Teaching Statement

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When I tell people I am a mathematics teacher, the most frequent response I receive is a combination of the statements: "I was never very good at math" and "I never liked math classes." This response has always bothered me since I have been a math teacher almost as long as I can remember. My first 'teaching' memory is of helping other students in our eighth grade math class. In college, I became a math tutor and had the unique experience of working with a non-traditional group of college algebra students. They had not been inside a math classroom in years. Their main goal was to pass the class; to accomplish that task, they wanted to learn. This group started me on the path to becoming a teacher. I eagerly anticipated seeing this desire to learn mathematics in all my students. Unfortunately, when I started teaching high school, I realized this desire to learn math is hardly universal. Consequently, as a college-level teacher, I have come to believe that the ability to motivate and encourage students to learn math is an essential characteristic of a mathematics professor.

While at The University of Iowa, most of my teaching experience has been with non-math majors. Here, the questions they ask demonstrate their true feelings about math: "Why do I have to learn this?" and "What's this good for?" These students offer many challenges to a teacher's ability to stimulate learning, while at the same time demonstrating that motivation is essential before any mathematics will be learned. I believe the first step in encouraging these students to learn content knowledge is to help them become comfortable in a mathematics class. I want them to enjoy my class, especially those who are taking their only required math class. For these students, my classroom will be the last opportunity for them to appreciate the beauty and excitement found in mathematics. I believe that my greatest service to these students is to help them understand the purpose of mathematics, and to see mathematics as a field that can be studied by all.

How do I build a comfortable classroom environment? First, I learn the students' names (and hopefully some personality characteristics) as soon as possible. Recognizing them as individuals, not a class, is the only way that they will feel comfortable approaching me on an individual basis. Second, I build community among the students. One method I have used successfully is small group learning. Building relationships in the classroom leads to groups working on mathematics together outside of the classroom; this supplies an additional level of support besides the teacher. Another benefit is that questions can be asked in a smaller group. Students do not have to express their confusion in front of the entire class. Small groups also allow me a regular opportunity to speak individually with each student, thereby getting to know them as well as gauging the understanding level of the entire class.

Now that the students have a support system in place and feel comfortable in the classroom, they need to see a purpose to learning more mathematical content. To see this purpose, they must be able to make connections between old and new knowledge as well as between mathematics and the world around them. Each day's lesson is one of two types: the first on a topic, or a continuation of a topic. If it the first lesson on a

topic, there needs to be outside motivation as to why the topic is even of interest. For example, pre-service elementary teachers study different number bases to help them see the difficulties their future students will have in learning the base 10 system. If the lesson is a continuation of a topic, connections need to be given between the previous concepts and the one to be introduced. One simple method to connect concepts is not to begin a class with new material. I prefer to start with a review problem from the day before, which can be related to the new day's lesson.

Once students feel at home in my class and are motivated to learn, I must address what I want them to learn. If this is their only college-level math class, what do they need to take away from it? I believe the answer is general problem solving and reasoning skills. Too often, math is taught purely as a series of steps which, when applied exactly to one particular type of problem, guide the students to one correct solution. Mathematicians know that true mathematics is more than just applying a process. We do our students a disservice when we focus only on the ability to correctly use algorithms. In order to illustrate problem solving and reasoning skills, it is important that the students be exposed to a broad spectrum of problem types in a mathematics classroom. Many textbooks now incorporate questions that involve writing about mathematics. I have found that while these are more difficult to grade, they are a more accurate measure of the students' understanding. Multistep questions or extensive projects also force students to think through mathematics, not just to apply a specific algorithm. When teaching a discrete high school mathematics class, I ended each unit with a cumulative project rather than a traditional exam. Here, each student had to first create a situation, then choose and apply relevant mathematics to the situation and finally analyze the outcomes.

I have also had the opportunity to be a teaching assistant for a required course taken by math and math ed majors. These students ask different types of questions: "How can sets be both open and closed?" and "What is the best method for proving a function is injective?" These students are already interested in math and may not need the encouragement or motivation that the non-math major needs. However, I believe that using the techniques of teaching non-math majors can greatly enhance these classrooms as well. When these students feel comfortable in the classroom, they will ask questions and be actively involved in learning. This allows us to cover the significant mathematical content that is usually found in these classes. Using small groups gives students the chance to practice speaking the language of higher mathematics. Showing connections between mathematical topics and the world allows them to see how math is used outside of academia. This can lead them to choosing a career in which to apply their math skills. Lastly, these students are already skilled at manipulation of symbols and using algorithms to solve problems. When we focus on reasoning skills, we are only adding another level to their mathematical abilities.

As a teacher, my desire is that every student, regardless of interest or skill level, leave my class with a sense of the power and purpose of mathematics. I want them to see mathematics as a system of concepts and ideas that they use in their daily life, not as a school subject only accessible to a small minority of the population. The next time they are introduced to a math teacher, I want their immediate response to be, "Wow- what a great job to have!"