Promoting Student Success using *Universal Design* to Decrease Barriers in Higher Education

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I began teaching as a graduate student, and have since continued to grow in my understanding of content as well as educational design and delivery as faculty contributing to both 2-year and 4-year public institutions. Through the years I have become increasingly aware of the many kinds of diversity in my students: learning preferences, amount of college preparation, first generation college-bound, ages represented by concurrent enrollment as high school students through retirees, persons with disabilities, English language learners, and military active duty and/or veteran status. Early in my association with UA-Little Rock, Earth Science faculty joined a pilot program with the Disability Resource Center. "Project PACE" was funded by the U.S. Dept. of Ed and UALR to teach faculty to use Universal Design techniques in order to reduce barriers for the majority of students while increasing access to higher education. NCES (2013) indicates that students with some college courses or who achieve degrees become members of the workforce at higher rates. If redesigning our courses lower barriers, then our 2YC population benefits even more in the long term.

Universal Design (UD) can be summarized as three overarching principles covering multiple means of representation, action and expression, and engagement. Each of the three principles has three associated guidelines (CAST, 2011). UD guidelines naturally include many of the suggested "best practices" for learner-centered instruction as well as for English language learners, such as use of both visual and auditory media, incorporation of interpersonal strategies (cooperative learning, think/pair/share, jigsaw); designing course structure for applying consistent routines, "road maps" to science, and outlines; demonstrations; reading and writing (e.g. journaling); instructional techniques such as wait time and analogies; and vocabulary/concept strategies. My Project PACE training also included training through CAST (www.cast.org), DO-IT (http://www.washington.edu/doit/), and WebAim (http://webaim.org/).

My goal is as much to support my students' success in learning integrated science concepts as it is to foster each of them in learning more about the way they learn so as to promote their continued intellectual growth once they move on from my classroom or institution. The deliberate use of Universal Design with my classes brings strength to my teaching and I perceive its use as valuable, mainly due to its far-reaching implications. I work primarily with non-science majors, many of whom are in the early elementary to middle childhood tracks within teacher education. For many with identified or non-identified disabilities, it seems "too late" in the pipeline to make science accessible enough for them to want to major and select a STEM vocation. I continue to articulate that I am applying UD techniques, why I apply them and encourage my future teachers to do likewise as they develop their toolkits. I believe that by deliberately providing UD rationale and implementation, I best model what I desire them to take ownership of and apply in their own professional endeavors. But is it easy? Not initially, especially when I had to retrofit existing courses. Was it impactful *enough* in terms of numbers of persons served for the effort involved on my part? Now that I have been involved in UD for more than a decade, I am convinced it is well worth it in terms of impact. If we consider just one of the sub-populations such as students *identifying* themselves as a person with disability, the potential is large across the U.S. with approximately 770,000 people enrolled in 2- and 4-year institutions – and 50% of that demographic at 2YCs (Raeu and Lewis, 2011). The National Center for Educational Statistics conducted a survey in 2009 of higher education institutions (public, private, nonprofit, and for profit). Institutions responded to issues such as: limited staff resources to provide faculty and staff with training on accessibility issues, costs associated with appropriate technology, lack of incentives for faculty to change their instructional practices, and costs associated with incorporating Universal Design features into major renovation and new construction projects. Public and private nonprofit schools reported upwards of 40 % - 55% with barriers hindering implementation of Universal Design. Not surprisingly, 2YC institutions were on the upper end of that range.

However in as much as I embrace applying Universal Design, there are challenges to its implementation: time, funding and notifications. In terms of time, I am getting more modalities added to my courses incrementally otherwise doing the variety of recommended modes all at once can be overwhelming. What's making it easier now? In part, Society is "catching up." U.S. federal laws are tightening in terms of accessibility. The course management system I use for my hybrid and online classes now has a number of useful features (e.g. voice threads) or using inexpensive commercial software I can auto-transcribe lectures using voice recognition. Notification? This had been a big challenge until I started with UD, as faculty don't often learn that a student needs accommodation until the start of the semester or some time long into it… and that assumes students notify you at all (especially in an online format). Plus students have varying attitudes concerning notification and self-advocacy. So…all the more reason to develop curriculum and course implementation and management using UD: If you have done so effectively, then barriers have been diminished and there is no need for most eligible students to request an accommodation…since the barriers are not there to begin with!

At this point, I am not yet clear whether or not there are any quantitative studies providing evidence of the effectiveness of Universal Design in post-secondary geoscience education. There are publications for K-12 science (e.g. Howard and Potts, 2013) and I found a whitepaper summarizing a NSF-sponsored workshop for chemistry faculty (NSF, 2010), but I have been unable to specifically find any UD studies published for college-level geoscience courses. In the broader realm of UD applications however, I am aware of articles available through the Association of Higher Education and Disability (www.ahead.org). Roberts and others (2013) conducted a systematic review of empirically based articles concerning UD in postsecondary education. Their summary included qualitative, quantitative, and mixed methods documented in peer-reviewed journals since 2000, and resulted in very few papers identified (though this may be due to the lack of standardized lexicon within the UD community). Other recent articles through the Journal of Postsecondary Education and Disability by Humphrey and others (2012), Park and others (2013), and Schelly and others (2012) provide promising results, suggest professional development and classroom strategies, indicate increased faculty interest in commitment to reasonable and effective accommodations, and support the premise that use of UD may enhance experiences for all students. So, there appears to be an opportunity!

I am now ready to take the next step by collaborating with others to quantitatively explore specifically the efficacy of Universal Design in geoscience education. I have been asked to facilitate a break-out session during this July 2013 SAGE 2YC workshop, which I have labeled rather generally as "Students with Disabilities." I look forward to participating in a cohort of faculty with similar interests in Universal Design in order to expand future professional development, implementation and assessment. Universal Design has all the essentials of various "best practices" and "student-centered/learner-centered" techniques that are now much more ingrained in my way of knowing and doing (thanks to workshops through "On the Cutting Edge" and SAGE 2YC). Let's now broaden participation and formally access it!

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"Never doubt that a small group of committed people can change the world. Indeed, it is the only thing that ever has."
Margaret Mead