Assistive Technology Resources for Children and Adults with Disabilities

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Please address all correspondence to Closing The Gap, P.O. Box 68, Henderson, MN 56044. Telephone 507-248-3294; Fax 507-248-3810. Email <info@closingthegap.com>; Website <www.closingthegap.com>.

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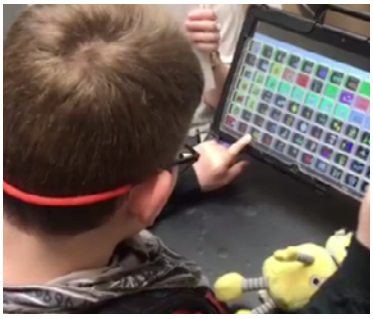


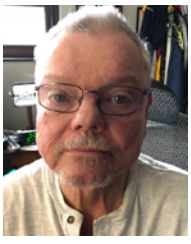
Technology Ideas for Monitoring Student Progress Through A UDL Lens

Nearly everything that occurs in schools today is contingent upon the utilization of sound assessment principles and practices. Basically, we look at two types of assessment in the classroom: formative and summative. Formative assessment is a process that uses information assessment strategies to gather information on student learning. Often, this type of assessment is used in monitoring student progress on a short term basis (e.g., daily, weekly, monthly). Whereas, summative assessment typically shows what students have learned at the end of a particular benchmark, such as a lesson, unit or course.

Generally, teachers have used tests as the tool to produce, typically with a paper and pencil type function, measurable information on student performance. Consequently, the tools are not always the best representation of student learning. Though this type of assessment tended to serve a purpose, it did not provide a good picture of student learning over time. Additionally, in the past, both formative and summative assessment, were used mainly to determine grades. The teacher taught a chapter in the book, there was intermittent quizzes throughout the chapter and then the big chapter test at the end that counted as 50% of the course grade.

As the methodology and pedagogy of instruction have evolved into the twenty-first century, so have the ways that teachers assess and monitor student progress. Many of these ideas are based upon "new theories of learning, motivation and instruction that guide school personnel to use assessment as an essential part of instruction [that] should be viewed as a tool not only to document learning but also to enhance learning" (McMillian, 2008, p. 1). Universal Design for Learning is one of those "new theories of learning" that is used to rework our methods of assessment.

DEBRA K BAUDER, ED.D., University of Louisville, College of Education, Department of Special Education Louisville, KY. Dr. Bauder has served as Associate Professor of Special Education and has been in the field of special education for over 40 years. She has been a teacher, technical consultant, computer specialist, technology training specialist, instructor in higher education, and a director of statewide training in assistive technology. She currently directs the Masters in Education Assistive Technology Program (online)



THOMAS J. SIMMONS, PH.D., CRC, University of Louisville, College of Education, Department of Special Education, Louisville, KY. He has been a professional practicing in special education for over 35 years. I have been a teacher, professor and rehabilitation counselor throughout this time.

DR. SUSIE GRONSETH, is a Clinical Associate Professor in the Learning, Design, and Technology program area in the College of Education at the University of Houston, where she teaches undergraduate and graduate courses in learning technologies, educational multimedia, teaching strategies, and instructional design. She has a Ph.D. in instructional systems technology from Indiana University. She specializes in applications of Universal Design for Learning (UDL) to address diverse learner needs in online, face-to-face, and blended contexts. Her research interests include use of learning technologies in ways that engage learners, represent content in a variety of ways, and provide opportunities for learners to demonstrate their knowledge and skills.

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UNIVERSAL DESIGN FOR LEARNING AND ASSESSMENT

Universal Design for Learning (UDL) is a framework that is used to align curriculum and assessment in an accessible way for all learners. Within this construct, one looks at pedagogy through the lens of providing scaffolds for students to achieve their educational goals. In order to understand the student progress, one must assess and evaluate student learning; and, as a result, a teacher might need to further adjust or provide more choices for the student to use to achieve their educational goals. The UDL framework suggests that teachers provide opportunities to learn that are differentiated to match the needs of learners (Beaudry & Wilson, 2010).

The UDL is based on three major principles: multiple means of representation, multiple means of expression and multiple means of engagement. The principle of expression is particularly relevant to refining assessment and monitoring student progress methods. A teacher might focus on this principle when exploring ways to incorporate UDL into their assessment methods.

SO WHY SHOULD ONE CONSIDER UDL WHEN ASSESSING STUDENTS?

First of all, there are multiple ways of expressing one's learning. (CAST, 2018). The following case scenario illustrates this concept of UDL:

> Eric is an 8th grade student who has been identified as an individual with a learning disability in the areas of reading and writing. he attends a general education class, but struggles with reading the textbook and completing written assign-ments and tests. When given a test, Eric has difficulty with both reading the test questions and writing his responses. As a result, Eric appears to not understand that he has learned the course content. however, when discussing the information, Eric demonstrates a clear understanding of the content.

The case scenario provides an acknowledgement that different forms of assessments are needed to better understand John's learning. A UDL approach to assessment would guide the teach-er to consider multiple ways for Eric to demonstrate his under-standing. For instance, the teacher could have Eric use text-to-speech on a device (computer, tablet, phone) that allowed each question to be read. Eric could then record his answers. Other ways to demonstrate learning could include creating a podcast or a video or drawing a comic strip. Furthermore, varied test formats including the use of computers for assessment, speech-to-text and other communication means are viable options (Brand, Favazza, & Dalton, 2012). All of these UDL strategies would provide an authentic assessment based on knowledge rather than the ability to read.

Another reason to use UDL for monitoring student progress is that a teacher can ensure an accurate assessment of a skill or knowledge. For instance, embedding design features in digital assessments (such as text-to-speech capability, availability of key word definitions, hints or coaching tips, etc.) will generate assessments that support students who vary in terms of their strengths, weaknesses and learning needs (CAST, 2018). The results of a study conducted by Black, Weinberg, and Brodwin (2015) indicated that by "establishing clear expectations, providing advanced organizers, presenting information in multiple formats, giving frequent informative feedback and using diverse assessment strategies" (p. 19) led to better learning outcomes.

MONITORING STUDENT PROGRESS

Within this framework, formative assessments are generally conducted informally for the purpose of gathering information about the student during the learning process. Monitoring student progress is considered a systematic means of gathering data that reflections a student's understanding of content. According to Bransford, Brown, & Cocking (1999), "Given the goal of learning with understanding, assessments and feedback must focus on understanding, and not only on memory for procedures or facts" (p. 140). Teachers determine what students understand and what they still need to learn to master a goal or outcome (Reiger, 2012). The objective of monitoring student progress through formative assessments is to provide feedback to students rather than to evaluate them for grades. Such feedback can be provided and within the educational contexts, is generally regarded as crucial for improving learner knowledge and skill acquisition (Hattie, 2011). Additionally, the feedback also gives learners the opportunity to develop their cognitive strategies and to straighten out misconceptions through instructional practice (Azevedo & Bernard, 1995). Teachers that use formative assessment approaches and techniques are better prepared to meet diverse students' needs through differentiation and adaptation strategies, thereby increasing levels of student achievement and greater equity for student outcomes (Centre for Educational Research and Innovation, 2008). One should consider having learning goals that are clear to develop meaningful assessment activities. These assessments should allow educators and learners to observe and measure whether goals have been achieved. For example, educators should consider designing assessments alongside learning goals so that you can ensure you are measuring the intended goals of your lesson (Boud, 2000). Offering relevant, authentic options for assessment can help learners transfer usable knowledge and understand the "what," "how" and "why" of their learning (CAST, 2018). One might ask two questions: Are my learning objectives and goals clear? (Harlan, 2010) Does my assessment reflect and measure the intended learning goals, or are there additional components or skills that are also being measured by my assessment? (Rose, Hall & Murray, 2008; Erkens, Schimmer, & Vagle, 2017).

According to Reiger (2012), there are several considerations regarding the types of formative assessment strategy. For ex-ample, Reiger (2012) stipulates that teachers need to determine what aspect of student learning they want to measure. Teachers also need to consider the learning preferences of their student.

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Reiger also indicates that formative assessment strategies can be given to students individually, as partners, in small groups or as a class. The type of grouping used for the formative assessment may also influence the choice of strategy. Lastly, the underlying idea about monitoring student progress is that it is a constantly occurring process, or a series of events in action and not just a single tool (NCTE, (2013, p. 3).

TECHNOLOGY IDEAS TO MONITORING STUDENT PROGRESS

With technology-based learning tools and apps, (e.g., mobile devices, online learning environments, online quiz formats), students can receive feedback immediately after assignments or assessments are completed (Bokhove & Drijvers, 2012; Pilli & Aksu, 2013; Van der Kleij, Feskens, & Eggen, 2015). Teachers can receive feedback on the progress of their students at the level of the individual student (e.g., feedback on a specific learning strategy used by a student) and at the classroom level (e.g., a comparison between class performance and national benchmarks) (Koedinger, McLaughlin, & heffernan, 2010). There is evidence-based research that demonstrates learning gains and supports claims that technology can promote deeper learning (higgins et al., 2012). The use of technology provides a variety of tools that may facilitate the learning process. The connections among teacher, student, content and technology are fundamental in the construction of the learning environment (Wang, 2008). The affordances of the technology as a digital tool are important (Beatty & Gerace, 2009) but the way in which it is used determines the function it performs and whether it becomes an effective educational tool in the classroom context.

EXAMPLES OF TECHNOLOGY IDEAS FOR MONITORING STUDENT PROGRESS

To illustrate the ways to monitor student progress, the following Table 1 provides technology ideas under eight formative assessment categories that incorporate the flexible options found with in the UDL framework.

CONCLUDING REMARKS

Formative assessment strategies can easily be used to moni-tor student progress in a variety of ways through the use of technology. Although using technology has many benefits, one of the most important aspects of assessment is to ask whether or not an assessment demonstrates the actual knowledge of learners. As teachers and administrators struggle with the everyday accountability for student learning, they are also faced

Formative Assessment Strategy	UDL Principles	Digital Tools	Extensions / Comments
Video Assessment Tools	Multiple Means of Engagement	EdPuzzle (https://edpuzzle.com) An assessment-centered tool that allows teachers and students to create interactive online videos by embedding either open-ended or multiple-choice questions, audio notes, audio tracks or comments on a video.	Teachers can create their own video and upload it to YouTube. Then a teacher can use that video with EdPuzzle and embed questions, audio notes and comments.
		TED Ed (https://ed.ted.com) A website that allows teachers to create lessons around YouTube videos. Teachers can select YouTube videos and use their URLs to add questions in different formats.	The added value of this tool is that it has a section where teachers can track stats of how many students have responded to answers or have seen the lesson.
		Playpostit (https://www.playposit.com/) This program uses YouTube and Vimeo videos, in which a teacher can create questions about the content of the videos for the student to respond to.	Teachers can track the progress of their students within PlayPosit. To create lessons, start by identifying a topic and objective, then search YouTube and Vimeo from within the PlayPosit site.

Formative Assessment Strategy	UDL Principles	Digital Tools	Extensions / Comments
Student Collaboration Tools that give students opportunities to express themselves creatively for many different purposes and helps them practice communicating complex ideas clearly and effectively.	Multiple Means of Expression Multiple Means of Representation	AnswerGarden (https://answergarden.ch/) An online feedback tool. The teacher asks a question and invites participants to the teacher's AnswerGarden. Students then provide their answers that instantly form a growing word cloud.	You can use AnswerGarden for real time audience participation, online brainstorming and classroom feedback.
		Padlet (https://padlet.com/) An easy to use program that allows students to post ideas and comment on other posts. A web-based means of collating ideas and collaborating online.	A strategy to use this program is to get students to share ideas and discuss key concepts of lessons. This is a rendition of the original Wallwisher online program. Easy to use.
		#BookSnap (http://www.taram-martin.com/booksnaps-snapping-for-learning/) Students use their smartphone camera to connect with printed course material like textbooks, notes, printouts and posters. Students take a picture and view online links related to the material. Students can make comments or ask a question. View everything in a specially design social network where students can share ideas, ask questions or help other classmates with their problems.	This strategy can be used with various apps such as Snapchat, Book Creator and Buncee.
		Coggle (https://coggle.it/) A mind-mapping tool designed to understand student thinking.	This program has the capability for real-time collaboration. The student can also add text labels and images outside of the diagram tree to annotate parts of the map.

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Formative Assessment Strategy	UDL Principles	Digital Tools	Extensions / Comments
Student Collaboration Tools that give students opportunities to express themselves creatively for many different purposes and helps them practice communicating complex ideas clearly and effectively.	Multiple Means of Expression	Google Forms (https://docs.google.com/forms/) A free tool for creating all sorts of quizzes. Works with a Google account. Google Forms is easy to use and works on all iOS platforms. It has a feature that supports integrating videos in your forms.	Ideas using Google Forms include engaging students in "bell ringer and exit ticket activities," With a bell ringer via a Google Form, students have something to engage with right away when they enter the classroom. Some teachers elect to create a simple check-in (how are you feeling this morning?) or a reflection on the previous night's homework (Carey, 2014).
		Plickers (https://www.plickers.com/) Allows teachers to collect real-time formative assessment data without the need for student devices. Works well for the one-device classroom.	Plickers enables teachers to poll their classes for free, without the need for student devices. Each student receives a card (a "paper clicker"), and the teacher uses an iPhone/iPad to scan student cards to do instant checks-for-understanding.
		Kahoot (https://kahoot.it/) A game-based classroom response system. Students connect a device, such as a phone, iPad or laptop, and login to the PIN code to access the test. The test is given on the board, and the students choose the correct answer. It automatically records their score based on how correct and fast they answer.	Kahoot requires students to use individual devices to respond to quiz questions (compatible with mobile devices and laptops).
Visual Representation of Learning	Multiple Means of Expression	Animoto (https://animoto.com/) Gives students the ability to make a short, 30-second share video of what they learned in a given lesson.	Animoto is easy to use for teachers and students. Students can demonstrate their understanding of concepts through this video program.
		Flipgrid (https://info.flipgrid.com/) Students can use 15-second to 5-minute videos to respond to prompts; teachers and peers can provide feedback.	Strategy that teachers and students could use include recording and uploading video starters, and embedding YouTube and Vimeo videos as discussion prompts.

Formative Assessment Strategy	UDL Principles	Digital Tools	Extensions / Comments
Concept Mapping	Multiple Means of Engagement	MindMeister (https://www.mindmeister.com/) This program is a mindmapping platform. While users can enter text and organize ideas into subtopics, MindMeister also allows for images and URLs to be embedded in the mindmaps.	The concept map can be shared with others. Students can work together at the same time to complete a concept map.
		Bubbl.us (https://bubbl.us/) This program is a beginner's mind-mapping site that allows users to insert text, change the size and colors of topics, make links between different entries, and navigate around the mindmap or "sheet."	Users can share sheets with their contacts for collaboration, and their work can be printed or saved as an image (.jpg or .png).
Journal/Digital StoryTelling	Multiple Means of Engagement Multiple Means of Expression	Voxer (http://voxer.com/) A voice recording tool to let students listen and self-assess their ideas and assignments, let students chat about their work or provide feedback to students.	With Voxer, teachers can send recordings to parents so they can hear how their children are doing.
		Little Bird Tales (https://littlebirdtales.com/) This program is a storytelling and e-learning tool.	Students can create web stories combining text and graphics as well as animated versions.
		AdobeSpark/ (https://spark.adobe.com/) An easy to use program that allows students to create reports, research papers, posters, writing assignments, and presentations.	A simple narration-based animation program. Users read a line of their story to their device (pressing and holding an on-screen button as if using a walkie talkie), choose a visual (e.g., photo, icon, or text), and repeat these steps for each line ("page") of their story to create a complete animated, narrated video.
		StoryBird (https://storybird.com/) Storybird is a visual storytelling tool. Student can use this program to demonstrate their understanding on content. It could be used for journal writings.	A student can print out their creation and share with others.
		Puppet Pals 2 (http://www.polishedplay.com/support-pp2) A tool for creating custom animated shorts. Students can record, use audio and develop characters that could demonstrate their learning on specific topics.	Only available for iOS (Apple iPad/iPhone).

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Formative Assessment Strategy	UDL Principles	Digital Tools	Extensions / Comments
Transfer and Apply	Multiple Means of Expression	Buncee (https://www.edu.buncee.com/) A creation and presentation tool that helps students and teachers visualize, communicate and engage with classroom concepts and ideas.	This program allows students to share their knowledge and creativity in an easy, collaborative and engaging way.
		Wordables (https://itunes.apple.com/app/wordables-the-word-cloud-guessing-game/id771308667) The word cloud guessing game. This app allows you to elicit evidence of learning or determine background knowledge about a topic. These word clouds are pictures composed of a cloud of smaller words that form a clue to the topic.	Students and teachers can make word picture puzzles (pictures made up of a cloud of smaller words to form an overall clue).
Quick Class Check	Multiple Means of Expression	Formative (https://goformative.com/) This online, all-student response system provides teachers the opportunity to assign activities to students, receive the results in real time and then provide immediate feedback to students.	Formative runs on any Internet connected device.
		Quia (https://www.quia.com/) Teachers can create games, quizzes, surveys, and more, and access a database of existing quizzes from other educators.	Students need individual devices to respond to quiz questions (compatible with mobile devices and laptops).
		Triventy (http://www.triventy.com/) A free quiz game platform that allows teachers to create quizzes students take in real-time. These live quizzes provide teachers with real-time data on student understanding of classroom concepts.	Teachers can create a collaborative quiz and invite students to add questions to it.

Table 1: Technology Ideas for Monitoring Student Progress

with how they can better translate and demonstrate the student learning. With the onset of twenty- first century concepts and technology, the option for teachers to provide a better means of understanding student progress is through the types of formative assessments that incorporate flexible and accessible means. It's also important to note that through these ideas and digital methods, the use of the paper and pencil should not be a the tool of choice. Instead, one needs to provide assessment that engage and allows students to demonstrate their understanding of concepts as they develop skills which will generalize and authenticate their competency.

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Adapting LAMP Words for Life for Individuals with Visual Impairment

For five-year-old Ani, communication was a struggle from the beginning.

Ani lost her vision shortly after birth, spending the first years of her life in a Bulgarian orphanage where she experienced severe neglect. When the Miller family met her at the age of two, they knew she was meant to be a part of their family. With love and excitement, Ani was adopted and brought home to Kansas City, where it just so happens her mom is a teacher of the visually impaired and an orientation and mobility specialist at the Children's Center for the Visually Impaired. Initially, Ani demonstrated a lot of negative behaviors and attachment issues which were the primary concern of teachers and therapists. In terms of formal language systems, Ani was essentially nonverbal. She used a few word approximations when highly motivated but verbal speech was not her preference. She also used a handful of tactile signs as well as eight abstract tactile symbols. Tactile sign was a struggle for her as it required great fine motor and body/space awareness, two things that she is working on. Her team could see her potential. They understood she would benefit from having several communication strategies, and for her to communicate more than her basic wants they needed to give her a vocabulary that would offer room to grow and give her a path to robust independent communication.

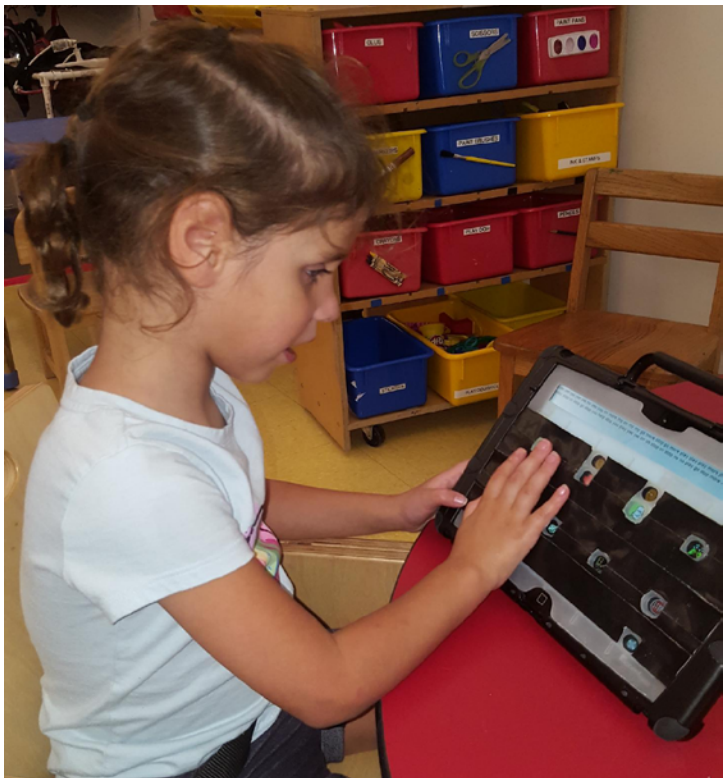

Image 1: Ani Learning First Words

Fortunately for Ani and her dedicated team, Gretchen

CINDY HALLORAN- an occupational therapist, is the Director of The Center for AAC & Autism and co-author of the Language Acquisition through Motor Planning approach. She has over 30 years' experience working exclusively in the field of pediatrics, receiving additional training in the area of sensory integration and neurodevelopmental treatment. She has worked in school, residential, home health and private clinic settings; was co-owner of Integrated Therapy for Kids, a private clinic in North Little Rock, Arkansas; and has served as the therapy department head for Arkansas Easter Seals and Riverdale Academy.

JEREMY LEGASPI- Jeremy earned his Bachelor's Degree in Speech and Hearing Science at Arizona State University in 2003. He completed his Master's Degree in Clinical Speech-Language Pathology at Northern Arizona University in 2005, and his Graduate Certificate in Assistive Technology in 2013. Prior to joining PRC in November of 2014, Jeremy was assistant director at Foundations Developmental House (a speech therapy clinic) in Gilbert, AZ. There he completed speech and language evaluations, independent education evaluations, provided ongoing therapy, supervised speech-language pathologist assistants, wrote and implemented individualized education plans, and presented nationally on the topics of AAC and Apraxia. Jeremy also has two years of experience in the public school system and five years of experience at a non-profit school for special needs. Jeremy holds the Certificate of Clinical Competence in Speech-Language Pathology from the American Speech-Language-Hearing Association (ASHA), a state license in Speech-Language Pathology from the State of Arizona, is a member of the Arizona Speech-Language-Hearing Association (ArSHA), and is a member of ASHA's Special Interest Division 12 (AAC Division).

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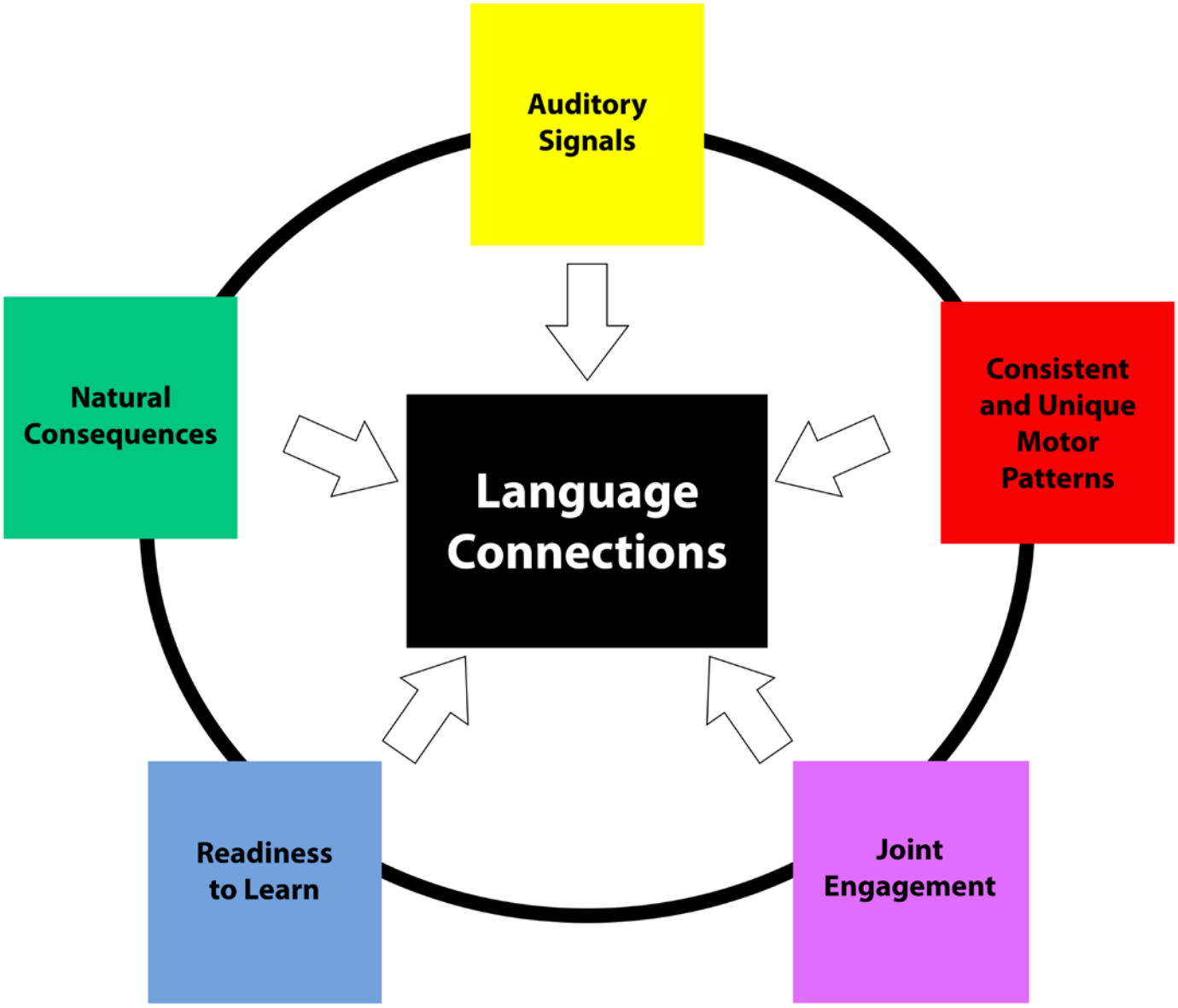

Image 2: The Components of the LAMP Approach.

Bright, consultant for the Prentke Romich Company, was assisting in the development of a robust AAC solution that follows the Language Acquisition through Motor Planning (LAMP) approach with a tactile keyguard for individuals like Ani and presented it to her therapists as an option. Ani was learning pre-Braille, so utilizing tactile cues to locate words on a speech generating device seemed like a good option. (See image 1)

WHAT IS LAMP?

LAMP is an augmentative alternative communication (AAC) approach designed to give individuals who are nonverbal or have limited verbal abilities a method of independently and spontaneously expressing themselves using a speech-generating device. The key components of the LAMP approach include providing an environment and activity that promotes readiness to learn, encouraging joint engagement and learning language through a unique and consistent motor plan paired with an auditory signal and a natural consequence. Teaching of vocabulary happens across environments, with multisensory input to enhance meaning, and the child's interests and desires determining the vocabulary to be taught. (See Image 2)

In presuming competence, rather than progressing through different AAC strategies or language systems, one language system that offers the potential for unlimited language growth with the ability to present and teach language at a level commensurate with the learner's current abilities is selected at the outset. If a speech generating device with a complex communication system isn't available initially, it's used as the goal so motor plans for vocabulary can remain consistent.

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UNIQUE AND CONSISTENT MOTOR PATTERNS

- No need for picture discrimination
- No need for understanding that a symbol can represent a thing or concept
- Complex language organization system used initially but motor patterns simplified or vocabulary masked to encourage initial success.
- Consistent motor plans allow for automaticity to develop- allows for decreased cognitive load and increased rate.

There are multiple benefits of a word-based system that pairs a consistent motor pattern with consistent auditory output along with teaching words by providing a fun, natural response. There are no cognitive prerequisites for the implementation of LAMP, as intervention can begin at the cause and effect level and systematically build upon the stages of natural language development while maintaining a consistent motor pattern to access each word. There is no need to discriminate pictures. The visual differences help to direct reach and touch but understanding the meaning of picture or perceiving all the details of the picture are not necessary. Understanding that a symbol can represent a thing or concept is not a prerequisite but can developed naturalistic way by pairing motor auditory natural response, which is a quicker path to communication. For emergent communicators, motor patterns for initial words can be simplified or vocabulary masked to encourage initial success. Having a consistent motor movement per word allows for automaticity to develop which decreases the cognitive load for the communicator and increases rate of communication.

AAC systems typically used for beginning communicators with significant visual impairment focus on accentuating visual and tactile input. These necessary modifications tend to limit the amount of vocabulary available. Real objects may be a good introduction to using symbolic language but there are limitations with representation of core words, quick access to lots of words, and combining words. Progressing from real objects to picture symbols opens the door to more language options, but also requires relearning. Communication boards and single overlay speech generating devices can be modified to assist the learner with visual impairment with high contrast icons and tactile cues but again access to vocabulary and grammar is limited and without auditory output, language isn't consistently reinforced. Braille is the standard tool for written communication for those with significant visual impairment but may not be a practical option for a nonverbal child who is preliterate. In fact, it's designed for transmission of written communication rather than real-time alternative to verbal communication.

Dynamic display speech generating devices have been successfully used to provide a means to develop spontaneous generative complex communication in individuals without visual impairment. Access to thousands of words are made possible by screens that change providing different visual options on each screen. However, the visual and functional change between screens and the lack of tactile cues on a touchscreen prove to be an obstacle for those with visual impairment. An AAC system that utilizes simple unique and consistent motor patterns for words provides a static display in a dynamic environment and along with a tactile keyguard may eliminate this obstacle.

LAMP Words for Life has been designed with one unique and consistent motor pattern for words and seemed to be a natural fit for some students with visual impairment. It's structured to allow the ability for complex communication but can be adapted to the skill level of the learner while providing a structured path for language development. Motor patterns can be shortened initially to provide immediate auditory output upon touching the buttons but are expanded upon when skills progress to access more vocabulary. A few words can be presented at a time to teach in activities that are relevant and motivating to the learner in a manner that preserves the unique motor patterns for every word.

MODIFICATIONS TO SUPPORT VISUALLY IMPAIRED LEARNERS

With input from clinicians using LAMP Words for Life with children with visual impairment, modifications were made to address the needs and challenges of these learners. At the same time, we wanted to maintain as much consistency with standard LAMP Words for Life as possible to make it easier for classrooms with multiple AAC communicators to model and support language learning.

TACTILE CUES

Having consistent motor patterns for words is key for these learners but visual strategies to teach those motor patterns such as modeling, icon sequence cards, vocabulary masking or pointing to icons aren't effective for this population and tactile cues are needed to assist in finding and discriminating locations. A keyguard provides a physical border for each button and allows for consistent landmarks to find desired button much like the raised areas on a keyboard to mark the home row.

One of the speech pathologists providing input was Michelle Britt-Thompson. She was working with an elementary student with autism and visual impairment who'd had minimal success with real objects and primarily communicated with inappropriate behaviors. Having seen communication growth when implementing the LAMP approach with other students, she gave it a try. This student's fine motor skills were significantly delayed as she didn't have an isolated point and demonstrated sensory defensiveness when presented with an AAC device. Michelle adapted a large communication board replicating the home screen of LAMP Words for Life with only a few words showing, puff paint to create a grid and tactile symbols. It was used to teach core words in the classroom. Eventually the student transitioned to a portable communication board and then to an Accent device. To create a tactile version of Vocabulary Builder,

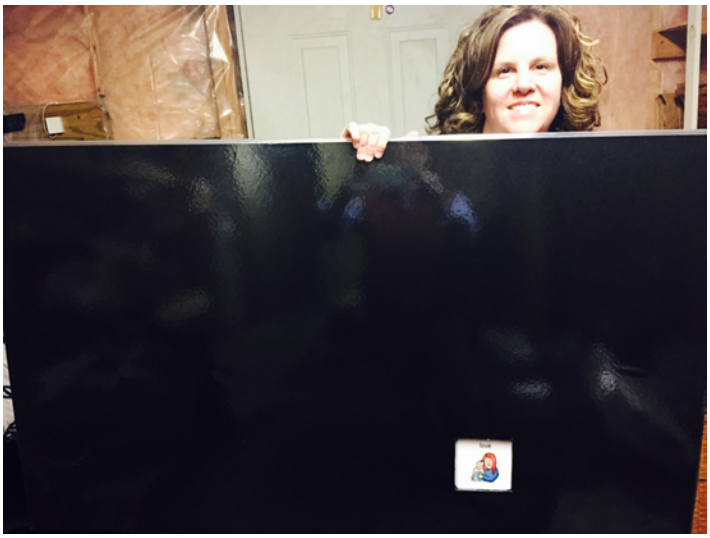

Image 3: Large Communication Board

Image 4: Portable Communication Board with Grid

Image 5: Accent with Tactile Masking

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Michelle covered the keyguard with Gorilla tape and made cut-outs, leaving only a few words visible. This helped the student learn to isolate an index finger to select the desired word as well as using the landmarks on the keyguard to find the desired word. (See Images 3, 4 and 5)

It was decided to create a standard keyguard with build-in tactile cues to accompany the VI version of LAMP Words for Life. Initially, a 3D printed design was developed so clinicians could print it locally. Tactile cues were placed around the edges and eight squares within the middle of the grid were raised so that each button was next to or one location away from a marker. While the layout of vocabulary on the home screen is identical to standard LAMP Words for Life, highly motivating core words can be moved to those raised locations to aid tactile search when teaching first words. While only necessary in initial stages, once swapped, those words need to stay in those locations for motor consistency. The 3D design was a helpful tool initially as changes could be made as feedback was received, but they were not very durable, and the finish was rough to the touch. Using input from clinicians, a flip-up KeyGuide was designed. It rested closer to the screen to make access easier, while still being able to flip up for programming and vocabulary masking and unmasking. A molded touch KeyGuide allowed for a smoother material and rounded edges on tactile cues for better tactile experience. (Image 6)

SIMPLIFIED MOTOR PLANS

LAMP Words for Life has three vocabulary files with increasing levels of complexity. At the one-hit level, 82 words can be said by pressing one button allowing for immediate reinforcement. At the full level, 2-3 button pushes are needed to say most words, and there are consistent patterns to say words based on parts of speech. For example, all present tense verbs end in the same location. All adjectives end in a different but consistent location. In the VI version of LAMP Words for Life, the words learned at the one-hit level become double hits on the same button to eliminate the need for tactile search and increase rate. Since the corners provide a good reference point, they are left blank to be utilized for customization of favorite people, places, and things.

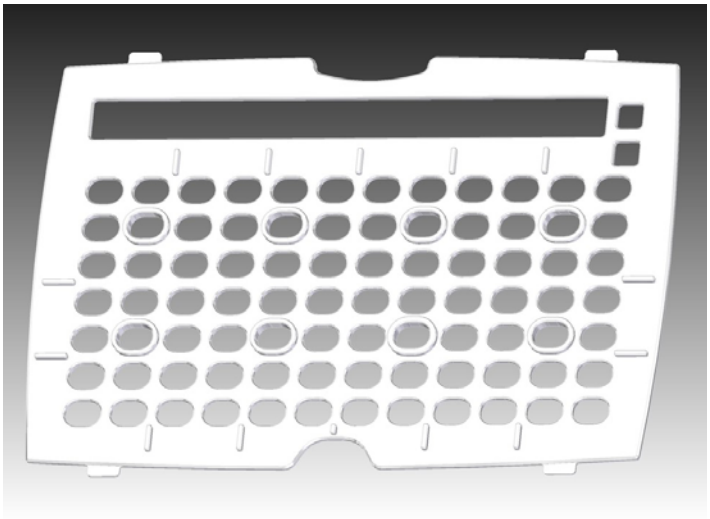

Image 6: Touchguide with Tactile Markers

Image 7: High Contrast Icons.

HIGH CONTRAST ICONS

When every word is produced with a unique and consistent motor pattern, visual discrimination is not a requisite skill. However, for those individuals with some visual skills, accentuating the icons to better direct reach is beneficial.

Will, a teenager with cerebral palsy and CVI, started using an Accent 1000 in October of 2017. His speech-language pathologist, Katie Nelson, describes what their team did to help him be successful. She pulled the contrast icons into the Unity 84 sequenced vocabulary Will was already using. "Since there were not high contrast options for most of the row of categorized parts of speech (am, social, determiners, prepositions, etc.) I changed the background color of each symbol because the symbols themselves are mostly black. We gave each one a different color to help Will remember them better. The symbols themselves don't offer a lot of details for someone with VI so I thought distinct colors would help more." Will has a great memory and memorized a lot of vocabulary but is starting to use his limited visual skills to try and scan pages and find new words. Katie says that "His mom has noted a big increase in his production of new multiple word phrases since the switch, so I know what we have done already has been very helpful." (Image 7)

In LAMP Words for Life-VI, the background color of most icons was changed to black to contrast the bright colors in the icons. A small set of high-contrast Minspeak icons were developed for the home screen with less detail and fewer brighter colors. (Image 8) Color coding based on part of speech was maintained outside the home page.

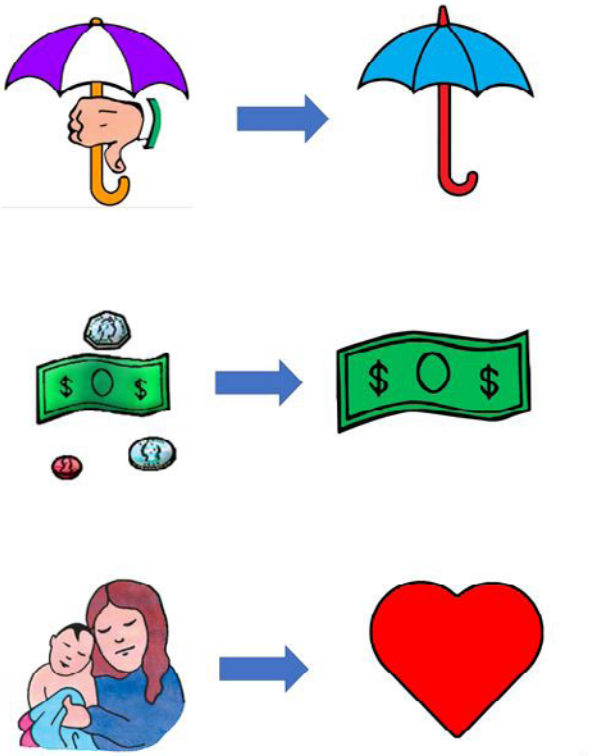

Image 8: Examples of Simplified Icons.

Image 9: Ani and Dad at the Park.

PROGRESS FOR ANI

It's awesome that a community of therapists could pool their experiences to help shape a product that can benefit others. Once Ani switched to LAMP Words for Life – VI and the Tactile KeyGuard, some of her frustrations went away although she is still learning a systematic scanning pattern to locate words. "Ani is an amazing little girl who has grown so much in all areas of her development," shared her speech pathologist, Erica McCarthy. "Ani continues to show everyone around her what she can do! It's also nice that she can be easily understood by the majority of communicators versus the unconventional language systems like tactile symbols or tactile ASL." LAMP Words for Life - VI gives Ani and her family a much more efficient communication system to expand her language. (Image 9)

Erica stresses that you always want to make sure the family can incorporate the AAC system into their routines and teach them how to incorporate siblings. For example, using the tactile keyguard and static locations in LAMP Words for Life - VI, Ani's older sister who is also visually impaired but verbal can model communication on the device for Ani.

"In the short time that Ani has been using the Tactile KeyGuide, she has increased her intentionality and independence for purposeful communication. She can have more autonomy in her day, participate in activities that previously caused behaviors and - best of all - communicate more effectively with her family and peers. The Tactile KeyGuide is the solution she needed to access AAC. The tactile markers help establish a motor pattern that is concrete and achievable for her to navigate language on her own. Though she is still learning, she is already using the vocabulary for so many different language functions, and it has been such a joy to see her personality through her language, like her great affection for wind and musical toys but avid dislike of loud noises! There are many obstacles that children with visual impairments face when using AAC, and this KeyGuide and language file address many of them. In working with a population solely comprised of young children with visual impairments this is filling such a large void!" ■

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DISKoveries

New and Noteworthy Apps

By Joan Tanenhaus

For more detailed information, pictures and videos, see developer's website, Apple and Google Store, and YouTube.	**KEY** * - A Free or Lite Version or Trail is available A - An Android version is available

APPS

PRODUCER/WEBSITE		BRIEF REVIEW
TactusTherapy www.tactustherapy.com Tactus Therapy has produced an outstanding group of speech therapy apps designed to help adults with stroke recovery and useful as well for both children and adults with autism, language delays, apraxia and other speech and language disorders. Using evidence based techniques, these apps are designed for both speech therapy and home use, and can be customized with many setting and features, are compliant with HIPAA privacy laws, and collect data . There are free versions of all the software so you can actually try them before you invest in the full versions. (See previous DISKoveries articles for review of other Tactus apps- Advanced Naming, Advanced Comprehension Therapy, Visual Attention, Question Therapy, Category Therapy, Spaced Retrieval, Comprehension Therapy, Reading Therapy, Writing Therapy)		
Advanced Reading Therapy	*A	This app is designed to enhance auditory and reading comprehension skills using varied passages at 3 different levels. Level 1 includes passages with about 50 words or less at Grade 0-1 reading level with 3 questions each. Level 2 includes passages with 50-150 words at Grade 2-3 reading level with 4 questions; and Level 3 passages have 150-600 words at Grade 3-6 reading level with 5 questions. There are letters, text messages, news articles and up to full chapters of books, jokes and stories. Users can read or listen to instructions, adjust text size, line spacing and speech rate. They can hear the passage, play one word at a time as needed or play one sentence at a time. There are over 200 passages in 15 categories. Great for focus on attention to detail, memory, inferencing and self monitoring. It makes an excellent home training program or a therapy tool.
Number Therapy	*A	This professional speech therapy app helps those with aphasia practice communicating with numbers of all sorts- understanding longer numbers, saying numbers, reading, typing or writing them. Trouble with numbers can lead to difficulties such as taking messages, scheduling appointments, paying bills, returning a phone call, etc. Users work on Understanding, Speaking and Typing numbers in the context of money, years, zip codes, phone numbers, ordinals, and fractions. There are three presentation modes- Listen, Read and Both with built-in cues and automated scoring. Options include choosing number of trials, field size, difficulty (3 levels), phone or claculator keypad for typing, and control over speech rate.
Advanced Language Therapy 4-in-1	*A	Watch for this new collection of Tactus apps which will include Advanced Naming, Advanced Comprehnsion, Advanced Reading (all previously reviewed in DISKoveries) and a new app, Advanced Writing Therapy.

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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 and easy report writing and progress monitoring. Well done and very comprehensive apps.		
Following Directions Monsters		Designed to work on following directions and auditory memory skills, this app has 27 levels of difficulty. Level 1 is simple on-step directions (i.e., touch the car, touch the ball). Level 20 works on sequencing (first, second, third), while Level 27 includes the concepts of before/after, with multiple-step directions and descriptors such as color/size. Ther can be up to five simultaneous players, with each player working on their ownl level. There are many program options, including: optional text display, ability to replay audio, ability to increase difficulty with success, automatic advance, ability to control number of images and more. Data is kept for each individual student and can be displayed as a report card and/or emailed, printed or opened in other apps. For more details, pictures, and content information, see www.smartyearsapp.com.
Lexico www.lexico.ch		
Lexico Cognition Pro		This app is an excellent and comprehensive app to help develop language skills, basic language concepts and vocabulary, auditory comprehension and auditory memory skills . There are 5 different areas-which include 30 different games with 360 questions and answers in different categories. It is appropriate to use with children 2nd -3rd grade and up, adults with aphasia, ESL students and young adults and older with developmnental disabilities. Users are presented with matching boards- with 12 colorful, well-chosen pictures on a clear white background. Then they are asked questions such as "What Goes together", "The girl is on a swing", Find the opposite: hard-working" "The red one is on the blue one", "who works where", "who is thinking of" They have to drag the question box (picture or words) to the matching picture. Each time they select the correct picture, part of a puzzle is revealed. All questions are read aloud and can be repeated. For reading practice, the sound can be turned off. All of the activities can be used to set a context for language comprehension and expression- for example "Who works where?" can be topic-- who is she, what is she doing, what do you think her job is, where do you think she works- let's find a picture that shows the kind of thing she does at work, etc. Great to use as matching game or as an open-ended language program.
Lexico Cognition	*	This free program presents Level E of above full program- it includes concepts related to above/below/between, bigger/smaller/wider, inside/outside/next to, left/right, and relationships of 3 objects to each other. Excellent to use for spatial vocabulary and comprehension and to get a good sense of the app.
Teach Speech Apps www.teachspeechapps.com		
Following Directions		Four flash-card type activities include (1) One step directions drag and drop (put the red circle on the crib) (2) two step directions, choose from 4 pictures (Touch the bed and then the piano) (3) Inclusion/Exclusion choose from 6 pictures (Touch the sunglasses but not the blue one.) 4. Motor-skill based and conditional directions (Put your hand on your head and then bark like a dog). Other apps in the series include Wh Questions, Prepositions, and others.

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APPS FOR THE APPLE WATCH: COMMUNICATION, HEALTH AND SAFETY FOR SPECIAL NEEDS		
PRODUCER/WEBSITE		**BRIEF REVIEW**
Proloquo2Go Assistiveware www.assistiveware.com		Proloquo2Go is a symbol based AAC communication app. With an Apple Watch, AAC users can use it in two ways. They can use it as a switch to access Proloquo2go on the iPhone or can choose Communication mode and touch to build and speak simple sentences or select short phrases. When in this mode, they can have the program speak the message aloud and also display the message as Upside-Down text so it is right-side up for the person they are talking to. Users can edit, add or delete vocabulary to make it more efficient for their needs. A great way to quickly speak frequently-needed or important words or phrases.
Proloquo4Text Assistiveware www.assistiveware.com		Proloquo4Text is a text based AAC communicaton app. With the Apple Watch it is used together with the app on your iPhone for communcating short, frequently used and important messages. Use the Apple Watch folder on Proloquo4Text iPhone app to create a list of commonly used phrases or use the built-in stored phrases which can be edited or deleted. Then, on the watch, just scroll through the list and tap to speak the text you want. You can tilt your wrist towards the person you are talking to and the message will flip so it's easy to read. If there is more than one iOS voice available for your language, you can change the voice on the Watch, too.
Pill Alert Pro-Medication Reminder www.thelinklinks.com	*	Use this app to remind you to take your medications on time. When you get the haptic reminder, you can mark as taken, skip or snooze it for reminder later. There is a paid version available if you want to remove ads and have unlimited profiles.
Fantastical 2 for Apple Watch Flexibits www.flexibits.com/fantastical-watch		This is a calendar app that is designed to replace Apple's calendar. With this app, you can very easily add an event or reminder by just speaking. You just press and hold and then speak your new entry (in English, French, German, Italian, Spanish or Japanese). You can edit an event in the same way. Two different complications are available- one shows the name & time of the next event and the other just shows how many events are left for the day. If you include an address in your event, you can touch to get directions. Fantastical is also avaialble for the iPad and for your Mac computer. All sync together with iCloud. Good way to use Apple Watch's built-in haptics to remind users about doctor's appointments, important meetings, and other life events.
Just Press Record for Apple Watch Open Planet Software www.openplanetsoftware.com		The Apple Watch app for Just Press Record lets you record anytime, anywhere with a single tap to start, stop and resume, even when your phone is not nearby. There is unlimited recording time and recordings automatically transfer to the iPhone or iCloud. Youn can listen to the most recent recording through the watch speaker or any connected earpods. Use the digital crown to adjust volume or a downward swipe to pause. There is also accessibility support with VoiceOver and reduced motion. On the iPhone, there is forward and rewind, adjustable playback speed, and you can view recent recordings or browse your library by date or time. You can also use the app for text to speech trancription, with support for 30 languages.
WaterMinder for Apple Watch FunnMedia www.waterminder.com		Water and being hydrated are important to health and well-being. This app keeps track of the intake of water during the day, giving current hydration (i.e., 8 oz., 14 oz., 17 oz.) levels and creating a hydration schedule that reminds you when it's time to "water" up. Select your body weight, the amount of water for each drink and the kind of drink (water, tea, coffee, or others) and then just press the + sign whenever you have a drink that day. Just glancing at your watch will show you what percentage of the day's intake has been achieved. Very well-designed and motivating!
Calc Lite for Apple Watch TLA Systems Ltd. www.pcalc.com	*	This app lets you do your basic calculations right on your wrist. Many individual options are available as in-app purchases.
RULES! for Apple Watch CodingMonkkeys https://rulesgame.net		A high level memory training-follow the directions game, for fun playing while wearing your watch and looking to pass some time (maybe waiting at the dentist or on the bus.) Each 4 picture level has a new rule to follow (i.e., tap green, tap upper right, etc.) The trick is to remember all past rules, for example, at Level 6 if it tells you to tap all whales, you then have to remember rule 5, then rule 4 and so on. You must recall all the rules when asked until you clear the board. To use as a learning experience, try untimed mode and some notetaking for references.
Peak for Apple Watch Brainbow Limited www.peak.net	*A	This app has a collection of games that focus on memory, problem-solving, visual-motor skills. On the Apple Watch, they work for focus and attention for short periods of time.

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BOOKS ON TECHNOLOGY AND SPECIAL NEEDS

Assistive Technology in Special Education: Resources to Support Literacy, Communication, and Learning Differences, Third Edition, Joan L. Green, (Prufrock Press Inc. Waco, Texas, 2018. www.prufrock.com, www.innovativespeech.com)

This new book is an amazingly thorough, comprehensive and up-to-date (published 2018) collection of Assistive Technology resources and strategies for the Special Needs population. Its goal is to help families and professionals know and understand the available solutions and how to find, select and use them. It's an organized, well-written presentation that helps the user find the resources they already have but don't know about (on their phones, computers and iPads), learn about other free and available resources, and also understand the additional options that are available. The initial chapters assist in how to get started, and to understand the benefits of Assistive Technology. Following are chapters with suggestions, strategies, and resources in special learning areas. There are chapters on Accessibility, improving verbal expression, Augmentative and Alternative Communication, auditory comprehension and receptive language, reading comprehension, reading skills, written expression, writing skills, attention, cognition, Executive Function, Organization Skills. Within each of these chapters, there is detailed information and further analysis. For example, in the chapter on Verbal expression, there is information on the importance of understanding the cause of the problem, strategies to encourage verbal expression, online resources, available technology options, App resources, information about speech intelligibility, verbal apraxia, fluency, word knowledge, word retrieval dialoging and conversation and more. There is also an excellent chapter on Tools and Strategies to Support Learning New Information which deals with topics such as reducing digital distraction and using audio recordings for lectures, as well as a chapter on Online Organization and Collaboration (online storage, digital bookmarking tools, video chatting) and so much more. The final chapter covers Keeping Students Safe and Preparing for the Future. This is the kind of book you will use constantly as a reference to help understand both strategies and technologies that are available for particular learning needs. Visit Joan's website, www.innovativespeech.com, for more information about events and webinars, her very informative blog, free resources and information about her consultant services.

Technology and the Treatment of Children with Autism Spectrum Disorder, Teresa A. Cardon, Editor, (Springer International Publishing, Switzerland 2016. www.springer.com)

Teresa Cardon, as Editor of this volume, has addressed how technology, both hardware and software, can be used with individuals with Autism. It presents research-based educational interventions and technology tools and their role in helping children and adults with ASD. There are excellent chapters in the following areas: AAC Assessment and Establishing Treatment Goals; Technology, Autism and Occupational Therapy; Collaborative Teaming: OT and SLP Co-treatment; Writing Skills through Assistive Technologies; Using Visual Organizers and Technology (to support Executive Function, Abstract Language Comprehension and Social Learning); Video Modeling; Vocational Skills, and Mobile Technology. In addition to related research, there is much practical information included in each chapter- websites, specific apps recommended as areas are addressed, techniques and strategies. For example, the chapter on Using Visual Organizers and Technology, includes extensive information about executive function, literacy, graphic organizers, social stories, social scribing, and time management. The chapter on Video Modeling includes detailed material on theoretical support, parameters and implementation of video modeling. There are Resource lists, and a comprehensive reference list at the end of each chapter. This is an important volume for speech pathologists, special educators, occupational therapists, as well as researchers and psychologists and those in related disciplines such as educational technology, rehabilitation, and social work. It provides an excellent review and foundation for understanding the wide range of technology tools, resources, and techniques as well as insight into future implications in all areas of Special Needs, not just in the area of Autism Spectrum Disorders.

Technology Tools for Students with Autism, Katharina Boser, Matthew Goodwin and Sarah Wayland, Editors, (Brookes Publishing Company, Baltimore, Maryland, 2014. www.brookespublishing.com)

This is another excellent collection of chapters and resources related to the use of technology with individuals with Autism Spectrum Disorder, with research and insights applicable to all individuals with Special Needs. A section on Classroom-Based Technology Tools includes sub sections on topics such as Tools for Routines and Self-Management; Tools for Structuring the Classroom Environment; Tools for Delivering Instruction; and Tools for Verbal and Written Expression. There are also chapters on using Virtual Reality and Therapeutic Robots. In another section on Language Tools, there are three chapters – Software for Teaching

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Semantics, Grammar and Pragmatics; Mobile Media Devices; and Technology Supporting Literacy. These chapters present detailed research as well as specific references to apps and other materials and how they can be used. The next section is on Social Skills and Emotion-Regulation Management Tools- including chapters on Using Technology to Teach Emotion Recognition; Incorporating Technology into Peer Social Group Programs; Technologies to Support Self-Awareness, Personal Style and Self-Regulation. There are also sections on Data-Collection Tools, and Teacher Training and Practical Implementation. A final section is on Adult Transition to the Workplace. The book explores the benefits of a wide range of technologies including video modeling, language processing software, digital stories and book creator apps, mind mapping, text-to-speech, use of multimedia such as cameras, recordings, and so much more. It helps to guide the reader in understanding the technology, how to select appropriate technology, and how to apply it. It is an extremely comprehensive collection of research, resources, techniques, evidence-based practices, and references for a very wide range of technology applications for children and adults with Special Needs.

NEW & NOTEWORTHY ACCESSORIES FOR SPECIAL NEEDS

Many new accessories are available to assist individuals by providing easier access, organization, and device protection. Following are some of these for the Apple Watch, iPhone and iPad.

POWERPIC FOR THE IPHONE (TWELVE SOUTH: WWW.TWELVESOUTH.COM)

This is a wooden picture frame, with a wireless charger hidden inside. Made from New Zealand pine, and available in white or black, it holds a 5"by 7" photo. Just plug the PowerPic USB cable into any USB outlet, computer or adapter, and set the phone against the frame. Any Qi-enabled wireless phone will charge with up to 10 watts. It works with phone cases up to 3mm thick. With the phone in this upright position, you can interact with it easily while it is charging. A small status light on the back lets you know when the phone is fully charged.

PowerPic for the iPhone (Twelve South: www.twelvesouth.com)

Compass Pro for the iPad (Twelve South: www.twelvesouth.com)

COMPASS PRO FOR THE IPAD (TWELVE SOUTH: WWW:TWELVESOUTH.COM)

The new Compass Pro for the iPad is an all-metal folding stand with soft silicone on the legs that holds the iPad at three

different angles- both vertically and horizontally. It folds flat for complete portability, comes with a carrying case and works with all iPad and iPad Pro models, and with most iPad covers & cases. Great way to make the iPad accessible and usable for all tasks- from reading, writing, typing, sketching, Facetime, watching videos and more.

AIRSNAP FOR AIRPODS (TWELVE SOUTH: WWW:TWELVESOUTH.COM

AirSnap is a full-grain leather case for AirPods. You can put your AirPods Charging case into AirSnap, fasten the metal snap and the ear buds are safe. With the cutout on the bottom, you can recharge them without ever taking them out of the case. There's also a swivel clip on the top that lets you attach the AirSnap to a backpack or bag so they are ready to use. AirSnap provides easy access, easy charging and safe storage.

Airsnap for Airpods (Twelve South: www.twelvesouth.com)

HiRise Duet for iPhone & Apple Watch
(Twelve South: www.twelvesouth.com)

HIRISE DUET FOR IPHONE & APPLE WATCH (TWELVE SOUTH: WWW:TWELVESOUTH.COM

The HiRise Duet is a charging stand that powers an iPhone and Apple Watch at the same time, in the same place. Made from metal accented with leather, this stand has an integrated lightning connector to charge the phone and a Watch Charging Disk, for the watch. Both the back support and the Lightning Connector can adjust to work with most slim phone cases and sleeves. The Apple Watch is charged on its side, which lets you use it as a bedside alarm click with the crown serving as a snooze button. With the iPhone upright, you can also see and interact with it while charging. The base of the HiRise Duet is lined with soft leather so the watch is protected. With 15-watts of Lightning Power, HiRise Duet charges your iPhone faster than standard USB and wireless.

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. (e-mail: ForTLL@aol.com) ■

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ALL ABOARD!

Everyone Can Learn and Communicate!

When an AAC evaluation is completed and we finally get our hands on a shiny new device or gorgeous picture system, we are often disillusioned to believe that this is the key to success, the missing piece. But in all actuality, the new communication system is just a ticket to ride. In order to truly pave the path for communication acquisition, one must get their whole team on board: direct instructors, para professionals, general educators, administration, families and community supports. There will be dark tunnels filled with doubters. There may be derailments with system malfunctions or even medical complications. There may be delays in departures as sometimes certain crew members may be lagging in enthusiasm to join the adventure. All of these setbacks are part of the journey, but with presumed potential, access to robust vocabulary and commitment of key crew members embarking on a plotted journey, that terminal is within reach.

You might be a conductor, an engineer, trainmaster or brakeman - all are vital components in getting that train out of the station to its desired destination. No matter what your role, it's time to get on board the AAC express to chart the course of success and help move our learners to the station platform of communication. Without the train workers to get that engine going, that ticket in your hand is just a piece of paper or a digital representation of a passed transaction. Validate that ticket by developing a team of support for your AAC users to reach their greatest potential.

About four years ago we had a shift in the population of students we were serving. Previously, the students making up our intense interventions elementary classroom were primarily verbal communicators. This change in our classroom population brought us many students who had little or no established means of communication.

The world of AAC has never been a strength for us and the ever changing technology was overwhelming. With multiple communication app developments, many with a hefty price tag, we were faced with the multiple challenges of figuring out how to do an AAC eval with feature matching, determining means of funding sources or alternative ways to acquire device(s), and learning the systems to be able to adequately recommend, implement and teach the system(s). At this point in our journey, our State also released a new version of alternative standards; for the first time ever, our students were held accountable to make academic gains. What an exciting, scary, intimidating and uncertain time for us in our professional educational careers! So many unknowns drove us to pinpoint a destination of success and develop an itinerary that would help our students learn, grow and achieve.

FIRST STOP: ADMINISTRATORS

At the beginning of each school year we meet with our building principal and share our goals for the year. Our administrator is a very well-respected and driven woman. Setting goals with

ANGELA SHEETS is a graduate of Ball State University with a bachelor's degree in special education. She has taught elementary intense interventions for 18 years. She is passionate about designing access for all students to meet their greatest potential. Sheets is also a parent of a child who has cerebral palsy, who is an assistive tech user. Sheets has co-presented at PATINS, Indiana Principals' Association, Indiana AAC Summit, OCALICON, ATIA, SXSW.edu, Center for AAC and Autism and AAC in the Cloud. In addition, she has served two years on the ISTAR Content Review Panel, has had guest posts on the AAC Language Lab and PrAACtical AAC, and is a certified LAMP professional.

NICOLE WINGATE, M.A. CCC-SLP, is a graduate of Ball State University with a bachelor's of science degree in speech-language pathology and audiology and a master's in speech-language pathology. She has worked in a public school setting for 18 years. She is passionate about optimizing her students' communication abilities so that they may become competent communicators. Wingate has co-presented at PATINS, Indiana Principals' Association, Indiana AAC Summit, OCALICON, ATIA, SXSW.edu, Center for AAC and Autism and AAC in the Cloud. Nicole has had guest posts on the AAC Language Lab and PrAACtical AAC and is a certified LAMP professional.

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her is serious business as no one wants to let her down. She shares our visions of advancement and achievement. At the end of the year we meet again and talk about if and how those goals were met, as well as, any follow-up needed to ensure success. Goal examples included:

2015-16: "Work collaboratively with other special ed team members to learn and implement AAC for specific students."

2016-17: "Work collaboratively with other special ed team members to learn and implement AAC for specific students and fine tune Core Language Group."

2017-18: "Work to develop a process for AAC evaluations at BHES."

2018-19: "Create and implement AAC language lessons beyond Core Vocabulary," and "BREATHE and enjoy the accomplishments."

Each year another professional goal layer was added. While oftentimes this feels like a race, it really is a journey. Plotting your course in a step by step manner makes the chunks of advancement manageable and strategic.

These goals were well received and understood by our administration partially due to the extra effort we put in to ensuring that principals, superintendents and special education administrators are familiar with our students and involved in our classrooms. We continuously send them pictures and video updates. Additionally, we host several larger scale classroom events (carnival, fiesta, Thanksgiving feast) and send special invitations to our administrators to attend. These events give our students opportunities to show what they know, how they have grown and have face-to-face encounters with the people who are heavily involved in making educational decisions. Having these authentic experiences gives our administrators greater understanding of how important AAC and AT are to our students access to their education. Initially, extending these invitations took a great leap of faith. From day-to-day, we really never know what behavioral needs or health emergencies may arise, but the reality is that this is our reality. As special educators, we have learned to expect the unexpected. Why not invite key decision makers to experience the unexpected with us? We decided that we couldn't criticize administrators for not knowing if we didn't give them opportunities to learn our routines, needs, struggles and successes.

It was the previously mentioned goals combined with daily work with our students who were lacking in means of communication that drove us to figure out what we didn't know. No one was knocking on our doors delivering devices or instructional strategies. It was up to us, with the support of our administration, to set our course of professional development to discover the techniques and strategies that our students so desperately needed us to know. We attended our state conference for assistive technology. We soaked in all that we could and asked questions of other colleagues from around the state. LAMP Words for Life kept coming up in conversations of success stories.

Upon return from the state conference, our enthusiasm bubbled over. After a rejection from our special education board of directors, permission to hold a LAMP training was gained from our district level superintendent. This was huge as it was a perfect example of not taking "no" for an answer and it was our first direct opportunity for guided instruction and implementation. To host the LAMP training, our school was charged nothing beyond sub coverage, and three of our students were able to participate. This was a win-win situation as it meant that our students had hands-on, direct sessions with certified trainers, and we were able to observe, absorb and learn. Not only did other colleagues get to attend, but the families of our students, as well. This was the beginning to building an AAC community in our small rural school and town of Bluffton, Indiana.

Following the training, we began borrowing devices. Borrow, borrow, borrow! We borrowed as many devices as we could from our state lending library, Easter Seals and vendors. Being able to trial devices with our students is so beneficial. The borrowing of multiple devices also means that we have enough pieces of technology to make sure that our paraprofessionals have opportunities to gain real, hands-on experiences.

SECOND STOP: INTENSE INTERVENTIONS CLASS

After building our confidence in maneuvering the devices, we had to figure out how to teach the vocabulary. We needed to devise instructional practices that were practical and meaningful. We decided to implement a Core Word of the Week. On Mondays, we pursue full immersive AAC support in the intense interventions classroom. We have ALL hands on deck - SLP, teacher and assistants! This is an extremely active, busy and loud session as we strive to learn the motor plans to utilize the target word in addition to gaining understanding of how the core word can be demonstrated in multiple settings and situations. The same core word is carried out all week long. This has been a super beneficial strategy to make sure that staff have an opportunity to have strategies modeled for them so that they can carry on with the lesson throughout the week.

Putting a team approach into practice was an imperative piece for building success. Sometimes intimidating? Yes! Sometimes scary? Yes! Important in getting everyone on board? Yes! We ended up learning so much from each other and from our students. When we combined our knowledge, services, brainstorms and our resources, we became so much more efficient and successful with our services.

THIRD STOP: PARAPROFESSIONALS

Our assistants are critical players in the lives of our students. They are often our hands, feet and voices, as we cannot be in all places at all times. These assistants love to learn new ways to support our students. Let's face it, they are not making the big bucks. They are in this job to help our students achieve. It's our job to give our assistants the strategies that they need to

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do their jobs well. How do we accomplish this? There are only so many minutes in the school day. And most of those minutes are spent directly with students. We had to become creative to make sure that our assistants had access to the information that they needed to be effective implementers of communication.

On a weekly basis, classroom lesson plans are emailed to all assistants and related service personnel. In the plans, the core word is indicated along with a short tip of the week. This tip might be a link to the prompting hierarchy, video clip of how to use the word finder or an overview of the content connectors. These are brief tips but quick reminders of important tidbits.

We have hosted luncheons for staff to be able to ask direct questions from therapists and play a role in helping to develop courses of action. This also serves as a fantastic time to celebrate those awesome paras!

Additionally, we have done short training centers. While students were participating in holiday activities in their general education classrooms, we pulled all assistants for brief training centers.

When training with our assistants, the feedback is phenomenal. They have expressed that they feel valued when we take even a few minutes to give them specific instructions and tips. The reports that our assistants provide to us is equally as valuable as they often see our students in situations that we do not. Taking time to develop these mutual relationships means that our students have a better, more unified scaffold of support.

FOURTH STOP: GENERAL EDUCATORS

The core word of the week set the stage to get our general education teachers and students involved. We began making Core Word of the Week videos. Any staff member or student is able to participate in helping make the video. And boy, do we have FUN! While capturing real-life instructional models of core vocabulary, we also manage to collect some video bloopers that we reveal to staff at the end of the school year. Our related arts teachers, along with some of our other general education teachers post the Core Word of the Week with the picture symbol sequence from LAMP Words for Life outside their classroom doors. Along with the Core Word of the Week is a QR code that leads to the video. You can find our videos on YouTube under the channel WingsWorks .

The video project is based off of the same evidence-based practice of video modeling. This strategy has led to some project-based learning opportunities for our general education students to write video scripts, act in the scenes, record, edit and produce the videos in a very authentic learning project to help their peers advance in language acquisition.

The videos serve as a great springboard to begin educating our general education staff on the basics of AAC. We also held some mini AAC staff developments after school. We made them short and sweet, around 15 minutes. Just enough to entice their interests and share the basics.

We have also educated the other students in the building on AAC during disability awareness month. This helps foster the social language piece for our students in their general education classes. AAC is compared to glasses for eyes, hearing aids for ears or braces for teeth. It makes it easier for the students to apply understanding.

This past year during disability awareness month, we had a "Chatterbox Challenge." Our entire school was silent from 8:00 - 8:30 am. We equipped our general education teachers with alternate forms of communication for their students. These included manual boards, simple signs, slap bracelets with icons, white boards, visual pulleys, etc. Our principal gave the morning announcements through a digital presentation showing several different forms of assistive technology and AAC. This was an awesome opportunity for our entire student body and faculty to all see forms of AAC that are used in our building on a daily basis by our students. Such a fantastic and efficient means of educating our school and giving them hands-on experiences.

FIFTH STOP: PARENTS

Including parents in this whole process is probably one of the most important pieces and sometimes the most difficult piece. It

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is much easier to train and support staff when you are with them during the entire work day. Scheduling training opportunities with parents can be much trickier. Our parents have access to our word of the week resources and videos through our school website. Additionally, we have made short training videos to assist parents on the basic functions of devices and at home modeling tips. We try to keep our parents posted on new developments and accomplishments by sharing as many photos and videos as possible.

We have hosted community playdates at our local library to set up examples of modeling and interactive opportunities to support communication development amongst peers and siblings.

SIXTH STOP: COMMUNITY

Living in a small community may have an advantage in that word travels quickly here. We have been granted opportunities to share our students' success stories and educate key community players on the AAC developments in our town.

Our local YMCA hosts adaptive camps during all school breaks. These camps offer half day enrichment activities and events at no cost to our families. As our students increased AAC fluency, it became apparent to the YMCA staff that having devices available on site would be a great benefit for staff and campers. YMCA staff wrote a grant to purchase devices to have on hand for modeling and interactions during camp events and also available at the desk for anyone who might need them.

Just down the road from our YMCA is Hope Church, a local ministry that offers an All4One Sunday school class. The class has multi-tiered supports in place to form a foundation for inclusive, Christ-centered educational opportunities. As more and more AAC users and an increased number of students with limited communication began participating in All4One, the Hope Church staff quickly realized the need to train staff and volunteers on basic AAC implementation. The staff also created low tech AAC systems and purchased high tech systems to have communication modules available for modeling instruction and student use.

By navigating your journey to include strategic stops for training and demonstration with special educators, paraprofessionals, administrators, parents and your community, a large, lasting impact will be accumulated! Your team will be inspired to jump on your AAC express and support the travel to communication success! The power of communication changes lives one word at a time! All aboard! ■

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By Kelly Key
Tuesday, January 15, 2019
3:30 pm – 5:00 pm (CST)

Tips and Activities for Implementing Core and AAC with Older Students

By Kelly Key
Tuesday, February 5, 2019
3:30 pm – 5:00 pm (CST)

Is Your Student Data Safe?

By Kelly Fonner and Mike Marotta
Thursday, March 7, 2019
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By Rachel Kruzel
Tuesday, March 26, 2019
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Top Ten Transition Tech Tools: Common Assistive Technology Tools used in Post-Secondary Education

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Virtual Reality

in the Universal Design for Learning Classroom

You may have seen the fun Virtual Reality (VR) booths at the mall or amusement park, but this emerging technology field isn't just fun and games. These technologies have significant implications for education. Of course, variations of high-end technology like virtual reality, multi-user environments or augmentative media have been used in educational fields, such as aviation or medical schools, for decades usually with high cost equipment. As the cost of technology drops, more K-12 schools are gaining greater access to this emerging technology and there is great interest to use it as an educational tool. Let's unpack some of the terminology surrounding VR.

VIRTUAL REALITY

Virtual reality (VR) involves a three-dimensional environment that may include 360 images, audio, text or video. The difference with VR from traditional multimedia lies in its interactiveness. VR is defined as a three-dimensional computer generated environment that updates in real time and allows human interaction through a device. There are different levels of the interaction through the input/output mechanism. Total immersion might include a data glove giving tactile feedback and headphones or helmet offering immersive surround sound. It can also be done with a very inexpensive viewer and common mobile phone technology, making it affordable for classroom use.

AUGMENTED REALITY

Augmentative reality (AR) is similar to VR, but rather than an immersive environment that isn't actually there, AR superimposes a computer-generated image on a user's view of the real world, thus providing a composite view. The most famous example of augmented reality is the popular game Pokemon GO that uses a mobile device's GPS to locate, capture and battle virtual creatures which appear as if they are in the player's real-world location.

MIXED REALITY

Mixed Reality (MR) interfaces combine real and virtual settings in various ways, to enable psychological immersion in a setting that blends physical and digital worlds. For example, an outdoor augmented reality experience using mobile devices can superimpose information, simulations and videos on a through-the-camera-lens view of space.

In the classroom environment, VR and AR hold potential for engagement, learning and retention. In our experience implementing a VR grant in Minneapolis Public Schools, teachers have creativity used VR to take students on field trips to a place or set of places that would otherwise be inaccessible to their class.

JANET PETERS is the Project Coordinator of Educational and Assistive Technology with the Great Lakes ADA Center. She has extensive experience with Universal Design for Learning including, serving as an advisor on the National Center for Accessing the General Curriculum hosted by the Center for Applied Special Technology (CAST) and is a CAST Cadre member. She is currently working with the Minneapolis Public Schools on Virtual Reality and Universal Design for Learning.

JESSE MORGAN is an occupational therapist (OT) and assistive technology professional (ATP) in his 19th year with Minneapolis Public Schools. Jesse is the lead staff at the Assistive Technology Center (ATC) for Minneapolis Public Schools.

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This has allowed students to make better connections with their learning by providing concrete visual explanations and examples. The VR implementation has significantly enhanced engagement and excitement about learning experiences. It's also increased participation in classroom reflections across ages, disabilities and content area.

Although we are just starting to explore this area, there has been speculation that some VR expeditions have the potential to develop greater empathy and deeper understanding about diverse communities. Roman Krznaric in Six Habits of Highly Empathic People (2012), suggests the following can be developed as a result:

- Cultivating curiosity about strangers
- Challenging prejudices and discover commonalities
- Gaining direct experience of other people's lives
- Developing an ambitious imagination

It's possible that work in VR spaces not only can enhance the learning outcomes, but when students participate in shared experiences such as these they feel more participatory of the classroom experience.

The use of VR technologies for creating learning environments holds great promise but also many challenges. One challenge is using a pedagogical foundation and not getting "star gazed" by the cool factor of the technology. In the current grant project, we are using the best practice framework of Universal Design for Learning (UDL) to implement VR.

VIRTUAL REALITY IN THE UNIVERSAL DESIGN FOR LEARNING CLASSROOM

Universal Design for Learning (UDL), developed by CAST, is an educational framework based in the neurosciences that uses curriculum design to lower the barriers that traditionally limit access to information and learning for many students. (Gordon, D., Meyer, A., & Rose, D. H, 2016)

A key concept behind the UDL framework is learner variability. Learner variability is the idea that all individuals are unique in how they learn. Not only do we all learn in unique ways, but our abilities continually change in response to the environment in real time. UDL encourages us to think about learner variability in our classroom as a normal and predictable part of teaching any group of students. With intentional design, teachers can proactively plan for variability. Those who embrace the idea of learner variability can use UDL to design opportunities for all students to engage, understand and respond in meaningful learning. The UDL Principles and Guidelines are pragmatic tools to address (and embrace!) learner variability.

(See Image 1: UDL Principles)

UDL also can serve as an excellent method for new technology integration to enhance and support the educational environment. Conceptualizing emerging technology, such as VR, with the UDL lens will ensure it can improve learning experiences for all students and not inadvertently cause barriers.

In our project, we used VR to target support of the affective

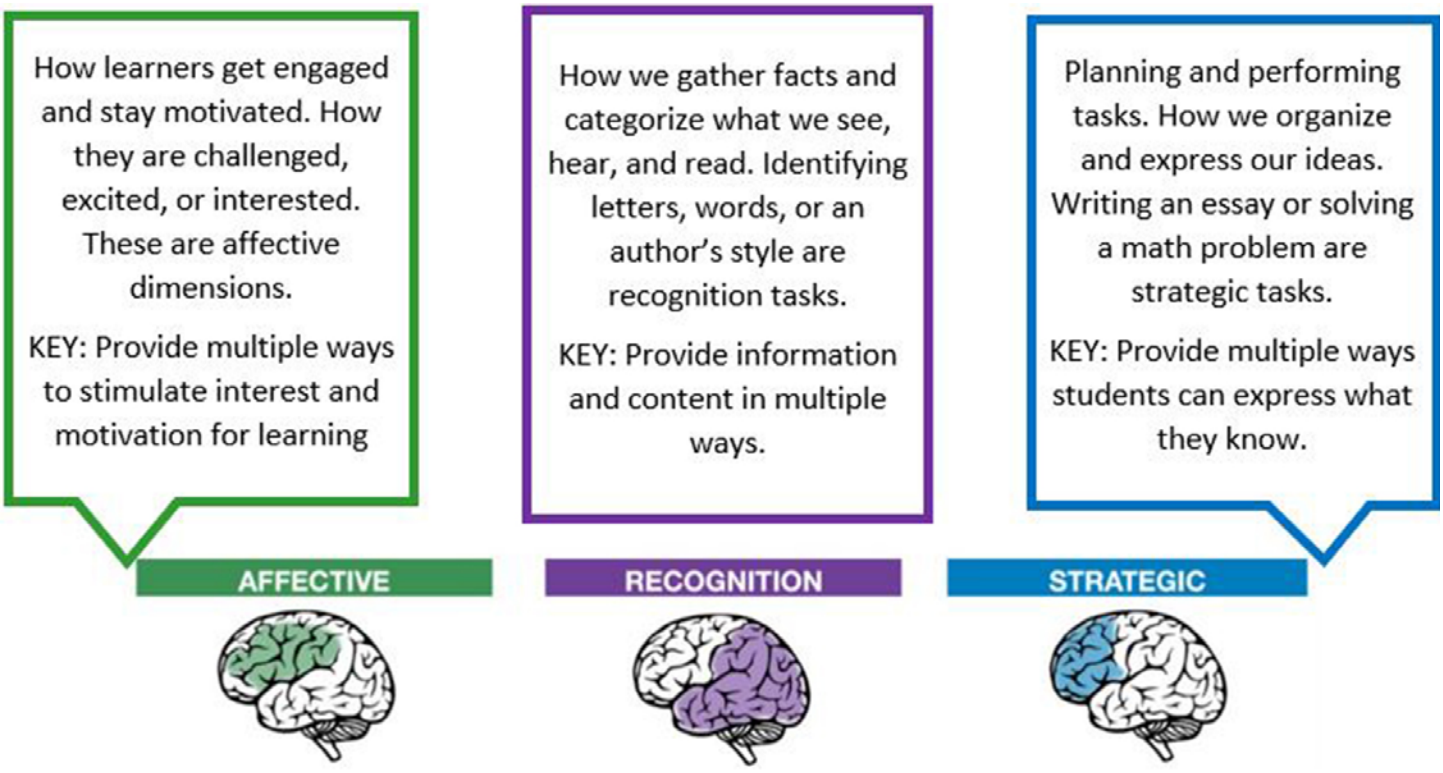

Image 1: UDL Principles

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and the recognition networks. The first principle in the UDL framework is to support the affective networks by providing multiple means of engagement. The affective networks are specialized to evaluate patterns and assign them emotional significance. Students differ in the ways in which they can be engaged or motivated to learn and therefore it's essential to provide multiple options for engagement. In our classrooms, students had a variety of abilities, cultural backgrounds and prior knowledge of the content. The students were very excited to use the VR kit and because of the structured and intentional lessons, VR supplemented the experience to optimized relevance and authenticity. VR's interactive, multisensory, 3-dimensional experience engaged students in a way that was not normally possible.

As with engagement, learners differ in the ways that they perceive and comprehend information that is presented to them. For example, students with disabilities such as blindness or deafness need content to be presented in an accessible way for their sensory ability, but all students in the classroom have differences that require a varied and flexible approach to teaching the content.

Minneapolis is a large urban district with many cultures and languages represented, 91 at last count! We decided to focus the VR implementation on UDL Checkpoints to supply background knowledge and guide processing and visualization. VR offers an amazing experience to gain understanding of place. For example, one teacher used the VR kit with her English Language Learners (ELL) in first grade to explore the National Mall in Washington D.C. Many students were new to our country and VR was a way to give them a sense of the national park and its monuments, connecting information they had learned about to a "real-life" setting.

One affordance of VR technology is as a deeply immersive experience that supports the UDL Checkpoint to guide processing and visualization. For example, students in a 4th grade classroom learning about forms of energy were able to stand at the base of a wind turbine and look up, generating "oohs" and "ahs" about the height and enormity of the structure. The experience supported the visualization of their learning content in a way that would be difficult without the technology.

CLASSROOM IMPLEMENTATION

As mentioned, Minneapolis Public Schools was able to implement VR for UDL through a state level grant. The grant included the VR kit with devices for 20 students and one teacher console. The goal was to promote inclusion and it included training and support.

In order for teachers to get the district VR kit into their classrooms we first asked them to complete an online request form. The questions on the form centered around principles of UDL and inclusion. The questions included: Do you see a need to improve inclusive practices in your school? Are you familiar with UDL? and How might virtual reality (VR) in your classroom

Image 2: Middle school student using VR Headset

enhance inclusion? The answers to these questions helped us design a learning experience catered to each classroom's specific needs. It also provided us an opportunity to either introduce UDL or talk about UDL on a deeper level depending on the teachers baseline UDL knowledge.

When explaining the VR kit to potentially interested teachers, we stressed the importance of using VR as a tool to supplement learning. We reminded teachers that it should be used to deepen understanding of a topic that is already being addressed in the classroom. We also used UDL terminology to help reinforce the importance of multiple means of engagement and multiple means of representation. We worked with teachers to plan a lesson around a current topic using VR. Some of the classes where VR was implemented were International Baccalaureate (IB) schools so we tried to tie the VR lesson into their current unit of inquiry. IB schools use units of inquiry to develop learning targets.

The VR kit was used across the entire school age spectrum during the 2017-2018 school year in Minneapolis Public Schools. The kit was used in High 5, elementary school, middle school and high school. From five-year olds traveling under the sea to middle school kids looking inside an eyeball, the students were

all amazed and deeply immersed in the VR lessons.

In order to match learning units with a VR lesson we used the Google Expeditions app. Google Expeditions has over 900 free expeditions to choose from. Expeditions can be searched by title or topic and can be downloaded onto a tablet or handheld device. Only the teacher device needs to have the expedition downloaded.

Once we paired a lesson topic with an expedition from Google Expeditions we were ready to implement VR. One of our first VR lessons was with a High 5 classroom doing a unit on life underwater. We decided to divide into teams of two people for a couple reasons. One reason is that it can be hard on the vestibular system to use VR continuously for long periods of time, so we wanted to have built in breaks. Also, we wanted students to have time to complete a worksheet or think about what they were seeing. The students in the High 5 classroom absolutely loved the VR lesson and many of them later said they actually felt like they were underwater. I can support this because I saw several of them trying to reach out and touch the fish they were seeing through their VR goggles.

(See Image 2: Middle School Student Using VR Headset)

We also visited the pyramids and Sphinx in Egypt with third graders learning about ancient civilizations. The students commented on how much more they were able to appreciate the size of the pyramids by using VR instead of looking at pictures. We implemented VR with middle school students who were learning about the eye. This lesson was especially rewarding because some of the students did not want to participate in the eye dissection exercise, so this allowed them to see inside the eye without having to actually cut one open.

The kit was used in fourth grade to help students better understand the solar system. Students were able to travel to outer space and see planets and the solar system in a way that helped them understand the solar system in much deeper way than seeing pictures in only one dimension. One student commented, "This was the coolest thing I've ever done in school!" and another student later told me the VR lesson helped her learn how big and how far away the planets really were. There was a very rich level of learning that occurred across all settings and all age groups. The students were excited to share their VR learning experience with their peers, families and school staff. I overheard one student tell a peer at lunch that he went to the moon during science class today! At the end of each lesson, we asked if there were any questions and the top question asked was if they could do VR again another time.

SPECIAL CONSIDERATIONS FOR ACCESSIBILITY

Students of all academic levels were able to participate in the VR lessons. It was rewarding to see the inclusive atmosphere where advanced learners and students with significant needs were all learning the same information in a shared environment. In order to receive the VR kit, we made it a condition that all learners (advanced learners, English language learners and students with special needs) would be included in the lesson. In one classroom, a group of students on the autism spectrum were able to fully participate with their same age peers for the first time all year.

Some students needed assistance to use the devices appro-

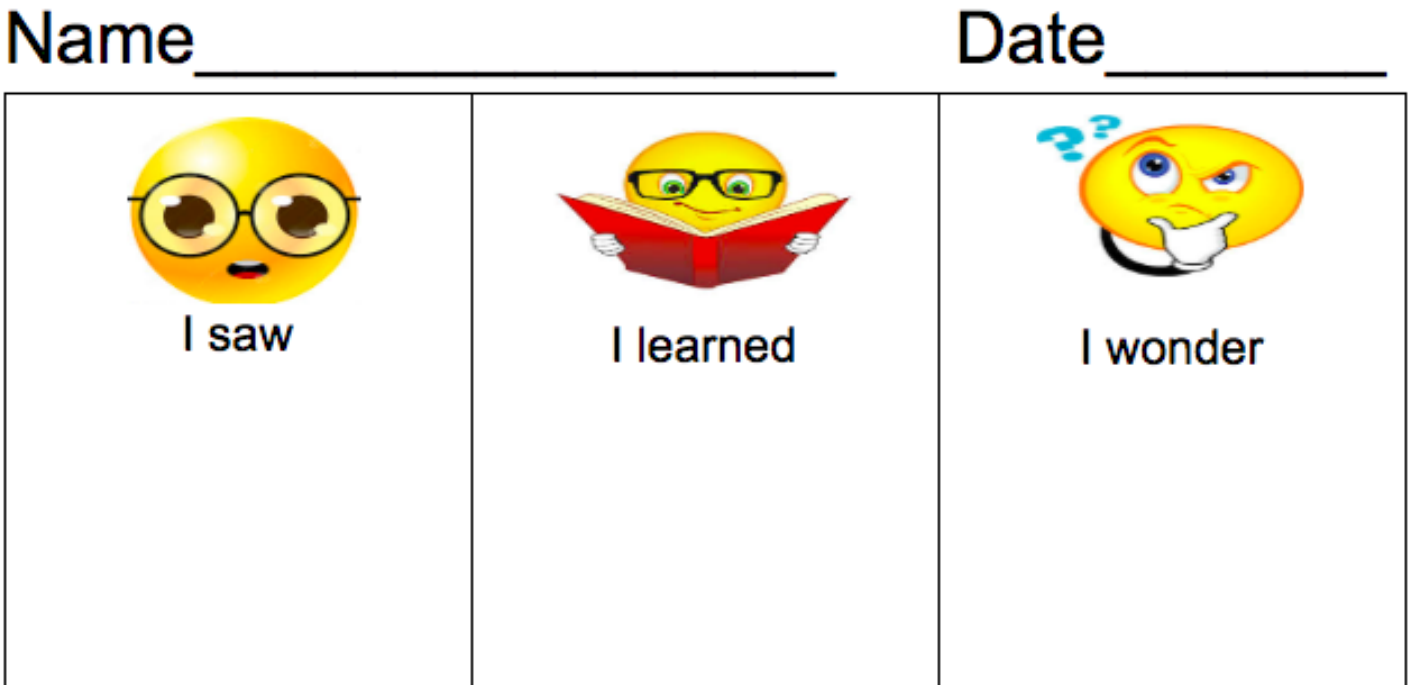

Image 3: UDL Worksheet that Goes with the VR Lesson

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priately and since we wanted to make sure everyone was included, we made a few adaptations. Some of our students with emotional and behavioral disabilities had a difficult time sharing the devices or holding them without throwing them. In these cases, we provided one-to-one adult assistance to make sure the student could participate safely.

We had some students with vision impairments that also needed some assistance. We were able to remove the devices from the goggle set and allow students to view the screen directly from the device. This allowed students to enlarge the scene as needed. We found that this was also a helpful strategy for students that experienced motion sickness while using the goggles.

For students that had motor deficits that prevented them from holding the goggles, our district Assistive Technology Center (ATC) designed a band that could be attached to the goggles allowing for hands free use. We also allowed our students with noise sensitivity to use noise reducing headphones during the VR lesson.

All students were asked to complete a worksheet during the VR lesson. We devised a worksheet using the UDL principle of allowing students to use multiple means of action and expression. The worksheet was intended to provide a way for all levels of learners to share what they learned. It included visual supports and allowed students to share information both verbally and non-verbally. Students were given the option to share what they learned using multiple means of expression. Students were able to share verbally by looking at the visual prompts on the worksheet and speaking their answers to a peer or adult. Students were also allowed to draw pictures of what they had seen, what they learned and what they wonder. In addition, students were able to print their answers on the worksheet provided. A group share out at the end of the lesson allowed all learners to share their experience.

(See Image 3: UDL Worksheet that Goes with the VR Lesson)

CONCLUSION

In conclusion, we were very pleased with the outcomes of the VR project and were able to work out logistical and programmatic details of training and support surrounding the use of the VR kit. The feedback from staff, students and families was overwhelmingly positive. The VR project showed great benefits in the classrooms where it was implemented to support Minneapolis Public Schools ongoing efforts with UDL implementation. In fact, one of the programs where it was used was able to purchase their own kit for continued integration. In the future we hope to extend the use of VR and possibly expand to include AR technology.

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- Coding - Learn how to code and control droids and drones.

MAKE MUSIC

Skwitch lets you make music from the palm of your hand – from anywhere. So when you feel inspired to create, you can. It works as an easy to use musical instrument or advanced MPE/MIDI device, and you don't need any training. It's easy to compose your own riffs, melodies and chord progressions. Just press the Skwitch in different places, and you can step forward and backward through your favorite melodies, expressively shaping the sound as you squeeze.

NO ONE'S LEFT BEHIND

The unique design features of Skwitch mean it can be used by everyone – including people with disabilities. It's all about how your creativity can connect with technology and make something inspiring and amazing. And when you download 'Switch Access' it will turn your iPhone into an accessibility switch, which you can use with Switch Control. In short, we believe that Skwitch is the most inclusive gadget out there.

CODING'S FOR EVERYONE

With Skwitch you can code and make music without any musical knowledge or abilities. It's easy. Just take Skwitch out the box, slot it on to your iPhone and you're up and running. Within minutes you'll be programming your own musical instruments that respond to your touches on Skwitch. You can even learn to control droids and drones – all at the touch of a button.

LEARN MORE

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TEMI, THE PERSONAL ROBOT

BE ANYWHERE.

Connect to your friends, smart devices, media and video communications, harnessed by the power of your voice, hands free.

HEY TEMI

For years we've been dreaming of robots that will serve us in our home and office. Today the time has finally come!

TEMI, THE PERSONAL ROBOT

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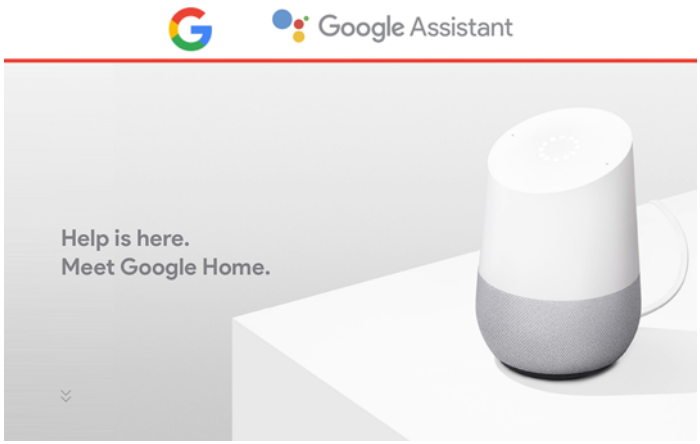
HELP IS HERE. MEET GOOGLE HOME.



GOOGLE HOME

At Google they believe in the power of technology to make a difference in people's lives. And for 19-year-old Robbie Ivey from Michigan, that certainly rings true.

Robbie has duchenne muscular dystrophy, which has left him able to control only his eyes, head and right thumb joint. Among the many challenges Robbie and his family face, nighttime is one of the key ones. For years, Robbie's mom Carrie has set her alarm every few hours to get up and change his position in bed so he doesn't get bed sores or infections. Earlier this year, a sleep-deprived Carrie put out a message to the Muscular Dystrophy Association asking for help to try and find a better way. She got a response from Bill Weis, a retired tech worker, who thought he could set up Robbie's bed to be controlled by voice activation. While working on the bed, Bill had an epiphany: if he can control the bed this way, why not everything else in Robbie's bedroom universe?

As part of their efforts to spotlight accessible technologies throughout National Disability Awareness Month, they hear directly from Robbie about how technology has helped him gain more independence in his life as he starts off on his first year at Oakland University in Rochester.

HANDS-FREE HELP FROM THE GOOGLE ASSISTANT.

Get answers, play songs, tackle your day, enjoy your entertainment and control your smart home with just your voice.

SAY IT TO PLAY IT.

Listen to music, playlists, audiobooks and more, getting rich sound from Google Home's high excursion speaker.

TACKLE YOUR DAY.

Get personalized help with your schedule, reminders, calls, news and more, whenever Google Home recognizes your voice.

LEARN MORE

LECKEY – I'M READY TO GO, MYWAY!

MyWay is the NEW upright movement device from Leckey, which is all about providing children with maximum opportunities for interaction, exploration and participation in a supported, upright position. With MyWay, children can say "I'm ready to go, MyWay!"

MyWay has a revolutionary harness support system which delivers the core stability required to support head control and limb movement, enabling children to achieve optimum stepping ability. Furthermore, MyWay's open-frame design makes touching, feeling, participating and discovering easier, giving children more opportunities for development and learning. It also allows therapists to get close to the child and work with their lower limbs whilst they are in MyWay.Mobility Disability

TAKING UPRIGHT MOVEMENT THERAPY IN A NEW DIRECTION

MyWay brings something new to the world of upright movement via its revolutionary harness support system:

The MyWay harness delivers the core stability required to support head control and limb movement, enabling children to achieve optimum stepping ability.

The structure and comfortable postural support delivered by the MyWay harness means it works for children with a range of needs e.g. those with scoliosis or lordosis, those with low truncal tone and those who experience dystonic movements. The MyWay harness provides a 'hug' like effect via the corset-style design, which can increase sensory feedback, dampen involuntary movement and provide comfort.

The MyWay harness supports children in experiencing an upright view of the world, supporting their cognitive, visual and social development.

If a child is unable to complete a standing transfer, they can be hoisted directly in/out of the MyWay frame in their harness using the optional hoisting straps accessory.

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INCLUSIVE CLASSMATE PC

INCLUSIVE CLASSMATE PC

The Inclusive ClassMate PC is an elegant 23.8" high definition, all-in-one touch screen PC combined with the power of Windows 10 Professional. The Inclusive ClassMate PC comes with 50 of our best touch and switch accessible software titles pre-installed, enabling access for early learners and those with physical difficulties.

SOFTWARE

Their top 50 award winning switch and touch screen software titles are pre-installed, providing access to thousands of progressive and engaging educational activities, tailored to the individual needs of your students. Their comprehensive range of software has been specifically developed for students ranging from the earliest stages of interaction and those with visual difficulties through to those learners wanting to develop early curriculum skills.

READY TO USE OUT OF THE BOX

The Inclusive ClassMate PC is ready to go out of the box, with no configuration required. Offering the ability to install your own software, a 21.5" 10-point multi-touch LED back-light display with ambient light and proximity sensors, as well as high quality built-in speakers, comprehensive video and USB connectivity. This is the perfect all-in-one solution to fulfill all your computing needs.

MOUNTING

The Inclusive ClassMate PC includes VESA mounting points (100×100) providing easy mounting to floor stands, table stands and wall mounts. Coupled with the REHAdapt Mounting Plate and their range of Mounting Solutions the Inclusive ClassMate PC is a flexible, robust and portable solution for the classroom.

SWITCH ACCESSIBLE

The Inclusive ClassMate PC is also available packaged with the iSwitch, a Bluetooth switch providing wireless access to all your favourite switch accessible games and online services. Alternatively, you can connect a range of USB switch interfaces including the EasySwitch Bundle.

WHAT'S INCLUDED?

The Inclusive ClassMate PC includes their top 50 software titles including thousands of progressive and engaging educational activities, taking students on their first steps of interaction with technology through to making independent choices. No Internet connection needed, all software is pre-installed and ready to go.

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