Teaching Statement

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Taking a math class is like embarking on an expedition to climb a large mountain. Each problem solved is a step toward the summit; every new concept is an obstacle to overcome. My job as a teacher is akin to that of expedition leader; I ensure my students are prepared for the difficulties ahead. I point them in the right direction while letting them find their own path. When their resolve weakens, I become their cheerleader, pushing them to succeed in the face of adversity. When they are lost in the midst of the problem at hand, I teach them how to find the path forward by keeping the larger objective in mind. When we arrive at a vista, I help them survey the ground we have covered and the route leading to the summit. I am very fortunate to have had many opportunities during graduate school to teach a variety of courses with a large degree of latitude and independence concerning the course structure and topics covered. This experience has allowed me to hone my skills as a mathematical guide.

Organizing and leading an expedition is a major undertaking; designing a class is no different. I spend a lot of time thinking about the structure of the courses I teach, the major ideas I want to convey, the order in which I will present topics, the types and frequency of assessments, etc. Each assignment, lecture, or quiz is crafted with a specific objective, be it to communicate a particular concept, or hint at an upcoming idea, or to reinforce a major theme. Beyond the classroom, I model these practices as a TA Training facilitator, leading workshops on classroom management and giving feedback to new instructors.

The beginning of an expedition is a critically important time. The dynamics between expedition members and their relationship with the leader are formed early on, and once established, these habits are very difficult to change. In my classroom, there is an expectation of interaction and inclusivity, meaning that my classroom is a failure tolerant environment. I encourage and value input from all of my students; I am much happier with twenty wrong answers than none at all. I actively praise students for willingness to provide input, especially when they are unsure or incorrect. A review from my trigonometry class stated:

> "[Derrick was] one of the best teachers I have had in my time at the U. He was very helpful and made every question feel like it was a good one. He was able to slow down and explain a complicated subject in a way that was understandable."

Some techniques I have used to promote student engagement and active learning include group quizzes, weekly problem sessions, and group worksheets (designed to challenge students and improve conceptual understanding), among others.

Student feedback and input is crucial for me; I use it to identify points of confusion and adapt my teaching accordingly. It would be rare for me to lecture for five minutes without any student feedback; I am constantly prompting the audience for questions, answers, and explanations. In week two of a linear algebra class, I had a room full of students who struggled to describe geometrically the solution set of a single linear equation in three variables. Because the social dynamic of the class had already been set, students felt comfortable enough to offer a wide array of incorrect responses: point, line, cylinder, etc. Were it not for these responses, I could easily have missed this gap in their knowledge. Because of the environment in my classroom, I was able to modify my lesson plan and address the problem.

Just as in the classroom, the bulk of any expedition consists of a long, slow march toward the summit. Rather than use a formulaic approach, I try to guide students, often leading with examples, towards a deep understanding of the material at hand. One student review from my calculus class stated:

> "I thought that the examples used and explanations given were well thought out and well articulated. I also thought that Derrick responded effectively to the questions posed by students. I liked how we were pushed, through various examples, to try to think outside of the mathematical equations towards what was actually going on through the language of mathematics."

Along the way to the summit, there are myriad difficulties to overcome. Success often depends on finding novel ways to approach a problem and I find this aspect of teaching very engaging. For example, when learning to graph functions $f\colon \mathbb{R}^2 \to \mathbb{R}$, I might start with the function that assigns to a location in our city the altitude of that point, and have the students work in small groups to determine what they think the graph of this function should be.

Success also requires a willingness to change plans to address unforeseen obstacles. My lessons are dynamic and flexible. I might spend fifteen minutes of a lecture building off a comment from a student, relating their ideas to recent material, and using it as a jumping off point to delve deeper into the topic of the day's discussion. When students are confused, I may review material we recently covered. When students are disengaged, I might use think-pair-share to introduce a new concept, prompting them with a question they don't yet know how to answer, and having them discuss their thoughts on it.

While the stated purpose of an expedition may be to reach some predetermined summit, in reality attaining the summit is rather inconsequential. The point is the effort and work that got you there. I emphasize this perspective in the classroom, making sure to reward effort, in addition to correctness. Once they enter the workforce, many undergraduates will never again use the math they learned in college. The value they derive from math classes is not the math itself, but the critical thinking and logic skills necessary to do that math. Too often, we lose sight of this reality, tying grades to mastery of the mathematics, rather than improvement. Some semesters, I will have students spend some class time each week working in groups on "Food for Thought" worksheets (sets of challenging, mainly conceptual problems). To highlight these ideas, I grade these worksheets based on effort and engagement with the material.

At the end of every expedition, the leader should reflect on what worked well and what went poorly. Only through serious reflection on our teaching practices can we hone our craft. At the end of each semester, I dissect every aspect of the course I taught: What worked well? What went poorly? How did the students respond to daily homework? How did group quizzes affect student engagement? What will I do differently next time I teach this class? I am always incorporating lessons from my past experiences, successes, and failures into my teaching in the hopes of leading a bigger and better expedition next semester.