

STATEMENT OF TEACHING PHILOSOPHY

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While a graduate teaching fellow at the University of Oregon, I taught twenty-one different sections of undergraduate mathematics courses, ranging from college algebra to third-quarter calculus. I was responsible for preparing and delivering lectures, writing and grading quizzes and exams, and assigning course grades. As a result of my experience, I have adopted some principles about teaching.

Lessons, while remaining technically accurate, should encourage a holistic perspective on the material. Students need to see the big picture and see how all the various topics fit together. For example, in a calculus course, it is important for students to know the differentiation rules for various functions. However, it is also important that students understand the meaning of the derivative. Years after taking my class, I'd rather a student remember that the derivative is the rate of change rather than that $\frac{d}{dx}x^2 = 2x$. Of course, it would be even better if such a student remembered both.

Likewise, **we should encourage understanding, not mere memorization.** Memorization is an important part of mathematics mastery, but it should come as a result of understanding. During my first year as a graduate student, while I was teaching an introductory statistics class, a student asked me if she was expected to memorize one of the large probability tables in the back of the book. I realized many students view mathematics as a series of unconnected facts to memorize, set apart from the rest of the text by red rectangles. Under this unfortunate view of mathematics, memorizing a Z-table is not so unreasonable. It is a challenge and a responsibility for teachers of mathematics to encourage conceptual understanding.

We should portray mathematics as a story about discovery, rather than merely learning timeless facts. Students often view mathematics as a subject set in stone, unchanging and eternal. I remind my students that mathematics—or at least our understanding of it—is the result of human endeavor, and that struggle is an unavoidable, and often essential, aspect of the subject. For example, when covering series in a calculus class, I not only briefly discuss the Riemann Hypothesis, but also how Apéry's constant ($\sum_{k=1}^{\infty} 1/k^3$) was only proved irrational in 1978.

We should hold students accountable for their own learning, but provide firm guidance on this expectation. Some of the most important lessons that students should learn in college is how to take responsibility for their own welfare and for their own learning. Students are more motivated when they are in control of their own studies. Furthermore, this expectation helps students become more successful after they leave school.

However, responsibility cannot be obtained overnight, and postsecondary educators must make the expectations clear. I begin each class by explaining my expectations and encouraging the students to take responsibility.

Teachers of mathematics can and should take steps to reduce student stress. Partly because they may be ill prepared, partly because of previous bad experiences in mathematics, students may approach the class with a negative attitude and a feeling of inevitable failure. In first-year students, this is combined with the stress of an entirely new level of responsibility for their own learning. While we should have high expectations for our students, we should also avoid creating *unnecessary* stress. For example, I use low- or no-stakes methods of student assessment before exams, and emphasize to the students that they are “practice for the exams.” I generally do not make homework as a large part of my students’ grades, although I do encourage them to do it. I believe in-class worksheets which are not collected are a good method of no-stakes assessment. (By not collecting worksheets, I allow the students to be less self-conscious about experimenting or making mistakes.)

Technology can be a useful tool in the classroom when prudently used. For example, I take a nuanced stance on graphing calculators. No doubt, it is unfortunate when students reach for their TI-89s when asked to compute $\frac{1}{7} \times 7$, but this problem can be addressed with patience and assessments in which calculators are disallowed. On the other hand, calculators can help students explore the behavior of functions in a rapid way. We must educate students about the limitation of these tools.

During my time at the University of Oregon, the department began to adopt automated online homework systems, such as WebAssign or WeBWorK, giving me an opportunity to contemplate the benefits and drawbacks of these systems. These systems allow students to receive instant feedback on their work. Instead repeating the same differentiation error twenty times, students using WebAssign or WeBWorK learn immediately when they are doing problems incorrectly. Furthermore, such systems allow for greater student-instructor interaction: students can send a message requesting help and I can see exactly what responses they have tried.

On the other hand, these programs cannot (yet) evaluate a student’s reasoning, but only check if the answer is correct. This makes some problem types (e.g. multiple-choice) inappropriate. Also, the focus on getting a correct answer may encourage guessing and does not ensure students will carefully write down the work used to obtain answers. (I encourage students to write out their work as they would with a traditional assignment.) Nevertheless, I believe online homework systems, if carefully and properly used, can be a useful part of student assessment.

Learning can and should be fun. Of course, the purpose of a mathematics class is to learn, and sometimes learning is not fun, as frustration and struggle are an unavoidable part of the learning process. Nevertheless, students learn more effectively when they have a positive attitude and enjoy the material. As a teacher, it is my responsibility to foster both, which I do with a relaxed and enthusiastic, yet professional, demeanor in the classroom.

I view teaching as an important component of my activities as a mathematician. It forms part of our bridge to other disciplines and helps secure the future of our subject. It is an honor and a privilege to share my love and enthusiasm for mathematics with others.