Teaching Statement
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Teaching is a fundamental part of any working mathematician’s life, whether it be lecturing to a classroom of undergraduates or giving a research talk to a group of colleagues. A critical part of being active in the math community is explaining one’s work and asking questions. The skills required to do these things well are precisely those which make one a good teacher and student. Foremost among these are proper preparation, gauging one’s audience, recognizing both understanding and confusion, and pacing one’s self to allow for questions and processing.

I find teaching to be a challenging, rewarding, and invigorating part of my job. I believe that my experiences as a teacher have made me a better researcher and collaborator. In what follows, I will first discuss my experiences and development as a teacher, and then I will look ahead to what I would like to do with my career as a teaching researcher.

I have been teaching at public universities in the US for over a decade in various capacities: I have lectured in mid-sized calculus courses with strong students at Virginia Tech, led small calculus recitation sections with weaker students at UIC, and taught an inquiry-based learning course in real analysis to math majors at the University of Michigan. I have also co-supervised two REU projects at Michigan. I have learned a variety of lessons from these different experiences which have been integral to the development of my teaching philosophy.

I began at Virginia Tech, an engineering-focused school, where I lectured a few medium-size calculus courses. Most of the undergraduate students I taught had strong fundamental skills and were eager to learn and work hard. They regularly took advantage of the resources offered to them, including my office hours and exam review sessions. Working with these students was often a joy, for they were quick to follow me, responsive to my questions and full of their own. I found lesson planning and leading my own class to be my biggest challenges. As with most calculus courses, the syllabus set a blazing pace and I learned a lot about how best to determine what to cover during each class given the time constraint and, just as significantly, the strengths of my students. As a result, I was able to leave Virginia Tech comfortable as a lecturer and a more technically proficient teacher.

Teaching at UIC was a significantly different experience. At Virginia Tech I was frequently lecturing my own course, whereas at UIC, I was mostly responsible for leading small recitation sections for large calculus courses. The one exception was the semester I was chosen by the department to lecture multivariable calculus, which was similar to my VT experience of strong students and a torrid syllabus pace. While the recitations were less demanding than having full teaching responsibilities, the nature of the recitations gave me a better understanding of the difficulties of teaching students with weak mathematical backgrounds.

While my best students at UIC were just as bright as my best students at Virginia Tech and the students on the whole were just as capable of achieving at a high level, UIC is an urban institution with a diverse student population who typically are underprepared for college-level calculus due to an inadequate secondary education. My average student at UIC
had weak algebra and geometry skills, little understanding of how to write a mathematical sentence, and most often calculus was the last math-based course he or she would ever take. My main realization from my teaching experience at UIC was that intelligence had little to do with success when teaching service courses—the main challenge was getting these students to engage the material and work on their foundational skills. Most of my students were smart but lacked any fluency with mathematical thinking and language. Although this made my job as a teacher more challenging, I derived great satisfaction from their successes and I learned a lot in the process.

At the University of Michigan, I taught four semesters of an inquiry-based learning (IBL) course in real analysis to math and math education majors. IBL is based around the principle that learning is an active process. In an IBL class, the students produce most of the course content in a collaborative format, with careful but not overly-imposing structure from the teacher. The center piece of the IBL format is group work, which almost entirely replaces lectures by having the students engage whatever problem or concept I chose for the discussion. In a worksheet cycle in my course, I would briefly introduce some definitions (e.g., convergence of sequences), and then they would go about working some examples and proving basic theorems (e.g., if a sequence converges, then it is bounded) before presenting their solutions to the class. The key point here is that the students must actively engage the concepts in class, work through their confusion in real time, and develop their ability to communicate their ideas clearly. My role was to facilitate this interaction and help alleviate confusion when a group could not resolve it.

My time teaching this IBL course was incredibly illuminating. Never before had I seen the thinking and working processes of students so clearly. I find that one of the hardest tasks in teaching is knowing when my students are confused and, more importantly, how and why they are. During the group conversations, not only were students more likely to admit to being confused but I could actually observe how they would process their confusion with their peers. Unsurprisingly, a majority of the issues my students had were related to a lack of mathematical maturity, in particular a lack of a well-developed mental framework for mathematical formality.

In the end, the difficulties faced by my students in the IBL course at Michigan were, at their core, similar to those of my students at UIC: the real challenge was developing mathematical fluency. I see one of the main tasks of undergraduate math education to be centered around helping students develop mathematical linguistic and formal thinking skills. I believe that my varied teaching experiences, both in classroom style and student background strength, have helped me understand how better to do this. By appealing to and building on the students’ intuition, I have become better at motivating the material to keep the students engaged and working on building their basic skills. I have also learned to be more patient and aware of the signs of visibly but silently struggling or confused students. In addition to slowing the pace of my speech and board work to allow for comprehension and questions, I have learned to encourage the students to ask questions and answer my prompts even when they are uncertain, which helps them take an active role in the classroom and thus stay engaged. Moreover, I have become more successful in getting my students to take advantage of resources offered to them, especially my office hours, which most students seem to find useful and during which I learn about what they are finding most difficult. I find this especially crucial for lecture-based courses.
I look forward to the challenge of teaching graduate level courses and the prospect of discussing deep ideas with budding mathematicians. I am particularly excited about the prospect of having graduate students of my own and guiding promising young researchers through the first stages of their careers. I had a small taste of this last summer when I co-supervised two REU students at Michigan. These students were quite strong and have a promising future as researchers, so it was a pleasure to spend time talking math with them. I have been fortunate to have excellent mentors so far, and I hope to be able to pay back the mathematical community through my pedagogical efforts.