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Teaching Philosophy

There is a quote by Paul Halmos that I admire for both its truthfulness and simplicity: “The only way to learn mathematics is to do mathematics.” It corroborates my stance that math is an action verb and emphasizes my belief that worthwhile learning is rooted in doing. As an instructor, my goal is to facilitate an environment where I am only responsible for part of the ‘doing’ of mathematics that is happening at any given time. The aim of my teaching is not merely to impart information to students, but to aid in the establishing of new schemata that allow them to learn independently, think critically about the course content, and to sharpen problem solving skills both inside and beyond the classroom. The most important component of these objectives, undoubtedly, is the how. My approach thus far can be stated succinctly—*engage and equip*.

With respect to engagement, it is important that students understand my expectations for involvement from the get go. On the first day of every class I have a dialogue. I implore them to consider their reasons for taking the course and to make goals for what they hope to achieve by the end of the semester. I also ask the important question, what do they expect from me as their instructor? From this I discuss my role in facilitating not only their goals but my own through the course objectives. I also ask if they prefer working in groups or individually, other academic interests, hobbies, and for more details about their math backgrounds via survey. This information allows me to determine how to best engage the students as the course progresses.

I incorporated interactive lectures when I taught Basic Algebra in the Fall of 2016 as the instructor of record. At the beginning of some classes students were split into teams of three or four. The lessons had built in stopping points with review questions so that students could practice problem solving in real time as the concepts were being introduced. In a large lecture setting, for Calculus and PreCalculus, I started with warm-up exercises where I would leave the podium to answer individual questions, even if students were sitting at the back of the lecture hall. When moving around did not make sense, I posed questions to the entire class and waited patiently until someone answered. I would thank whoever response by asking their name and repeating it and their answer to the entire class.

I also create interactive variants of standard classroom activities. When I taught trigonometry independently in the spring of 2017, I designed a Top Chef Grapher’s activity, in lieu of a graphing worksheet, where students had to create a meal in teams given certain ingredients: $\sin(x)$, amplitude of 5, phase shift of π , etc. After creating the meal (writing a correct function), the students had to present it to be judged (draw an accurate graph and describe its features). This was a very well received activity. Student comments from surveys and course evaluations consistently indicate that my class made learning fun.

Having students engaged and actively participating in class is only half of the battle. The other half involves equipping them with the tools that they need so that engagement serves to facilitate meaningful learning. At the University of Iowa, I have pursued two graduate teaching certificates that have helped develop the pedagogy to do this. While attaining the Graduate Certificate in College Teaching I did a teaching practicum in Discrete Mathematics at William Penn University, a private liberal arts college in Oskaloosa, Iowa. This course was taught using inquiry-based learning (IBL), and I gained

first hand experience in this technique as a co-editor of the course workbook.

Another important take away from the graduate coursework for the college teaching certificate is the use of scaffolding to aid in the development of critical thinking skills. I make sure that worksheets I give to students include guided questioning. For example, in Calculus for Business, a standard question might be: Given $f(x) = (x + 5)(x - 7)$, find the equation of the tangent line at $x = 3$. As a Teaching Assistant for this course, instead I would ask the question in the following way.

1. Given $f(x) = (x + 5)(x - 7)$, answer the following:
 - (a) Compute $f'(x)$.
 - (b) Evaluate $f'(3)$.
 - (c) What is the relationship between your answer in part b) and the slope of the tangent line to $f(x)$ at $x = 3$?
 - (d) Use point-slope formula to find the equation fo the tangent line to $f(x) = (x + 5)(x - 7)$ at $x = 3$.
 - (e) Draw a graph that includes both $f(x) = (x + 5)(x - 7)$ and the line you found in part d). Observe how the line in part d just touches $f(x)$ at $x = 3$.
 - (f) Given any differentiable function, how can be use the derivative to find the equation of the tangent line to a specific point on the graph?

Asking questions in this manner may seem tedious, but it helps to aid in conceptual understanding. If a student is asked to explicitly find the equation of a tangent line in an assessment, they can reflect on these multiple steps as a schema for working through the problem.

The Graduate Certificate in Online Teaching has completely transformed the way that I incorporate technology into the classroom. I have adopted blended learning as a strategy to encourage independent learning. I partially flipped my trigonometry course in Spring of 2017 by creating instructional videos for students to view over the weekeend, which were coupled with short video quizzes to be completed before class on Monday. Thus, students were responsible for preparing for Monday's class period before arriving, which allowed us to use the flipped period focus on more than introductory content. We tackled more challenging problems typically reserved for homework through worksheets and activities, like the aforementioned Top Chef Graphers activity.

Incorporating blended learning into my teaching toolbox, using scaffolding to facilitate independence, establishing classroom environments centered around active learning, and exhibiting passion by incorporating creativity into lessons are all ways in which I am to engage and equip student learners with the skills they need to be successful. I believe learning should be a transformative experience, and I am passionate about my continued development as an educator to help students achieve learning outcomes. I will continue to focus my energy not just on imparting knowledge, but on ensuring that transmittance of information leads to the development of new schemata in students that will allow them to become independent learners with critical thinking skills.