

TEACHING STATEMENT

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Effective mathematics teaching requires that an instructor adapt to the level of the students. Daily practice is key to achieving engagement and understanding. Thus no matter the sophistication of the material, an undercurrent of student engagement connects my courses at all levels. In traditional classes students focus on the lecturer, whereas I try to redirect their attention to the material. My lessons strive to coach the students in mathematical thinking, rather than inundate them with information.

As I first discovered while teaching algebra at the University of Washington (UW), basic math classes are the most challenging to teach. Student ability varied widely in my algebra section, making it difficult to engage more than a few students at any one time. The department requires using the “Discovery Method” of teaching, which discourages lecturing. Following their guidelines I presented the initial problem, led students to the correct approach through questions, and assigned problems throughout class. Remarkably, this approach was effective – the skilled students provided answers to help move things along, while almost all students contributed something to the discussion. From algebra to calculus I have found success employing a watered-down version of the Discovery Method. Striking the right balance between questioning and lecturing allows class to flow smoothly while still engaging students in the material. The principal challenge is finding that balance.

Rigorous and abstract courses, such as the four sections of advanced multivariable calculus I taught at UW, require more extensive lecturing than basic courses. At this level students have a much greater degree of engagement – clear presentation of the material suffices in motivating them. However, asking leading questions still brings students to the next step in an argument, and encouraging student questions leads to interesting class discussions. Once a student in my Calculus III class asked “If the Maclaurin series of a function converges, does the function equal the series?” This led to discussion of the classic pathological example $e^{-\frac{1}{x^2}}$. A similar question in a multivariable calculus class explored the distinction between C^∞ functions and analytic functions,

which created excitement about material students would cover in future courses.

Inspiring such excitement in students is the most satisfying aspect of teaching. (Indeed, I beamed with pride when one of my former calculus students informed me I inspired him to declare a math major.) Eliciting enthusiasm is a nontrivial process. Many professors use “real-world” problems in their attempts to increase student interest and subject relevancy. In my experience, discussing pathological examples and counterintuitive results engages students more effectively than concocting accessible applications. As we dissect such puzzling problems, students recognize the extent of their problem-solving abilities. My classes also react positively when I interject tidbits from math history: the irrationality of $\sqrt{2}$, the story of the Ramanujam-Hardy number, the reason behind the name “Arabic numbers,” and the eccentricities of Gauss. Sometimes I even find stories from my own life that relate to the material.

I take written assessments from my students seriously, as they help me determine which experimental ideas to keep and which to eliminate. Discussions with other professors and fellow tutors at University Tutoring Service provide an abundance of ideas to test in class. After nine years of teaching experience, from developing WeBWorK at the University of Rochester to concluding a calculus class by introducing differential forms, I continue to refine my teaching style. End-of-quarter student evaluations testify to the success of my efforts. Students consistently cite frequent homework assignments, daily homework discussions, and engaging lectures as major contributors to their learning. In my most recent evaluation, the (adjusted) median score for “instructor’s contribution to the class” was 4.8 out of a maximum score of 5. Such positive results give me confidence that my dedication to teaching inspires an appreciation for mathematics and critical thinking.