Universal Design for Learning: Assistance for Teachers in Today's Inclusive Classrooms

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Universal design for learning (UDL) is a valuable tool for the proactive planning of engaging, accessible lessons in today's diverse classrooms. UDL focuses on three core principles—representation, expression, and engagement—to help educators develop motivating, accessible instruction that will increase the participation of all learners, including those with special needs. Classroom application of UDL includes the use of technology, multiple modalities of instruction, flexible assessment, and group activities to give students choices and provide them with opportunities to empower themselves as learners. Although there is not yet a conclusive body of quantitative research on student outcomes related to UDL, the literature documents benefits that include reduced behavior problems, increased metacognitive knowledge, and improved access to the curriculum for struggling learners.

Keywords: Universal Design, differentiation, special needs, technology, diverse learners, inclusion, English language learners, special education

One of the most frequent concerns of new teachers is "How can I reach my students with special needs?" Although most teachers receive some training in differentiation, many still feel that meeting the diverse needs of students in inclusive classrooms can be challenging (Meyer & Rose, 2000). Typical inclusive classes may have a wide range of learners, including students with learning disabilities, English language learners, children who are gifted and talented, and students with attention problems, autism, or emotional problems. Additionally, every class includes an array of average learners, all of whom need concern and attention.

One solution to addressing the needs of diverse learners lies in the concept of universal design for learning (UDL). UDL was developed by the Center for Applied Special Technology (CAST) as a method of lesson planning that helps teachers create lessons that are effective for the broad range of students in their classrooms (CAST, 2010). UDL involves the proactive application of instructional design concepts, pedagogical knowledge, and instructional technology to create instruction that is accessible and engaging to learners across the spectrum of ability (King-Sears, 2009).

Typically, when teachers try to make content accessible for struggling learners, they accommodate the work after it has been planned. In other words, teachers plan the lesson for the majority of their students, then think about what they need to change to make it accessible for individual students with special learning needs, like Raymond, who can't decode, Missy, who has trouble paying attention, Giovanny, whose English is just emerging, Yolanda, who is gifted, or the other myriad of children who have unique learning requirements. For each of these students,

the teacher might need to create an individualized accommodation that allows the student to fully participate in the activities and understand the content. Although this approach can help students with learning difficulties gain access to the general education curriculum, it requires time and concerted effort after a lesson is developed, and is only the first step toward true accessibility (Edyburn, 2010).

UDL takes another approach to differentiation. UDL is a *proactive* strategy that helps teachers build differentiation into their lesson plans from the beginning, eliminating the need for most of the accommodations teachers typically make after the fact, and providing the flexibility and accessibility needed to reduce the barriers for students with disabilities (CAST, 2010; Edyburn, 2010). It is based on the principle of universal access as is commonly seen in architecture (Burgstahler, 2001). To understand this better, consider the following example. You are walking through a building, arms loaded with personal items, textbooks and your heavy winter coat. You reach the door and find you don't have a free hand to grab the handle. Thankfully, there is a disability access button at the side of the door that you can push with your hip, and you sigh with relief as the door opens electronically. That is an example of universal access. That access button, which was designed to help people in wheelchairs, has also turned out to be invaluable to people with shopping bags, mothers pushing strollers, and people carrying too many personal effects. What was designed for a specific population, people in wheelchairs, has turned out to be helpful to everyone. That is also the principle behind UDL. By proactively designing lessons to make them accessible to students with special needs, teachers end up helping everyone in their class, providing improved access to the curriculum for all.

The Core Principles of UDL

There are three core principles that teachers need to consider when planning with UDL: how to *teach* the content to make it accessible (*representation*), how the students will *show* what they learned (*expression*), and how to *motivate* all the learners to do their best work (*engagement*). To use UDL to its maximum advantage, teachers must learn how to present the content so that it is not just oral or in print (*representation)*, but so the content is represented through a variety of modalities and methods such as videos, websites, pictures and realia. Additionally, UDL requires teachers to provide students with a variety of options to communicate what they have learned (*expression*), so that we move beyond traditional tests and papers to include options that allow students to capitalize on their affinities and talents. Finally, teachers need to implement an assortment of classroom strategies that empower their students and draw them into the learning (*engagement*) by providing choices, reducing anxiety, and rewarding effort. Those three concepts—representation, expression and engagement—are the cornerstones of UDL, and are the keys to planning motivating, accessible curriculum for the diversity of learners in inclusive classrooms (CAST, 2010). Additionally, the application of technology is a key underpinning of UDL, compelling teachers to make the acquisition of knowledge more accessible to students through such tools as voice to text software, interactive web programs, and electronic text. The thoughtful and well-designed application of technology is critical to implementation of UDL in the classroom (Edyburn, 2006).

The following scenario illustrates some of the challenges facing teachers as they plan instruction for today's inclusive classrooms. Although this is not a real scenario, it represents the type of

thinking in which a teacher might engage while preparing to teach a class of students with diverse learning needs, and helps highlight the practical application of UDL in the K-12 classroom.

Instructional Planning Without UDL

Imagine a teacher is planning a fifth-grade science lesson about the circulatory system. A typical lesson might engage students in instructional activities such as reading aloud from the science textbook, discussing the content of the chapter, drawing a picture of the circulatory system, and answering the questions at the end of the chapter—a typical (and perhaps predictable) science lesson. Does it meet the needs of the students? Let's take a look at some students that might be found in an inclusive classroom and see if this lesson will satisfy their individual learning requirements.

Most inclusive classrooms contain students who are identified with learning disabilities (LD); in fact, more than 88% of students with LD spend at least 40% of the day in general education classrooms (U.S. Department of Education, 2011). Let's call our student with LD Raymond. Raymond can't decode at grade level and can't follow along easily in the textbook. Although he has strong oral comprehension and is able to understand grade level concepts, he's liable to miss many key points in a textbook-based lesson such as the one described above. Additionally, his writing is poor, so answering the questions in the textbook can be unproductive for him. The lesson described above is unlikely to be successful for Raymond and other students with LD who struggle to read and write proficiently.

Another group of students common to many contemporary classrooms are those identified with Attention Deficit Disorder (ADD). Take the example of Missy. Missy has extreme difficulty staying focused when the class is doing whole class reading. She will often cause a disruption by playing with her pencil loudly or wriggling around in her seat during textbook reading, and there is a high likelihood for behavior problems when she is answering questions in writing—a non-preferred task for Missy. Does this lesson meet the needs of Missy, who has trouble paying attention in class? Most likely this lesson will not engage her, and Missy along with other students like her is very likely to exhibit behavior problems due to lack of engagement in the instructional activities.

Sixty-seven percent of all public schools include at least some English learners (U.S. Department of Education, 2007), and in urban areas they constitute the majority of children in many schools. Let's call this student Giovanny. Giovanny is a hard worker, highly motivated, and never causes any trouble. Unfortunately, his English vocabulary is still pretty basic, so a lot of the science content in the textbook is inaccessible to him. He gives all his assignments his best effort, but his work often shows confusion on the concepts, and English writing is very difficult for him. The lesson outlined above is not the best design for English language learners like Giovanny, who will need more support with English vocabulary and writing in order to be successful.

Finally, approximately six percent of learners nationally are classified as gifted and talented (U.S. Department of Education, 2006), such as Yolanda. Yolanda is a high-functioning student who is bored by repetitive tasks that don't challenge her higher-level thinking. The teacher may be concerned that she's not getting the opportunity to develop her unique gifts to their maximum

potential. In this particular lesson Yolanda will probably do a good job, but she could process this content on a much higher level if given the opportunity. This traditional textbook-based lesson doesn't give a gifted student such as Yolanda the enrichment opportunity she deserves.

Instructional Planning with UDL

As can be seen by the examples above, it can be challenging to meet the needs of the array of students in an inclusive classroom, particularly when using traditional instructional methodology. What can a teacher do to help this diverse group? One solution is to plan the lesson using UDL. First, let's consider the teaching part of the UDL equation—*representation*. The goal of the representation element of UDL is to consider multiple ways to present new information so that everyone can access the concepts, and not just rely on the textbook to be the primary carrier of facts to the students (CAST, 2010). What can be done to represent this material in a way that will make the content more accessible to Missy, Giovanny, Raymond, Yolanda, and all the other learners in a typical inclusive classroom?

Presenting Information With UDL: Representation. There are many elements a teacher can consider when presenting information using UDL. A teacher could think about ways to use graphics and videos, ways to engage students in kinesthetic activities, and options for activating background knowledge, linking new learning to old. CAST calls this the "what" of learning— providing students with a variety of opportunities to gather information and organize it to make sense of the new data (CAST, 2010). For example, we know that many students will need some assistance with the vocabulary of a fifth grade science lesson, so the teacher should carefully choose 4 or 5 words to pre-teach that are critical to understanding the main concepts from the text. Judiciously choosing vocabulary is key to pre-teaching because too many words will likely be counterproductive and may overwhelm English learners like Giovanny (Beck, McKeown & Kucan, 2002). It might also be a good idea to use a keyword strategy such as the Lincs strategy from the University of Kansas (Ellis, 1992) in which students use pictures and mnemonic devices to learn and retain new word meanings, or the book Vocabulary Cartoons (Burchers, 2007), which makes vocabulary more accessible through engaging pictures and stories that include mnemonic devices and keywords. Figure 1 provides additional information on these and other instructional strategies mentioned in this article. Whatever strategies are employed, the focus should be on providing options for students to understand and retain new vocabulary beyond the conventional activities of copying dictionary definitions and practicing rote memorization.

Figure 1
Instructional Materials and Technology

Comic Life
A web-based program that supports students in creating, uploading or printing their own comic book pages on topics of their choice. *www.plasq.com/comiclife*

Dragon Naturally Speaking
Easy to use speech recognition software for PC or Mac. Is also available as an application for iPhone, iPod Touch and iPad. *www.nuance.com*

Figure 1
Instructional Materials and Technology (continued)

e –Speaking
Free voice recognition software available for Windows-based computers. Technology by Microsoft. *www.e-speaking.com*

Graffiti
An interactive strategy in which the teacher mounts poster paper around the classroom with a variety of prompts. Students circulate the room with colored markers, drawing or writing their responses to the prompts and to other students' responses. *www.facinghistory.org /resources/strategies/graffiti-boards-reacting-diff*

KWL
A strategy for stimulating prior knowledge on an instructional topic. Students are asked to generate what they already know about a topic (K), and to create questions about what they want to know (W). At the end of the lesson or unit, students go back and generate a list of things they learned (L). *www.readingquest.org/strat/kwl.html*

Kurzweil 3000
A text-reading system available for Windows or Mac based computers. Includes a variety of tools to support the struggling reader in K-12 classrooms. *www.kurzweiledu.com*

Lincs Strategy
A visual mnemonic strategy to help students learn and retain complex vocabulary. Developed by researchers at Kansas University Center for Research on Learning. *www.k8accesscenter.org/documents/JKnight.webinar.ppt*

Vocabulary Cartoons
A series of books that use cartoons and mnemonic devices to help students learn and retain complex vocabulary. *www.vocabularycartoons.com*

Visuwords
An on-line graphical dictionary that helps students visualize links and relationships between vocabulary words. *www.visuwords.com*

Another productive way to support the vocabulary acquisition of English learners such as Giovanny during the representation portion of UDL is to highlight the relationships between English vocabulary words and the students' primary language using a word web. For example, the word "circulation" is "circulacion" in Giovanny's primary language, Spanish, and in this case both the orthography and the meaning are similar, a critical element for learners in early stages of English acquisition (Brenders, van Hell, & Dijkstra, 2011). Explicitly demonstrating the relationship between these cognates can help Giovanny and other Spanish speakers retain the

vocabulary and apply the learning to a variety of other new words. Additionally, presenting the information in a visual format through the use of a word web makes it more comprehensible to many learners, and is a foundational principle of UDL (Council for Exceptional Children, 2005). The web-based program Visuwords is one technological tool that uses visual mapping to help students understand the relationships between words with common roots and meanings.

Activating background knowledge is another primary tenet of representation. Many teachers use the "Know, Want to know, Learn" strategy (KWL), in which students generate lists of things they already know about a topic, things they want to know, and finally, things they have learned (Ogle, 2007). However, KWL has been around a long time and can be a bit overused, so instead a teacher might choose to use a more unusual and interactive strategy to activate prior knowledge and interest students in the new topic. Graffiti (Bennett & Rohlheiser, 2001) is a learning strategy that asks students to move around the room while writing down, drawing, or dictating everything they know about a particular topic on large sheets of paper. It is a creative strategy that gets children actively engaged, and after students have generated ideas, they can work in groups to share and clarify their thoughts. Kinesthetic, cooperative activities such as Graffiti are really motivating to students with attention problems like Missy, who typically don't enjoy textbook based lessons and who crave stimulation and movement. Additionally, students like Raymond who do not write well can choose to represent their ideas through drawings when engaged in a Graffiti activity.

Implementation of UDL also requires the use of technology whenever possible to make content more accessible to students (Edyburn, 2010). Before asking the students to read from a textbook, the teacher might show a short YouTube video about the parts of the circulatory system to catch students' interest and to present the content in a visual manner. As mentioned above, one of the key precepts of UDL is to provide content in a variety of modalities, and the use of technology such as video can provide an alternative input for students who need it (King-Sears, 2001). Because some children have trouble getting meaningful information out of a video, it can be a good idea to have them watch the video twice. Teachers can have them watch it through once, hold a quick discussion about the content, then go back and have them watch it again in sections. After each section of the video, the class can go into the text and read about that particular topic. For example, when the video shows the chambers of the heart, students can stop and read the corresponding part in the textbook. Using video or Internet technology to provide visual support makes the content come alive for students, and builds comprehension for everyone. Although some teachers might be afraid that they will be spoon-feeding their students by using video in this way, research indicates that poor readers often don't know how to access visual information stored in their memories (Tovani, 2000). Using video to preview new information can help students learn to associate new content with what they have previously learned in other mediums.

Another effective application of technology for representation is the use of electronic books. By providing access to text on the computer or an e-reader such as an iPad, Nook or Kindle, students can enlarge the print, change the background color, access electronic dictionaries, and even have difficult words read aloud. Raymond, the student with LD, could use a text to speech program such as the Kurzweil 3000, or the text reader built into Mac operating systems, to read web-based or electronic text aloud to him in synthesized speech. For Raymond, access to electronic text can

make the world of print comprehensible and meaningful (Edyburn, 2006). In UDL, teachers provide all students the option of accessing text through technology whenever possible.

As the students are watching the video and reading or listening to the text, the teacher might simultaneously give them the opportunity to interact with the content in yet another modality, by using a graphic organizer to outline the main points in the text. The teacher can ask students to categorize the new information on the graphic organizer as they go through the text and the video, and then model this activity on an Elmo or overhead projector during the lesson, thus providing another means of visual support. Again, this falls under the UDL principle of representation. The Center for Universal Design (1997) recommends building redundancy into the presentation of essential information by representing it in a variety of ways—in this case, using lecture, video, a graphic organizer and electronic text allows students to experience the content multiple times through multiple formats.

Assessing Learning Through UDL: Expression. The UDL principal of expression asks teachers to consider a variety of approaches for students to show what they have learned, focusing on providing options that allow them to express their learning through the modality most effective to their learning style. Although some students are able to answer questions in the textbook successfully, many students do this kind of work haphazardly. Since the teacher's goal should be to have students show understanding of the key points identified in the learning objectives, UDL encourages teachers to give students a broad range of alternatives to demonstrate that understanding. For example, students might write a short play, write a poem or limerick, make a poster or painting, make a Power Point presentation, answer the questions in the textbook, give an oral presentation, dictate an essay onto the computer, or dictate answers into a tape recorder. The list could go on and on. Giving students choices of ways to demonstrate what they have learned allows them opportunities to successfully participate in the curriculum, despite their learning challenges (Rose & Meyer, 2002).

By providing choices to students, the teacher is also minimizing attention and writing problems for students such as Missy and Raymond. Instead of struggling with traditional paper and pencil tasks, these students can select an option that will engage them and make the most of their strengths. Missy, who is a kinesthetic learner, might choose to write and perform a play with a partner, while Raymond might decide to dictate his work using computerized voice-recognition software such as Dragon Naturally Speaking, or e-Speaking, a free program for Windows users. The choice of activity doesn't matter—what's important is that the students are developing metacognition by focusing on their own learning assets, and they are experiencing success by using a mode of expression that suits their individual affinities. Furthermore, by incorporating choices into a lesson plan, the teacher has now differentiated for gifted learners, too. Our gifted learner Yolanda, for example, might choose to write long, complicated limericks about topics she is learning, or create a computer-based comic strip using a program such as Comic Life. These options can be integrated into the lesson plan for any student to implement.

Assessing Student Outcomes in UDL. In UDL, summative assessment of student learning is closely linked to the principal of expression, and should be flexible according to the instructional objective and individual students needs. Skill (for example, a student's ability to write a paper) should be separated from knowledge (a student's understanding of the concepts in a unit). By

separating these two components, teachers can reduce the effects of writing deficits where they exist, and acquire a truer picture of what a student has actually learned. Like instruction, assessment should be provided in multiple formats so that students can show their understanding of concepts and topics in a style that allows them to respond in the medium that is most effective for them (Hitchcock, Meyer, Rose & Jackson, 2002).

Most of the ideas for expression cited above also can be adapted and used as methods of assessment by providing a rubric of expectations to the students. For instance, in the previous example of the circulatory system, the rubric might specify that students need to illustrate understanding of the functions of the veins and arteries, the chambers of the heart, and the transportation and distribution of oxygen in the system. The students could choose how they show mastery of this content through a variety of activities or technologies. By giving students multiple opportunities to show their learning through a broad selection of authentic formats, students build confidence in their abilities, and become more comfortable with assessment in general (Thousand, Villa & Nevin, 2007).

Motivating Students Through UDL: Engagement. The UDL principle of engagement involves addressing the affective network: how students feel about school and the content they are learning. The focus of the engagement principle is to get students interested in the curriculum, to challenge them, and motivate them to learn about the topic at hand (CAST, 2010). One way that UDL recommends motivating learners is by providing them with options about how to participate in the classroom, for example, giving students the choice of working with a partner or small team whenever feasible. In our example lesson, the teacher might give students the choice to work alone, with a partner, or in a small group to complete their final project. Group work is very motivating for many students, and can be used as an informal peer support strategy (Thousand, Villa & Nevin, 2007). It is not unusual for a large percentage of a class to choose working with a partner over individual work at least some of the time, and research tells us that students are developing social and thinking skills as they collaborate (Johnson & Johnson, 1999; Kagan, 2011). The first few times a teacher gives students these options it can be logistically challenging. If it is done consistently, however, soon the students will know the routine and the teacher will have created a community of learners who can make informed choices about how to learn (Rose & Meyer, 2002).

Another important component of engagement is reducing threat for students. Students can feel threatened in the classroom when they are asked to expose their deficits (for example, by reading aloud), are forced to work in an area that is too noisy or too crowded for them, or when required to "work quietly" for long periods of time. Options for decreasing threat include giving students the opportunity to work in a quiet, private space, allowing students to "say no" to reading aloud or answering questions in front of the class, varying the length of work sessions, and giving students the chance to earn short breaks. Providing feedback that rewards effort and not just outcome also reduces threat for struggling learners (CAST, 2010). For example, awarding two grades on assignments—one for student effort and one for correct application of the concepts or skills—can build student motivation and increase engagement. Grading that includes both process and product has been shown to be an effective tool for successful inclusion of students with special needs in general education classrooms (Silva, Munk & Bursuck, 2005), and can have a positive impact on student engagement.

Benefits of UDL

Since UDL was officially recognized in the reauthorization of IDEA in 2004, it has begun to gain acceptance in classrooms across the country. However, quantitative research confirming its beneficial effects on student outcomes is still in short supply (Edyburn, 2010). One documented benefit of UDL can be a renewed focus on the efficacy of instruction. For example, Meo (2008) found that teachers trained in UDL for high school math instruction began to place less blame on the students for insufficient learning, and instead saw the deficits as related to poor instructional design.

Another aspect of UDL, the use of technology to enhance instruction, has been examined in a number of studies. Boyle et al. (2003) found that audio textbooks were more effective than a regular textbook in helping high school students with high-incidence disabilities learn content. Similarly, Anderson-Inman and Horney (2007) found the use of technology such as e-readers and electronic dictionaries helped build positive outcomes in reading, while Xin and Reith (2001) used video to improve the vocabulary acquisition of elementary students with learning disabilities. Despite evidence of positive outcomes for some elements of UDL, more studies are needed to quantitatively determine the overall effects of UDL on student outcomes (Kennedy & Deshler, 2010).

For teachers contemplating the implementation of UDL, there are a few key benefits to consider:

1. Students' behavior problems will reduce significantly if their learning needs are met (Morrissey, 2009). UDL can meet the learning needs of students and reduce inappropriate behaviors by providing motivating options for representation, expression and engagement.

2. Building a variety of choices into lesson plans gives students the opportunity to play to their strengths and avoids the need for modifying work, while providing students the opportunity to gain metacognitive knowledge (Murawski & Spencer, 2011). By teaching students how to maximize their individual learning strengths, we create independent learners who are more likely to be successful in a variety of settings.

3. When used well, Universal Design for Learning incorporates all these techniques into lessons that are accessible for a variety of struggling learners—and which will help every child in the class become more involved and confident in the classroom (CAST, 2010; Council for Exceptional Children, 2005).

Final Thoughts

Research suggests that using the principles of UDL to design instruction can help teachers not only make their lessons more accessible to learners with special needs, but make them more interesting for all their students. UDL challenges us to broaden our thinking about instruction so that we move beyond traditional "read, lecture, worksheet" teaching into instruction that uses technology and flexible methodologies to create curriculum that is more appealing to all types of learners. If it were possible to condense the principle of UDL into a simple definition, it might be "*Proactively planning engaging lessons that use a variety of modalities and techniques to present*

information, and which give students options for how and with whom they complete their work". Yes, this is a great simplification, but the critical elements are there: *representation* of information in a variety of formats, *engagement* of learners, and means of *expression* that allow students flexibility and individualization. For more information on UDL and its application in the classroom, see the resources included in Figure 2.

Figure 2
Resources on UDL

Books

Council for Exceptional Children (2005). *Universal design for learning: A guide for teachers and educational professionals.* Upper Saddle River, NJ: Merrill.

Murawski, W.W., & Spencer, S. (2011). *Collaborate, communicate & differentiate! How to increase student learning in today's diverse schools.* Thousand Oaks, CA: Corwin Press.

Rose, D. H., & Meyer, A. (Ed.) (2006). *A practical reader in universal design for learning.* Cambridge, MA: Harvard Education Press.

Rose, D. H., & Meyer, A. (2002). *Teaching every student in the digital age: Universal design for learning.* Alexandria, VA: ACSD. Also available on line at: http://www.cast.org/teachingeverystudent/ideas/tes/

Thousand, J. S., Villa, R. A., & Nevin, A. I. (2007). *Differentiating instruction: Collaboratively planning and teaching for universally designed learning.* Thousand Oaks, CA: Corwin Press.

Websites

AccessIT: National Center on Accessible Information Technology in Education: http://www.washington.edu/accessit/index.html

Center for Applied Special Technology (CAST): http://www.cast.org/teachingeverystudent

National Center to Improve Practice: Technology in Early Childhood Special Education: http://www2.edc.org/NCIP/library/ec/toc.htm

National Center for Universal Design for Learning: http://www.udlcenter.org

U.S. Office of Special Education Programs, Toolkit on UDL: http://www.osepideasthatwork .org/UDL/index.asp

AUTHOR NOTES

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