

Teaching Statement

December 16, 2020

I've been an instructor for algebra, precalculus, calculus, and differential equations, I've led seminars to train undergraduate math majors in proof writing and to prepare graduate students for their algebra qualifying exam, and I've been a TA for dozens of discussions. My study of math education as an undergraduate and my continued practice teaching during graduate school have given me many opportunities to reflect on my craft. Not only have I honed an effective technique to get the students to achieve their learning goals in a class, but I also appreciate the importance of connecting with students, and humanizing the mathematics classroom.

In a typical class meeting I try to lecture for no more than half the time; the students can be engaged in listening to a lecture for only so long. They'll digest the lesson better by grappling with the ideas themselves rather than just listening to me *tell* them the ideas,¹ so for the rest of the class period I employ an *inquiry-based* approach. I'll ask the students, usually in groups, to answer some questions or explore some concept that relies on the ideas from the lesson. The lecture serves only to provide the scaffolding, to help them understand and remember the facts, while with the group activity I can guide them towards higher tiers of Bloom's taxonomy of learning. This is the real substance of most lessons.

Occasionally I'll give the students an ungraded quiz (formative assessment) to emphasize the most important ideas that we've talked about, and to reinforce their memory of the facts and techniques we've covered.² I've learned in six years as a TA, talking with thousands of students, that testing and grades cause them intense anxiety. So now I deliberately assign ungraded tasks and quizzes to the students to counter this anxiety, and keep it from impeding their learning.

At the end of each term, once while grading the finals and once while reading my evaluations, I'll reflect and write down ideas on how I can improve the class. Reading the students' finals gives me a clear picture of which ideas I need to rework in the lessons, while reading the students' evaluations can tell me how I need to change the atmosphere of the classroom. For example, when I first started teaching six years ago the word *unapproachable* came up on my evaluations a couple times. Since then I've adjusted my classroom persona to be less firm and stern, and instead more informal and warm. And the students have responded well to this! One of my students wrote:

"Mr. Pierce is probably one of my favorite TAs I've had. He's very easy to talk to, even on things that don't relate to math. Going to office hours is not intimidating at all and really helps, [...]"

Since then, in addition to just being warm and welcoming, I've committed to being empathetic with the students, never forgetting that they are people outside of the classroom. After all, my demeanor and my personality in class color the students' perception of what a mathematician looks like. With this in mind I strive to adopt a persona in the classroom that invites students to the field, and that humanizes mathematics. And the students appreciate this cordiality. When I run into past students around campus, the one thing I *consistently* hear from them is that their current classes feel sanitary and impersonal, and that they miss having a TA or instructor that they're comfortable talking to. One of my differential equations students wrote:

¹Wright, *Student Centered Learning in Higher Education* (2011) <http://eric.ed.gov/?id=EJ938583>

²Carpenter, *Testing Enhances the Transfer of Learning* (2012) <https://doi.org/10.1177/0963721412452728>

“[Mike] has been the most personable and understanding professor that I have at at UCR in any department.”

In addition to being a teacher during the academic term, I've been a mentor and educator in a few programs outside the major curriculum. After seeing countless undergraduates struggling with proof writing, I joined the summer [Advanced Mathematics Program \(AMP\)](#) at UCR as an instructor. The purpose of the program is to give students individualized attention to bolster their writing skills before starting their upper-division classes. But the program also allows us working mathematicians an opportunity to act as mentors to the undergraduates, to reassure them in their work, and to welcome them as they mentally transition from being a college student to being a member of the mathematics community. This is what I mean by “humanizing mathematics,” helping the students see mathematics as a community instead of just a subject in school.

And with this goal of welcoming students into the mathematics community in mind, I've conducted a couple research projects with undergraduate students. I wanted to learn more about quantum calculus, a topic adjacent to my own work, and decided to invite the undergraduates from the classes I was TAing that term to join me. And a few of them did! We spent the term diving into a math textbook together. They got some experience independently reading about mathematics, and they ended the term giving an expository talk on quantum calculus for the UCR Math Club. Then in spring 2020, early in the onset of the pandemic, I co-led a team of undergraduates in a research project on topological data analysis. We guided them through the formulation of a project idea (can you use persistent homology to identify a person based on computer keystroke data?) and supervised the execution of this idea while handling the logistics and organization in working together remotely so that they could focus on the project.

I'm proud to know that I've developed a teaching philosophy that is not only effective at inducing learning in the students, but also humanizes mathematics. I strive to continue being mindful of the students as people in my career as an educator while serving as their model of a professional mathematician, and I look forward to continuing to learn more myself as teacher and mentor as I further hone my craft.

Mike Pierce

A handwritten signature in black ink that reads "Mi Pierce". The signature is written in a cursive, slightly slanted style.

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