Teaching Statement

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A teacher in a university setting has two sometimes conflicting assignments. The teacher has the role of a "judge"—he is responsible to evaluate the learning and performance of the students and ensure that grades earned in his class are meaningful and fair. On the other hand, the teacher must also be a "coach" for the students, pushing them and encouraging them to stretch and build confidence. While the former role is important and cannot be neglected, I believe that the most successful teachers are those who can emphasize the latter so that the students see the instructor as being on the same team as they are.

One of the most important attributes of a successful mathematics coach is his enthusiasm for the subject. This is important even when the students are self-motivated and interested in mathematics; in a lower level undergraduate class where this is often not the case, it is essential. I try to let my enthusiasm show to my students, while at the same time acknowledging that math can be hard work. One of my students in a course evaluation observed, "Mr. Johnson is clearly passionate about math, wants to see his students succeed, and his slight eccentricity made what could otherwise have been a very boring class quite enjoyable."

Teachers should be approachable and available to students. I have taken classes where I had an idea that I wanted to discuss with the teacher after class, but the teacher walked straight out of the room when the lecture was over before anyone could talk to him. I make it a habit after the lecture to stay in the front of the classroom with a smile on my face and wait, not even erasing the board or gathering my materials until the students have left. I find that many students with a quick question will come talk to me in this setting when they probably would not have taken the time and trouble to come to office hours.

While interests and aptitudes do vary, students who label themselves as "not a math person" often create a self-fulfilling prophecy by increasing their anxiety and avoiding the work necessary to succeed. A mathematics coach must emphasize to the students that success at the undergraduate level comes through hard work and proper preparation rather than some native quality of being a "math genius."

Students in an undergraduate classroom have diverse interests and motivations, and a good teacher must make the material relevant to them. While some are motivated by the quest for "pure knowledge" (though even these students need to be shown the "abstract" questions that the content is answering), I like to try to appeal to other students as well, using stories, history, philosophy, or concrete comparisons. For example, in a class that covers the sum of an arithmetic sequence formula, I like to frame the exposition with the legend of young Gauss thwarting his elementary school teacher's attempt to assign a difficult task. When introducing the exponential function, I like to show how long it would take for the graph of the function to reach the moon (not very long!). In one class, I shared an example of someone who had used linear algebra to compare the relative value of cards in an

online card drafting game. When talking about convergent infinite sums, I bring up Zeno's paradox, as well as the closely related problem: "If you need to mail a letter, and you walk halfway to the mailbox, and then half the remaining distance, and continue this way, will you ever reach the mailbox?" (One possible answer: "I always approach mailboxes that way.")

Some of my most memorable experiences with teachers have been when the teacher took the time to talk to us about something that was not necessarily directly related to the course material, but that was interesting, inspiring, or thought provoking. While it is important to use class time well, I will occasionally start class with a "fun math fact" about an accessible open problem, or perhaps a good math joke. In my linear algebra class, I took one day (advertised before hand) to talk about quantum mechanics, since a lot of the language and concepts that we had used in the course had come up in a book I was reading on the subject. In another class, one of my student's wrote in his student evaluation comments, "[The instructor] occasionally engages in interesting, maybe off-topic, discussions with students about the mathematics—keeps the class interesting."

I have now had several years of experience in teaching and feel comfortable with the basics of making a class work. As I continue in my teaching career, I would like to begin to experiment with and implement more of the evidence-based best practices for math education that can foster more student engagement than the "traditional" lecture approach. One resource for ideas could be the MAA's recent Instructional Practices Guide. I also hope to continue learning from other expert teachers among my colleagues in my next position.

I am interested in promoting interest and excitement about mathematics by giving popular math talks or similar activities. I have given several talks to high school, undergraduate, and graduate audiences. One of my favorite topics is the Busy Beaver function, a sequence of numbers that grows so fast that it is provably incomputable. I like topics that inspire the imagination and ask apparently "simple" questions whose answer is interesting or still unknown. One time, I volunteered to fill an emergency cancellation in the graduate student colloquium by re-giving a talk that I had done three years before. One of the students who had attended both lectures commented to me afterward that he thought the second time was better because I was more comfortable with the audience and having more fun. I would like to continue volunteering for these kind of opportunities and refine my skills and confidence.

Becoming a great teacher is not something that can be accomplished without thought and effort. I look forward to growing and improving in my next teaching responsibilities.