

Universal Design for the Mathematics Classroom

Universal Design (UD) is a set of principles that allows for designing curriculum and creating an environment in the classroom without barriers so that every student has the same opportunity for success. This allows for students to be more comfortable and capable of learning (National Center On Universal Design of Learning). The concept of UD comes from an architectural idea. It was originally an initiative used to construct or remodel buildings so that they were accessible to everyone. Using this same initiative in education is a process and takes time. Just like remodeling an old building with new innovations and better accessibility, restructuring a classroom with new teaching styles and new curricula requires time and commitment (Jannarone, 2014). UD is beneficial for teachers because creating this environment and curriculum now saves you from doing extra paper work and making more accommodations later. The curriculum can also be reused for future classes with minor tweaks depending on the particular set of students. We have been studying UD because we care about our students and want them to succeed. We also want to help further the quality of education we provide at the University of Arkansas.

At the University of Arkansas, every instructor must make accommodations for students' individual needs in both the classroom and assessments each semester on a case-by-case basis. Our hope with UD is that the majority of these individual needs would be addressed through changes in the design of the course. Then, as educators, we can focus more on teaching and less on logistics.

Our research focused on students with general learning disabilities, math-specific learning disabilities, and physical disabilities, as well as students who may have undocumented disabilities. We found that each specific disability has a best UD practice, and then we put together a list of best general

UD practices. Ideally, every classroom would have every type of UD practice in use, but it may be more realistic for teachers to start by implementing one or two practices. Then, as need arises each semester, teachers can add more UD practices to their own classrooms. Among the best UD practices to implement are board organization, captioned videos, online resources, being an observant teacher, and using a variety of assessments (Jannarone, 2014).

Students with certain disabilities benefit more from specific practices. Attention Deficit Hyperactivity Disorder & Attention Deficit Disorder (ADHD/ADD) are common among students. These students may have difficulty focusing or being still in class. To help these students, it is important to keep eye contact and let them know that you are paying attention to them (HelpGuide.org). Another increasingly common condition among students is Post-Traumatic Stress Disorder (PTSD). To help these students, it is important to have captioned videos and online notes. This helps the students stay caught up with the material in the event of an absence or trouble concentrating (American Council on Education). Pay attention to your students' behavior in your classroom, and do what you can to help the students who may be struggling with one of these disabilities whether it is documented or not (Downs, 2014).

Dyslexia and dysgraphia are two learning disabilities which affect how a student interacts with written language. Dyslexia is a learning disability that affects reading, often characterized by difficulties with word recognition and spelling. Students with dyslexia benefit from having important information, whether in directions or class notes, underlined or highlighted to increase the likelihood of understanding what is being asked or said (The International Dyslexia Association, 2002). Dysgraphia is a disability that affects writing and fine motor skills (The International Dyslexia Association, 2009). To help students with this disability minimize written work and use technology when possible (Jones, 1998).

Learning disabilities specific to mathematics are becoming better documented and understood. Therefore, educators need to know how to help students with math-specific problems. Three specific disabilities are math anxiety, test anxiety, and dyscalculia. Math anxiety and test anxiety are not the same, but can be addressed in a similar fashion. The difference is that students with test anxiety become anxious about tests, whereas students with math anxiety become anxious about math in general. For students who experience math anxiety, minimizing threats and distractions is beneficial because it allows students to relax and creates an environment of calmness, which is a more productive environment for everyone (Keiffer, 2014). For students suffering from test anxiety, have grades based on a variety of assessment types. Allow them to give a speech, create a project, write a paper, conduct an interview, be interviewed, or present to the class to show what they know. Do not hinder students, or their learning, by assessing them in only one way, but rather give options and opportunities for success.

Dyscalculia refers to a wide range of different math-specific disabilities. Commonly, students with dyscalculia struggle to relate things they see or hear to certain conceptual knowledge (National Center for Learning Disabilities). Since this disability is so diverse, it is harder to create a general environment that is accessible to everyone. That being said, one of the best approaches to creating an accessible environment is to foster collaboration and communication. This allows for all students, especially those with math-specific learning disabilities, to feel comfortable asking classmates and instructors for help (The International Dyslexia Association, 2009). It will also help eliminate the fear of being wrong. Using alternate teaching methods, such as group work or project-based learning, will also help students with dyscalculia, as well as other students. This provides a way for students who do not think just like their teachers to succeed.

Another group that warrants consideration is students with physical disabilities. Although every physical disability is different, there are some practices that can start you on the right track to making

your class accessible. Lecture notes should be available early so they can be converted to Braille or printed in large text when needed. In addition, making notes available online allows students with visual impairments to use technology to enhance their learning. For students with hearing impairments video captioning is extremely helpful. Be aware that YouTube and other websites do not necessarily have accurate captioning software (Downs, 2014). See what resources your school or department has available for captioning when needed.

Students with undocumented disabilities tend to struggle in the classroom with a variety of issues including grades, behavioral issues, or motivation. There are several reasons why students have not been diagnosed. Sometimes they cannot pay for the tests, and sometimes they go through school and no one notices them struggling. Many students are not aware that anything is wrong and just think that they are “bad at math” or “bad at school.” Educators need to be understanding and patient with these students in particular. You may be the only teacher who has ever cared to work with them, and therefore you can make a difference in that student’s life. It is also important to remember that everyone has “bad days”, and while teachers cannot accommodate every student for every bad day, they can help most of the time by simply being understanding. With UD, students with undocumented disabilities should be able to process and understand everything from class as well as their classmates (University of Arkansas Little Rock).

There are several teaching practices that work well for all students and are therefore good UD practices. They include, but are not limited to, board organization, video captioning, using online resources, being an observant teacher, and grading based on multiple types of assessments. To organize the board, work from left to right, underline important information, recap the previous day’s lesson, and outline a schedule for the current class period. This helps students who have ADHD, students with physical disabilities, students with dyslexia, and students who just struggle with organization. Providing videos with captioning is beneficial for students with PTSD, students who are hearing

impaired, students with ADHD, and students who are visual learners. Utilizing online resources is good for everyone! It helps the students to have multiple sources of information, and allows you as an instructor to not reinvent the wheel for every lesson. Look at known educational websites, such as Khan Academy or Wolfram Alpha, for tools and visual aids that you can utilize in your classroom. You can also point to these as an outside resource for students who need a little extra help. Be an observant teacher! Be aware of the students who might be struggling and be in communication with them. Be patient! You have the wonderful gift of being the only person who sees all of the students' faces at one time. Notice them and ask questions based on what their facial expressions are telling you. This helps all students feel important and cared for. Lastly, give your students options for assessments, such as projects or presentations, if possible. Allow the students to show what they know by giving options and opportunities for success.

Creating curriculum and a classroom environment that is universally designed, in the whole sense, is a daunting task. As graduate students, we do not have the ability to change the entire curriculum, but we have decided to implement UD one step at a time. We can adjust our classroom environment based on the needs we currently have, and those best universal practices. WE can then add on each semester to the changes we have already made. Eventually we will get to a place where we will not have to make accommodations in the classroom anymore. The same can be done with the curriculum. Overhauling curriculum is not done every semester, but we can make some changes each semester until we have a more universally designed course. This is the same process used in remodeling buildings so that they are accessible to everyone. First they add an elevator, then a ramp, and then they widen the hallways. Eventually they construct a new building with all of the accommodations included. It is going to take time, but taking these steps now will help eliminate the need for making accommodations later and will make you a better teacher.

Bibliography

- American Council on Education. (n.d.). *Accommodating Student Veterans with Traumatic Brain Injury and Post-traumatic Stress Disorder: Tips for Campus Faculty and Staff*. Retrieved February 12, 2014, from <http://www.acenet.edu/news-room/Documents/Accommodating-Student-Veterans-with-Traumatic-Brain-Injury-and-Post-Traumatic-Stress-Disorder.pdf>
- Downs, S. (2014, February). Universal Design at the University of Arkansas in Little Rock. (E. Goins, Interviewer)
- HelpGuide.org. (n.d.). *Teaching Students with ADHD*. Retrieved February 12, 2014, from Teaching Students with ADHD: http://www.helpguide.org/mental/teaching_tips_add_adhd.htm
- Jannarone, A. (2014, February). Universal Design. (K. Blair, Interviewer)
- Jones, M. S. (1998, December). *Accommodations and Modifications for Students with Handwriting Problems and/or Dysgraphia*. Retrieved February 12, 2014, from Resource Room: <http://www.resourceroom.net/readspell/dysgraphia.asp>
- Keiffer Ph.D, E. (2014, March). Mathematical Anxiety. (K. Blair, & E. Goins, Interviewers)
- National Center for Learning Disabilities. (n.d.). *What is Dyscalculia?* Retrieved February 12, 2014, from National Center for Learning Disabilities: <http://www.nclid.org/types-learning-disabilities/dyscalculia/what-is-dyscalculia>
- National Center On Universal Design of Learning. (n.d.). *What is Universal Design for Learning*. Retrieved March 28, 2014, from What is Universal Design of Learning: <http://www.udlcenter.org/aboutudl/whatisudl>
- The International Dyslexia Association. (2002). *Accommodating Students with Dyslexia in all Classroom Settings*. Retrieved February 12, 2014, from Just the Facts...: <http://www.interdys.org/EWEBEDITPRO5/UPLOAD/ACCOMMODATINGSTUDENTSWITHDYSLEXIAINALLCLASSROOMSETTINGS10-02.PDF>
- The International Dyslexia Association. (2009). *Understanding Dysgraphia*. Retrieved February 12, 2014, from Just the Facts...: <http://www.interdys.org/EWEBEDITPRO5/UPLOAD/UNDERSTANDINGDYSGRAPHIA.PDF>
- University of Arkansas Little Rock. (n.d.). *Reframing Disability: Creating Paradigm Shift from Medical Model to Social Model*. Retrieved January 21, 2014, from University of Arkansas Little Rock-Disability Resource Center: <http://www.ualr.edu/pace/shift/>