



UNIVERSAL DESIGN FOR LEARNING & ASSISTIVE TECHNOLOGIES: WHAT DO THEY HAVE IN COMMON

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INTRODUCTION

A lot of us have heard about Universal Design for Learning, or UDL. It's a research-based approach for achieving a goal that we all share-- improving education across all grades, across all subjects, for all learners. UDL principals have their roots in architecture and product development, but for those of us involved in special education, the concept is really about designing the curriculum to accommodate all kinds of learners, especially exceptional students.

This article will help you apply UDL principals using assistive technology (AT), but probably not the kind of complicated, expensive AT that you might be familiar with. We want to share with you some creative approaches that will allow your students with disabilities to participate in the general curriculum and to foster greater collaboration among your educational team. These ideas are just a few that they describe in detail in their new book, *Assistive Technology for Young Children: Create an Inclusive Learning Environment*. First we'll define and Assistive Technology and Then we will take a look at the different tools for AT, and then we suggest ways to merge UDL and AT in your classrooms and the expanded role for the SLP.

DEFINING THE RELATIONSHIP: UNIVERSAL DESIGN FOR LEARNING AND ASSISTIVE TECHNOLOGY

We come from a systems perspective. Having worked in special education for a very long time, we have learned to approach things in multiple ways using multiple lenses. So even though we may be specific about a content area of UDL and assistive technology, we take a systematic change approach. In this short article, we want to share some resources you can use to further your effort in this area. But most of all, we want to give you a philosophical approach you can use when determining how you might incorporate UDL and assistive technology approaches in your own schools and programs.

Let's begin with the law and the one that applies most specifically to assistive technology. It's the IDEA Act (Individuals with Disabilities Education Act) of 2004. That legislation was originally created in 1974-75. By 1997, it included information about assistive technology and a specific definition that we like to go with. IDEA speaks to what assistive technology is and what a device is. For those of you who work in schools, you know that when you confront an IEP situation, assistive technology is something that is required by law to be considered for every child.





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When discussing the definition of universal design, we often mention that the concept comes out of architecture. The idea behind it is to front load, or to look at ways of creating an environment that is accessible to everyone. For example, if you create a set of ramps for wheelchairs to be able to access a room or a building, those ramps should also be accessible by anyone. So the idea is to preconceive and think about how you can manage environments that allow accessibility for all. It could be a very simple approach. The other day my mouse pad kept falling and somebody said I should use double-sided tape to keep it in place. This is a very simplistic notion of how you might modify an environment to make it work. Universal design for learning is based on the concept that all learners are accommodated during the design, implementation, and evaluation of curriculum. It is really important to think about universal design as a proactive approach to redesign the curriculum.

Universal Design for Learning has a rich research base --over 25 years of research and development. The term “universal design” was coined by the Center for Applied Special Technology, or CAST. The CAST website has an extensive collection of sources of research and applications for schools to look at universal design for learning. But the UDL concept extends beyond the architectural concept of universal design. We think about cognitive access to learning, not only the physical access.

There are three principles --representation, engagement/action and expression. The research supports that different parts of our brains are stimulated during learning, and each provides representation. Multiple means of representation can engage learners of diverse backgrounds. Learners today come from all kinds of diverse backgrounds with disabilities, language differences, and learning differences across all levels of school. So thinking about how to represent materials in ways that stimulate different parts of the brain and get everyone engaged in learning is the first principal.

Thinking about engagement in learning and stimulating interest and motivation for learning is the HOW question: How do children learn? How do they remain engaged and attentive to learning? When we consider action and expression, there are multiple ways that children and students can express themselves. Learning to differentiate the ways that students can express what they know, requires different tools. This is where the relationship between the universal design for learning and assistive technology comes in, but before we talk about the commonalities, we want to look at the differences.

There are some differences between UDL and AT. One is that UDL considers the needs for all learners in the initial planning stages of curriculum. This is the most challenging part of the theoretical concept of UDL. Thinking about curriculum being accessible to all learners, rather than with assistive technology, looking at individual considerations. Evaluating, and assessing and developing interventions for children after the fact, after they come into a classroom and finding out that things aren't working, and adapting after the fact is necessary. But when we consider universal design, the evaluation of access and participation and the progress for each learner is in the beginning. Specialists and team members in the school can come in and give their expertise and think about the instructional environment proactively.





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What would it involve for a child with a hearing impairment or a child with complex communication needs, what would that classroom look like initially, rather than after the fact? It is our dream that all children can walk into the classroom and have access to learning.

Some of ways of UDL and assistive technology can compliment each other have to do with IDEA 2004, which reinforces the privileges for UDL. The law requires access to the context and the content of curriculum, and in that context and content, active engagement with the curriculum. UDL has the potential to augment IDEA and to eliminate barriers to learning. It also offers a window for assistive technology to be part of the initial planning and design. Rather than using assistive technology after the fact, the resources can provide the means to compliment and expand UDL up front.

Let's look at an example of a relationship between UDL and the multiple means of representation, engagement, and expression, and how AT tools for access can be used from the beginning. We can depict concepts through visual support, like visual schedules and word walls and visual representations of meaning in multiple formats beyond text, using icons and pictures and visual symbols. These are access tools for learning through engagement, for having different ways for children to engage in curriculum, and then multiple means of expressions.

Communication devices are another example. Low-tech to high-tech communication devices can provide many ways for children to indicate through pointing, through gesturing, through eye gaze, through use of high-tech systems to communicate. Our vision for all children is to have access through means of technology that is already available through a screen reader and a magnifier. A child who needs visual support can magnify text and gain access to learning just like other children along with all of his or her peers.

HOW TO INCORPORATE ASSISTIVE TECHNOLOGY TOOLKITS

One way to consider incorporating AT and the UDL model is to use toolkits in the classroom. Toolkits are a way to approach access with a variety of devices and materials. You can make some basic low to mid-tech devices and materials available to teachers that allow them the opportunity to experiment and explore and pilot different, simple, low-cost measures of supporting a child in the classroom.

Having this type of toolkit helps you, on the go, to provide support and ideas for modifying learning environments. The purpose of the AT toolkit is to increase access to low-tech inexpensive tools. The toolkit is based on the need to have these tools readily available for students, families, and educators, and to use them in multiple ways in various classroom activities and routines. This approach puts AT and AAC in the hands of practitioner teams and the children that are in need of support. It also improves the process of assessment and piloting different devices and supports by selecting the most appropriate technology for young children with disabilities and older students with disabilities as well.





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Let's explore some examples of curricular areas and how you might create classroom toolkits to support learning. The first area is AT for literacy. You can easily make adaptations of books, games and materials to increase access and participation in literacy activities. In our new book, we go extensively into toolkits and we created four categories of toolkit items. In this article, we are going to give you some of the ideas, but there are many.

You can go from low-tech to high-tech tools depending on what you have in the room. For instance, if you have an access to interactive white boards (IWBs) that might be a high-tech option. You get some Bluetooth switches that allow access to your IWB that is in your classroom. But we want to give you some ideas of low-tech tools. The first one is how you can adapt books.

There are many ways to adapt books. One of the simplest and easiest ways to adapt books is to add page-turners and page fluffers. Page-turners can be as simple as little tags you put on pages to allow easier physical access to the book. Another idea for younger children might be furniture bumpers that you can purchase at Home Depot or Wal-Mart. You can also buy from independent living "Bump-ons," which are little plastic bumps that you can add to pages that allow better access into the books, so you can turn the pages a little bit easier. These are some really easy ways to begin adapting books.

The next tool to consider is the slant board, which is another very simple way to improve access to a book. For example, if you have a science book that a child with disabilities cannot access because of limits to their positioning or posturing, you can take a binder and add any Velcro material you can find in a material store, you add that to the binder, you put Velcro on the back of the book and attach it to the binder. This elevates the book to give the student a better angle and easier access to turning pages of the book. It is very easy to do.

There are also many writing adaptations. At any drug store you can find pencil adaptations that allow you a larger grip. They are colorful and you can individualize them depending on the interest of the child. A very simple way to modify both pens and paintbrushes is to buy Styrofoam balls and stick a pencil or pen into the ball. It makes it easier to grip. All you need is a few very inexpensive Styrofoam balls and you have an adaptation and help a child who is not able to paint or to draw to be able to participate in that activity with other students.

You can purchase highlighter tape from educational supply stores or online and it comes in a variety of shapes, sizes, and colors. It really is a teacher's best friend. It's removable, so you can buy one roll and use it many times. It allows you to accentuate text or maybe block out a specific part of the text that you want the child to focus on. So during a lesson, again lets go back to science, if you're focusing on some specific topics that you want them to learn about, you can use highlighter tape to highlight that portion of the book where you want to draw their attention.





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Another way to draw a child's attention to specific conceptual information in a book is to use white labels and cover portions of the text or pictures in the text. You cover anything that might be visually distracting and that allows the student to look at the critical elements of the information that you want them to learn about. It makes it really easy. These labels are inexpensive, readily available in local stores and can easily be put on books to eliminate the distractibility of particular aspects of text, especially when there is a lot of text or a lot of visually disorganized information on the page.

Another way to accommodate learners is by using alternate representations of text. There are a wide variety of websites where you can get more information about alternate representations of text. You can download books that already have text embedded in the stories. There are different ways you can use voice output on computers, text to speech using sign language icons to match key words. There is a board maker with symbol pictures where you can use symbols to support particular words that you want the child to learn. There are beginning Braille books, there are talking pens, and there are also a plethora of mobile apps now that provide different pictures and symbols. You can also create your own storybooks using a variety of very inexpensive apps.

When we are talking about AT toolkits, we are talking about two different kinds of toolkits. We are talking about some of the equipment you'll want to have readily available in a classroom for the use of all students who may benefit from them. We're also talking about supplies. Thinking of these two different sets of tools, you'd have a single-message VOCA (a voice output communication aid) or other types of VOCAs, but you'd also have supplies so you can quickly make things. Supplies like a laminating machine, a photo album binder, and a Velcro mitt -- all of these things are easily available in dollar stores.

One type of VOCA, an express one, can be mounted at different areas of the classroom and it is really good for repeatable messages like, "It's computer time...it's time for the reading circle... it's time for math, or I'm all done I need some help." An express VOCA can be really useful for those repeatable messages. Other handy devices are the step-by-step and the sequencer. Both of these devices can be programmed with jokes, with stories, with songs, with conversations in a series of messages. A multiple message VOCA can be programmed with thematic units and they have room for different overlays that can be switched out and have available in different environment in the classroom.

Communication books of all kinds can be designed. These are a very handy low-tech system -- a way to categorize icons, pictures, and photographs to create communication dictionaries for all of the students who need the support in the classroom. The Eye Gaze Communication System is something that can be designed from simple to complex. A child can use it to indicate quadrants of letters and then to use word predictions and the communications partner is able to engage the eye contact and see exactly where the child is indicating using pointing and direct access with Eye Gaze.





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Another way to adapt a learning environment is with computers or computer stations, and, of course, sometimes students have access to computers at their own desk. We want to share some ideas of how you might adapt a computer station. Some of classrooms already have available touch screen computers that allow much easier access than a keyboard. There are also adaptations for keyboards and there are various types of computer switches. There are a variety of USB port switches that you can add to take the place of a mouse. In our book we go through a list of switches from different companies. One example is the R.J. Cooper switch. It costs ten dollars and you make it out of two CDs and it will activate anything you plug it in. There are switches that have a light touch, a hard touch, that are small, bright, large-- all types of switches you can use to access computers as well as battery operated toys and any kind of battery-operated device.

When you think about computers you also want to think about software considerations. In our book we have a specific guide and selection approach for software that includes categories and sub-categories that we recommend teachers and administrators consider when they're thinking about purchasing software.

There are many considerations, questions you should ask like, "Is this software age-appropriate? What kind of design does it have? Is the background color distracting? What about volume, sound effects, animation? Can the student control the software program or does it take someone else to operate the software? What is the difficulty level? How much response time is allowed? Is it a short time or a lengthy time? Does it have text to speech capabilities? Is there a data collection function for the teacher, which can be very important?" These are examples of many things you need to consider when you are looking at software.

We wanted to mention iPads. It is an area that we are focusing on. We are doing training across the state of California. First of all we want to ask you, why would you consider mobile devices to support learning? If you look at the very limited research available out there we know that iPads, other tablet devices and iPhones are readily available, so we are going back to our universal design for learning philosophy. They are very cool, other students use them, they offer a spectrum of communication options, there are many apps available to support communication in learning, and the number of apps is increasing exponentially every day.

Tablets, like the iPad, are an alternative to AAC devices. They are easy to learn and there is not much preparation time required for using apps. They are just fantastic! We are very excited about the explosion in tablet technology. Consider the cost and effectiveness compared to typical AT items that you may already have in your school. If you have a few simple switches, several output devices, a sequencer for scheduling someone's day, and a voice pen for book adaptation, just these few AT devices would cost about \$600. This is about the cost of an iPad today equipped with some communication and learning apps. But, you are paying the same amount of money for a piece of technology that could be accessed by multiple students and multiple teachers in multiple ways.





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We've created a selection guide for tablet apps based on our software consideration guide. You need to think about the same things when you are putting together a list of apps or when a teacher says, "I really need this app," or when a family member comes in during the IP process and says, "I want my child to be able to use an iPad in the classroom," and wants certain apps. In all these situations, you need to go back and look at the choices systematically.

You might ask yourself, "What are the physical considerations for the app? How is it going to support learning? Go back to the software considerations. You should think about the color, the animation, the illustration, and the vocabulary level and how much it costs. Some of the communication apps are expensive, but there are basic communication apps that you want to start with.

There are other questions to be asking, too: "Is it easy to use? Is it physical to use? What kind of directions would support both the technical and educational aspects of using the device?" If you have teachers or staff considering iPads who are not comfortable with technology, you need to make sure that the directions will get them going easily and that the app is intuitive. You want to be sure when they touch something or when their students touch something they are going to have a good experience and there is an outcome immediately that they understand and they will move forward with using that app.

MERGING UDL AND AT IN THE CORE CURRICULUM AND THE ROLE OF THE SLP

When we talk about merging UDL and AT, we talk about designing the classroom. The first step is to look at the classroom itself to make sure it is clutter-free. Sometimes classrooms get cluttered, so looking at what physical barriers might prevent access for all children is important. For children with sensory, visual, or hearing impairments, or for those who need access to devices and materials, we need to make sure things are reachable. For instance, visual schedules for classroom routines are often used for children with autism. However, they can be useful for all children to see what is on the schedule and what is expected of them to stay on schedule. It is particularly helpful for children who have behavioral problems or social interaction issues.

Having a toolkit in each classroom is our goal. When we look at the general education curriculum, it is somewhat narrow in the way it is designed. We need to look at and understand the curriculum standards for each grade and we also need to consider the core curriculum standards that we are beginning to adopt. Understanding the core curriculum looking at the environment surrounding us and looking at the activities around the core curriculum is essential. What are the environments in the classroom and how can they be adapted so they all children can participate?





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The key is using differentiated instruction and providing students with different ways of participating, using different ways of learning. We need to understand and create individual student goals. For example, if a particular student's goal is to learn to read and that student is challenged with sight words and text, we can use icons and pictures to support them in reading. They can then understand the text when that barrier to reading is overcome.

We have to acknowledge the role of the speech and language pathologist. The SLP in any school is an asset to universal design and AT because speech pathologists are uniquely equipped. I think it is important to know that we as speech/language professionals (and I being one of them) have unique knowledge in the understandings of language to support access to the curriculum. So we should lean on the speech pathologists to do an assessment and to determine what the language needs are for each student. Of course in the classroom and school, it takes team collaboration.

There are many people available in the district -- teams of specialists and consultants. They can be members of wider school-based teams. The challenge is getting everyone together and communicating. This can happen through virtual learning communities. It is important for a team to organize from the bottom up, but without the top-down support, those efforts will go unrecognized. Commitment to expanding AT services requires expertise as well, so a system of training, a series of workshops, a series of applications that build specific team-work skills are key. Time, consistency and commitment are required for success.

In our classrooms we need specific tools, and we need to have them available throughout the classroom, not just for specific learning needs, but also for everyone. Adding pictures to word walls, having pocket-sized speech generating devices available with pre-recorded messages, having core and specific vocabulary sets for individual students on speech generating devices - these types of tools are essential. Having a literacy station in each classroom, equipped with a digital text reader is another example. You can use a simple, digital picture frame that is adapted with a switch that allows children to change the pictures and read the story.

When setting up computer stations in your classrooms, pay attention to physical positioning, visual and hearing concerns, and fine motor control. There is a more information in our book about these considerations. But to sum it up, you need to set up computer stations with access for all children. This can be done through adaptations. We want everyone to consider the skill domains for computer use --all of the skills that need to be attended to in using computers. This includes taking into account the attention requirements and the attention skills of each individual, the cause and effect, turn-taking, social interaction between adult and student -- all of these skills are essential for considering the use of computers.





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Finally, it is really important that you go with technology. Technology is not going away. Hand-held technology is here to stay, and this very moment, new technologies are being invented. We want to be able to hear students' voices in any way they can communicate, whether it's through visual representation, through voice output devices or through other means. The goal for UDL and AT is to determine the best fit for each student. Individual student needs and goals should drive the selection. We would like to close with the main message that universal design opens the window for all learners with assistive technology, and the two areas of development can combine. We need to design our classrooms effectively, build collaboration in our schools, and link our speech/ language pathologists to the curriculum. We need to understand how to adapt the core curriculum using assistive technology tools with a universal design approach, and to fully leverage new technologies, allowing the needs of our students to guide us.





About The Authors

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Kathleen Curry Sadao, Ed.D., is a program specialist with the Supporting Early Education Delivery Systems (SEEDS) Project, in the Sacramento County Office of Education. Her work includes developing training materials for the field and facilitating a state-level assistive technology work group creating web-based AT training products. Dr. Sadao has been in the field of early childhood special education for more than 25 years. She has traveled the Pacific Islands providing training and technical assistance to newly developed ECSE programs as a Head Start Technical Assistance consultant and later a National Early Childhood Technical Assistance Center coordinator. Currently Dr. Sadao and her SEEDS Workgroup on Early Education Technology (SWEET) team have been field-testing AT training modules around the state of California.

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Dr. Nancy Robinson completed her master's degree in speech and hearing sciences at Portland State University and Ph.D. in special education at the University of Washington. Her areas of teaching, clinical practice, and research include augmentative and alternative communication (AAC); early intervention; collaborative team development; family support; and interagency systems development in remote rural areas, particularly in the Pacific Islands. In 2007, she received the CSHA District 1 Outstanding Achievement Award for her clinical service, teaching in communicative sciences and disorders, research and publication, administrative service, and service to CSHA. Dr. Robinson co-directs a four-year federal grant with Dr. Gloria Soto to support specialized graduate study in AAC, Project CLLASS.

Sadao and Robinson are the authors of new book "Assistive Technology for Young Children, Creating Inclusive Learning Environments (Brookes Publishing, ISBN 978-1-59857-091-5.)





About SPED Ahead

SPED Ahead is an opportunity for school administrators and special education specialists to catalyze discussions about new ideas and promising practices that help exceptional students achieve. With a series of free interactive online events and related multimedia web-based resources, we will explore answers to tough questions and shape effective leadership strategies for addressing special needs students' challenges for literacy skills, scholastic achievement and peer relationships.

About PresenceLearning



At PresenceLearning, we love to see children thrive, which is why we are making the promise of live online speech therapy (sometimes called telepractice) come true.

With the ongoing shortage of SLPs (speech language pathologists) and budget pressures in school districts reaching crisis proportions, innovative modes of delivery have become essential for giving children the speech therapy services they need.

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Our mission is to make live online speech therapy practical, affordable and convenient while providing an extraordinary therapy experience for each child. The PresenceLearning solution includes:

- access to our large and growing network of top-notch SLPs
- the latest video-conferencing technology
- the most engaging games and evidence-based activities
- time-saving collaboration and practice management tools targeting SLPs and educators

Join the growing group of SLPs, educators and parents committed to seeing children thrive as part of the online speech therapy revolution.

