

TEACHING STATEMENT

CASEY PERDUE

1. INTRODUCTION

During my PhD, I have gained valuable teaching experience which has shaped my teaching philosophy greatly. Over the past four years, I have primarily been a Teaching Assistant (TA), hired in that position for twelve quarters and three summer sessions. During four of those quarters, I was a Lead TA for a large coordinated course, which involved coordinating with several instructors and managing a team of TAs up to 11 graduate TAs and 10 undergraduate tutors/readers, as well as creating discussion section plans that would get taught to up to 1250 students (in addition to teaching my own discussion sections). I was one of my department's two Junior TAs last academic year, and am currently one of two Senior TAs; the role of the Junior and Senior TAs is to run the course which trains incoming PhD students on how to be an effective TA and implement evidence-backed teaching methods. I have also been the instructor for my own course, where I created a syllabus, gave every lecture, and wrote my own exams, among other responsibilities. Having these teaching positions has given me an understanding of what I feel the goals of a math education are, and has shown me what needs to be done to achieve these goals.

I think that it is essential for students to have a positive experience when learning mathematics, and we as educators have a significant responsibility in this regard. To me, the point of teaching mathematics is to strengthen students' abstract reasoning skills and to show them that they need not be frightened of the subject, and I focus on achieving these goals. By being thoughtful about how I teach, cultivating a supportive environment in my lectures and discussion sections, and making an effort to keep everything running smoothly, I believe that I create conditions where my students have the best mathematical education possible.

2. MY GOALS WHILE TEACHING

When teaching mathematics, one of my primary goals is for my students to learn that they need not shy away from future situations which involve mathematical thinking. It is disappointingly common for students to enter their undergraduate education with a negative perception of mathematics, and sometimes even with 'math anxiety'. One of my deepest beliefs is that one does not need to be special to do mathematics; people from every background have the ability to succeed in any course. In addition to telling my students this, I demonstrate it to them by carefully cultivating an inclusive environment where students are comfortable sharing their ideas, even when they may not be quite right. For example, while teaching, I regularly ask my students questions and pause until someone proposes an idea, while repeatedly emphasizing that it is okay for them to not know the 'correct answer'. I always ask my students to explain their thought processes, as I can then positively reinforce any ideas which are on the right track, even if they were not able to fully solve an exercise or answer a question I gave them. I believe that the greatest mistake any instructor of mathematics can commit is to give students anxiety around math, especially by putting their students down when they do not have the 'right answer', and I construct a dynamic in my classroom which does not allow this to happen.

I also seek to teach my students to recognize the power of abstract thinking and strengthen their reasoning skills. While many of them may not later need to use the specific content I am teaching, the skills that they learn in my course will undoubtedly serve them well. One way I attain this is by giving my students novel exercises that stretch their understanding in new

ways, rather than trying to focus them on learning to do very specific types of problems. I avoid teaching them algorithms for producing answers, and instead emphasize how one would arrive at that solution on their own.

My last major goal, especially when teaching more advanced courses, is for students to learn the intuition of the content I am teaching; I want them to feel as if they could have come up with much of the material themselves. One way I achieve this is by focusing deeply on examples, which can sometimes even lead to students predicting theorem statements. One of my favorite teaching moments occurred when I was a TA for an intro-to-proofs course: my students had just seen the definition of binomial coefficients in lecture, but had not yet learned much about them. During my discussion section, I decided to show them Pascal's triangle, without any explanation of why it was relevant. Very quickly, several students noticed the connection, and I was able to help them build a proof sketch of the pattern they predicted. This moment exemplifies what I believe an effective undergraduate education in mathematics should look like.

3. ACHIEVING THESE GOALS THROUGH STUDENT ENGAGEMENT

In order to achieve any of the above goals, an essential prerequisite is for students to be engaged in the course. This takes many forms; however, I will focus on active learning and AI usage. First and foremost, I deeply believe that students should be active participants in lecture, and I encourage this by regularly having them do 'think-pair-share' exercises. These involve giving students time to work on an exercise alone and collect their thoughts, then having a period of time where they talk to other students around them about their ideas, and then finally discussing the problem as a large group. My students are very active participants in class; they are comfortable asking lots of questions, in large part because I invite them to do so. I also keep the energy level very high during my lectures, and show why I find the material interesting and worth teaching them. I believe that students find an attitude like that infectious, and consequently find the course material more interesting themselves.

One aspect of student engagement which has recently become relevant involves AI tools. While these tools can sometimes be helpful, e.g., if students use them to produce more practice problems, it is certainly very tempting for students to use them to complete important tasks they have been assigned. As instructors, I think we need to recognize this and adjust appropriately. When designing the syllabus for my most recent course, I chose to reduce the weight of homework in the final grade, and increased the number of low-stakes assessments (i.e., short quizzes). This incentivized students to understand the material each week prior to their quiz, making the homework more of a tool to help them with studying, which in turn disincentivized them from offloading their homework onto an AI tool.

4. ACHIEVING THESE GOALS THROUGH ORGANIZATIONAL SKILLS

One aspect of teaching which I think is often underemphasized, but which has an enormous impact on students' experience, is the level of organization of course staff and the amount of effort put into course logistics. When students perceive that a course is disorganized or regularly has preventable problems arising, I believe that they are more likely to get frustrated and disengage.

When I worked as a Lead TA for a large coordinated course, which involved coordinating with several instructors and managing a team of 11 graduate TAs and 10 undergraduate tutors/readers, a very significant part of my job was keeping everything in the course running

smoothly. In such a large course, even a small amount of disorganization would have a significant impact on the 1250 students enrolled in its various lectures. For example, I have been a TA for smaller courses where not everyone would finish grading final exams on time, leading to students having either no chance to submit regrade requests or very small windows of time to do so. While this is certainly unfortunate in a smaller class, it would be a disaster in extremely large coordinated courses as it impacts so many students; one of my tasks as a Lead TA was to ensure that precisely this sort of issue did not arise. The experience of focusing so deeply on course organization directly benefited me when I later was the instructor of my own course, ultimately helping make sure my students had the best possible learning experience.