TEACHING STATEMENT
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1 Background

I decided to go to graduate school at the age of 23. I had been working as a technology consultant with Andersen Consulting and enjoyed my time there. However, it did not suit me for a long-term career. I reflected back on what I enjoyed most about the job, and I decided that it was training other people; my main goal at Andersen Consulting was to be assigned to an instructor role at the central training center so that I could teach new employees about computer programming.

I also thought back to my undergraduate experience. I realized that I had been tutoring people in math nonstop during my three years of college. I enjoyed tutoring so much that people started forcing me to take money for the tutoring sessions - it had never crossed my mind to charge people for my tutoring skills.

With this in mind, I decided that I wanted to teach for a living. Since I also really missed learning pure mathematics, it was a natural choice to attend graduate school to become a college professor. I decided to attend graduate school in order to become a good teacher - any enjoyment I derived from research would be just a bonus. Fortunately, I also enjoy the research aspect of the job.

My love of teaching has caused me to gather a wide variety of education experiences. In graduate school, I pursued a minor in mathematics education, which in turn sparked an interested in K-12 education. I spent two years teaching in high school classrooms as a part of a fellowship during my third and fourth years of graduate school.

My first job as a preceptor at Harvard University was chosen to gain new teaching experiences. As a preceptor, one of my main responsibilities is to train graduate students to teach successfully in the classroom. This involves many seminars and videotape viewings; I have learned a lot about teaching through this reflection. Additionally, I work with superb colleagues who have taught me much about teaching; most significantly, I have learned how writing good homework and exam questions can very much support your teaching goals. I intend to continue to seek out these experiences throughout my career.

2 Outside Assessment of My Teaching

I am widely regarded by my colleagues as a good teacher, and I have been recognized for my teaching in the classroom. I won the math department’s “Excellence in Teaching” award while at Wisconsin, the “Derek Bok Center for Teaching and Learning Certificate of Distinction in Teaching” at Harvard, and I was nominated for the prestigious Joseph R. Levenson Memorial Teaching Prize at Harvard. My teaching scores consistently range from very good to excellent.
Teaching is a passion of mine, and I enjoy discussing teaching and teaching philosophy. The driving force of my philosophy is that one learns mathematics by doing mathematics. “Doing mathematics” means different things at different levels. In higher-level math classes, the students generally have the experience and motivation to do the mathematics on their own. This can allow for a lecture-based classroom, which has the advantage of covering more material over the course of a semester. In many lower-level math classes, students may need assistance in doing the mathematics. For these classes, I often favor in-class group work. This has two advantages: first, it allows me to watch them do mathematics so that I can gently guide them to a proper way of thinking mathematically. Second, working in groups forces the students to verbalize their thoughts, which requires them to think about the math before they speak about it.

Ultimately, I have to tailor my teaching methods to the individual class. My first priority as a teacher is to teach in a manner that best allows the students to learn. In other words, student learning trumps any preferred teaching style that I might have. One manner in which I determine how students learn is by reading education research and applying it to my classroom. I am not a superstitious man, and I believe that we should have research to back up classroom practices. The latest example of employing research to improve student learning is happening in my calculus class this semester. I am currently giving students short breaks every 12-15 minutes of class to organize their thoughts with a partner. This was described in Active Learning: Creating Excitement in the Classroom by Charles C. Bonwell and James A. Eison, and has been repeatedly shown to cause better long term retention of the material versus a control group; the average difference was approximately two letter grades.

I strive to empower each student to build the confidence to check the validity of their mathematical reasoning on their own; I do not want them to have to appeal to an oracle such as a teacher or textbook to determine if they are correct. Hidden in this statement is my belief that students are very intelligent, because it takes intelligence to determine the validity of mathematics. Since it is my belief that the students are capable of such things, my expectations for them are high.

One manner in which I foster this sort of reasoning is by presenting two different instances of “student work.” I normally do this in homework or a workshop. The student’s job is to decide which of the methods is correct, and justify their answers. This sort of presentation has three advantages. First, it removes the student from the normal situation where they simply need to agree with what the professor or textbook author states; too many students say, “Everything makes sense in class, but then I can’t do it on my own.” This type of question is an attempt to reduce the frequency of that experience. Second, it reinforces the notion that reasoning is a fundamental part of mathematics, and that mathematics is not just a “bag of tricks” to be memorized; students can study the material and deduce which is more valid. Finally, this is a skill that in
math that can translate easily to the “real world,” since this is really teaching critical thinking skills. When two politicians disagree about about an issue, the student will need to critically decide which politician has a better argument.

A second way I try to make mathematics relevant to students’ daily lives is by requiring that students write up some of their homework problems. Writing might be the most important skill that a student can learn in college, and math courses do not need to be an exception. What is more, this can be done while staying true to the discipline. Rather than having the students write a short biography of a mathematician, I have them write up detailed solutions to math problems. This is really no different from what mathematicians do every time they submit a paper to a journal, and the students gain exposure to a truer nature of mathematics.

One last aspect of my teaching philosophy is that learning (and therefore teaching) should be enjoyable. Ultimately, the class is meant to be educational, but I like to add a pinch of entertainment to my class - one or two humorous one-liners per class can go a long way in motivating students to pay attention to the material. Another part of enjoying the learning process is being comfortable. I have been a part of many different teams in my life: athletics teams, project teams when I worked at Andersen Consulting, and teaching teams. I have always viewed myself as making great contributions to each team by increasing morale. I work to achieve this, but I think I have a natural talent for it as well; I am almost always smiling, I listen very well, and I genuinely like people. In short, I am very approachable. This is equally true of my teaching, and qualities such as these make my students very comfortable in my classroom. This comfort translates into a better learning environment.

4 Larger Impact

I love teaching. However, teaching only affects a relatively small number of students. One of my career goals is K-12 outreach, which is the best way that I can think of to have a positive impact on society. Because of this desire to effect change, I spent 27 months working in the Kindergarten-Through-Infinity (KTI) program at the University of Wisconsin-Madison. This is an NSF program of joint professional development for K-12 teachers and graduate students in mathematics, science, and engineering. I worked every day in a high school classroom, and I attended the same professional development workshops as the teachers.

The best way to have a large and lasting impact on K-12 education is to work with current and future K-12 teachers. In graduate school, I taught Arithmetical Problem Solving and Geometric Problem Solving, which is a content course for pre-service elementary and middle school teachers. The typical student in this class had a reputation for being uninterested and unmotivated. Along with the other two instructors, I modified the curriculum to make it more relevant to the students’ teaching careers. While keeping the content intact, we introduced student videos and student algorithms to the class to explicitly tie the content
of the course to their future experiences as teachers. This was a great success, as none of the instructors of the class experienced the difficulties normally associated with the class. To the contrary, it was my experience that the students were eager to learn and quite excited about the material. We are currently in the process of turning these materials into a textbook.

While at Wisconsin, I also co-created a week-long workshop for high school and middle school algebra teachers entitled *Misconceptions in Algebra*. We researched potential topics, did a literature review to determine what was known about misconceptions in algebra, and lead the workshop. At Harvard, I have sought out opportunities to work with in-service high school teachers by teaching content courses in the Harvard Extension School, leading seminars in Japanese lesson study, and acting as an advisor for in-service teachers’ masters theses.

Finally, I am interested in education issues beyond teaching. I believe that I can help with public policy on education, too. To this end, I am interested in the possibility of obtaining an AM Congressional Fellowship or eventually running for school board (or a different political office) once I get settled into my career.

5 Conclusion

I decided to become a professor because I love teaching. I have a lengthy track-record of good teaching, and I am active in many aspects of teaching: I have taught undergraduates, taught graduate students in education, advised master’s theses, advised portions of an undergraduate honors thesis, and worked extensively with teachers and students in K-12 education. I have knowledge of research that has been done in math education, and use the results to inform my teaching. I have great respect for my students, and they both learn and enjoy my classes.