Aidan W. Murphy

Dr.Aidan.Murphy@gmail.com ■ Home Page ■ LinkedIn

TEACHING STATEMENT

The primary influences on my teaching are from each semester of undergraduate calculus I taught during my years as a graduate student and as a visiting assistant professor during my time at Virginia Tech, and also from many conversations and much time spent with the math education researchers in the Virginia Tech math department. These have given me both practical classroom experience, as well as time to think about how I view the acts of doing and teaching mathematics.

The first important point is that, even though I take the view of Platonic idealism when practicing math for myself, when I take the role of educator I strongly regard math as a deeply cultural activity. Through this lens, mathematical objects exist as a construct which serves the purpose of helping people communicate with each other about the nature and existence of patterns. This places importance not only on communication of an instructor with the class, but also of students with each other.

I also regard math as an incredibly creative and artistic activity. The sentiments expressed in "A Mathematician's Lament" by Paul Lockhart capture this view in better words than I can write, by comparing the art of mathematical reasoning to the arts of music and painting. Creativity is enabled in environments where one can experiment and grow, and where one is challenged to re-evaluate notions they currently hold.

The largest way in which these views influence my teaching is by the adoption of groupwork regularly in the classroom. Every class period starts with a lecture in the first half, and groupwork in the second half. Groupwork takes the form of questions prepared by me beforehand for students to work on together in small groups of two or three students. Students are often reluctant to talk with each other at first, given the lack of agency they have been given in their mathematics education prior to college, but warm up within a week or so. This is especially true when groups are formed at random with some frequency at the beginning of the semester, so that students can get to know others in the classroom that they might not have otherwise.

The problems used for groupwork should range from moderate to challenging; a groupwork problem that is almost a copy of a worked lecture example does no good to the student working on it. By having problems that are just out of range of mechanical reapplication, students are able to explore the concepts more fully with their peers during groupwork. And because groupwork forms so much of the class time, my students also get to know their classmates.

In lectures, I also frequently reference the history of the development of the subject. Mathematics in the classroom tends to lose the story behind it much more than other fields of study do, and college mathematics is the first place some of that story can be brought back, such as in the development of the calculus. Making these connections to the narratives of history as often as I am reasonably able provides at least some context for the subject

matter being discussed, where there previously was no context. At the very least, it can help break up lectures with some fun facts.

As a last point on classroom practices, I modify my lectures based on the questions I receive during class. I mean this both in the sense of answering questions as they come, but also of sketching questions on the board or following a student idea in the written notes, as much as time permits. This better enables dialogue within the classroom, at least, as much dialogue as one professor can have with many listening students. It also gives plausibility to student suggestions, and a chance for me to model what good exploration looks like in a mathematical context, especially when the student suggestion does not yield a successful approach. Showing students how to fail gracefully and recover is just as important as showing students how to successfully solve problems.

There are also long-term goals I have for teaching. The most prominent of these is the search for an alternate grading style which doesn't introduce too much overhead for the grader. I believe that far too often, students equate the numbers they receive on their assignments with their own personal value, which has predictably harmful effects over long periods of time. Even though many teachers try to emphasize the learning over the number, it becomes difficult to lead by example when you are the one assigning numbers to student work.

I have experience as a student with a number of alternate forms of grading; however, these usually require quite a lot of time invested on the part of the professor. I hope that in the future there may be a way of forming a hybrid grading scheme from these, or that I may find a new way altogether of satisfying the need to know "how good" a student is.

I also have experience guiding undergraduate students in research from my time at the Johns Hopkins APL. When guiding a student first starting to do research, I felt it was valuable to set up meetings for a couple times each week while the student first starts, in order to make sure they do not become lost for too long. In future weeks, once they get used to their autonomy in their first research experience, then meetings can occur less frequently. I think too much attention can be detrimental to the first experience of research; just like students may benefit from the discomfort of working on difficult problems in homework sets, they also benefit from the discomfort that comes with figuring out what direction to take through the forest of literature that exists.

Lastly, for myself, I enjoy the challenge of communication that teaching presents. Learning how others, especially my students, approach mathematics can further develop my own worldview, and further understand their worldview. I find it incredibly fulfilling when working towards effectively communicating with students, while working to overcome the puzzle that is the barrier between myself and another. Part of this puzzle has to do with the multitude of backgrounds from which our students come, and I feel like every struggle I take on to have those difficult instances of communication give me yet another insight into how the content might be viewed or interpreted differently.

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