Teaching Statement

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October 2019

Both as a researcher and as an instructor, my primary goal is to engage and excite students with mathematics. I strive to bring my passion for the subject to the classroom in a way which most effectively shares my knowledge and expertise with people of varying mathematics backgrounds. My teaching philosophy is simple: through peer engagement, collaboration, and building confidence, students in my classroom develop the tools they need to become independent learners. Even for students who choose not to pursue STEM, I feel that the tools needed to succeed in calculus such as critical thinking and problem solving are extremely versatile in all aspects of life, and it is important as an undergraduate mathematics instructor to develop these skills as effectively as possible.

Harvard University has provided me with extensive teaching experience.

• In my first year, I was given a semester’s worth of teacher training in a course called “Teaching Undergraduate Mathematics”, where experienced senior preceptors led discussions around the most effective ways to teach students, and had us practice one-on-one and in groups our presentation style, and our engagement with the class through active learning methods.

• In my second year, and separately in my third year, I taught a section of undergraduate linear algebra. The course head, a senior preceptor at Harvard, would meet with all of the section leaders once a week to discuss the material for the coming week. We would then independently develop our own lesson plans and teach the material. During class, this involved teaching material for between 20 and 40 minutes, followed by a worksheet session where we engage with students one-on-one with the aid of a course assistant.

• In my fourth year, I course assisted an undergraduate group theory class run by Ana Balibanu, a Benjamin Pearce postdoc at Harvard. I held two hours of office hours a week for the class of approximately 150, handling student’s questions one-on-one and leading miniature discussions. I also met extensively with students who were struggling in the course, some of whom later became math concentrators.

Each week during the semester I also taught an optional supplementary session, covering material beyond the scope of the course for advanced students who wanted broader exposure to higher mathematics.

• This year, I am currently teaching a section of undergraduate multivariable calculus, with an identical arrangement to my second and third years.

I feel that the most important thing I’ve learned through these iterations of teaching is the importance of an active classroom discussion for information retention. By clarifying misconceptions when they are first exposed to the material, students reinforce correct mathematical
beliefs when they work through problems in class and on the homework. I’ve found that an effective way to engage students is to pose open-ended questions which students can speculate freely on, rather than having the pressure to answer a narrower question correctly. When a student responds, I can then throw their response back to the class along with an additional clarification or further question and guide the discussion in this fashion.

For example, when teaching students multivariable calculus, I asked the students what were some possibilities for the set of all \((x, y, z)\) such that \(x^2 + y^2 = 1\), clarifying that I wanted to just collect possible options on the board for discussion. By feeling like any answer would further the class discussion, there were some students saying circle, some students saying sphere, and some students saying cylinder. The students who thought circle and sphere had separate misconceptions about the analogies between equations in 2d and 3d, but by addressing these misconceptions explicitly we were able to tackle two major points for the day: that equations with a missing variable would always behave like a cylinder, and that \(x^2 + y^2\) represented the squared distance to the z-axis.

When students start solving worksheet problems, I like to walk around and engage students one-on-one. Many students won’t ask a question unprompted, but will ask the question they had on their mind if specifically prompted. Most students grapple the material at an operational level before understanding the material conceptually, and the questions they ask reflect this stage of understanding. Pulling from students’ diverse ways of thinking often helps me see how the material can be more effectively re-expressed, and I like to pass on and share what I learn from them with other students in the class.

When I taught for the first time, I was humbled both by how much I still had to learn, and how bright and talented the students were. Subsequently, I have been able to factor in what material students engaged with the most, and what perspective on the material was the most helpful, leading to a happier, more engaged classroom. I know that I still have many areas to hone, but I feel that my years of teaching have greatly improved my pedagogy from where I started four years ago.