

Teaching Philosophy

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Much of my teaching philosophy has been formed as a result of my unorthodox career as a mathematics student. The math curriculum in my high school included reading and writing about great mathematical ideas and guided exploration to discover trigonometric concepts. I attended Kenyon College, a small liberal arts school, where calculus was taught through a deep understanding of applications, such as modeling the spread of disease through a population. Because of my background, I value self-discovery of mathematical concepts, a focus on applications, a small classroom feeling, and using writing to explore mathematics.

Teaching is a large on-going experiment. I have taught a wide variety of courses at very different institutions, from a writing based mathematical survey course aimed at pre-service elementary school teachers to a Linear and Discrete Math course designed for Junior level Industrial Engineers. The motivations and needs of the students drive my choice of teaching methods. By constantly refining and changing how I interact with the students, I encourage a student-focused and dynamic classroom environment.

Asking and answering questions is an integral part of learning; to this end, my lectures are very conversational. Students are not accustomed to this level of interaction. To meet this challenge, each class begins with a non-mathematical question to initiate participation. When I pose a question, I simply wait for an answer, and sometimes, I have to wait a very long time. “Managing uncomfortable silence” retrains students to no longer rely on waiting to be told the answer. Every answer, right or wrong, deserves a response. I interact with the student, praising, asking leading questions and gaining clarification as needed. We may learn more from exploring an incorrect answer than being told the correct answer. Once the stigma of being wrong is reduced, students are more willing to offer suggestions or answers.

One of the important tasks in learning mathematics is “unpacking” the concise notation and interpreting the precise language necessary to convey mathematical ideas. The ability to read mathematics is a skill that many students lack; students may not even realize it because they don't often even try. Due to this, textbooks are often an underutilized resource. Reading mathematics may be difficult or slow for students, but I always emphasize its importance and work to instill the mathematical maturity required. I pick out specific passages for them to read and discuss them in class. In lecture, my examples are different from those in their book, but I give the page numbers where the text covers similar problems. Lectures should add value to the textbook, and the textbook should reinforce the lectures. In more advanced classes the goal is not to simply read the textbook, but to work towards the ability to read journal articles and understand how mathematics is used in other disciplines.

Maintaining open communication is necessary for shaping the class as it moves forward. Each class has a website where I post announcements, handouts and solutions to tests and quizzes. Students' grades are always available to them through WebCT. At a recent

conference, I took part in several pedagogy discussions on techniques designed to link grades directly to skill acquisition. This gives an opportunity to make grades more meaningful for students. As well as offering static information on the website, I also offer individualized assistance to my students through email and instant messaging. To get feedback from my students during the semester I have used online surveys and 'three minute quizzes.' Quiz questions range from content: "are you comfortable with using the Fundamental Theorem?" to procedural: "what percentage of the recommended problems do you complete before each lecture?" The results of a recent precalculus survey showed that 70% of my students felt that anxiety impeded their academic performance. To address this I had a speaker come to the class to talk about reducing test anxiety. Students have responded very well to all of these forms of communication.

One of the skills I have learned from my advisor, Dr. Prasad Tetali, is to meet students where they are. If I am working with a student in a calculus class who is having trouble using the chain rule because he doesn't understand composition of functions, that is where we must start. It doesn't do either of us any good if we don't address composition because "he should know it already" or because he is too embarrassed to communicate the underlying problem. On the other hand, meeting students where they are calls for recognizing opportunities to engage more advanced students. Several students in my Linear and Discrete math class were double majoring in mathematics and Industrial Engineering and had already covered most of the linear algebra material in another class. However, they hadn't yet taken abstract algebra, so I gave them a list of definitions and challenged them to figure out how to integrate the definitions with the material we were studying. The students gained some connections between subjects and I gained some very attentive students.

I have been very involved in the School of Mathematics' teaching community. Some of my activities have included leading case study discussions in the TA training seminar, speaking on panels for the international graduate student orientation, participating in the round table discussion group for graduate lead instructors and representing the mathematics department in a CETL focus group. In 2005, I was elected to the math department Graduate Committee, serving as an advocate for all aspects of graduate students' careers. One of our main achievements was creating teaching assistant positions for entry level graduate courses. We also tackled the issue of recruiting and retaining under-represented populations in the mathematics graduate program. Diversity is important to me, not only in the mathematics community, but also Institute wide. To that end, I participate in Georgia Tech's Safe Space program, have worked with Yvette Upton and the Women's Resource Center to increase and shape programming aimed at graduate women on campus, and I have met with students through Georgia Tech's FOCUS program which recruits graduate students from historically black colleges.

There are many topics which I would like to explore in the design of future courses, such as including more group work and educational technology. I seek opportunities to share my enthusiasm for mathematics and to decrease the impact of math anxiety and diversity issues, both inside and outside of the classroom. Maintaining a dynamic classroom will necessarily expand my teaching skills and goals. I look forward to continuing to teach,

and to learn, in the Georgia Tech community.