

1. Introduction

The task of a mathematician is to explore the unfamiliar, to discover the truth behind seemingly disparate examples, and to share this understanding with others. Teaching serves several purposes which are integral to this mission. When we teach future mathematicians we give them an example to follow and a conceptual understanding which will become a part of how they approach problems. When we teach non-math majors we give them the valuable tools of analytic reasoning and rational thinking, as well as an understanding of what a mathematician does. In both cases perhaps the most important thing we can teach our students is confidence in themselves and in their ability to overcome adversity.

2. Teaching Experience

My first exposure to teaching occurred in 2005 when I was a freshman at Bowdoin College and was hired as an assistant coach for the women's volleyball team. I wouldn't teach my first course until 2011, but I coached every year in between, for players of both genders ranging in age from 14 to 30 years old, and from a wide range of socioeconomic backgrounds. During the same time period I was a teaching assistant, recitation leader, course builder, grader, and individual tutor in mathematics, computer science, and physics at Bowdoin and Wesleyan. I learned that these two experiences of conveying information could inform one another: tutoring taught me how to diagnose the source of confusion in my players, and coaching taught me how to motivate students to keep trying and to believe in themselves.

My first experience teaching a class of my own was Integral Calculus at Wesleyan University in the spring of 2011. Wesleyan places a high value on teaching, so a grad student's first teaching experience always comes with support from a senior professor who teaches an independent section of the same course. My mentor and I worked together to craft the syllabus, homework assignments, solutions, quizzes, and exams. Each class period contained a lecture, group work, and a conclusion, generally focused around a slogan or single key concept. We taught our courses following the Harvard Consortium method, which focuses on group work and student exploration projects. For example, three explorations (involving Gabriel's Horn, the proof that $0.999\cdots = 1$, and the rate of cooling for coffee) are hosted on my website: <http://dwhite03.web.wesleyan.edu/teaching.html>.

I received positive student evaluations (the complete set is hosted here), and was selected by the department to teach the Graduate Pedagogy Class in 2012 for incoming graduate students. I developed this course from the ground up and have placed my syllabus and course materials on my webpage. During this semester I also helped advise a student-taught forum for math majors who wanted to teach in high school. My pedagogy course focused on not just the nuts and bolts of how to teach, but also on the theory of pedagogy, different approaches to teaching, uses of technology and handouts, and general pointers for thriving in graduate school. Teaching this pedagogy course gave me a chance to think deeply about my teaching philosophy and how to best reach students. It made me a much more effective teacher.

This past summer I taught an intensive summer course on statistics which compressed a full semester's worth of material into four weeks (12 hours per week). As this was the first time statistics had been taught in this format, and the first time it was taught by a grad student, I sought advice from faculty members. I built on their advice and molded it to fit my setting. I chose a textbook, crafted a syllabus, and created all course materials. This experience, coupled with my diverse experiences as a TA (please see my CV) makes me hopeful that I can be an effective teacher for a wide variety of courses.

3. Teaching Philosophy

Never stop improving. At Wesleyan I have had the good fortune of working alongside many phenomenal teachers. One feature they share is a desire to constantly improve their teaching. I have adopted this trait and on a number of occasions have applied pedagogical approaches I learned from conversations with faculty and graduate students. For example, while teaching calculus I worked with other instructors to craft a lesson plan making use of java applets to help students visualize Taylor approximations. We also collaborated on exploration problems and handouts, each benefiting from the myriad examples

which the others had seen over the years. I plan to continue to hone my teaching skills in this way. Just as I believe students can always achieve more, I also hope I will never stop improving as a teacher.

Planning is key. In any teaching methodology, the quality of the teacher's planning is crucial if students are to learn. In lecture courses this means motivating the topic, finding a slogan the students can keep in mind, and choosing examples which present the subtleties of the topic while also preparing students for their homework and exams. Only with good preparation can a teacher adapt to student confusion. Only with clear expectations and fair assessment can students put aside their concern about grades and focus on learning. Preparation was one of my slogans while teaching pedagogy. The course covered preparing quizzes, handouts, and lectures integrated with technology. It also covered the kinds of planning needed to teach a course via problem-based learning, the flipped classroom, or the consortium calculus.

I made good use of these lessons when teaching the summer statistics course. I chose a different book than had been used in our department previously and inserted additional units to supplement the textbook's approach via TI-83 calculators. I lectured from slides and gave the students printouts before class so that they could remain active learners rather than struggling to keep up with their note-taking. I had to prepare all my lessons well ahead of time and to anticipate student difficulties so that I could prevent anyone from falling behind. I left blank spaces in the handouts so that students could add solutions to in-class exercises and take notes when I tailored a piece of the lecture to address student misconceptions.

Encourage communication. Student communication, both with each other and with me, is of fundamental importance for learning to take place. I encourage student-to-student communication via group work and I encourage students to communicate with me via an open-door office policy, being welcoming to questions, and turning every question into a teachable moment. When meeting one-on-one I try to maintain a patient, non-judgmental demeanor so that students will be comfortable and open with me. I make it clear to them that questions can only help, and so they should never be afraid to ask. Students often come to me for advice about other areas of their life, and I have stayed in touch with several and continued to mentor them. I very much enjoy this role, and hope to continue in it throughout my career.

I am a firm believer that students profit when they teach the material to one another. When I taught calculus, one student group consisted of three hockey players. One was a very strong student and under my guidance he helped the others stay on track and learn the material. In the process he came to understand the material better himself, and all three gained confidence. I later wrote him a letter of recommendation for medical school and am confident that he will make an excellent doctor.

Connect on many levels. Students often need to hear material more than once before it sinks in, and different students respond well to different explanations. I find student learning is maximized when I present several different explanations for a given concept. While teaching calculus, my mentor taught me the Rule of Four to present material graphically, numerically, algebraically, and verbally. I used this again while teaching statistics, and several students told me that it helped them learn. When I teach I try to connect with every student on a human level, to bring my excitement with me to every class, and to keep them engaged by choosing examples and practical applications of interest to them.

Motivate/Empower. Students in introductory math courses often suffer from a host of anxieties which are detrimental to learning. My method for getting past such anxiety is to create an environment where the students view the class as a team pulling together and looking out for one another rather than as a competition. Creating such a group dynamic requires me to earn students' trust, to build their confidence, and to convince them that I am on their side. During the statistics course I enabled this environment by inviting the students to my house for a Fourth of July barbecue. There they got to know each other, to become comfortable with one another, and to form study groups. In these groups students support each other, teach and learn together, and prevent any student from falling behind. With the team dynamic in place, exams become mountains to climb rather than moments to fear. I challenge my students, but they know that they can meet these challenges and that doing so will move them one step closer to successfully mastering the material. My experiences have molded my philosophy. I strive to be well-prepared, to motivate the material before diving into details, to earn students' trust, to encourage questions, to create a team dynamic, and to empower my students to succeed against all obstacles.