Philosophy of Teaching Statement

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Often times the last question we attempt to answer is why. It is my belief that a student may better learn if they are encouraged to ask and answer the simple question, why. If a student can answer this question, the ability to generalize and apply concepts could improve. The idea is analogous to testing the health of a tree; the rest of the tree may look healthy, but if the roots are not healthy the tree is not going to thrive just like a student needs a strong foundation to be able to think at a deeper level. Here, the question 'why' is having students solidify their foundation of a subject through having then explain their thoughts first to themselves, then to each other, and then to the class. In my teaching experience, I have noticed a relationship between the "ah-ha" moment and when a student can answer the question, why, in fact, research shows that the productive struggle for the "ah-ha" moment is where students develop persistence and confidence in learning (Edwards and Beattie, 2016). Our goal as educators is to help students develop skills, like persistence and confidence, to help them in their future endeavors. With this in mind, I center my class around the idea of answering why and the productive struggle.

Student Engagement

Motivating students to learn can be a difficult task especially for mathematics courses. It can be even harder to get them to engage with the material, each other, and the class. I believe that getting students to think about 'why' certainly engages them with the material and, when applied properly, can get students engaging with one another and the class. The most common questions educators ask their students start with what. While these questions are important for the building of procedural knowledge, the engagement tends to come from one student and even that student may not fully comprehend their answer.

Consider the topic of factoring done in most 100-level math courses. A common method used by educators to engage the class is questions like "what does $x^2 + 2x + 1$ factor into?" and then fielding an answer from the class and moving on. I like to add a follow up question of why after getting an answer to encourage students to think more about their reasoning rather than just getting the answer. This method of "fake" quick-answer questioning can be extended by using active learning strategies like think-pair-share where sharing involves students communicating their reasoning as well as their solution or a quick poll to see who agrees and ask for explanations. These extensions encourage students to reflect on their understanding of the concepts and gives everyone in the class alternate ways to think about the problem.

Conceptual Student-Centered Learning

In mathematics pedagogy courses, one of the first questions you are told to ask yourself when preparing to teach a course is "what am I providing that the textbook does not already provide the students?". In mathematics it almost feels like a rite of passage to teach like most textbooks, in the following manor: introduce the topic, define the necessary tools, do an example, and let students do an example. Similar to questions that begin with what, this system has its benefits, but can take the productive struggle out of learning mathematics. This method is especially common and problematic with the transition to online teaching and learning.

In most textbooks you have chapters with several sections that build on each other. Why not replicate this idea in teaching? I often start a lesson on a section in the middle of a chapter with an example for the students to try before introducing any new tools or material. Consider the most commonly used identity $\sin^2(x) + \cos^2(x) = 1$ which is typically introduced in the first section of the chapter on identities. The next section defines two more identities which are derived from the Fundamental Identity and proceeds to use them in practice. This is a moment for the students to be introduced a problem from the new section and see if they can derive the new concepts themselves. While more difficult for students, this method of student-centered learning (a variation of a flipped-classroom and discovery-based learning activities) is apt to promote productive struggle and deeper conceptual learning than the conventional way. This can be extended to active learning strategies like discovery-based jigsaw activities where students teach each other the lesson's topic once they develop their own comprehension of the lesson through the activity. It is also important to note that student-centered learning practices translate very well to online learning since it gives the students a way to engage with the material which is difficult in an online setting.

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Conclusion

My goal as an educator is to provide students with the atmosphere to learn skills and tools needed to succeed in the future; whatever that future may be. The above gives some of my strategies and insights toward engaging my students in conceptual student-centered learning. Many of the strategies I choose to try and implement were crafted from ideas in the MAA Instructional Practices Guide. I have had success with why-centered teaching and many of the MAA IPG strategies, but I intend to explore alternate approaches to active learning and student focused teaching as well. Much like a potter, I plan to mold my teaching craft by practicing current strategies and exploring new ones.