

Teaching Statement

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This past August, I joined a group of approximately twenty graduate students and professors from around the country to participate in the Eleventh Annual Emerging Scholars Program Instructor Training Workshop in Austin, Texas. UT-Austin's Emerging Scholars Program and the University of Kentucky's MathExcel are both centered on time-intensive calculus discussion sections, whose philosophies and methodologies are based on a model developed by Uri Treisman. The training and experience that I have received throughout the past several months as a MathExcel workshop leader have provided the most recent influence on my teaching goals and philosophies.

MathExcel is intended to push students to learn calculus at a level beyond simply being able to repeat solutions to important problem types. Students in the program meet for six hours each week, as opposed to the three hours of a normal calculus recitation. My responsibilities as a workshop leader include supervising two undergraduate assistants, creating worksheets with challenging problems, and overseeing students as they work through these problems in small groups. Instead of answering questions directly, we are taught to redirect questions toward the students, with the goal of helping them to provide their own answers. Answer keys to worksheets are never provided, as students are encouraged to use discussion with their peers and confidence in their own reasoning to justify their solutions. MathExcel encourages students to work through their problems and to create working friendships with students who possess similar educational goals and interests. As the semester has progressed, it has been fulfilling to see the number of questions decrease as the students have learned to reason through many problems without my assistance. My goal as an educator is to motivate students to learn and to teach them how to further their educational growth. I plan to build on my experiences as a MathExcel workshop leader by incorporating many of the key ingredients of Treisman's model into future courses that I teach.

In the Spring 2004 semester, I will have the opportunity to broaden my educational experience by working with my advisor, Dr. Carl Lee, on the Appalachian Collaborative Center for Learning, Assessment, and Instruction in Mathematics (ACCLAIM) grant. The purpose of ACCLAIM is "to build a mathematics infrastructure in the Appalachian regions of Kentucky, Ohio, Tennessee, and West Virginia, providing a model and resources for other isolated, rural, poverty-stricken areas across the country." (<http://www.acclaim-math.org/>) The two primary goals of ACCLAIM in these regions are to build mathematics capacity and expertise through advance degree programs in mathematics and to improve the quality of mathematics teacher education programs and mathematics teaching at the middle and high school levels. My assignment will be to assist Dr. Lee with some of the day-to-day details of the grant, and I hope to gain experience both in working on an education grant and in observing the methods, struggles, and successes of this effort to improve middle and high school education. I further hope that it will provide insight into the backgrounds of a large population of aspiring and practicing teachers and will thus help me to better understand the students who are leaving their classrooms and entering mine.

Whereas my experiences with MathExcel and ACCLAIM provide recent and future influences on my teaching career, it is also important to consider what has shaped the foundations of my teaching philosophy. During my second semester of graduate school, my teaching assignment was to lead two recitation sections of Calculus II. The lecturer and primary instructor for these sections gave me the freedom to determine the format with which to conduct the recitations. I started the semester by using a traditional question and answer approach in which both students and I solved problems at the chalkboard. This format worked well in the first section, and I used it for the entire semester. In the second section, however, the gap in both abilities and preparation between students was made apparent by the disparity in the difficulty of questions being asked. The feedback that I got from students in this section demonstrated that the recitation format

simply was not working. As a result, I began having the students in this section work on homework problems in small groups. I addressed questions on a group-by-group basis and only presented solutions at the chalkboard when the majority of the class was struggling with the same problem or concept. It was immediately evident that this format was more effective in the second section, and I quickly discovered how important flexibility is to being an effective instructor.

Every class has students with different backgrounds, abilities and personalities. Every teacher also has his or her own strengths and weaknesses. Some are great storytellers and seemingly have a story to go with every concept. Some are very charismatic and keep their students entertained. One of my strengths as instructor is that I am very organized, and I am able to make it clear to my students exactly what is expected of them. Through student feedback, I have also learned that I have the ability to present difficult concepts in ways that are easy to understand. In order to create an effective learning environment, it is important to be willing to adapt a class to fit the abilities and personalities of both the students and the instructor.

I discovered my desire to teach while tutoring as an undergraduate student at Coe College. I learned that tutoring provides an ideal method for conveying information, as it provides the tutor with immediate feedback regarding the successes and problem areas of a particular student. One can readily observe the types of explanations that best match an individual's learning style and can tailor the education toward that student. In a recitation, it is still possible to receive immediate feedback, but an instructor is faced with the challenge of explaining concepts to a group of students who may think and learn best in a variety of different ways. Lecturing provides an even greater challenge, as a lecturer must be able to read the audience and determine when ideas must be clarified further. I try to be approachable both inside and outside of class, and I attempt to conduct a lecture in which students feel comfortable answering questions that I pose and asking questions when they become confused. Office hours offer an invaluable tool for both teaching individuals and for discovering the needs of the students, but they can only provide this aid if students are willing to attend them. Requiring students to stop by my office within the first two weeks of the semester or providing a challenging assignment for which most students will require help are two methods that I have found effective for encouraging students to seek assistance outside of class. Although I always implore students to provide me with feedback at any time throughout the semester, I have also used midterm evaluations as a tool for determining what is working well and what could be improved for the remainder of the semester.

When I began my career at the University of Kentucky as a teaching assistant, my teaching philosophies were primarily influenced by my experiences as a student. For example, as a student I observed that taking detailed notes often prevented me from thinking about and understanding the concepts I was transcribing, but declining to take notes removed an important reference for when problems arose outside of class. As an instructor, I soon realized that writing definitions and long problem statements on the chalkboard can consume a large percentage of class time. To make better use of the limited class time available, I often have found it beneficial to provide students with lecture outlines. This allows more time to be spent on explaining key ideas and working through important examples, and it furthermore provides more opportunities for students to ask questions and have time to digest the concepts being presented.

Learning math requires a hands-on approach. In order to master mathematical concepts, a student must read the textbook, construct and review important examples, and work problems. An effective instructor has the ability to explain the material more fully than a textbook, but if students are to succeed, they must be motivated to work outside of class in order to reinforce the ideas presented in a lecture. Whereas it is often assumed that internal motivation should sufficiently drive a college student, many students require external motivation such as quizzes and homework to push them to succeed in a college mathematics

course. As the amount of time available for grading is often limited, I have frequently used the following techniques to motivate learning:

- **Dividing homework problems into two sets.**

I break a homework assignment into two sets: those to solve for themselves and those to solve for me. Students are informed that the problems in the first group do not need to be written up formally, and they will be graded on whether it appears that a substantial effort was put forth. Those in the second group will be graded for correctness, and complete solutions are necessary to receive full credit. This motivates students to complete all problems, and it allows me to provide feedback on their formal solutions.

- **Writing quizzes that come from a set of suggested homework problems.**

I give students a list of suggested problems. I inform students that although I will not collect these problems, the quiz problems will come directly from this list. This has proved effective at motivating students to strive for complete solutions to all problems.

The foundation for my teaching philosophy was laid by my experiences as a student, but it has been further influenced by my experiences as a teaching assistant and by those of my colleagues. My fellow graduate students have provided an invaluable resource in this regard, and I believe that discussing teaching philosophies and methodologies with fellow educators is necessary for continued growth as a teacher. To be an effective educator, it also is vital to continue learning beyond graduate school. Exposure to new material allows you to see first-hand how frustrating it can be to struggle with a new concept, and how fulfilling it can be when you reach the point of understanding. When you stop learning and experiencing the highs and lows of your own education, it becomes more difficult to relate to the peaks and valleys that your students are experiencing.