

Teaching Statement

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Teaching is communication. While simple, it is wise not to forget this. Depending on the audience, the method of communication takes different forms. The approach for a small advanced undergraduate course in linear algebra differs from the approach for a course like *Spirit and Uses of Mathematics* aimed at potential primary school teachers and both would be completely different from a large lecture calculus class. However, in each example, the key to success is the interaction between the instructor and the student. Whether having a student come to the board to give a proof, leading a group discussion on the benefits of various ways to teach children arithmetic, or simply pausing during an example to allow students to solve it themselves – more communication results in more learning.

During my graduate student career at University of Colorado, beginning in the Spring of 2000, I have had the opportunity to teach a wide variety of courses at the undergraduate level, including a linear algebra course and the course for elementary schoolteachers mentioned above. For each course, I brought my enthusiasm and love for mathematics into the classroom as much as possible, aiming for future majors in one case and hoping to keep the ‘mathphobia’ of prospective teachers from impacting our children in the other. I bring my energy and excitement about mathematics to every class I teach.

In my Fall 2006 *Spirit and Uses* class, I coordinated with a local elementary school to have some of my students volunteer as math mentors. Dr. Eric Stade, the course supervisor, mentioned this outreach proposal with local schools at the initial meeting to discuss planning for the semester. I was thrilled with the opportunity to provide this service to the local community. Previously, in high school, I participated in an outreach program with elementary schools organized by the department head of science in my district. Primarily by going into schools and showing children that science could be fun with a hands-on approach. Creating slidewhistles out of plastic tubes and a cork to demonstrate properties of sound waves was an example that never failed to bring smiles to a elementary school classroom. The undergraduates from my class who participated this term seem to be as thrilled as I am about the program and are eager to continue mentoring next semester. I would certainly be interested in developing similar outreach programs, and others at the middle and high school level, which encourage students who have been traditionally underrepresented in mathematics.

In most of my teaching duties, I have been the instructor of record, creating my own course plan, designing exams and assigning grades. For example, in linear algebra, the only requirement was that I use the same book as the other sections, so I was able to create a plan that allowed me to introduce quadratic forms, an aspect of my research area, to that class. In most other classes, I was given similar latitude to focus the class in the areas that I felt were most relevant. At all levels communication and feedback is the key to a successful class. Answering and asking questions while lecturing to ensures students are absorbing the material, not just writing it down like some sort of obscure hieroglyphics. Validation of my effectiveness at communicating mathematics came when students from my Calculus 3 class excelled later in my Linear Algebra class, in one case, becoming a graduate student in mathematics at CU.

In *Calculus with Biological Applications* the approach was from the perspective of dynamical systems, utilizing programming projects with graphical calculators to highlight numerical

applications such as approximation of integrals with Riemann sums and predator-prey interactions. I believe we are only scratching the surface of the potential of technology in the classroom. For the past few years I have attended the Consumer Electronics Show in Las Vegas viewing the latest innovations for the year. After seeing a talk at the joint meetings on the effectiveness of tablet computers in the classroom, I made my next computer purchase a tablet. I hope to be able to use it or similar technology in future classes.

I have also taught mathematics at the general education level in the courses *Math for the Environment* and *Quantitative Reasoning and Mathematical Skills*. In these classes communication is enhanced by using creative examples from the real world such as showing the weakness in HIV testing across the entire population or explaining how the ‘average daily balance method’ benefits the banks. On one occasion, I was extremely proud that the department chose me to take over a QRMS class in crisis midsemester. My success in this difficult task was shown by student course questionnaires at the end of the term including comments such as “He saved our QRMS class” and “Thanks so much for coming in and saving us, you have no idea how grateful[sic] we are.”

Some other comments from end of semester questionnaires: “Keep teachers like Michael Daniel running the show”; “I actually enjoyed this class + I have always hated Math because I was intimidated by the instructors as well as the material. Mike made it more comfortable.”; (the best way to improve this course would be to:) “not have it at 8AM, and clone Mike”; “Professor went beyond the textbook, made class interesting”; “loved the class”; “very fair and accessible”; and “Instructor was great! Best math teacher I’ve had in ages.” While this feedback from students comes after the class is over, I value students’ opinions and critiques during the semester and adapt when necessary.

Communicating mathematical concepts and promoting quantitative literacy are the goals of any teaching assignment. Success depends on fostering an environment of open dialog, which engages and educates the student while illuminating the teacher’s knowledge and love of the subject. Creating this atmosphere drives me on the continuing path to being an inspiring teacher.