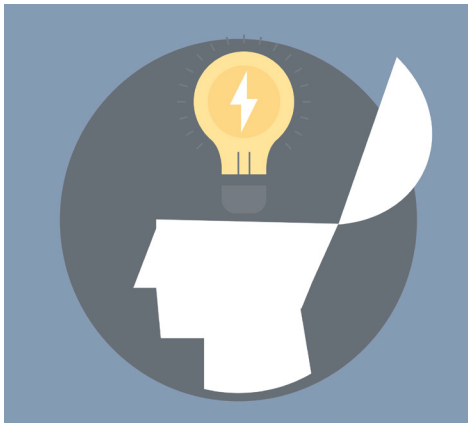
UNLOCKING DEEPER LEARNING

UNIVERSAL DESIGN FOR LEARNING

SPRING 2018, TOWSON UNIVERSITY - OFFICE OF ACADEMIC INNOVATION



UDL ACROSS TOWSON UNIVERSITY

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Welcome to the first edition of "**U**nlocking **D**eeper **L**earning through **U**niversal **D**esign for **L**earning." The goal of this newsletter is to spread inspiration as well as practical ideas for how the Universal Design for Learning (UDL) can support relevant and rigorous learning. You will read several testimonials from faculty who have applied the UDL principles with great success. Their hard work and insights are captured here in order to be shared with other faculty members at TU.

The Universal Design for Learning is a particular approach to teaching with overarching principles that map onto the learner's needs. The three principles involve providing multiple means for representation of information, expression of new learning and engagement with the content being presented. UDL is applicable to any course or topic and can guide the instructor to accomplish more meaningful development and presentation of ideas in the classroom.

Over the past three years, across 6 semesters, I have continuously tried to revise a particular assignment in my Psychology of Human Development class. Each new semester yielded new versions and additional improvements but the assignment still seemed to be lacking relevance and clarity. In the Fall of 2017 I joined the UDL 'Re-boot' cohort. One of the assigned tasks was to 'UDL' (verb!) one assignment in the course. Throughout the Fall 2017 semester, I had a direct help line to accomplish my goal to revise the elusive assignment. I learned several crucial strategies, was introduced to innovative technology and programs available and received a tremendous amount of encouragement and feedback. The most important message received was that there is no right or wrong way to apply UDL. The important thing is to allow for exploration. And there is still more to learn and improve...

UDL is a universal but personal process. Being part of the current UDL cohort, I discovered in the initial meeting that while everyone in the cohort was interested and focused on applying the same principles it would look very different within each of the departments, subject areas and classrooms. Not every approach that can be utilized in the education department, can be replicated in the math department. However, everyone can appreciate the process and share experiences and ideas.

UDL at Towson University has been a grass roots, organic type of initiative that is gaining momentum. A large part of the rise in this movement was due to a 'teacher leadership' component. Many faculty members felt that UDL was an important ingredient to include in the teaching process, regardless of their college or department and so they chose to educate themselves about UDL and the benefits for their students.

That is the goal of this UDL newsletter. A forum for faculty to share accomplishments, whether big or small, in their UDL journey. As noted in the articles, UDL can assist in accomplishing many educational goals.

CONTENT

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A STRATEGY FOR IMPOSING METHODS WITHIN UNIVERSAL DESIGN FOR LEARNING (UDL) GUIDELINES

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The technique presented below may be particularly useful to instructors in the mathematics and sciences.

UDL emphasizes that instruction should be congruent with the learner's unique learning style. For example, if a person learns better by listening to audio or by presenting an audio cast then by using visuals, then UDL recommends both instruction and assessment using audio for that particular learner.

This creates a challenge in the mathematical and science disciplines where proper technique may intrinsically require several modalities only some of which the learners are comfortable with. A good example is the "rule of four" introduced by Deborah Hughes-Hallet as part of pedagogic reform in the teaching of calculus.
The rule of four states that calculus concepts should always be introduced and solved in "four" modalities: i) verbal, ii) graphical, iii) formal-algebraic and iv) computational. All instructors and mathematicians are aware that using only one of these techniques hampers a person's ability to solve all calculus problems; contrastively, skillfully using all four techniques greatly enhances the problem-solving ability and comprehension of calculus. Similar situations exist in other branches of mathematics and science.

I have successfully used the rule of four in the Theory of Interest course, Math 312, which is part of the curriculum in the Actuarial concentration in the Mathematics department at Towson University. However, I face the problem that some students (and for that matter some books and software) insist on exclusively doing things by formula.

As is well known, forcing learners to make graphs, in this case, timelines, simply creates ill-will, an environment in which learning is difficult. My solution to this challenge, which has evolved over several semesters of experimentation is as follows. My course policy acknowledges that students will get full credit on tests for any problem with a correct answer and correct methodology. This semester I am using practice software and students are graded based on a correct answer; again methodology does not count. However, each class day I select one problem to be handed in, whose solution is known, and which is graded by compliance with the rule of four (with some modifications I have introduced). In other words, students must present a written solution which clearly identifies the modifications I have introduced). In other words, students must present a written solution which clearly identifies the graphical, formal and computational components of solutions to verbal problems. To give more flexibility I further explain that students are free to experiment with different algebraic methods and different timelines; they get credit as long as the components are there.

I supplement this approach with a transactional attitude. In a sense, the instructor is transactionally involved with students since the instructor must sell the things to be taught to the students who in turn pay with expending effort to learn them. The burden of interest in the sale if of course always on the seller. So, I see it as my job as instructor to find and present problems where solution by a particular modality-graphical, or formula or computational-leads to a neat quick solution. This uses a constructivist principle: Students are never taught but rather learn by constructing concepts themselves; the instructor can at most provide for them an environment conducive to such discovery. By presenting specific problems I enable students to discover that four modalities must be used for problem solving mastery.

PROVIDING "CHOICE" FOR ASSESSMENT OF LEARNING

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Implementing the principles of Universal Design for Learning in my undergraduate and graduate classes has been a rewarding experience. To address the diverse learning needs of my students, I design lessons that minimize barriers to learning. One way in which this is accomplished is by providing "choice" for students in the assessment of learning outcomes. For students in my Introduction to Special Education class, this poses a dilemma for some since they have reported that such flexibility is novel to them. As students utilize critical thinking skills and reflect on various options available, they become increasingly comfortable and adept at making such decisions. By modeling the principles of UDL, my students can identify how they would implement the principles in their teaching. It is exciting to see my students so enthused and motivated about their work, and the manner in which they interact with each other in class. As an educator with a focus on "brain literacy"- UDL provides an excellent framework for accomplishing this goal. The UDL journey continues!

UNIVERSAL DESIGN FOR LEARNING PRINCIPLES IN ACTION DURING RADIUS OF SKATE BLADE ACTIVITY

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Teachers certified in Maryland are expected to be able to incorporate Universal Design for Learning principles in their classroom instruction. This makes it important for them to see UDL principles in use in their teacher preparation courses, not only in their pedagogy-focused courses but also in their content courses. This is my fourth semester teaching MATH 325: Problem Solving for Middle School Teachers, a mathematics content course for pre-service teachers in the middle school education program. Below, I will describe how an activity that I conducted in class on February 6th uses UDL principles.

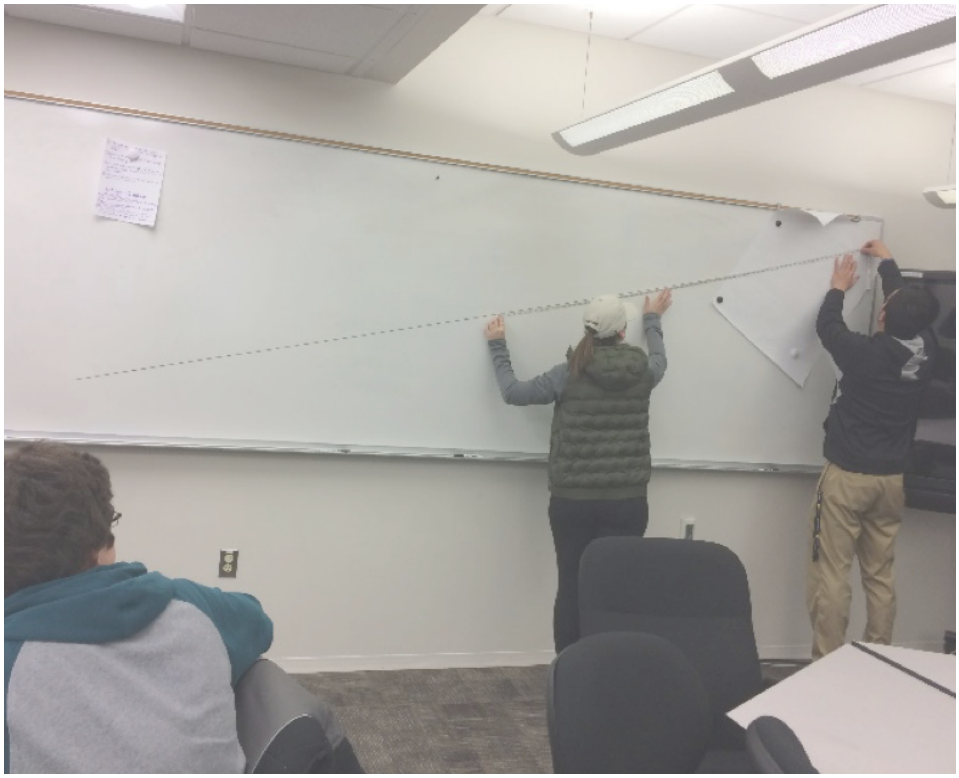

Photo 1: Jordan Stracke & Jeff Mohilchock

The problem that students were asked to solve is, "What is the radius of a given figure skate blade?" While there is a specific answer to the problem, there are many ways to solve it, including different theorems about circles that students could apply.

Multiple means of representation:

Undergraduate secondary mathematics education student Robert Nedwick created a Powerpoint presentation that provided vocabulary / syntax background regarding parts of a figure skating blade. Students saw pictures of the figure skate blade, and they also had access to physical skate blades in front of them. For mathematical content background knowledge about this problem, students had access to a set of geometry textbooks and the Internet. Instead of providing them the theorems that they would need to apply, they needed to research them.

Photo 2: Alyssa Barber, Youyu Liu, and Elizabeth "Lisa" DeGroff

Multiple means of action and expression:

I asked students to find the radius in more than one way. Two groups used physical actions to help them determine the radius, and one group decided to just use a relevant equation that they found.

Jordan and Jeff drew a tangent to the skate blade, and then constructed its perpendicular bisector. In Photo 1, they are using markers to continue to draw the full circle on the board to see where the circle will intersect the circle again on the other side. From there, they will be able to determine the length of the diameter of the circle and then calculate the radius. [see Photo 1]

Alyssa is holding a string (which has the length of the group's estimated radius length) on the floor, along the perpendicular bisector of the arc of the traced skate blade. She is at a point where she thinks is the center of the circle, but will move further or closer depending on recommendations from her groupmates. Her groupmates Yuki and Lisa are moving the edge of the same piece of string (treating it like a compass) to see if it will overlap with their tracing of the skate blade. [see Photo 2]

Yet another group researched online and found an equation that they could use based on the Intersecting Chords Theorem.

Multiple means of engagement:
Students had a lot of choice and autonomy in how to proceed. Some students became discouraged when they could not find more than one way to derive the radius of the skate blade, but I allowed them to consult with the other groups. This fostered collaboration and community among groups in the class.
Coming into this class, I did have one way that I used to solve the problem myself, but none of the students used that way. So I also learned new solution methods while watching the students work on the problem, and it was a very interesting class for me to watch! This was the second time that I tried this problem with students and the activity took about 75 minutes.
The very first time I tried the problem with students, in Fall 2017, I did not use UDL principles in mind. I provided students with the theorems that I used to solve the problem and just asked students to apply it to the skate blade. It took students about 30 minutes to arrive at a solution to the problem using that one method.
I have noticed a difference in the level of understanding that the students have about the problem and about the solution process. When given a new situation in which the same geometry theorems could be applied, the students from Fall 2017 struggled to remember what we had done in the earlier class period and I had to repeat the theorem again and walk them through applying it to the new situation. This semester, I haven't had to repeat any explanations of applicable theorems because the students have internalized them and have more flexible knowledge about how to adapt them to different arcs. Even though the UDL-based activity took longer to implement initially, I think it was time well spent because the content addressed is more memorable to the students.

WHAT STUDENTS HAVE TO SAY ABOUT UDL

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Since joining the UDL PLC in 2014, I have seen a tremendous shift in many facets of instruction. Implementing UDL increases student learning, makes teaching more exciting, and heightens student engagement.

As closure to one particular lesson this fall, I asked my students to reflect on their learning; I believe their words capture my sentiment in the power of UDL:

"It helps to understand more when you hear different people explain the same thing. Repetitiveness helps it stick in your head. It's fun!"

"I learned at a deeper level, as only reading the text is not helpful for me. I like using different strategies to learn."
"I like UDL because we all learn in different ways, and I can learn in the way that makes the most sense to me."

"Talking to classmates about how they understood something helps me think about things in other ways. This helped me think at a deeper level."

"I would like to learn this way in other classes! It keeps me on task and helps me learn at a much deeper level. I feel like I retain more info this way."

Not only have I embraced the UDL framework, my students have as well. I highly recommend joining TU's UDL journey!

"I learned at a deeper level, as only reading the text is not helpful for me. I like using different strategies to learn."