

Assistive Technology Resources for Children and Adults with Disabilities

Closing The Gap

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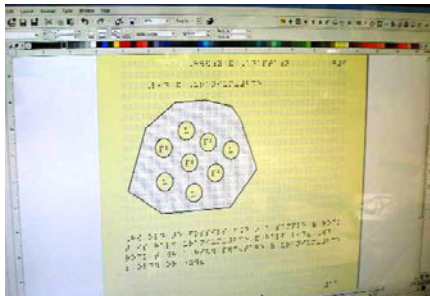
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Braille on Demand

One-Day Braille Transcription Service

...look around for a need and start coming up with ideas to fill that need. One idea will lead to another, and before you know it...you've done it! See a need, fill a need!
- the character Bigweld, from the movie "Robots"

"See a need, fill a need" is a driving philosophy behind Iowa Prison Industries (IPI), which provides work training opportunities to men and women incarcerated in Iowa's state prisons. IPI's programs have been shown to provide returning citizens with the skills needed to successfully re-enter our communities, which translates into fewer crime victims and lower costs to taxpayers.

In addition to traditional programs producing license plates, office furniture and clothing, IPI operates a braille transcription and production service known as the Anamosa Braille Center based at the Anamosa State Penitentiary. This IPI program employs 30 men certified or training in Literary Braille, Nemeth Code (For Mathematics), Music Braille and Literary Proofreading. The program includes comprehensive tactile graphic production for all transcribers as well.

Iowa educators seek to instruct students with sight-impairments alongside their sighted peers. But these educators can be at a big disadvantage when it comes to providing educational materials due to the lengthy time typically associ-



Construction of the stately Anamosa State Penitentiary began in 1874 using stone from a local quarry. Cells were four feet, 6 inches wide, seven feet six inches in height, and eight feet in length. It was almost ten years later that electric lights were first used.

ated with braille transcription. Educators are normally required to submit next year's entire curriculum for braille transcription early in the spring of the current school year, in order to have these materials available for their students when the new school year begins. Often, educators must wait for administration decisions on

curriculum before they can place their order for braille transcription. And if a student with a sight impairment changes school districts, let the scramble begin!

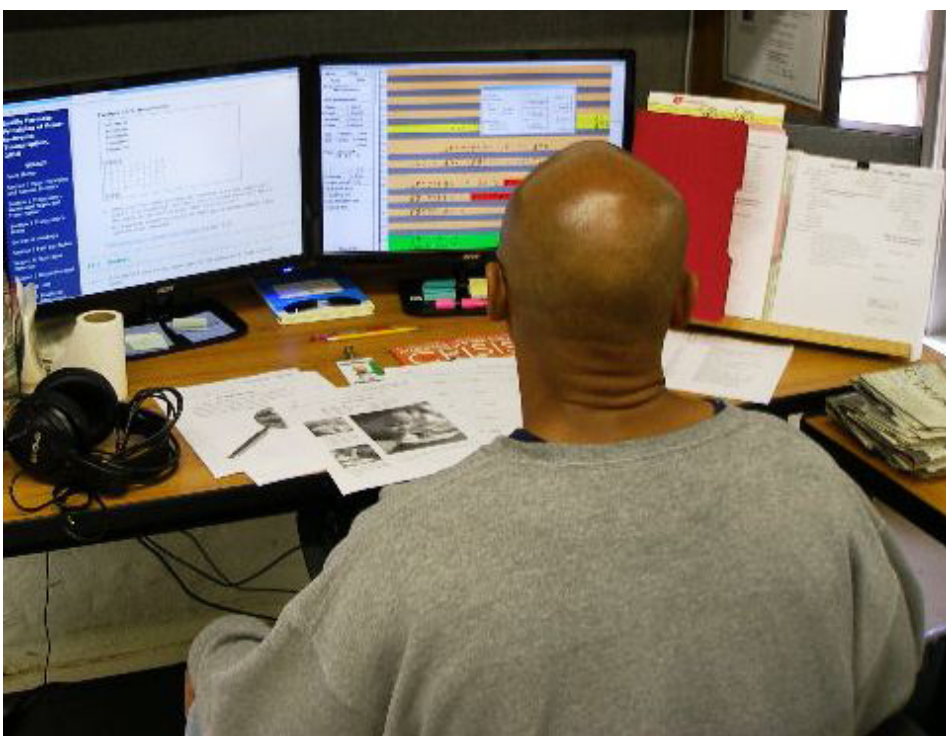
There is also a trend toward using worksheets and articles downloaded from the internet alongside traditional textbooks, materials that are not always available



DAN CLARK, Dan Clark is the Director of Iowa Prison Industries, a work training program for the men and women incarcerated within Iowa's nine state prisons. One of these programs, the Anamosa Braille Center, transcribes educational materials for school children with sight impairments. Prior to joining IPI, Dan spent 30 years in private industry. He holds an M.B.A. from the University of Buffalo and an M.S. from the Rensselaer Polytechnic Institute in Troy, NY. Dan and his spouse Kristin reside in West Des Moines, Iowa.



Every day nearly 200 men from the Anamosa prison go to work for Iowa Prison Industries, making license plates, furniture, signs, and transcribing braille. Work training provides the men with income, and prepares them for re-entry back into Iowa communities.



Braille transcriptionists at the Anamosa Braille Center are certified by the U.S. Library of Congress after years of study and testing. Specialized transcription software and OCR programs assist these men in transcribing braille within one business day for the Braille on Demand program.

months in advance. And impromptu collaboration between different subject area teachers and curriculum changes during the school year can be difficult to accommodate if educators are not experienced braille transcriptionists with access to an embosser. One educator told IPI, "There is only so much I can do since I am not a certified transcriber."

Seeking to improve the accessibility of instructional materials for schoolchildren with sight impairments [See a need], men at the Anamosa Braille Center developed a new service known as "Braille on Demand". This new service would do something a little bit crazy – email IPI a document today, and we'll email you back an electronic braille file tomorrow! [Fill a need].

Together with the Iowa Department of Education, IPI introduced the Braille on Demand service on a prototype basis in late 2015, giving a limited number of Iowa educators the opportunity to have documents transcribed into braille in just 24 hours. As the program began, the plan was for educators to upload one to four-print pages of material via the IPI website, which the Anamosa Braille Center would transcribe and email back to them for embossing at their school.

But during the first year that the prototype service was available, a number of unexpected developments occurred:

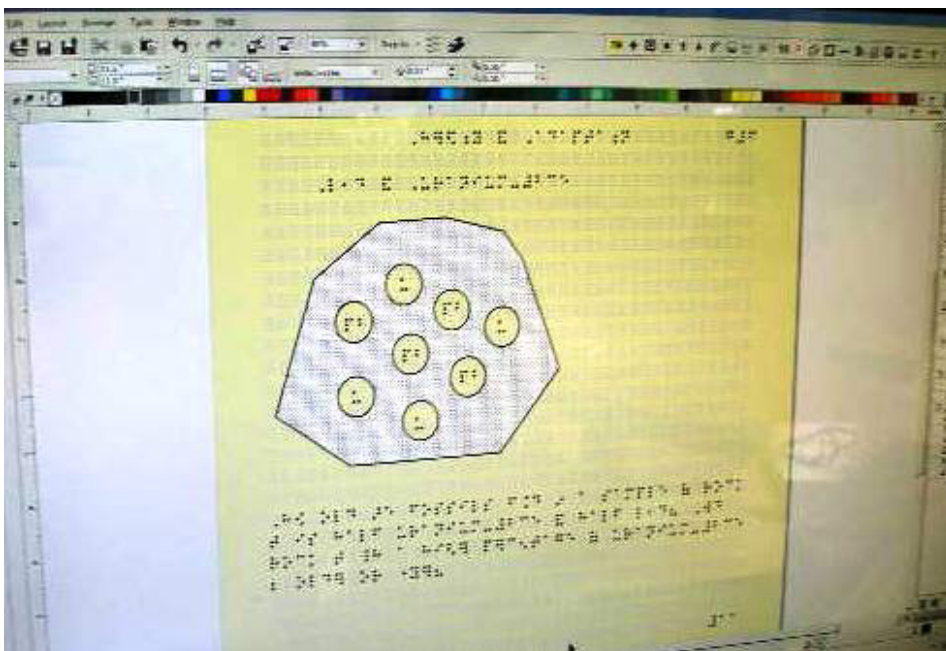
1. Demand for the service was much higher than anticipated
2. The variety of documents needing braille transcription was much wider than expected;
3. Few educators wanted to emboss the braille themselves, instead preferring IPI send them the finished product via UPS
4. The needs of individual students varied quite a bit, requiring a personalized approach.

DEMAND FOR THE SERVICE WAS MUCH HIGHER THAN ANTICIPATED.

It soon became clear that IPI was on to something big with Braille on Demand.



The Anamosa Braille Center produces hundreds of thousands of braille pages using high speed embossing equipment.



Students with sight impairments need accessible materials for all sorts of subjects, and the Braille on Demand program transcribes these within one business day.

One educator wrote us saying:

"Braille on Demand needs to be offered in the future for everyone working with students who are learning Braille. The direct contact, the idea of them thinking creatively on how to deliver Braille in a timely manner and in a variety of situations, and the willingness to communicate directly and quickly not only opens doors to student access to Braille, but also changes the way educators approach their teaching. [Braille on Demand] could make the state of Iowa a leader in braille instruction. If Braille on Demand continues, Iowa will have something that the majority of states can only dream of."

The volume of Braille on Demand grew exponentially, doubling after its first full year, and tripling the year after that!

Some unique aspects of working in a correctional setting are that offender movement can sometimes be restricted ("lockdowns"), and that offenders are frequently transferred to different facilities as they get closer to release (more than 90% of those incarcerated in Iowa are scheduled to be released). The Anamosa Braille Center developed a transcriber network linking three additional satellite facilities, which provided new transcription capacity as Braille on Demand grew. The satellites also allowed men to continue transcribing as they transitioned to other institutions, and provided redundant capacity in case a lockdown occurred.

THE VARIETY OF DOCUMENTS NEEDING BRAILLE TRANSCRIPTION WAS MUCH WIDER THAN EXPECTED.

One educator best summed up the services of Braille on Demand, "As a TVI, Braille on Demand has been a real game-changer in regards to my job. Last minute braille needs used to really throw a cog in things, now we can relax because we KNOW things will be taken care of. This not only includes braille, but Nemeth and tactile graphics as well. The big plus is IPI's willingness to adapt quickly to any situation, sending things in time no matter the circumstance. Braille on Demand



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The high volume and wide variety of projects that educators send into the Braille on Demand program was a surprise to the Anamosa transcriptionists. Transcriptionists at three other facilities were networked to provide additional transcription capacity.

is the perfect name for a service that has gone far towards letting students [with sight-impairments] have materials at the same time as their sighted peers.”

While IPI expected short, quick-turn-around projects such as “backpack stuffers,” the reality was that there was an unmet need to quickly transcribe all sorts of documents – everything from standardized tests to news articles to textbook chapters. The wide variety of projects was a surprise, but the men in Anamosa welcomed the challenge and appreciated knowing how much the schoolchildren needed these transcriptions.

EDUCATORS WANTED IPI TO SEND THEM THE FINISHED PRODUCT VIA UPS.

The original idea for Braille on Demand was that documents would be upload-

ed by an educator, and then IPI would email back a braille file that could be embossed there at the school. It turned out that fewer educators than expected were equipped with the ability to emboss braille at their local school, so Braille on Demand immediately expanded its services to include embossed braille sent via UPS Next Day directly to the school. Now, the vast majority of projects are embossed at IPI’s facility in Anamosa and sent via courier.

THE NEEDS OF INDIVIDUAL STUDENTS VARIED QUITE A BIT, REQUIRING A PERSONALIZED APPROACH.

One of the biggest surprises to the men at the Anamosa Braille Center was a desire on the part of educators to tailor transcription projects to the needs of

their individual students.

Typical braille transcription projects involve textbooks, literary works, or worksheets – these materials are put into braille according to standardized rules. They’re one-size-fits-all out of necessity, because that textbook or reader or worksheet might be used by any number of children, each of whom might be reading braille at a different level. So the rules of transcription are fairly rigid.

In contrast, each Braille on Demand project is for a specific student, and this specific student has his or her unique set of circumstances – their skill at reading braille of course, but potentially they may have other physical challenges, or perhaps an educator that is not overly proficient in braille, or whatever.

As a result, men at the Anamosa Braille Center worked with educators to develop



The Anamosa Braille Center uses the tools of lean manufacturing to continuously improve their operation.

a profile of needs for each individual student, and the IPI website was modified to assist educators in this process. Transcribers worked with individual educators to customize braille for each individual student, such as partially contracted braille, added math or tactile graphics, and offering interline (print over braille). In addition, the Anamosa Braille Center raised the number of allowed pages per order to a maximum of ten pages at the request of educators.

THE FUTURE OF BRAILLE ON DEMAND? EXPRESS BRAILLE.

The Braille on Demand service has definitely addressed an unmet need for accessible materials – respondents to the most recent online survey ranked it as 4.96 out of a possible 5.0. One educator responded to the survey saying

"Being a part of the Braille on Demand program showed me its value. While materials can be ordered through another entity for the beginning of each school year, the fluidity of teaching means many things come up that weren't planned, and Braille on Demand allows one to adjust teaching direction while knowing that students [with

sight-impairments] will have the same materials as their sighted peers. Students state that the graphics available through Braille on Demand are of a much better quality than those created on an embosser. Another aspect, and in many cases more important, is the availability of special orders such as Print over braille or partially contracted braille with the same expected turnaround time as any other order. I cannot stress enough how huge this is to beginning braille readers. My colleagues are jealous of my ability to have been ordering things during this pilot process. Truly, these special orders could completely change the way beginning braille readers are taught."

Braille on Demand was developed for Iowa schoolchildren and their educators, and is funded by the Iowa Department of Education. What about children in other states with sight impairments? To meet the needs of children outside of Iowa, IPI introduced "Express Braille," available to any educator or nonprofit organization in the U.S. and Canada.

Express Braille offers the same services as Braille on Demand, with the Anamosa Braille Center transcribing projects in one business day. Transcription costs \$9.90

per uploaded page, and users can pay with a p-card, credit card or purchase order. Embossed materials ship via UPS, so delivery times may differ depending on your location. (Shipping charges are added for embossed materials.)

The ordering process is simple: Log on to expressbraille.iaprisnind.com, create an account for your student with their individual profile of needs, and upload your document - the Anamosa Braille Center will do the rest!

Orders are limited to a maximum of ten uploaded pages per student per day, so that all educators can receive their braille in one business day. Maps and advanced biology tactile graphics are difficult to produce in the Express Braille timeframe, so for these and for estimates of larger or unique work or general inquiries, please contact the Anamosa Braille Center at 800-332-7922 or ipibraille@iowa.gov.

See a need, fill a need. Iowa Prison Industries saw the need to make learning materials more accessible for Iowa's schoolchildren with sight impairments. Braille on Demand fills that need. Now, Express Braille will help schoolchildren nationwide with sight impairments access the same materials as their sighted classmates and assist their educators with one-day braille transcription.

This article was authored by one of the men at the Anamosa Braille Center. Braille on Demand has improved the accessibility to instructional materials for students with sight impairments. It has also positively impacted the men providing this service, one of whom said "this is one of the best things I have ever been involved in. Hearing the impact Braille on Demand is having on these students makes me feel like my work has value. We are giving braille to kids who would otherwise not be able to learn what their classmates are learning. We are making a big difference in the lives of these kids and that is a good feeling." ■

What Can I Use?

Tech Tips and Tools You Can Use Now!

As a new school year approaches, we all begin to think of the year ahead. Each of us walk into our classrooms or the buildings we support, knowing that we want to find ways to reach more students, spend more time teaching engaging lessons, less time prepping materials and increase our effectiveness from the previous year. As the year approaches, this is a tall order with all of our responsibilities, student needs and an ever-changing technological landscape. Programs that worked with CD drives and software we once used have become obsolete. New technology streams into our classrooms and students have more access than ever. How do we begin to determine which tools are (1) the most effective and (2) will have the biggest positive impact on our students?

Read on to learn about technology-based tools that, within minutes, can be used successfully with students. The tools described below fulfill various needs, from classroom organization and management to providing accessibility for students. This article divides these tools by format and offers a brief description of each tool's capabilities.

WEBSITES AND WEB-BASED TOOLS

Websites and web-based tools are perhaps some of the tools we, as educators, use most often to research and find classroom materials. Each of the tools described in this section can be used within classroom management systems such as Google Classroom or Schoology, making them easily accessible for students. Each of these web-based tools can be used in multiple ways and with multiple group sizes, ranging from one or two students to entire classrooms.

KAHOOT- WWW.KAHOOT.COM

- **Use:** Review, Accessibility, Gamification
- **Audience:** Individual, Group
- **Difficulty:** Easy
- **Time:** 5 Minutes to Set up Account and Select Quiz / 15 Minutes to Create Your Own Quiz

For those who have not discovered this wonderful and free (so far) website, Kahoot is a trivia site, where teachers and students can create free trivia games that can be completely customizable. Students do not need accounts to play. Teachers simply create a free account and then select from thousands of quizzes made by others, or can create their own. Quiz creation is easy and takes minutes to add questions.

Kahoot regularly adds new features that increase the flexibility of this website. The original version allows you to enter a question and up to four possible answers, including the ability to note the correct answer(s). Once finished, the quizzes are saved in the teacher's account and can be played at any point in the future. When ready to play, the teacher selects the quiz and displays the login code and the game for all players to see on a common screen, which can be a SmartBoard, a projector screen or even a computer monitor or iPad. Each player signs into the game at this website: www.kahoot.it on any individual device that can access the Internet, using the login code and a nickname to play. We have used phones, iPads, android tablets and computers. As each question comes up, players choose their answer on their own device and scores display on the screen displayed to all.

Kahoot is a fun way for students to practice for upcoming tests, review information or to show what they know at the end of a lesson. Teachers can also use this as a fast pre-test to learn



CASSIE FROST, M.S.ED, has been in the special education field for thirteen years, teaching in environments including a residential treatment facility, an alternative school and the public school system. She has specialized in utilizing technology with students who struggle with emotional and behavioral disabilities, autism, and behaviors resulting from intellectual or learning disabilities. Cassie presents at a regional and national level on technologies that enable access and engagement for students.

what students may already know on a topic before beginning a new unit. Kahoot is a great tool to create quizzes and review materials accessible for students who struggle with reading or fine motor response. The questions are easily read aloud to the entire group and the response consists of touching a color block that is one-fourth the size of the screen. This allows the teacher to select a screen size appropriate for the student's fine motor capabilities.

PADLET- WWW.PADLET.COM

- **Use:** Organization, Link Management, Group Brainstorming
- **Audience:** Individual, Group
- **Difficulty:** Easy
- **Time:** 15 Minutes to Set up the Account and the First Padlet for Use

Padlet is a remarkable site that fulfills multiple needs within the classroom setting. At its simplest, Padlet is an online corkboard. There are both free and premium (paid) versions of the site. While the premium version does have additional features, the free version currently offers all of the features discussed in this article. When teachers create a Padlet account, they can set up as many "boards" as they would like. Each board has its own customizable web address and has privacy features specific to that board. If a board is left open so anyone can post to it, the board works well as a group brainstorming space, because it's editable with only a double click. If a board is locked so only the teacher has access, the possibilities increase. Think about all of the ways that you provide links and information to students. Perhaps you use Google Classroom or Schoology or some other learning platform. Each of these requires a login and multiple steps to edit.

Instead of all of these steps, Padlet houses links or classroom content. By simply pulling up the Padlet board and double clicking, you are ready to type and add new content. These boards can easily be linked within your Google Classroom or other learning platforms, while making, editing and adding links for students quick and seamless.

For example, by creating a board for your Science curriculum, you can easily add links to the videos you watch in class, making it simple for those students who were absent to watch. You can also add links to enrichment materials for the students who finish early.

Perhaps Padlet's best use is its ability to add links to additional content that supports your unit. Therefore, when there is a student crisis, or a student needs a few extra moments of attention, all you need to do is direct students to this additional content on the Padlet while you address the student in need, crisis or other situation requiring your immediate attention. The wonderful result? No lost instructional time, and students are focused on the topic being discussed in class instead of jumping to a different task.

This site is extraordinarily helpful for classroom management,

organization and maintenance of materials so that students who may have missed a lesson or need to access these resources in a different environment can do so. Padlet also helps teachers reach students who need supplementary or enrichment materials, and provides easy links for students who struggle with manually typing in long URLs.

Sample Padlet: <https://padlet.com/cfrost/science2016>

GOOGLE FORMS

- **Use:** Data Collection
- **Audience:** Individual Professional Use
- **Difficulty:** Medium
- **Time:** 20 Minutes to Set Up Form / 1-3 Minutes to Enter Data

Whether it's IEP goals, behavior tracking, or academic progress, data collection takes up a great deal of any professional's time. In order to streamline this process, one can use a readily available and extremely useful tool, Google Forms, to collect and graph data. This is accomplished by creating a form in the same way that you would if you were sending it out to gather information. However, instead of sending it out to multiple teachers, keep the active form link for yourself and complete the form daily or weekly to monitor progress.

You can use a similar method for tracking behaviors of students throughout an entire building, by creating a form and adding the link to mobile devices through a shortcut icon. Have Educational Assistants carry these devices (inexpensive prepaid phones that are not activated work as cost-effective mini-tablets that fit in a back pocket) and enter behavior data such as short interventions or time out of class into the form as soon as the behavior occurs. This creates an immediate notification for the Behavior Specialist and accurate, timely data for IEP goals and Functional Behavior Assessments.

Sample IEP Data Collection Form: <https://goo.gl/forms/n8JXaqa9MqoEi0Yf1>

Sample Individual Behavior Data Collection Form: <https://goo.gl/forms/BDDapkmTcQp5LP82>

Sample Group Behavior Data Collection Form: <https://goo.gl/forms/XOf1HsAkBBVktiRp2>

GOOGLE CHROME EXTENSIONS

- **Use:** Accessibility, Organization Audience: Individual
- **Difficulty:** Easy
- **Time:** 1 -5 Minutes to Install

Google Chrome offers a myriad of opportunities for students to adapt their web browsers to meet their individual needs. Chrome Extensions are accessed through the [Chrome Web Store](#) and are free to link to your Google Chrome Account. Once you are logged into Google Chrome and install an extension, it's available to you on any laptop or Chromebook that you are logged into. This is very beneficial to students who may work on a variety of devices from different shared carts throughout a school day.



Turn off the Lights - This extension is used to darken the screen surrounding a video. This is helpful when showing a video to students that you do not want to make full-screen, or for those who don't have this capability.

Select and Speak - This extension allows the user to highlight a selection of words on a webpage and then click the extension to hear a computer-generated voice read the selected text aloud.

Padlet Mini - This extension works along with the Padlet Website described above. When installed, the user can click on the extension to have the entire website that is currently being displayed uploaded to a Padlet page of their choice. This is useful for research as it places all of your information on one page.

1-Click Timer - This extension is a timer that displays a countdown with moving clock hands. When the extension is turned on, it displays a round timer in the upper right corner of your screen. You can select how long you would like the timer to count down from and it will display a visual and auditory alarm when time runs out. This will continue to function in the background if minimized and will pop up with the visual and auditory timer when the time runs out.

Save to Google Drive - This extension functions similarly to Padlet Mini. However, instead of saving to Padlet, this extension will save and upload all content from the website currently displayed to your Google Drive account.

Count Down - This extension is a digital timer. Once clicked, it puts a small rectangular timer that counts up from zero on the upper right corner of your screen. If minimized it continues counting up in the background until it is paused or stopped.

Time Warp - This is a website time monitoring tool that enables students to determine if they are spending too much time on one or more sites. Time Warp can also be used by students to block time-consuming websites by entering the URL(s) into a list. The options for blocking include setting a time limit for how long a specific site can be open, or blocking a site completely. When attempting to access a self-blocked site, students can decide if they would like to be redirected. For example, www.facebook.com could lead to www.cnn.com each time navigating to Facebook was attempted. Students can also choose to have a reminder to stay on task or an inspirational quote show up on their screen when they try to navigate to a blocked site. This is a superb tool to teach time-management and self-control.

Tab Snooze - This extension helps manage the large number of open tabs that most computer users have at any given time. Select this extension to "snooze" tabs that you are not actively using. You can choose to snooze the selected tab until you are ready to use it. This extension keeps track of all of the tabs you have snoozed and opens them back up at a time you have assigned. You can choose a time and date for the tab to come back, or you can select from options like "someday," "this weekend," or "tomorrow." There is also a feature that allows you to create a tab that is simply a screen with a written message that you can

snooze and schedule to come back. This is great for reminders, stress relievers or other time-sensitive messages for yourself or students, such as "Take a deep breath before this test. You will do great!"

Nimbus Screenshot - This extension is used to take editable screenshots of your entire screen or certain portions. This is beneficial when creating directions for how to use a website or to capture images of student work.

Loom - This extension is used to create screencasts of your web browser. Use it to record your screen along with your voice (and your webcam if you desire). This is excellent for demonstrating a computer-based skill or drawing student attention to a specific facet of a webpage.

BeeLine Reader - This extension is used to make web pages more visually accessible. By clicking on the extension you have the option to change all website fonts to the OpenDyslexic font. You can also change the color of the background and text of a website to make it easier to read. There is a variety of colors available including light on dark and dark on light options.

Read and Write for Google - This extension offers both a free and a premium (paid) version. Both versions consist of an additional toolbar that is available in the Chrome Web Browser as well as within Google Docs. Both versions offer built-in dictionaries that provide written definitions or pictures of words on the Internet or within a Doc simply by clicking on a word. Both versions also offer highlighting tools and speech to text capabilities.

Read and Write for Google offers a Premium account free for educators, available at <https://www.texthelp.com/en-us/products/free-for-teachers/> and then sign up with your district email account. The Premium account adds many more features, including text to speech, translation, web search and word prediction. In addition, the premium vocabulary creation tool allows users to highlight vocabulary words and, with a single click, create a worksheet that displays the word, text definition, image and a place for notes on each word.

IPAD APPS

With a cornucopia of accessibility features, iPads are an amazing tool for making learning accessible to all students. iPads are simply superb tools to engage and teach. While the world of iPad apps changes daily as new apps are being created, several have a good history of clearly demonstrating their worth in making academic tasks more accessible to students.

EXPLAIN EVERYTHING

- **Use:** Lesson Creation, Accessibility, Re-Teaching
- **Audience:** Individual
- **Difficulty:** Medium
- **Time:** 5 Minutes to Install and 1-20 Minutes to Create First Lesson and Upload

Explain Everything is a paid app which can be used to cre-

ate audio files, lessons and walkthroughs. It makes it possible to snap pictures of worksheets or handouts and, using a pointer, record your voice reading the worksheet while pointing to the place you are reading. This greatly helps re-teaching information or for creating an audio of a text that does not otherwise have audio access. Explain Everything makes it simple to rewind and re-record over errors or oversights. It also gives you the option to move the photo/document around while you record, including flipping between multiple documents in one recording.

SHOW ME

- **Use:** Lesson Creation, Accessibility, Re-Teaching
- **Audience:** Individual
- **Difficulty:** Easy
- **Time:** 5 Minutes to Install and 1-20 Minutes to Create First Lesson and Upload

This is a free whiteboard app that provides the basic functions of the premium Explain Everything. Using Show Me, you can create recordings of the screen, pictures can be uploaded and your screen recording is uploaded to <http://showme.com> where the video can then be viewed online.

APP-QUEST (APP-WALKTHROUGHS)

- **Use:** Guided Instruction
- **Audience:** Individual, Group
- **Difficulty:** Easy
- **Time:** 20 Minutes to Create the Walkthrough

While not an app, this method of utilizing apps in the classroom warrants discussion. While apps such as Explain Everything and Show Me are great for creating accessible materials, there are also times where iPad apps can be used to reinforce or teach content. The biggest concern most professionals have is how to gauge if a student is comprehending or even accessing the portion of an app that you would like them to without watching over their shoulder or directing them through each step of the app. In order to better guide students through apps, consider creating Interactive App-Quests. Just like teachers have used Webquests to engage students and lead them to pertinent information on a webpage, this very same thing can be done with App-Quests. To accomplish this, open an app and write out the directions that you would like a student to follow, complete with open-ended questions or places to draw what they are seeing on the screen.

Example App-Quest for iOS App-Tesla Town:

https://drive.google.com/file/d/0B_LkOhm4SEp7c01zQ2NR-WlNaRlk/view?usp=sharing

QR CODES

- **Use:** Accessibility, Instruction, Remediation, Enrichment
- **Audience:** Individual, group
- **Difficulty:** Medium-Difficult

- **Time:** 5-15 Minutes Depending on Activity

QR Codes are much like bar codes in that they contain information and can be scanned. However, barcodes can only be scanned left to right. A QR code can be scanned left to right as well as up and down. Additionally, QR codes can be positioned in any direction and can still be read correctly. This makes them incredibly student-friendly. QR codes are created to contain data, which can be audio, text or links to websites.

In the classroom, QR codes can be used in many ways. They can provide links to students who may struggle with typing in long URLs. They can serve as links to additional content and be placed on worksheets for students who are ready for “more.” QR codes can provide remediation for students when linked to a video showing a “how-to” and placed on a worksheet. Students working on a math assignment at home can simply scan a QR code on their worksheet and watch an example of a similar problem being solved!

Moreover, QR codes can be used to make academic tasks more accessible for students. A worksheet that is not in a digital format can be read aloud using a tool like Explain Everything and can then be turned into a video with a linked QR code placed on the worksheet. This enables students who struggle with reading audio access to the worksheet.

Reading QR codes is simple to do on any platform. There are hundreds of Google Chrome Extensions that read QR codes. Similarly there are many apps on iPads and Android devices that will read QR codes. Inigma is one of many that have been used successfully in many classrooms.

While exceedingly powerful, creating QR codes on your own is quick and easy. Visit <http://www.qrstuff.com> to create instant QR codes that can be downloaded or printed. To create QR code quizzes that can be placed around your room quickly and easily, visit <http://www.classtools.net/QR/index.php>. If you are not quite ready to create materials of your own, using the web search terms “QR Code worksheets” will quickly bring up a variety of ready-made materials that you can try in your classroom immediately.

CONCLUSION

These are just a few examples of tools meant to help you reach your goals of engaging your students and providing accessible education to each of them. As you explore this ever-changing, ever-growing world of educational technology, you may find some tools are more beneficial than others and some you may find work well for certain groups or individuals, and not for others. Digital tools literally change daily and continue to provide new and exciting ways to reach and teach all students. ■



Implementation in the Presence of Significant Joint Attention & Emotional Regulation Deficits

Once you've jumped the hurdles of a comprehensive assessment, gained parent and teacher buy-in, programmed or set-up systems, it's smooth sailing from here on out, right?

Successful intervention is affected by the skills (or lack-there-of) that the learners bring to the table. And what might have looked fitting in a one-on-one assessment situation may look very different in the day-to-day use.

Deficits in joint attention (JA) and emotional regulation (ER) can derail the implementation of the best matched AT or AAC supports. JA and ER are foundational skills which allow for optimal engagement and learning. When beginning instruction or therapy, it's imperative that these factors be taken into consideration.

The implications of poor or absent planning for engagement include: losing family and teacher buy-in, increased frustration or behaviors by the learner and possible abandonment of the system.

While there are many reactive strategies available and essential to plan for, the focus of this article will be on preventative supports and strategies. Preventative programming will foster the skills which are essential for learning.

ENVIRONMENTAL ARRANGEMENT

The purpose of environmental arrangement is to create a setting that encourages the learner to engage in a targeted behavior by focusing their attention and decreasing the uncertainty.

Adult partners should thoughtfully set up an interactive setting that is visually and physically structured and motivating to allow the learner to anticipate and understand what is expected of them.

Strategies to arrange the environment:

- Shrink the space by using tape on the floor or furniture to create boundaries to focus the learner's attention
- Limit the materials
- Be in control of preferred items
- Limit excessive visual stimuli
- Place items, which are not part of target activity, in bins or containers which the child is unable to open
- Design activities to be intrinsically motivating
- Use hands-on activities (as opposed to paper-pencil tasks)
- Allow for increased number of child-directed activities/tasks
- Allow for increased movement-based activities rather than sedentary
- Make the item available within the timespan the learner is able to pay attention
- Increase the duration and frequency of moments of engagement
 - Identify highly motivating activities
 - Create opportunities for activities to occur more frequently
 - Practice in a variety of settings and items
 - Practice with different people

Another aspect of environmental arrangement is thoughtful



MELISSA GARDNER, MS, CCC-SLP, CBIS Mel is a Speech-Language Pathologist and Certified Brain Injury Specialist in Los Angeles, CA. She holds advanced certification, education, and experience in Augmentative and Alternative Communication. Mel has experience in the home-hospital educational setting with students with Acquired Brain Injury, conducting evaluations and providing therapy leading to school re-entry. Melissa is currently an employee of the Diagnostic Center of Southern California, one of three regional assessment centers in the state. The Diagnostic Centers of CA are the foremost providers of specialized assessment, training, and technical assistance to all state Local Education Agencies, and are operated by the California Department of Education's State Special Schools and Services Division.

planning of which peers to include. Peers can model and normalize adaptive and assistive equipment for children. Often, we see abandonment when children do not want to look differently with peers. The thought of appearing different can be so distressing that learners will often prioritize the social needs over academic or communicative success. Using peer modeling can be an effective way to reduce an otherwise heightened emotional experience for the learner. Additionally, introducing high tech equipment when other students are using computers and tablets and allowing all students access to low tech supports minimizes the stigma.

PREDICTABILITY

When learners experience deficits in JA and ER, often uncertainty is a trigger. Increasing the predictability is an effective way to prevent a breakdown in performance. Learners will have the most success if their program is structured to include targets which are meaningful and purposeful within a familiar, consistent routine. Routines and structure create predictability in one’s life, which can be calming. If a setting is unpredictable or changes day to day, it will be exceptionally difficult for the learner to anticipate and understand what is expected of them.

1. Routines:

Educators should provide predictability through and within routines. All people are motivated by things which they can be successful in. Routines provide the opportunity to improve a learner’s ability to actively and consistently participate. Being successful at engaging and participating allows the student to acquire a sense of confidence and com-

petence. Over time these cumulative experiences support the learner to be motivated to cooperate in the instruction! One way to start introducing routine into your implementation of AT is to embed AT during the same time every day so the learner begins to predict when and what to expect.

2. Familiar Scripts:

Routines can also be made within activities by using consistent scripts. For example: See Table 1 below. This can help the learner predict - what is expected of them, what’s coming next, and when the activity will end. Implementing AT within a routine with familiar scripts allows for increased understanding, predictability, engagement and success.

VISUALS:

Visuals can support the learner’s comprehension of the situation, what to expect and when the activity will end. This level of predictability used consistently over time has potential to increase JA and ER.

1. Visual Schedules

Visual schedules can be used to support children at different levels of development. Even children, who are not yet symbolic learners, often learn what to expect through routine.

Visual schedules can take many forms:

- Class schedule – to develop clear and consistent expectations
- Task schedules – to break the targeted skill into manageable steps

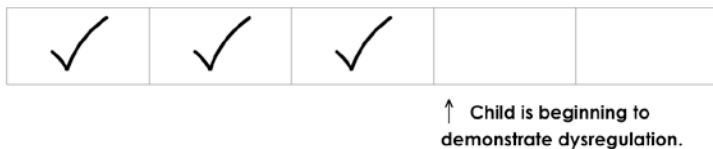
	Script	Strategies
Arrival	Hi Ana! Backpack comes off. Backpack goes in (the cubby)	<ul style="list-style-type: none"> Decide on a script to keep consistency across team members Use simple language and emphasize important words with volume and intonation. As the routine becomes familiar, leave space for the learner to fill-in <ul style="list-style-type: none"> Backpack comes [pause] Hello song is [pause] The learner may look at you to acknowledge the change in routine; she may vocalize; or may continue with routine.
Circle Time	Let’s go to circle time! Look! [point to visual schedule] Time for our Hello Song! [sing] Look! [point to visual schedule] Hello Song is all done Hello Song comes off And Hello Song goes in [Place visual schedule item in all done bin or folder] Look! [point to visual schedule] It’s time for our book	

Table 1: Familiar Script Example

- First/then boards or bins – to build contingency awareness and tolerance of a non-preferred task.

2. Closure Systems

A closure system typically requires the learner to complete three to five tasks before earning a preferred activity for break or a reinforcer item. Often within the closure system, students can be given structured choice as to the order in which the tasks are completed, which can further help to increase mo-



tivation.

While contingency is crucial (finish this = you get this), keeping the child in the most optimal state for learning is paramount! If you see the learner is becoming more dysregulated, drop the task demands while maintaining the contingency.



Example:

Decrease the task difficulty to developmentally appropriate



tasks within their skill repertoire.

Task: "clap your hands!"

The learner earns a check

Task: "Touch your head!"

The learner earns a check

"Good job!!! We are all done! Look! You did all your work!"

Maintaining contingency should not come at the expense of supporting optimum engagement. In the example, the service provider read the behaviors and modified the task to support engagement, which allowed the learner to complete the closure system. Though it may seem as if you have lost time, you have actually gained contingency awareness. Moreover, the student has been successful at completing their closure which reinforces willingness to persist. The student now knows that they are capable of completing the closure and that the service provider will not push them to exhaustion. Overtime, these experiences result in longer and longer periods of instruction and increased frustration tolerance.

3. Work Systems

A work system is defined by Division TEACCH® as a systematic and organized presentation of tasks and materials that visually communicates at least four pieces of information to the student (Schopler, Mesibov, & Hearsey, 1995):

- The tasks/steps the student is supposed to do.
- Visually represent how many tasks/steps there are to be completed.
- Visually represent when the task is finished (ex. use of an "all

Task	Example:	Task is Finished
Success-Level Activity Items in a blue bin	Put-in tokens The learner removes all task items from the bin and begins the task	When completed, the put-in materials are placed in the "all done" bin
Reinforcer Items in a green bin	30 seconds with a book	Use a timer. When timer goes off, the book is placed in the "all done" bin
Instructional-Level Activity Items in a yellow bin	2-3 trials with assistive technology The learner removes all task items from the bin and begins the task	When completed, the materials are placed in the "all done" bin
Success-Level Activity Items in an orange bin	Insert puzzle The learner removes all task items from the bin and begins the task	When completed, the puzzle is placed in the "all done" bin
Reinforcer Items in a purple bin	1 minute with music	All items have been placed in the "all done" bin visually indicating that the task sequence is complete

Table 2: Shown Example Schopler, E., Mesibov, G., & Hearsey, K. (1995). *Structured teaching in the TEACCH® system*. In E. Schopler & G. Mesibov (Eds.), *Learning and Cognition in Autism* (pp. 243-268). New York: Plenum Press.

- done" bin/box, timer, or other visual cue such as a stop sign).
- Visually represent the next scheduled activity.

For example, See Table 2:

Learners benefit from feeling successful in classroom activities. One way to accomplish this is to break lessons into success-level and new learning components. Any new learning material should be interspersed with success-level tasks. It's recommended that a lesson be broken down into manageable "tasks" to facilitate engagement.

4. Using Objects to Transition

A transition object may be an item or piece of an item which represent segments of the day to help the learner best understand what is being required of them during a transition. These objects should include actual items or pieces of items connected to specific locations within their classroom or school. Items selected should either serve a purpose at the next location or directly match to an item at that location. See Table 3.

When a child is able to transition without significant distress there will be more time for instruction and more optimal instruction.

5. Cue Cards

A cue card is a visual reminder of a specific social skill, classroom rule or appropriate behavior that the teacher has taught. For example, a card representing, "turn on," taped on a computer screen can allow for increased independence and less teacher prompting.

Visual cue cards can also be used for self-monitoring and supporting the learner with using calming strategies for de-escalation.

6. Video Model

Video modeling is a strategy that uses video recording and display equipment to provide a visual model of a targeted behavior or skill. (Ganz, J., Earles-Vollrath, T., & Cook, K. (2011). *Video Modeling: A Visually Based Intervention for Children With Autism Spectrum Disorder. Teaching Exceptional Children*, 43(6), 8-19.) There is no special training needed; the only requirement is competence with the necessary equipment which is often simply a smartphone or tablet. There are many identi-

fied benefits for using video modeling, but a critical benefit is that it's concrete and visual in nature, allowing students to see, hear, and experience the targeted skill. Video modeling has also been found to be highly motivating for students. This strategy can be used to train new skills with AT.

Descriptions and implementation steps are available at the National Professional Development Center on Autism Spectrum Disorder's (NPDC) website at:

http://autismpdc.fpg.unc.edu/sites/autismpdc.fpg.unc.edu/files/imce/documents/VideoModeling_Complete.pdf

7. Social Stories

Social Stories™ are an intervention method developed by Carol Gray. Social Stories are short descriptions of a particular situation, event or activity which include concrete and specific information about what to expect in a situation and/or a guideline for how to act.

A social story could be used to introduce the AT. The story should accurately describe the context, such as when it's used, who will be there, what happens and how to respond. Present the social story to the learner when they are calm and engaged. Additionally, stories are more effective when they are read just before engaging in the target situation. The story should be read frequently over days or weeks, until the target behavior is established or reduced. At that time, the social story may be faded.

See carolgraysocialstories.com for more information.

MODIFY THE LANGUAGE:

Many children with disabilities experience difficulty understanding complex or academic language. Even children with average language skills demonstrate a drop in skills when they become dysregulated, such as when a learner has the perception of a task becoming too challenging. This heightened emotion reduces their availability for learning. When this occurs, adult partners should reduce the amount of language being used and keeping directions simple.

1. Language Strategies

When beginning instruction with a student, make sure you have the learner's attention when a question, direction or important information is going to be presented. Directives

Task	Possible object
Snack Time	Rupperware container
Washing hands routine	Soap
Go home	Backpack
Speech room	Key to speech door

Table 3 : Example of Object Visuals

should use brief, simple and concrete language that is familiar to the learner. The adult should pause and make sure that the direction is not being provided in between a series of other comments or directions (e.g., praising one student, then giving the learner a direction, and then telling another student to stop doing something). Information should be presented in small chunks and provide repetitions if needed, allowing time for the learner to process the message before repeating it. Finally, when possible, use visual supports for understanding as much as possible, pairing visual referents with verbal information (e.g., pictures, objects, demonstrations, etc.).

2. Language to Change Behavior

Many children with disabilities (CWD) need explicit instruction on how to change their behavior. Telling a CWD, “no” often results in minimal or no changes. It’s important that adult partners are clear on what behavior the child should be using. Example:

- No ripping your graphic organizer → You can ask for help.
- No running → Not safe! You can walk.
- No biting → You can bite the chewy tube.
- No throwing manipulatives → Stop! You can count.

Instruction should still be provided in a clear, stern manner to indicate that what is being said is not an option.

STRUCTURED CHOICES:

Offering the learner choices which are acceptable to the instructor, supports engagement and participation. For Example: “Do you want to do two more or four more sentences?” Either option provided is acceptable to the instructor, but the child is

allowed more control over their participation.

For most young children, it’s appropriate to use visual supports when these choices are offered. For example, it may be helpful to have actual items or icons.

The Model of Choice Diversity (Brown, 1993), lists these seven types of choices available within the context of most activities and routines. Careful planning and consideration will be required to build opportunities throughout the day to maximize choice opportunities. See Table 4.

Structured choices have the potential to increase participation because the child has more buy-in when they are allowed to control certain aspects of their instruction.

TEAM CONSISTENCY:

Collaboration among all service providers and the family will be very important for consistency and repetition of learned skills and strategies developed. Frequent, ongoing communication between all adult partners will be essential, as everyone working with the learner should be aware of- and using the same strategies and communication styles.

1. Dysregulation Dictionary

A dysregulation dictionary is list of the learner’s escalation cues and strategies which are helpful in guiding the student to a more calm and available state for learning. The purpose of this tool is to prevent the student from reaching heightened states of dysregulation by having all members react appropriately, consistently, and before the learner has reached severe dysregulation – where reactive strategies will be needed.

CHOICE TYPES	EXAMPLES
Choice within an activity	“What color stylus do you want?” (show options of colors)
Choice between two or more activities	“Do you want to order sentence strips or use letter tiles?”
Deciding when to do an activity	“What’s first? Math facts or sight words?”
Selecting the individual with whom to participate in an activity	“Do you want to go with Josh or Isabel?”
Selecting where to do an activity	“Do you want to sit on the ball or the seat cushion”
Refusing to do an activity	Pushing materials away – is honored by the activity stopping or the item being removed
Choosing to terminate an activity at a self-selected time.	Half eaten snack - “Do you want more (show snack) or all done?” (move snack away from field of vision)

Table 4 : The Model of Choice Diversity Brown, B. C. (1993). *Choice diversity for people with severe disabilities. Education and Training in Mental Retardation*, 318-326.

Level of Dysregulation	Signs / Behaviors:	Strategy
Mild	Ana takes off her glasses and rubs her eyes. Ana becomes fidgety	Reference her first-then schedule Increase the reinforcement schedule
Moderate	Ana grabs for items around her She hangs out of her chair She chews on her pencil	Simplify task items Shorten length of task Offer structured choices
Severe	Self-injurious behaviors Yelling or crying Eloping Hitting	Corral to safe location Drop demands Reduce language Turn down the lights Play calming music

Table 5 : Shown Example Dysregulation Dictionary

Example: See Table 5:

Service providers should be consistent in their use of these strategies to help the learner maintain and sustain periods of engagement and decrease the intensity, duration and frequency of severe dysregulation. As the learner develops more advanced coping strategies, they should be added to the dictionary and shared amongst the team.

2. Team Reflection:

If progress is limited, the team can reflect on the tasks that have been tried in order to modify instruction.

Possible questions to consider include:

Is the task:

- Above the child's developmental level?
- Taking too long?
- Requiring too much sitting?
- Visually representing what is expect?
- Visually representing when the task will end?

Is the instructor:

- Using too much language?
- Responding to the communicative intent?
- Using reinforcement that is meaningful?
- Using reinforcement that is immediate?
- Providing structured choices?
- Interspersing success-level tasks?
- Missing escalation cues?

Is the learner:

- Understanding what is expected of them?
- Receiving enough exposure to the task, models or visuals?
- Is the child too hot, hungry or sleepy at the time of instruction?

Following discussion by the team, the level of support can be adjusted. Ongoing data collection and cross-discipline communication will best support the learners progress.

CONCLUSION:

Purposeful planning for engagement should be an integral part of any AT implementation program. It's important to note that all strategies will not be appropriate for all children. But having knowledges of many strategies will create a bigger tool-box to pull from when building a foundation for learning. ■



Closing The Gap 2018 36th ANN

Assistive Technology in Special Education, Rehabilitation and

24 PRECONFERENCE WORKSHOPS ANNOUNCED

MONDAY AND TUESDAY, SEPTEMBER 24 - 25
8:00 AM - 4:30 PM

PC-1 Two-Day Introductory PODD Course (Official PODD Course)

Linda J. Burkhart, Dale Gardner Fox

MONDAY, SEPTEMBER 24 8:00 AM - 4:30 PM

PC-2 Pragmatic Organization Dynamic Display (PODD) Alternative Access Workshop

Kelly Fonner, Laura Taylor, Debbie Reinhartsen

PC-3 The Accessible School: How the iPad Empowers All Learners

Mark Coppin, Nancy Kawaja

PC-4 Expanding Environments with AT and AAC (including iPads & Tecla) Using Access, Integration of Systems, Navigation Through Systems to Support Students in the Classroom *Karen M. Kangas*

PC-5 Core Vocabulary Quick Start: Everything You Need To Provide Core Vocabulary Intervention Next Week *Kelly Key, Deidre Dobbels*

PC-6 Embrace the Future: Tech Trends and AT *Kirk Behnke, Mike Marotta*

PC-7 "Now What?" - Strategies to Support School Teams in AT Implementation

Keri Huddleston, Elizabeth Echebarria, Robin Dunn

PC-8 Teaching AAC! The Balance of Conversation and Generative Language - Make and Take *Pati King DeBaun*

PC-9 Creating Assistive Technology Solutions in Minutes, Part III: A Make and Take Workshop *Therese Willkomm*

PC-10 Using Technology as Evidence-Based Practice! Developing Appropriate Programming to Meet the Learning and Behavioral Needs of Students with ASD *Susan K. Lewis Stokes*

PC-11 Digital Storytelling and Adapted Books: Creating Materials By, With, and For Students *Caroline Musselwhite, Deanna Wagner, Gretchen Hanser, Laurel Richardson Buell, Jeanmarie Jacoby*

PC-12 Skills for Life: Revamping Language and Literacy Instruction for our Most Complex Learners *Lauren Enders, Kate Ahern*

TUESDAY, SEPTEMBER 25 8:00 AM - 4:30 PM

PC-13 Breaking Out the AT Toolkit

Lindsey Huntley, Maricris Formoso-Santos, Mylene Matro, Loreto Dumitrescu

PC-14 Model Magic: Become the Next Top Modeler *Kelly Key, Deidre Dobbels*

PC-15 "Oh EYE understand it now!" Visual Supports for Those With Autism and Other Disabilities *Mo Buti*

PC-16 Teaching, NOT Testing, How to Find and Support Access to AT and AAC for Students with Complex Bodies *Karen M. Kangas*

PC-17 Choose Your Words: Teaching Language, Literacy and AAC in the Classroom *David Niemeijer, Jennifer Marden, Erin Sheldan*

PC-18 The SETT Framework: More Relevant Today than Ever! *Joy Smiley Zabala, Diana Carl, Kirk Behnke*

PC-19 Roadside Assistance for AAC, Anxiety and Apraxia *Kate Ahern, Jeanne Tuthill, Tanya Scott*

REGISTRATION OPTIONS AND FEES

Conference - Wednesday, Thursday, Friday, September 26-28, 2018			
Includes Preview of Exhibits – Tuesday, September 25, 5:30 pm - 7:30 pm and Continental Breakfast Wednesday and Thursday, September 26 & 27			
Registration Received	On or Before June 30	July 1 - September 13	September 14 - Onsite
Standard Rate	\$475	\$550	\$575
Group Discount - 5 or more	Groups 5+ Deduct \$30	Groups 5+ Deduct \$30	Groups 5+ Deduct \$30
Group Discount - 8 or more	Groups 8+ Deduct \$50	Groups 8+ Deduct \$50	Groups 8+ Deduct \$50
Group Discount - 20 or more	Groups 20+ Deduct \$70	Groups 20+ Deduct \$70	Groups 20+ Deduct \$70
<i>All group registrations must be received at the same time.</i>			
Parent Rate <i>(A letter describing your child's disability must accompany registration.)</i>			\$295
Full-time Student Rate <i>(Proof of full-time student status must accompany registration.)</i>			\$320
Presenter / Exhibitor Rate		\$375	\$500
Single Day Registration			Price
Thursday Only - September 27			\$300
Friday Only - September 28			\$130
Preconference Workshops <i>(Includes Preview of Exhibits – Tuesday, September 25, 5:30 pm - 7:30 pm)</i>			Price
Monday, September 24 or Tuesday, September 25* PC-1 through PC-22)			\$290 per day
BUNDLED PRICING! Monday and Tuesday Bundle - \$80 savings			\$500
Sponsored, Half-Day Preconference Workshops** PC-23 & PC-24, Tuesday, September 25			\$99
Exhibit Hall Only <i>(Includes Preview of Exhibits – Tuesday evening, September 25, through 1:30 pm, Friday, September 28)</i>			FREE

* Some preconference workshops carry an additional fee for materials. ** Bundled pricing not applicable to sponsored, half-day workshops.

ANNUAL CONFERENCE

and Everyday Living **PRIOR LAKE, MINNESOTA**

PRESENTATION & HANDS-ON LAB HOURS

PC-20 Chrome Literacy Support Lab

Mike Marotta, Kelly Fonner

PC-21 Teaching Students with Significant Disabilities to

Use Switches: Ready-Set-Click! Gretchen Hanser, Deanna

Wagner, Laurel Richardson Buell, Leon Kirschner, Stephanie

Hui

PC-22 COMMUNICATION CIRCLES: With a Little Help

From My Friends

Caroline Musselwhite, Jane Odom, Beth Waite-Lafever, Kim

Daswick, Sidney Daswick

SPONSORED HALF-DAY WORKSHOPS

TUESDAY, SEPTEMBER 25

(Sponsored by Attainment Company, Inc.)

PC-23 Half-Day Workshop - Proven Collaborative

Special Education Program Improvement

8:00 am - 12:00 pm

Ann Meyer, Robert C. Pennington

PC-24 Half-Day Workshop - Results Focused PRE-ETS

(Pre-Employment Transition Services)

12:30 pm - 4:30 pm

Janet Estervig

Presentations will showcase practical and sound assistive technology implementation strategies. Connect and learn from the best and brightest minds in assistive technology, and create a professional development path that covers what's important to you.

Presentations will be announced July 15.

In addition, some of the industry's most innovative manufacturers will offer unique learning opportunities, showcasing accessibility features across their respective platforms.

First-hand Learning From Global Educators

Experience hands-on activities with Apple Distinguished Educators (ADEs) in the 2018 **Apple Accessibility School**, where attendees will create content and design engaging learning experiences. In addition, attendees may participate in dedicated ADE presentations to get a deeper understanding of how Apple products are creating new opportunities for teaching and learning.

Visit with Microsoft Education Experts

Learn from the experts in the Microsoft Education Booth, where attendees can partake in the Microsoft Education Short Talks on various topics. Attendees can further their participation with Microsoft by attending the presentations that take a closer look at how to implement Microsoft into everyday activities.

PROFESSIONAL DEVELOPMENT

RESNA ATP Fundamentals Course and Exam	Price
2-day, ATP Fundamentals Course Sunday - Monday, September 23-24, 8:00 am - 4:30 pm	\$600
ATP Fundamentals Exam Tuesday, September 25, 8:00 am - 12:00 pm	\$500

IACET CEUS

As a co-sponsor, AAC Institute will again provide CEUs for both the conference and pre-conference workshops. AAC Institute has been accredited as an Authorized Provider by the International Association for Continuing Education and Training (IACET). CEUs will be offered for all sessions without charge. CEUs that relate to the practice of speech-language pathology and audiology can be used for ASHA certification maintenance. RESNA accepts IACET CEUs for ATP/ATS credential maintenance. Most state licensure systems accept IACET CEUs or other forms of self-reporting. Preconference workshops are offered for up to 1.4 CEUs. The conference is offered for up to 2.0 CEUs. For additional information visit www.aacinstitute.org/ CEUs.

ACADEMIC CREDIT

Graduate-level academic credit from Hamline University is available for a variety of levels of conference attendance. One full semester credit Cost: \$190

Requirements:

- 12 contact hours
- An outside assignment (12 contact hours requires one preconference workshop and conference participation; two preconference workshops; OR conference participation only.)

CERTIFICATES OF PARTICIPATION

Closing The Gap-issued Certificates of Attendance for conference participation will be available upon request at no additional fee. All preconference workshop participants will receive a Closing The Gap-issued, presenter-signed Certificate of Preconference Workshop Attendance.

Mystic Lake Center and Casino Hotel

Guests will experience luxury, modern amenities and sweeping west-facing golf course views as one of the first guests in the newly constructed Promenade Tower—adjacent to the new Mystic Lake Center and everything Mystic Lake has to offer. It's all just steps away from restaurants, bars and nonstop entertainment.

Get Active

All hotel guests also receive complimentary access to Dakota! Sport and Fitness during your stay. Dakota! Is a full-service fitness club, featuring an aquatic center with waterslide, cardio room, gymnasium, ice center, running/walking track, strength training area, and small bowling alley.

Gaming Action

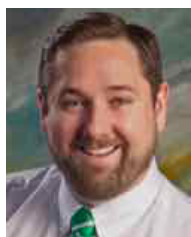
Play slots, blackjack, bingo and pulltabs at the largest casino in Minnesota.

Dining, Drinks and Entertainment

Mystic Lake's seven restaurants offers something for every taste and budget. Plus, visit one of the three lively bars all close to the action!



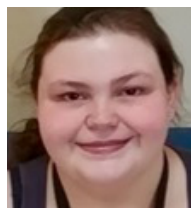
Growing Innovators: Inspiring candidates to Create using an AT Makerspace



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Innovation is not just limited to Silicon Valley any longer. As new 3D printing technology becomes more affordable and accessible, so does the ability of individualized assistive technology become more readily available in K-12 school settings. However, not everyone has experience with design and are often timid about innovating and trying new and emerging tools. In this article, the authors discuss how one university is seeking to innovate in its own practices in training teacher candidates to be self-directed innovators and advocates for AT. By doing so, the authors discuss the redesigning of a major course and leveraging the T-PACK (Mishra & Koehler, 2009) framework as well as the principles from Invent to Learn (Martinez & Stager, 2013) and Therese Wilkomm (2013) to build a course that revolved around innovating for the 21st century through makerspace and design exploration. In leveraging this model, the lead author, in collaboration with other key community and faculty members, designed a core course that employed STEM skills and designing and innovation thinking that allowed for leveraging an AT Makerspace within the course. This flip in course design provided teacher candidates with accesses to timely products, tools, design, printing and supports in order to understand how to leverage those tools to enhance their instruction of individuals with disabilities (Polly, Mims, Shepherd & Inan, 2010; Brown, 2015).

PLANTING SEEDS OF INNOVATION

In order to understand the process of redesigning a course to inspire pre-service teacher candidates to innovate, it is helpful to think of a degree program in education -- especially in Special Education -- as a garden in which instructors serve as cultivators who provide the needed instruction and room to grow so that candidates can blossom. For years this approach has led to many innovations in teacher preparation programs and how practicing teachers in public schools serve candidates with disabilities. However, as with all things - change constantly lies just ahead -- especially in the field of Special Education. Therefore, those who train teacher candidates to serve the K-12 Special Education field need to think about not just what pre-service teacher candidates need to know to do their job and serve their future students well, but also teach teacher candidates what it means to innovate and advocate in such a way that they are able to teach their own future students in the K-12 environment how to innovate and advocate for themselves. This is a daunting task but not one that is insurmountable. This is because the question really brings itself to a single seed -- a seed that when planted inspires teacher candidates to take calculated chances that benefit all learners. This thought led the lead author of this work to examine what others were doing broadly in education and to look for common themes and principles that could serve as key fertilizers of innovation in the classroom. This journey of discovery took on many forms from various works such as T-PACK (Mishra & Koehler, 2009), STEM/STEAM education (Martin, Bowden, & Merrill, 2014), makerspaces (Martinez & Stager, 2013) and col-

laboration (Friend & Cook, 2017).

As these areas began to take root, the need to change course expectations, projects, assignments, and instruction all began to morph into a new way of thinking, which led the lead author to ask "How do I empower teacher candidates in a particular course to innovate?" In this case, this empowerment required cross collaboration between programs, outreach inside and outside of the school community, working with a school district on how to inspire innovation, and continuous opportunities for the course to grow while continuing to be innovative. As the lead author connected with the other authors within this article it became clear that the need for innovation begins in the college classroom long before a teacher candidate transition into a teacher. However, the question as to how that innovation takes shape is one that resulted not just in a single stakeholder leading the course but rather a collaborative effort to find resources, provide instruction, develop assignments, and plan how candidates would use the skills of innovation in a K-12 setting. This new way of thinking changed the author's beliefs about how courses should be taught -- not as an isolated event, but as a collaborative effort in order to support innovation that has a long-term effect beyond the college classroom.

TENDING TO THE SEEDS OF INNOVATION

Perhaps the biggest challenge in planting the seeds of innovation within a college course is to plan a purposeful way to make innovation not just an isolated event within the confines of the college classroom, but to create a topic that sparks and nurtures student curiosity beyond the classroom environment. Curiosity is cultivated in the culmination of a tangible project, but it is not the end result that is the only goal. One does not have to think very far back in time to remember a mantra that consumed the airwaves for years that has inspired generations now to "take chances, make mistakes, and get messy" (Stone, 1994). Ms. Frizzle often repeated this mantra to her students, who were often timid, to think through the process and find solutions. Taking a cue from Ms. Frizzle's words of wisdom and with an eye to what the research says about TPACK, makerspaces, STEM/STEAM education, and design, the lead author, with support from the co-authors worked to flip a typical lecture style course to an innovation and student-centered makerspace course. This process required not just a willingness to modify the course and embrace the design process, which includes the notion to "take chances, make mistakes, and get messy" (Stone, 1994) that Ms. Frizzle embodies, but that the design process itself is viewed as the learning opportunity as opposed to a singular end product that results in a static grade. Being mindful of this goal was vital to the teacher and candidates as they embarked on uncharted territory in this course. The following framework helped guide the instructor and candidates as they began to unearth outdated beliefs and plant new mindsets around innovative practices.





Image 1

EXPLORATION

Where does innovation start in a higher education course focused on assistive technology? In this case, it started with first encouraging candidates to explore existing assistive technology on the market. In this process they were challenged to think through the innovative process that resulted in the product and also challenged to think of other ways that particular item could be used outside of its marketed intended use. This assignment required candidates to learn all they could about a particular item, present it to the class, and finally serve as a “design interpreter” who “sold” the item to the class by discussing the design, use, off-label uses, and end-user benefit. This higher-order thinking process challenged candidates to think about design and see problems and solutions in a differing light. What was once just a catalog search became a quest to see beyond the search labels and see the item as a solution to a need presented by an individual that underwent a purposeful design process in order to benefit the end user. Which, in essence, shifts the focus from designing for all to a more intentional design that takes into account the needs and preferences of the user that the product is intended for.

LOW TECH FABRICATION

As candidates began to shift their focus from design interpreters to AT design makers, the process included designing for the removal of barriers within instructional and life settings. Another important part of this process included continuing to explore perceptions and beliefs in order to further shift to an innovator’s mindset. The next step in planting the seeds of innovation was to ask candidates to find a problem that they had seen in field experiences or from personal connections and design a product to meet multiple needs. In this fabrication, candidates shifted from what was available to designing that same tool with modifications, or designing something different. candidates were al-

located a small budget (\$5.00) to complete their designs. Examples of candidates’ innovative practices included transforming an egg carton to a card holder, and using a tennis ball as a modified pencil grip (see image 1). Results of this process culminated with candidates shifting their mindset from perceiving the work as hard to understanding the work as a process of innovation, which was not as difficult as originally perceived. With this important shift, the instructor and candidates were eager to take their newfound sense of innovation further.

HIGH TECH FABRICATION

Innovation is a mindset of iteration towards improving the user experience. The next step in this process was to challenge candidates to see beyond available and low tech to how they could be high-tech designers and fabricators. Designing, adapting, and refining are essential in the work of creating assistive technology. In order to empower future special educators to embrace both high and low tech assistive technology tools; it is important to model collaboration and innovation through this innovative design thinking process. Through a shared interest in leveraging technology to increase inclusion, the course instructor for SED 212 and another university educator decided to demonstrate productive strategies for co-teaching and demonstrate an authentic innovation by leveraging 3D printing technology. The two professionals, while eager, had no previous experience combining candidates, design, and 3D printing; and therefore openly engaged the candidates in the process.

In addition to modeling local collaboration, the university personnel also wanted to encourage candidates to use social media to enhance global collaboration. Thus, they began asking candidates to use Twitter to follow hashtags such as #atchat, #assitivetech, #3Dprinting, #a11y, and #inclusion; educators like Neal McKenzie @neal_at, Hillary Goldthwait-Fowles, @hillarygf-phdatp; and organizations like @ATClosingTheGap, @PathstoLiteracy and @A11YProject to gain connections and inspiration for design. The candidates were asked to spend time seeking and following other educators to learn more about the range of tools being used and created. The candidates were visibly excited at the potential and existing resources they found online. While there are many designs available for download, and candidates were eager to try printing these; this project continued to engage the candidates as designers and makers at a higher level.

With the seeds of innovation begging to bloom, almost all candidates in the course were aware of the capabilities of 3D printing, but very few had prior experience in printing. Candidates all created free accounts with TinkerCad and engaged in the resource tutorials. Candidates were charged with the task of designing adapted tiles for an individual who used an Augmentative & Alternative Communication (AAC) Device -- the Cheap Talk 8 6-Level Communicator (<https://enablingdevices.com/product/cheap-talk-8-6-level-communicators/>) -- but was struggling with identifying the labels due to vision loss. Each team



Image 2

of candidates created a visual representation of their work, and designed a tile for printing (see image 2). Using Google Classroom, the candidates submitted the files for printing, and the university educators downloaded and printed the files. Once the tiles were printed, the candidates then learned how to program and prepare the AAC device for use with the end user in mind. Taking the time to design, while removing teacher candidates fears around the end product (i.e. will the design print the way one had intended), was a pivotal part of this process. Overall, the candidates suspended their beliefs of lacking the skills and expertise to be design thinkers in an AT makerspace, planted new ones, and began to sprout them (see image 3).

SPROUTING SEEDS OF INNOVATION TO BLOOM

Starting a garden of innovation takes planning and determination to see the innovative process through. It also takes a commitment to see beyond the immediate and predict the future. This can best be summarized as one teacher candidate, who is also an author of this work, put it:

"As a pre-services teacher when I enter the classroom I will bring with me the knowledge and capabilities of AT. With this, the normalization of using Assistive Technology in any form and knowing the power a device can make on an end user will be forefront in my thinking. In being able to 3D print a piece of AT for a specific purpose in user-centered design, I can build a close school network, cashing in on the excitement of designing new technology as well as collaboratively innovating and designing a device that can improve everyone's access to learning and to life."

This sprouting of candidates beliefs that they are capable of innovation by leveraging design thinking to meet the needs of diverse learners sets the tone to further empower teacher candidates to think beyond the traditional by encouraging teacher candidates to think about education as a collaborative effort that leads to everyone thinking beyond the walls of the classroom and purposefully leveraging design as a tool that can be utilized to serve all learners. By this redesign of the course, the seeds of innovation have not only been planted and tended to, but they were able to sprout and bloom in ways that none of the authors had envisioned, but are so eager to continue to support.

LET IT GROW

As one ponders what it means to innovate it often becomes a daunting cycle. These cycles go through many iterations and often find themselves rooted in program design, course design, technology purchases, etc. However, the most important component of innovation is how do you empower individuals (i.e. teacher candidates, teachers, students, or consumers) to be innovators? How do you leverage this paradigm shift? How do you normalize innovation to become something uncommon to something so common to where innovation is a daily practice? In other words, the process of innovation is a fundamental



Image 3



shift in mindset that challenges individuals to see innovation as something that was once reserved for the elite or someone from Silicon Valley but is widely available to the everyday person.

What has become evident from this approach to fostering innovation in the pre-service candidate classroom takes the authors back to that famous phrase from Mrs. Frizzell- to “take chances, make mistakes, and get messy” (Stone, 1994). This phrase should be our common mantra. It is one that is just as true in the everyday college classroom as it is in K-12 classrooms as it was on that magical animated series. It is possible to plant the seeds of innovation, prepare candidates to take chances, and empower change through innovation. As more individuals and institutions are empowered to think through design and take ownership of the process, innovation not only becomes commonplace, the lens of the importance of improving the lives of everyone will rapidly become commonplace. This notion is one that not only embodies innovation and design, but encompasses kindness, empathy, compassion, integrity, honesty, and collaboration. These beliefs will also continue to inspire the process of innovation, to inspire designers, engineers, and the everyday user that life can be that much better than it was the day before by taking chances and innovating.

For the authors, the steps of innovation do not stop with this evolution of course design. The next question that arises is how can this process of innovation be leveraged to support the community around the campus, how can the university further partner with local agencies to support innovative approaches, and what should further course development look like? All of these are questions that are emerging are rather timely as the season of new syllabus development begins, as future innovators register for classes, reach out for assistance, or participate in workshops. No matter the situation, the authors have discovered that innovation never sleeps and that so too must their approach to innovation. We must be ever ready to evolve and be flexible in our own thinking and understanding of how to be innovative in various ways as new technology becomes available and as programming language becomes more accessible.

PLANTING YOUR OWN AT MAKERSPACE

Replication is key if a revolution of innovation is to begin. However, the question as to how to get started is not as complicated as it first appears. In essence, the process can be broken down to the following eight steps: 1) Identify a problem; 2) Commit to finding a solution; 3) Empower your members (students, teacher candidates, users) to think critically about the identified problem that may exist for a user, themselves, or someone in the community; 4) Use tools such as the Innovator’s Compass (www.innovatorscompass.org) to work through the design process in a collaborative manner; 5) Look to sites such as ATMakers.org (www.atmakers.org) and other Twitter and Pinterest user handles for inspiration and resources; 6) Leverage existing technology such as Google Classroom, TinkerCad, and 3D printers to

make meaningful products that serve the needs of end users; 7) Allow the process of innovation to happen -- it may not always turn out as one expects but each iteration leads to innovation; 8) Don’t be afraid to start over or reach out for help.

Whether it be tiles for and AAC device in our case, Braille letters or numbers, pencil grips, fidget spinners, or adapted switches, the only limits to leveraging innovation and 3D printing in an AT Makerspace are one’s own imagination and willingness to embrace the design process as a method of learning and letting the space grow as you allow learners to innovate in their own learning and understanding process.

DISCLOSURES

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Introduction to Universal Design for Learning

ABSTRACT

Universal design for learning (UDL) is becoming a major philosophical principle in education. UDL proposes designing instructional materials and assessments that are tailored to a variety of student learning preferences and needs (Gordon, Meyer, & Rose, 2010). The UDL framework guides educators towards producing different ways students can interact with instructional content, express their learning and be better engaged with and attentive to instruction. This article will cover the history, legal issues and theoretical basis of UDL including examples for classroom application. Strategies and technologies including Assistive Technologies are also discussed towards creating a more flexible, supportive and inclusive learning experience.



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I. UNIVERSAL DESIGN AND THE BARRIER FREE MOVEMENT

During the twentieth century, rapid advancements in medicine and living conditions brought calls for changes to be made to accommodate a population that was living longer and facing challenges and functional limitations associated with growing older. At the same time, the end of two world wars saw a huge influx of veterans returning home with a wide range of challenges and disabilities which bolstered demands to rethink how environments, goods and services were made and offered. These demographic changes resulted in a population in need of physical accommodations and adaptations at home, work, school and public places.

This led to the barrier-free movement in the 1950's which brought fresh ideas and guidelines for designing buildings, public spaces and consumer products in order to better support this growing population of individuals in need of accommodations in order to complete basic tasks (Catanese, 2012). Building on the momentum of this activism, new laws and guidelines, such as the Architectural Barriers Act of 1968, came about. This Act mandated that the physical design of all buildings and facilities constructed with federal funds be made accessible to people with disabilities (Silver, Bourke, & Strehorn, 1998).

Expanding on this movement in the early 1970's, architect Ronald Mace founder of the Center for Universal Design at North Carolina State University, coined the term Universal Design (UD) (Story et al., 1998). Universal Design promotes removal of barriers in the design of products, buildings and environments so they are usable by all people regardless of abilities. UDL fosters the design of inclusive products and the least restrictive environments in order to accommodate the widest possible range of personal needs and abilities (Story, Mueller, & Mace, 1998) through addressing common as well as special needs. Accommodations we often see today were introduced at this time; for example, wheel chair ramps, ADA accessible parking spaces, grab bars in showers and tubs, closed captioning on television sets, etc.

An essential component of UD is that the accommodations and adjustments are built into the original design and not added as an afterthought. Additions or modifications added later, such as carving out a wheelchair lift in a set of stairs, can be expensive and inefficient. Another important premise and recurring result of UD is that accommodations made for specific groups of people often benefits everyone.

For example, when new sidewalks are laid today the curbs are lowered or entirely cutout where they meet a street. These lower curbs help people using wheel chairs or walkers cross the street without having to climb over high obstacles. The same curb cuts also benefit all walkers including people pushing strollers, pulling wheeled luggage, even those on skateboards and roller blades. Automatic door openers at grocery stores help people with wheel chairs and crutches as well as those walking with

armloads of groceries or children.

Around the same time UD was gaining acceptance, a growing disability rights movement that continues today influenced legislation including:

- The Civil Rights Movement of the 1960's which introduced laws prohibiting discrimination in educational opportunities, including discrimination against people with disabilities.
- The Rehabilitation Act of 1973 Section 504 - Reauthorization Section 508- prohibited discrimination against individuals with disabilities in all programs and services that receive federal funds. The act extended guarantees not only to individuals with cognitive and sensory disabilities but also those with mobility impairments and sets to increase access to technologies that can help overcome barriers.
- The Americans with Disabilities Act of 1990 (P.L. 101-336) (ADA) ensured equality for persons with disabilities in the areas of employment, state and local government services, public transportation and public accommodations. The ADA extended guarantees to public programs and services regardless of receipt of federal funds or not.
- Individuals with Disabilities Education Act (IDEA) of 1997 (last amended in 2004), intended to improve the educational opportunities for persons with disabilities. IDEA instituted Individualized Education Programs (IEP) which detail and guarantee educational services to individual students ensuring a free and public education is extended to learners with disabilities in the least restrictive environment including clearly defining assistive technology and assistive technology services.
- The No Child Left Behind Act of 2001 set new standards and goals aimed at improving public education. The act mandated educational achievement levels expected of all students including those in special education. Schools faced federal penalties including withdrawal of funding for failing to meet testing target scores in reading, writing, and arithmetic.
- The Every Student Succeeds Act of 2015, was designed to ensure that all students receive fair and equitable education. For the first time in educational legislation, the recognition of UD was included through the use of the companion idea, UDL, discussed in further detail in the next section. Under this law, academic standards cannot be altered for students with disabilities unless they have a severe cognitive disability. Each state must have an accountability system to ensure they are providing equitable education to all learners (ACSD, 2015) to "use technology, consistent with the principles of universal design for learning, to support the learning needs of all students, including children with disabilities and English learners" (p. 213).

The overall effect of this legislation is educators are being held more and more accountable to teach all learners to high standards and achievement levels and a recognition of how UD can play a role in that through using principles of Universal Design for Learning.

II. UNIVERSAL DESIGN FOR LEARNING

Hoping to meet expectations and demands for high academic standards and equal opportunity, educators are starting to experiment and apply the ideas from Universal Design by designing more inclusive materials and learning environments. Universal Design for Learning (UDL) means designing curriculum and teaching strategies that are flexible and adaptable to different learner needs and abilities. Instead of a one-size-fits-all approach to education, UDL provides a blueprint for rethinking how we design, carry out and assess teaching and learning (CAST, n.d.).

Like the universal design of buildings and environments, UDL attempts to remove barriers and provide content in new meaningful ways to learners. UDL begins with awareness that diversity of physical and cognitive abilities, learning preferences, interests and personalities are the norm and schools must find the best way to present content, assess learning and attract and sustain student interest. Helping one group overcome barriers often ends up improving the environment for everyone is also seen when incorporating principles of UDL in education similar to UD (Story et al., 1998).

The Center for Applied Special Technology (CAST) developed a set of guidelines for incorporation of UDL. They are “convinced that our future lay not in helping students overcome the barriers they [find in schools] but in helping schools and educators to lower or eliminate those barriers” (Gordon et al., 2010, p. 2). When curricular materials and instructional resources are developed, they should be designed from the very beginning to be flexible and provide the material in as many meaningful ways as possible. This built-in flexibility provides a wider range of options for students to choose from - meaning the curriculum adapts to the student rather than the other way around.

Technology has proven to have a large role in improving the quality and personalization of the educational experience (Matuk, Linn, & Eylon, 2015) and can be a great way to consider principles of UDL. With some imagination and ingenuity modern communications and multimedia technologies can be used to help build “electronic curb cuts” into instructional materials and lessons. To help direct individuals wanting to incorporate UDL in their teaching, the learning guidelines developed by CAST divides UDL into three areas: provide multiple means of engagement or the “why of learning;” provide multiple means of representation, or the “what of learning;” and provide multiple means of action and expression or the “how of learning” (CAST, 2018). The framework also affords options to provide access to learning, options to build on learning efforts, and finally options to help students internalize their learning. These concepts are discussed below in further detail with examples on how educators can incorporate these ideas into their classrooms.

Providing multiple means of Engagement

To develop purposeful and motivated learners, we must first get learner’s attention and make the curriculum relevant to the

learner. Learners who may struggle in one area, may thrive when provided with the opportunity to engage with the material in another way. What motivates one learner may shut down another. That is, a struggling writer may blossom when asked to draw out a concept or create a video. Engaging students in multiple ways not only helps struggling students, but all students in the classroom who have varying needs (Rao & Meo, 2016). As a result, connecting with multiple learners, requires the use of multiple means of engagement.

Novak (2014) further explains the UDL guidelines and checkpoints by providing additional guidelines that can provide options to learners. To provide options for recruiting interest, Novak suggests giving learners choices, and providing explicit connections as to why the lesson is relevant to the learner. To provide options for self-regulation, Novak suggests allowing group work, providing access to mentors and using checklists and rubrics to help students assess their own learning. Scaffolds, positive reinforcement and breaks can keep students motivated and prevent frustration. Other ways to help students sustain effort and persistence include reminding students to restate the objective of the lesson, providing varying levels of challenge, and giving feedback throughout the project or lesson.

Some examples of providing multiple means of engagement in teaching include:

- Match the presentation or reinforcement of new knowledge with students’ personal interests or local events – be explicit in making these connections.
- Give learners choice, so they work on something that is of interest. That is, allow students to read books or write stories on topics that are of interest to them.
- Make sure students feel safe to share their knowledge.
- For some, the degree of challenge must be just right – not too boring and not too difficult.
- For others, scaffolding everything except the lesson goal can decrease frustration and allow learners to persist.
- Allow breaks when students get frustrated. Have a designated space set up for students to take breaks with calming manipulatives.
- Allow learners to help create the grading rubric and a checklist for a project so that they can refer to them during the project.
- Investigate gaming apps that address an instructional goal and/or incorporate game strategies into curriculum.
- Allow the choice of working in collaborative groups or not.
- Offer technologies such as shared drives or documents that can be divvied up between students working in collaborative groups.

Providing multiple means of Representation

The printed page can be an unyielding barrier for some students. The notion of digital text, which means having all text information available on computers, is an essential ingredient for universally designed learning. Converting all text information



typically put on paper, such as readings, teacher handouts, correspondence, and announcements, to digital documents is an attainable starting point for UDL. Digitized text is amenable to a wider range of strategies and instructional support schemes expanding the availability of paper-based readings and hard-bound textbooks.

There are many additional ways to achieve greater accessibility of texts. Digitized text can be enlarged, spoken out loud by the computer, electronically highlighted, embossed to Braille and modified to complement the way a particular student learns and functions. Materials delivered via computer can be copied, pasted, reshaped to one's liking, connected to notes and online examples, linked to dictionaries and supporting evidence, easily updated, corrected, redistributed and made more responsive to change and new developments. Already there are vast collections of online books, libraries, magazines and newspapers in digital format teachers can draw upon for little or no cost.

Through providing multiple means of representation, all students can benefit. Learning materials, web sites and online documents that accommodate visual differences, most notably technologies that read computer screens out loud, generally call for simple text organization, adjustable viewing sizes and contrasting font and background colors. These requirements make reading and navigation easier for everyone. For example, computers that read documents out loud not only help students with visual barriers but also struggling readers and those whose first language is different than the materials.

Likewise, closed captioning, which means displaying the text of what is being said on video, benefits those beyond who are deaf or hard of hearing. Video captions make it easier for anyone to search for key words in a video, people trying to listen while viewing in a noisy environment, individuals who are learning the language spoken in the video, individuals who are learning to read or those who may struggle with understanding heavy accents found in some authentic videos.

Another vital concept of UDL is allowing students to pick and choose accommodations - providing them the ability to use them as they see fit. For example, closed captioning may not benefit or may add distraction for students with attention disorders. Verbalized on-screen text readers may also upset or distract students with high sensitivity to sensory inputs. Both of these can be turned on and off as needed.

Some examples of providing multiple means of representation in teaching include:

- Provide digital graphics and illustrations. Have both print and graphical formats available so that information can be obtained in a variety of ways by learners who prefer or are more comfortable with verbal or spatial representations.
- Take advantage of hyperlinking in materials being presented to students to show different types of instructional media, examples and explanations.
- Enable students to get words or passages quickly defined or

translated at any time while reading a passage.

- Provide various ways for students to take in information – lecture, reading, videos, manipulatives, etc.
- Break up long passages of text into smaller, more manageable portions.
- Make learning materials more accessible by:
 - Use of contrasting colors between text and backgrounds.
 - Making font size large enough for the intended viewing distance.
 - Use of captioning or transcripts/descriptive text with pictures, audio or movies.
 - Maximizing “legibility” of essential information. Keep all materials including web sites simple and clean.
 - Providing electronic versions of textbooks, articles, magazines or newspapers.
- Use a scanner and optical character recognition software (OCR) to digitize readings, handouts and announcements. Have digitized materials available for students to be able to use, edit and manipulate.
- Pre-teach math symbols and vocabulary needed for each lesson.
- Point out or summarize the important parts of each lesson, then model highlighting, asking questions and taking notes.
- Simplify directions, make them explicit, and provide directions in more than one way (verbal, write on board, demonstrate, etc.).
- Remind students what they already know or provide background knowledge to help with comprehension.
- Help students to generalize the lesson to other parts of their lives or courses.

Providing multiple means of Action and Expression

UDL also seeks to offer students opportunities for multiple, different or alternative ways to express learning. Assessments and evaluation of student learning should accommodate the different ways students best perform and indicate their knowledge, keeping in mind the nature of the content being taught. To indicate learning of a skill or concept one student may be more comfortable writing an essay, another may prefer creating a multimedia slideshow, preparing an electronic portfolio, or taking a standardized multiple-choice test.

Instruction and assessment should be adjusted or differentiated to account for each student's ability and the unique way in which they function in the classroom and are motivated (Pham, 2012; Valiandes, 2015). An autistic learner taking a spelling test may lack the coordination to write readable answers using paper and pencil. Audio recording the learner spelling the words out loud may provide a more valid and less stressful assessment.

Modern technologies more than ever can make possible and feasible the building of learning environments with the needed supports, media options and personalized adjustments for UDL while still allowing the ability for instructors to assess learner's

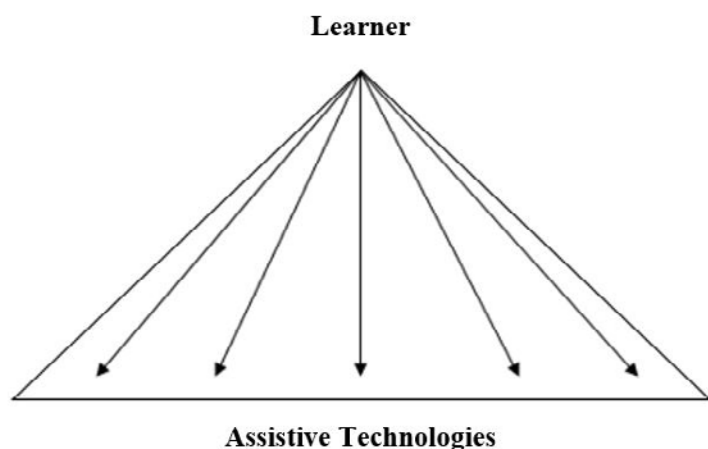


Figure 1. Traditionally a learner requests, seeks out, and acquires Assistive Technologies.

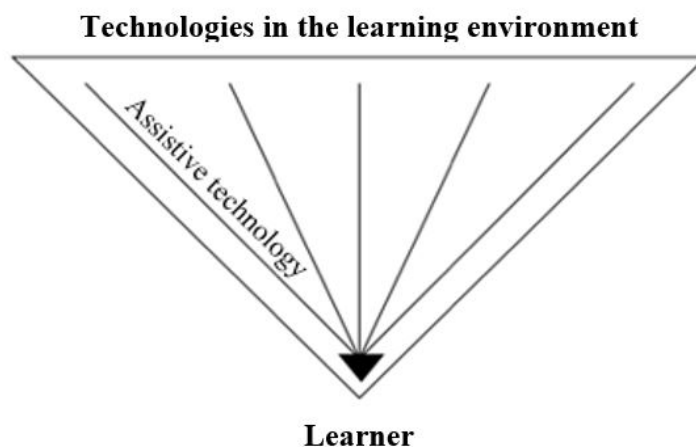


Figure 2. With Universal Design for Learning, various learning technologies and Assistive Technologies are proactively built into the learning environment.

progress (Matuk et al., 2015).

Examples of providing multiple means of action and expression in teaching include:

- Give parents and students the option of receiving classroom mailings and notifications via email or web sites as an alternative to sending home paper flyers and letters.
- Help students to stay organized through a large project by providing electronic reminders about due dates, including “soft” due dates.
- Help other students to stay organized by helping them to make their own reminders.
- Plan for use of screen or text readers, alternative keyboards, voice input, switches, scanning software and other assistive technology.
- Use outlines, indexes, summaries and study guides on important concepts and principles for student who may benefit from outlines as well as expository explanations.
- Help students to generate flowcharts and concept maps for complex processes and ideas.
- Give options for students to use presentations or electronic portfolios for demonstrating knowledge.
- Allow audio or video options for essays, spelling tests, presentations etc.
- Make sure spell checkers, thesauri, voice input and word prediction utilities are installed and operational in all software that can use them.
- Explain and demonstrate undo and redo functions in computer programs to decrease frustration for individuals with cognitive or physical conditions.
- Provide clear objectives, examples and checklists so that students can track their own progress.
- Provide opportunities for student reflection and questions allowing feedback on a project before the final draft.
- Allow students to show their learning by making a digital slideshow or creating a poster, rather than assigning writing, paper-based reports and essays.

III. ASSISTIVE TECHNOLOGY

Though originating from different places, UDL and Assistive Technology (AT) often intersect and sometimes are thought of as the same thing. AT are devices, tools, products and services that, when used, help people with disabilities to increase, maintain or improve functional capabilities. These technologies can vary from simple low-tech solutions to sophisticated high-tech adaptations. For learners with low vision, ATs range from rulers with built in magnifying glasses to software that magnifies the computer screen or scans and reads text out loud. For students with reading disabilities, AT may range from colored filters to text to speech software. For student with writing or physical disabilities, AT may range from alternative pencils or pencil grips to voice input or word prediction software programs.

UDL and AT do share much of the same history and tools. You may find that tools designed for AT are ideal for UDL. The overarching purpose of UDL and AT is the same: to reduce barriers. Traditionally, AT is reactive – a student with a disability has to struggle with learning obstacles before AT is considered. Teams who work with individuals with disabilities, including the teacher, then customize and document accommodations and adaptations for each person to ensure that AT is available for the student – even outside the UDL classroom illustrated in figure 1.

By design, UDL is more proactive and global, requiring pre-planning and placement of options for access to the environment from the beginning, thus making the learning environment more available to students with and without disabilities. While UDL gives options for most learners, the same options might be essential for access for a student with a disability. When it is essential for learning, UDL often becomes AT as illustrated in figure 2.

IV. COSTS

Some of the examples provided in this paper can be initially expensive in terms of time and equipment. The best that can



be said is that costs should decrease as technologies continue to advance and the instructor gains skill at planning and converting existing materials. Advancement in technology has produced an ever-expanding list of computer tools and programs teachers can use to foster a successful educational experience for the different, diverse range of abilities learners bring to teaching and learning.

With that being said, there are some recommendations that can be made in order to gain access to AT that may reduce costs:

- Seek negotiated purchasing pricing with vendors through your school or company, educational agency or state.
- Check your purchasing policy to ensure that digital copies of materials are included in contracts.
- For some materials, your organization may already have licensed products or negotiated reduced pricing, so be sure to check before you spend your own money.
- Many learners who need tools such as AT may already have them. If so, give students the flexibility and means to use their AT. If not, work with AT professionals to determine the best fit of technology features to meet the needs of the students.
- You may be able to make a stronger case for funding by taking the approach and arguing that UDL will make technologies available to everyone, not just a few targeted individuals. Give specific examples of how these technologies will help all the students in your classroom achieve to the best of their abilities.
- Look for local, statewide or national grants or foundations aimed at improving achievement and inclusion. There are also legal obligations in providing accommodations for students who need them. The price of the technology may be far less than lawsuits and litigation. Negotiating a school-wide license may be a marginal additional cost to a single license for a student in need thus providing wider access to the technology.

V. CONCLUSION

UDL can be a powerful tool for reducing barriers to learning in the classroom. When considering incorporating and evaluating UDL in your classroom, start with the three principles – provide multiple means of engagement, provide multiple means of representation and provide multiple means of action and expression. Engage students through including options for recruiting interest, then build on their effort and persistence so that they can internalize the reason for learning. Present information to students in various ways, then build their understanding of language and symbols so that they can comprehend your lesson. Allow students various ways to show what they know by allowing access to AT, then build their knowledge of the use of multi-media and scaffold learning, so students can set their own goals, plan, monitor their progress and manage their resources.

Incorporating UDL in small ways can make a difference. A teacher can be differentiating instruction, assessment and interest by using elements of UDL in ways such as when a student

is allowed to go to the internet for information, use a digital camera to take a picture for a report, scan a photograph to include in a biography, etc. In the end everything cannot be on the shoulders of just one or two people; the teacher and/or student. It takes a team. Educators, librarians, parents, support staff, computer lab managers, etc. All of these individuals should have access to training and resources for designing accessible learning environments, so all can use technology for their maximum benefit as they pursue academics and careers.

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The new Chat Fusion 8 offers front and rear cameras to enable device users to customize pages to meet their needs. It also has an extended battery life, and multiple access methods including Chat Point (optional headpointing), and single or dual switch scanning. A wheelchair mounting plate has been included for your convenience.

Chat Fusion comes with an 8" screen and weighs only 1.9 lbs making the device easy to hold. A stand and handle are built into the design, and a shoulder strap or waist belt are available options for hands-free transporting.

A docking station with WIRELESS charging capabilities, and a screen touch wake-up setting allow those without fine motor skills to easily use the device without assistance.

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Xbox Adaptive Controller – Game your way



GAME YOUR WAY

Designed primarily to meet the needs of gamers with limited mobility, the Xbox Adaptive Controller is a unified hub for devices that helps make gaming more accessible.

WORKS WITH A RANGE OF DEVICES

Connect external devices such as switches, buttons, mounts, and joysticks to create a custom controllers experience that is uniquely yours. Button, thumbstick and trigger inputs are controlled with assistive devices (sold separately) connected through 3.5mm jacks and USB ports.

STRENGTHENED BY THE COMMUNITY

Built from the ground up through strong partnerships with The AbleGamers Charity, The Cerebral Palsy Foundation, SpecialEffect, Warfighter Engaged, and many community members. Input from these groups has helped shape the design, functionality, and packaging of the Xbox Adaptive Controller.



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living with blindness or partial sight. The device uses ultrasound to detect obstacles that may lie directly in one's path. It then notifies the user of these obstacles through intuitive vibrations, allowing the user to safely navigate around any objects that they may encounter. The BuzzClip offers essen-

tial head level obstacle detection and can be easily held or attached to many forms of clothing, making it a highly versatile and useful device.

All aspects of the BuzzClip from its design to its functionality have been created with our customers in mind. It is an extremely practical mobility tool that can reduce fears of travelling as it provides a reliable way to inform a user of their immediate surroundings and prevent collisions.

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- Listen mode for interpretation
- 15 languages and 42 dialects supported
- Natural sounding female and male voices
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ZAPPOS ADAPTIVE – FUNCTIONAL AND FASHIONABLE PRODUCTS TO MAKE LIFE EASIER

THEIR STORY

A few years ago, a Zappos employee took a call from a customer whose grandson received the wrong shoes. Sadly, the employee was unable to find a replacement for what she needed. Their customer was frustrated — and rightfully so. She shared that her grandson, Gabriel, has autism and is unable to use shoes with laces due to the challenges of tying them. As Gabriel ages, it becomes increasingly difficult to find footwear for his needs.

That call made a lasting impression on their employee, and he vowed to do something about it. Following several months of immersive research, education, and talking with families and people with disabilities, he helped create a team dedicated to sourcing products that are functional, fashionable, and meet all types of needs. Although they're just getting started, Zappos Adaptive aims to connect people with products that make life easier.

BILLY FOOTWEAR

In 1996, Billy Price became paralyzed from the chest down and left with limited mobility in his arms and hands. Having difficulties putting on his shoes, he came up with a brand new zipper design that works for and appeals to everyone.

"I wanted to be like everyone else and have stylish shoes ... I used to have people help me put my shoes on because I couldn't put them on myself. There had to be a better way. We solved the problem by having a zipper that goes around the outside of the shoe and the toe so the upper folds over. When you put your foot in flat, you can zip it up and voila — the shoe is on."

– Billy Price, co-founder of BILLY

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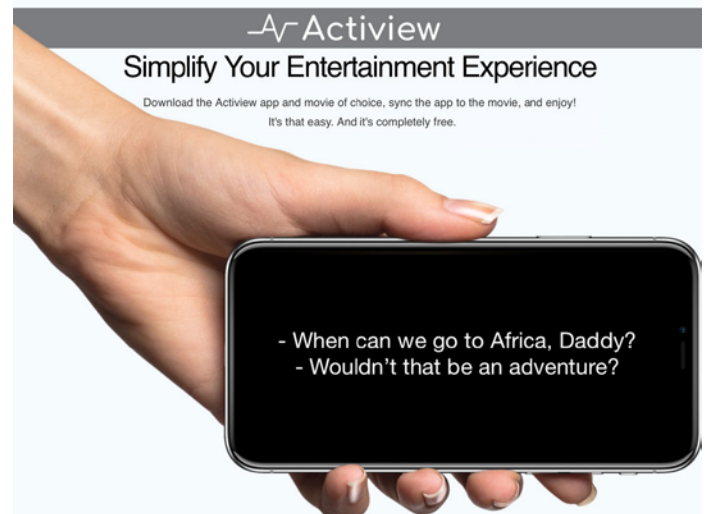
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