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# Teaching Statement

Justin M. Troyka

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Teaching is my passion and one of my greatest strengths. My lessons comprise both conventional lectures and student-driven group work, all for the purpose of promoting active learning. Fostering the right classroom environment is as important as any pedagogical tools and techniques, so I do everything I can to make students feel supported and welcomed. I create a comfortable space for students to participate and ask questions. In each class, I try to understand who my students are and what is important to them so that I can meet them where they are. These are the central ideas of my teaching, and I am always working to improve as a teacher and examine my pedagogical practices.

I make a conscious effort to support my students from marginalized groups such as women and people of color. I discuss this in my statement on diversity, equity, and inclusion.

## 1 | Group work and active learning

Having students work in groups is a great way to promote active learning, and by trial and error I have improved my ability to facilitate cohesive and functional group work. I make my pedagogy transparent, explaining from the start why group work is so beneficial: students develop the ability to work in a team; they learn better when they are cooperating, their weaknesses being balanced by others' strengths; and they get direct, hands-on experience with new concepts. Facilitating group work has been an invaluable experience for me, and my students find it works well too. Of the 35 students who completed the end-of-term evaluation for my **MATH 3** course (Dartmouth, Fall 2016), 15 of them (43%) specifically mentioned group work when asked to "comment on the aspects of the course that you think were most effective", and only three students reported disliking group work when asked to "comment on aspects of the course that could be improved". I have employed group work in many courses since then, each time improving and refining my approach. I have tried out "group roles" (facilitator, recorder, and so on), and I have started having students devise some ground rules for group work, to be revisited later in the semester.

I am no radical: lectures can certainly be effective, perhaps necessary in a fast-paced college course; but I fill my lectures with examples, questions, and problems, all with the goal of promoting active learning. As one student wrote in an evaluation,

Professor Troyka's lectures were very informative and the examples he used allowed me to understand many concepts in calculus that I was not clear on from simply reading the textbook. He also did a good job of making sure he didn't lecture for too long at once, which gave us the opportunity to consider what he had talked about and apply it to practice problems.

My role as a teacher is not to transmit knowledge to my students, but to guide them in *doing* what they are learning and constructing their own knowledge.

Like many of us, I was thrust into teaching online for over a year. I believe that this has made me a better teacher even for in-person classes, because many of the things I implemented to facilitate teaching online are things I want to keep doing in person. This includes starting each day of class with an opening icebreaker question (like “What is your favorite food?”) and giving students a two-minute stretch break in the middle of class. Other things I implemented when teaching online have made it into my in-person classes in a different form. For example, the online quizzes about pre-class videos are now incorporated into my courses as a five-minute informal “do it yourself” question during class.

## 2 | Creating a comfortable, nurturing classroom environment

My demeanor in the classroom is forthright, energetic, playful, and above all compassionate. I keep things somewhat informal, making corny jokes and calling my office hours “conversation hours” to make them less intimidating. One student commented in an evaluation that I “kept the atmosphere relatively light and made everyone feel welcome and valued.” From another student’s evaluation:

Having a very approachable and friendly professor, Dr. Justin Troyka, who made the course material and lectures fun made me want to attend every single lecture. By the end of the course, I have really begun liking calculus — which was a field I was not very fond of only a few months earlier.

I try from the very first day of the semester to create a classroom where students feel empowered to participate and ask questions, where they will not be judged harshly if they make a mistake. I avoid sarcasm and teasing, I make sure students feel respected, and I invite them to take intellectual risks. I was even able to do this in my 200-student classes at York: as one York student wrote in an evaluation (MATH 1300, Spring 2020), “You made everyone feel like they are in such a caring, friendly, and loving environment.” I repeatedly tell my class the maxim that *confusion is the first step towards learning*. One student said that I helped them be “more confident that I don’t utterly suck at math”; another said that the class “made me completely rethink math as a subject, and my confidence with math has really gone up.” All of this is to put students in the right emotional state for learning: not overwhelmed or self-doubting, but safe and confident.

I show my students, through my words and my actions, that a question is not a shortcoming but an opportunity for learning. One occasion that has stuck with me to this day is a time when I persisted in asking a student to repeat or rephrase their question, and this led to finding a subtle error with something I wrote on the board. Every time I choose to listen instead of dismissing students’ confusion, I have a chance to deepen the whole class’s knowledge and show students that I value their ideas and contributions. I make it a point to always end my answers to students by sincerely asking, “Did that answer your question?” One student commented in an evaluation:

He was obviously passionate about the course, but was not above our questions. There were some questions in class that would have been frustrating to answer, but he was very easy to talk to and answered those questions well without making the person feel silly.

That is why it is imperative for me to take students’ questions seriously.

### 3 | Listening to my students and meeting them where they are

At York, I taught Introduction to Sets and Logic (MATH 1190), a first-year course in discrete math required for information technology majors. I made an effort to adapt the course to the needs of the students who had to take it, by teaching several of the textbook sections about applications which had been skipped in past years. My students told me they appreciated these changes, including some students who had attempted this class before. In Linear Algebra, my students told me that they really liked the day we spent learning about applications, so the next year I expanded it to two days. Despite being a pure mathematician, I understand that applications can be a powerful learning motivator for many students.

My teaching methods have benefited from my willingness to listen. When I first started using polling software in my classes at York, I was awarding credit only for correct answers. It soon became clear that this system had too much bite. Several students told me they were too stressed about getting the questions right — it seemed that the correctness grade, the unfamiliar material, and the time limit all combined to create a great performance anxiety that I did not want in my classroom. So I changed the grade to be merely a participation grade, and this was much better for the students. The next time I taught, 94% of students reported the clicker polls to be helpful to their learning.

This year, in the interest of giving my students more autonomy in the class, I let them set some class rules and norms through guided class discussion. Instead of just telling my students some guidelines for effective group work, I had each group make a list of three potential “ground rules” for group discussion, and then they them as a class and agreed to the resulting list. They generated rules for homework assignments and tests in the same way. The students discussed and voted on whether to allow use of their notes during the test and, in my Linear Algebra course, whether the test would include *Mathematica* questions. A few students raised some good points that I had not thought of — for instance, that including *Mathematica* could result in unequal opportunity since many people were having unpredictable technical issues with *Mathematica*. The input from students is important to me, and students are more likely to follow the rules if they have a hand in setting them.

One of the most gratifying teaching experiences I have had is teaching MAT 108, Exploring Mathematical Ideas, at Davidson. This is a course for general liberal-arts students, and it is not a prerequisite for anything. The course covers advanced math topics with a minimum of technical details, offering tastes of number theory, infinite cardinalities, graph theory, and probability. Many of the students have chosen the course because they feel they are not good at math, so I emphasize from day one that they they need not be “good at math” to enjoy math and benefit from it. One of my students wrote, in a very kind note to me, “Math has never been my thing, but you made the class so engaging and I ended up enjoying some of the work/content. I am so glad I took your class.” Since many of these students are more humanities-oriented, I assign readings from works including Tom Stoppard’s *Rosencrantz and Guildenstern Are Dead*, Lewis Carroll’s “What the Tortoise Said to Achilles”, and *Flatland*. As a student wrote in an evaluation, “The more literary readings helped bring math to a more liberal arts perspective that I could relate to.” The atmosphere of the class is, above all, one of fun and curiosity.