TEACHING STATEMENT
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When I think about teaching math, my thoughts naturally turn to competitive hot dog eater Joey “Jaws” Chestnut. If our goal is to break Joey’s disgusting world record of eating 69 hot dogs in 10 minutes, we cannot expect to do this by watching Joey on TV - rather, we should immediately start eating hot dogs. Mathematics, though less nauseating, works under the same principle. My firmest conviction about learning math is that we know exactly what we practice. To learn to solve problems, it’s not enough to take detailed notes in lecture; rather, students absolutely must try problems on their own. Math is an involved discipline, and even the most perfect teacher can impart little to a student who isn’t willing to put in a great deal of effort.

Much of my experience at Nebraska has been teaching 100A Intermediate Algebra, which primarily covers properties of polynomials, factoring, and rational functions. By the end of the course students should be able to take, say, a quadratic equation and factor it, graph it, draw it, write a word problem about it, and find its zeros, vertex, intercepts, and social security number. It’s a very skill-specific class, so we spend much of our time doing problems. My class is almost never just lecture, because then what the students learn is either how to take notes, or how to be bored and pretend to take notes. So usually I will present a topic, and then have the students work problems which illustrate the concepts we’re discussing; this emphasizes that math is something one does, not something one watches. I like to have my students work on harder problems in groups, as this can make the problems seem less daunting. Working in groups gives them peer support and encourages them to check on each other and complement one another’s strengths. They learn to verbally communicate math and they hear other descriptions of the concept besides mine.

Many of my students suffer serious math anxiety from previous math trauma (and some are just allergic to fractions). To help alleviate this, I work particularly hard at the language I use when I talk to my students. “What are your questions?” gets a better class response than “Do you have any questions?” because they do, they always have questions, everyone has questions, and I want them to know that I think these questions are important. Also, I prefer to use “when” as opposed to “if.” When you come to my office hours. When you make mistakes. When you get confused. When you get stuck on your homework. These things should sound normal and like part of the process, not like something that only happens to failures.

In teaching this course and others, I have found that most methods can work almost equally well when everyone is trying their best and working hard, so I prefer those methods that inspire everyone to do their work and try their best.¹ I do believe in graded evaluation like exams, quizzes, projects, and presentations, because nothing makes us work harder than knowing there is a specific date by which we need to know things. Besides, performing for others makes things serious and real; it’s how we turn any knowledge or skill into a profession. For more mathematically mature students, having the students mostly run the class can be wonderful. My undergraduate analysis course was almost entirely taught by student presentations and I’ve never worked harder or learned more in a class. However, I have not been able to try this with my Intermediate Algebra students. Their mathematical compasses are not yet strong, and while I think they could do a good job, I think it would take more than a semester. To give them a smaller version of the same thing, I often have them work on the board, either in groups or alone. Just the fact that they are writing things on the board makes them vigilant, because things written on the board are canon. Once it’s on the board, someone else might write it down as correct!

¹It would probably inspire them most if I had a shark that bit them when they didn’t learn their factoring but I don’t have a shark so I take off points instead. We do what we must.
I taught Intermediate Algebra not only in the traditional style, but also under an Emporium format where students go through a computer lesson and do online homework. This was an excellent way for the students to get as many examples as they wished, with instant feedback. However, I personally did not prefer this purely computerized approach. The benefits of instant feedback are counteracted greatly by the fact that the feedback is identical no matter how one arrives at the answer: a tiny calculation error is exactly as wrong as a random wrong guess, and I don’t like that emphasis on results over process. The valuable habit of writing down all the steps is lost, so it can be difficult to tell where the true misunderstanding may be. I’m in favor of using computers as a tool, but not as the main source of classroom guidance. For this, we need teachers. Teachers know the shape of the subject and can put the material in context, which a computer alone cannot. A professor once told me that we never truly understand a subject until we are long finished with the course and need it again later. We don’t truly know Calculus until we are struggling through Real Analysis, which we won’t truly know until Measure Theory. Everyone is always working at least one class beyond their knowledge. Without a teacher, most of us would quit, because there’d be no indication that this confusion was leading somewhere worth going.

On a personal level, I also want to show my students that people exist who care deeply about math and don’t consider it an onerous chore. If I have to go to class and do a silly dance or make every story about cats so they realize, “This crazy lady really thinks math is important enough to go to this kind of trouble to get us to pay attention; maybe I should pay attention,” then I’ll do it, with pleasure. When I teach factoring, I tell the class how much I like it because it’s true, and probably there’s a shortage of people in their life who like factoring. I give them interesting stories about mathematicians who loathed one another over theorems and over women, about Fermat and what he wrote in the margins, about Newton hiding in his basement during parties. I’ll even give them stupid jokes about spherical cows. To put it in literary terms, I give them the poetry part of math even when they’re working on spelling. Math is a devastatingly beautiful subject and I’m tired of it getting the short end of the stick compared to more conventionally appreciated disciplines. Everyone knows someone who loves to read, but too few of us know math enthusiasts, and math deserves enthusiasts.

Though I love helping my students with math, my overall goal is that they will be able to function without me, having learned how to learn math. They have improved their ability to think deeply and struggle through difficult problems, not only valuing the right answer but how it was obtained. Last summer, I worked with Nebraska’s IMMERSE program, which helps prepare students from smaller undergraduate programs for graduate study in math. In working with such talented students, I had to be extra careful not to just tell them all the answers; it was so tempting when I knew they would enjoy the proof as much as I did. I had to step away and let them fight it out on their own, because knowing the answer too quickly, even if they appreciate it, deprives them of developing their problem solving skills and the fortitude to continue through difficulties.

Lastly, though I have focused on how to push my students to improve, I also work to improve myself as an instructor. Each semester I have my teaching evaluated by other grad students, by professors, and by the teaching professionals in our Graduate Studies department. I also like to give my students mid-semester evaluations, to make improvements that benefit not only my future students, but the current ones as well. After all, my worth as a teacher is not measured by how well I feel I’ve done, but by the satisfaction my students feel when, like Joey Chestnut, they are true masters of their craft.

I don’t use a GPS because my friends who use a GPS can’t find D Street, even if they’re on E Street and they just came from F Street. In my opinion, this is exactly the same thing.