

TEACHING STATEMENT

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Math anxiety is on the rise. A Bachelor's Degree is more important than ever in the job market, pushing students with weaker backgrounds into higher education. The United States is lagging behind other developed countries in STEM fields, a fact which news media is always quick to point out. In this context it's more important than ever to provide a relaxed and encouraging environment for students. While doing my best to provide such an environment, I also try to communicate complicated concepts and methods in simple and streamlined ways. It is my belief that if I succeed in these two goals then students will be more prepared to solve difficult and complicated problems with confidence.

Presenting the course material in a streamlined and intuitive way has always come naturally to me. I do this by trying to see things from my students' perspective. Here are two examples of how I present the material. In lower level classes, students typically aren't interested in the derivations of formulas or the proofs of theorems and they seem to rarely benefit from these explanations. Hence I almost never include them in my lectures.¹ I will also list step-by-step instructions for complicated methods like solving trig equations and optimization. These teaching strategies have earned me compliments on my course evaluations for my ability to explain concepts and methods. Because of my confidence in articulating the material effectively, many of the recent decisions I have made as an instructor have focused on creating a relaxed and encouraging learning environment. The remainder of this statement will covers some of these decisions.

An important consideration when attempting to provide a relaxed and encouraging educational environment is the format of course work. University of Oregon employs an open-source online homework service called WeBWorK which is popular among instructors. And it's easy to see why, WeBWorK has many advantages. Questions can be randomized so that each student receives problems with different numbers, to encourage sharing of methods rather than sharing of answers. Problems will immediately indicate whether a student is correct, giving instant feedback. It's very easy to ask questions about specific problems with an "email instructor" button. It should also be mentioned that WeBWorK saves the Department quite a bit of money in grading hours, and can provide standardization across different sections of the same class.

While aware of these advantages, I never use WeBWorK and I see this as one of the most significant decisions I have made as an instructor. Students regularly show appreciation for this decision. I even received applause from a student once after confirming on the first day of class that I don't use WeBWorK. So why don't I use WeBWorK, and why do my students hate it? The answer is simple, when using WeBWorK students have trouble finding errors they have made. WeBWorK doesn't encourage students to produce a clean process in which to search for mistakes (after all the answer is all that's needed for full credit), so they often don't realize this is the skill they need to be practicing. Being repeatedly told an answer is incorrect

¹Of course, it should be noted that this perspective is a result of the level of classes that I have experience teaching. In higher level classes with more interested students this attitude isn't appropriate.

without further explanation can breed anxiety, resentment, and resignation: this is the opposite of a relaxed and encouraging learning environment. I suspect WeBWorK would be fantastic if students were better able to take advantage of it, perhaps if they had used similar tools from an earlier age. But ultimately the mood it cultivates is too damaging.

Instead of using WeBWorK, I opt for worksheets with devoted class time and homework problems out of a textbook for extra practice. I set aside quite a bit of time in class for worksheets; I alternate classes devoted to lectures and worksheets. On worksheet days I move around the class and answer any questions that arise. Some students just need to be reassured that they're employing the right methods. Others will ask when they have trouble setting up a problem. Some will ask if their answer to a difficult problem is correct; I'm usually happy to check. Not only does this format emphasize students working through examples rather than listening to them, but it also gives students a shared experience. To see their peers struggle with the same problems they struggle with encourages respect and a willingness to work together and ask for help. As an added bonus, when students feel comfortable asking for help they make better use of office hours. To capitalize on this I schedule some office hours before classes when homework is due, to provide another window for last minute questions.

The attitude of the instructor is also very important for creating a positive environment. I'm happy to be there, and I think my tone of voice and facial expression usually reflect that. When students are having trouble I try to empathize and help them work through hiccups carefully. I might mention similar frustrations I had when I was learning the same material (for example, I had a lot of trouble learning where the negative sign goes in the quotient rule). If it seems the class as a whole is having a great deal of trouble with an assignment, then I might postpone the due date to the next class. If a particular student needs an extension on an assignment I'm usually happy to give it. Even though I'm sure at least some of the illness I hear about is fabricated and that certainly is frustrating, it doesn't feel appropriate to require onerous proof.

Exams are a common source of anxiety and frustration, so I do my best to minimize stress related to exams. For example, I format exams exactly the same way I format worksheets. This is intended to be a subtle encouragement - if they can do the worksheets and the exam is like a worksheet then they can do the exam. Also, at the beginning of exams I write some notes on the board about the format of the exam. I always end with "Good luck ☺" and "No cheating!". I even have the class vote on the color of paper the exam will be printed on (although they almost always choose blue). Not only do students find this entertaining, it provides them with a very slight feeling of control going into an exam. My hope is to provide an encouraging tone without discounting the importance of exams.

It's important to point out that in my efforts to maintain a positive atmosphere I don't coddle my students. I frequently assign difficult and complicated problems. The efforts I make to streamline the material and the little tricks I employ to create a relaxed and encouraging educational environment are to help my students as much as possible without lowering educational standards. Of course, the particular methods I have used in the classes I've taught aren't necessarily appropriate everywhere. Students who are more advanced or more confident will benefit from a more challenging environment. Ultimately, it's important to tailor your course to the needs of your students.