

TEACHING STATEMENT

BRIAN HEPLER

“Math is not a spectator sport.” Unfortunately, I can’t remember which math teacher told me this in my time as an undergraduate student at Boston University, but I will never forget the phrase, or the sentiment behind it. Students learn math by doing math, not by rote memorization—it is a process, one that has guided both my experiences as a teacher, and my own my experience learning new mathematics.

I have been involved in mathematics education for nearly ten years, starting with my first job as a math tutor working at Boston University’s Educational Resources Center. From there, I went on to help host BU’s “Math Help”, a weekly session where I offered free tutoring sessions for any math course offered at the university. Once finishing my undergraduate degree, I worked with the Worldwide Center of Mathematics (in Cambridge, MA), an e-textbook publishing company that is committed to producing free and affordable math textbooks and resources. My job was to proofread mathematics textbooks, write solutions to mathematics exercises that were included in these textbooks, and record mathematics videos; during this time, I was also a teaching assistant at Northeastern University, this joint position made possible by my fellowship at the time, the Robert Brian Massey award, given to me by the Worldwide Center of Mathematics.

Since then, I have been a teaching assistant at Northeastern, where I have been the instructor of six courses, all of which were basic-level mathematics courses. One of my favorite examples comes from the course “Interactive Mathematics”, a general-education requirement for math that focuses on several elementary, but important topics : the concepts of mean and standard deviation, the concept of a limit in math, and basic probability (applied toward polling problems, this was an election year!). During the unit on mean and standard deviation, we examined the famous short story “The Pit and the Pendulum” by Edgar Allan Poe, and discussed the narrator’s predicament mathematically. The narrator is strapped to a table, and overhead swings a giant, 30 foot long bladed pendulum is slowly lowered, until it will eventually kill him. The problem I pose to the students is then: “How long does it take for a 30 foot long pendulum to complete 12 swings? Does the narrator have time to escape?” To determine this, I have the students perform several experiments to determine what variables might determine the period of a pendulum (using mean and standard deviation to determine what is “normal data”), eventually determining that length is the only important variable for small periods. From this, we make predictions about the final result for a 30 foot pendulum, and actually construct such a pendulum in one of the larger buildings on campus to test our predictions. I really enjoy when the students get to see firsthand how close their predictions are to the actual result—math becomes *real* for them in that moment, not just a list of dry formulas and rigor. I could have simply written on the board

$$\text{The period of a pendulum of length } L \approx 2\pi\sqrt{\frac{L}{g}},$$

and saved several weeks of work, but that formula would not have *meant* anything to my students. Math is not a spectator sport, and I try to always find some way of bringing the material to life for my students, although it is not always as easy as building a giant pendulum. My commitment to this principle is part of the reason I was awarded the Best Teaching Assistant for the year 2017-2018 for the Northeastern University Math Department, for providing excellent service to the department by teaching a wide range of courses as Instructor of Record, including MATH 1213, 1231, 1251, and 1342. Also, for receiving very good student evaluations in these courses. For this, my name was inscribed on a plaque in 511 Lake Hall (the main lecture room in the department).

I am also actively involved in the Bridge to Calculus outreach program, a summer program at Northeastern University designed to help high school students from Boston Public Schools prepare for AP-level Calculus courses. For this work, I was nominated for the College of Science Dean’s graduate student award for excellence in advancing diversity.

Here are a few of my favorite student reviews:

*Brian is truly a wonderful teacher. This class could've been a disaster, but Brian never became frustrated and always took the time to hear students out and help explain or even re-explain concepts in a way that they would understand. **Very impressed** with his classroom presence. Easy to follow lectures and whiteboard notes. Great resources to study with.*

- From the class MATH 1213 Interactive Math, Fall 2016

*Bri is a great teacher, incredibly intelligent, almost always overly passionate about what he's teaching (**like he literally loves math which is terrifying**), always willing to go back and review for those who don't understand, and never got upset with us. I can only imagine how tough it is to be a Grad student and teach at the same time, but he never let it show. Best math teacher I've ever had, just hoping he teaches Calc 2.*

-From the class MATH 1251, Calculus and Differential Equations for Biology 1, Spring 2016.

Outside of the classroom, I am an active math blogger on my webpage

<https://brainhelper.wordpress.com/blog/>

the blog title "BrainHelper" a fun anagram of my name. Mostly, I like to write about what I am currently learning, which is usually something related to the microlocal theory of sheaves. Anything in advanced mathematics takes a lot of time to learn, and I find that writing my notes as a "lecture to myself that has forgotten the material" helps me best understand the material.

In addition to being a regular speaker at the Northeastern University Math Graduate Student Seminar, I am also a co-organizer of the Boston Graduate Mathematics Colloquium, with Boston University and Boston College. The aim is to provide a venue for grad students at all levels to give math talks accessible to a general audience, and meet fellow researchers who are right down the street (from all over the greater Boston area).

<https://sites.google.com/view/bgmc>

From these seminars, I have learned that a good math speaker also has to be a bit of a showman. By this I mean, one has to be careful to not present a too-technical proof that will bore the audience, to always show enlightening examples, to modulate your voice so that the most important concepts are highlighted by it, and even to try to lighten the mood when the topic is too heavy. Everyone comes into a lecture or seminar with the same unspoken question, "Why should I care?" I consider answering this question to be my top priority every time I step up to start speaking.

Of course, I still have many things to learn and polish. I look forward to continue having teaching experiences that are as helpful for me as they are for the students.

DEPARTMENT OF MATHEMATICS, NORTHEASTERN UNIVERSITY, BOSTON, MASSACHUSETTS 02115
E-mail address: hepler.b@husky.neu.edu