

Teaching Statement

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A major formative experience in my teaching career was when I took an inquiry-based Algebraic Topology course from Krystyna Kuperberg. It was a challenging experience, but it really taught me how to be a mathematician. Inspired by this experience, I attended the Legacy of R.L. Moore conference. After speaking with other teachers who were passionate about inquiry-based approaches, I was inspired to use the technique on a few of my classes.

A second experience that fundamentally changed my teaching was a summer bridge program for students who had been rejected from university admission. I had attended an MAA meeting the previous spring, where I had heard of standards-based grading, and I decided to implement this into the bridge program. By the end of the 5 week course, all of the students had mastered the content necessary to be admitted to the university, and many had gone beyond the required minimum. It took a few years to fully understand how to implement mastery grading into my classrooms, but now, I use it nearly exclusively.

When I design a course, I first look at what I see as the purpose of the class. Is this a course for math majors that is exposing a student to advanced content, or preparing them for further study in a field of mathematics? Is this a course where the student will take the mathematical skills into their study of another discipline? Alternatively, is this a course that is designed to fulfill a general education elective, where students need to learn to become less anxious about mathematics, and to appreciate the role of mathematics in society? The liberal arts curriculum gives me opportunity to work with students in all three groups. Depending on the answer to this question, I choose the structure of the course.

If I'm teaching a higher-level course, where I can expect some mathematical maturity of the

students, I use inquiry-based learning. Depending on the level, I may provide the students with a text, or we may just work off of a set of course notes. I tend not to lecture, but instead, give the students a set of problems designed to make them think about the material. Problems are presented by students, and I facilitate the discussion through failed attempts until the class achieves a correct solution together. I find that students who take these courses become more eager to delve into new material without fear of failure. I supplement the in-class work with more difficult homework and exam problems, to provide more detailed feedback and address any gaps in student knowledge.

If I'm teaching a large course, a lower level course, or a course where I expect high levels of math anxiety, I used a team-based approach. With this technique students take a short readiness quiz, I lecture on content that wasn't understood on the quiz, and students work in permanent teams on discovery activities. Less confident students can build their skills and reduce anxiety, and stronger students learn to explain concepts clearly and identify gaps in their own knowledge.

In both situations, I use standards-based grading. Giving students repeated attempts to demonstrate mastery of a learning objective reduces anxiety, builds confidence, and gives me a more accurate picture of a students knowledge at the end of the semester.

I believe these methods help me keep students engaged, and that they increase mathematical maturity. By giving students the opportunity to struggle, fail, and make that failure productive, they get away from the mindset of memorizing algorithms, and begin to think more deeply about mathematics. By focusing on mastery, students are better prepared for future courses, and a student who struggles early on, sees an immediate opportunity to get just as high of a grade as a student who did not struggle, provided they are willing to work for it.

Initially, students are wary of these innovative approaches. As the course progresses, comments like "How will I learn without a lecture?" or "Why isn't there a book?" are gradually replaced by "Are you teaching Calculus II next semester?" or "Do all of the professors teach their classes like this?".

I believe that anything we can do to make the classroom more engaging, while maintaining rigorous content, is a positive change. In my experience, this method does exactly that.