot apply Medicare competitive bid pricing to accessories used with complex rehab wheelchairs.

Click Here to contact your House Representative and ask them to sign on in support of H.R. 3229 today!

Position Paper- Technical Correction Needed

House of Representatives Letter to CMS Codes Effected by Policy Change

Help Get a Separate Category for CRT

Complex Rehab Technology (CRT) needs to be separately recognized in order to improve and protect access for people with disabilities who rely on CRT for their medical and functional needs. Legislation was reintroduced into the House and Senate in 2015 (H.R. 1516 and S. 1013 the "Ensuring Access to Quality Complex Rehabilitation Technology Act of 2015"). Email your Members of Congress and ask them to co-sponsor this legislation today!

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New Assistive Technology App Available for Students with Dyslexia

A new tool is available for students who rely on assistive technology. Lectio is an assistive technology app now available on iTunes specifically designed to meet the needs of individuals with dyslexia or other language-related learning disabilities at home, in the classroom and in the community.

Lectio CEO and co-Founder Kris Parmelee created the application after years of frustration looking for an easy-to-use assistive technology for her own son, Sam, who was diagnosed with dyslexia in first grade. "Kids with dyslexia can read, and need to read independently." But after sitting by her son's side every night during homework to help with just the occasional word he could not decode and read on his own, Parmelee searched for a solution.

"I couldn't believe there wasn't anything on the market that would allow him to read that one word on a worksheet or in a textbook that he couldn't read himself." Lectio allows the user to self-select text and have it read aloud using their iPhone, iPod touch or iPad. "This app allows my son to read independently, as much as possible, without missing words that are important to the context of what he is reading."

"Lectio is another tool in the box for students — and even adults— with dyslexia." Parmelee is very clear that this is not a replacement for one-on-one engagement with tutors, teachers and even parents, but rather it complements that learning and provides support to encourage independent reading.

"I am not the only one searching for something to help my child's efforts in reading," Parmelee said who, with her business partner Mark LaFay spend the past year developing the application. This included earlier efforts that included beta testing with more than 450 users from English-speaking countries around the world. "Real end-user feedback was critical to the development of Lectio so that it can really make a difference," says LaFay.

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