Teaching Statement

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Over the last 8 years, I have taught mathematics and computer science at the undergraduate level in a variety of settings. My pedagogical responsibilities have ranged from designing computer science courses from scratch and delivering them at Saint Mary's College of California, to guiding class discussions in a flipped-classroom calculus course at the University of Toronto, to delivering virtual automata theory lectures at Xidian University. I have taken part in reading groups delving into the scientific literature on math pedagogy, and I have incorporated its findings into my own teaching. My experiences have guided me to a teaching philosophy that prioritizes practice, interaction, and student quality of life.

My primary goal as a teacher is to make competent and creative problem solvers of students and to give them the confidence to ask their own questions and push for their own discoveries in the company of their colleagues. This is reflected in my teaching methodology and in my approach to assessment.

Methodology. My teaching methodology is inspired by *discovery-based learning*, which is known to be more effective than passive, lecture-based learning in undergraduate mathematics education [Lov+14]. I generally prioritize *doing* over *watching*, and spend as much of my class time as possible helping students work through examples and exercises. I also encourage students to work in groups by pushing desks together or giving them whiteboard space to collaborate whenever the space allows.

In my first semester as a professor at Saint Mary's College of California, I designed and delivered two courses: an introduction to programming in Python for first-year students, and an introduction to the analysis of algorithms aimed at juniors and seniors. Both courses were project-based and had interactive lectures that revolved around worksheets consisting of a series of problems and exercises that the students would solve on whiteboards in teams. During the problem solving portion of lecture, I would make my way around the room and help each team individually wherever they were stuck. Student feedback[1] regarding the lecture format was almost entirely positive, and multiple students particularly noted that active collaboration during lecture created a genuinely welcoming community.

While I was an instructor at Xidian university, I learned to plan virtual lectures around examples that clearly motivate the definitions, assumptions, and theorems I needed to cover. I also learned to use breakout rooms to have students interact with each other, and to set aside sufficient time for students to work with the new material. Allowing students time to work in class gives them the opportunity to find their own knowledge gaps. It also gives me more opportunities to work with students one-on-one, gauge the overall well-being of students, and assess the state of the class's knowledge on the whole.

While I was a teaching assistant at the University of Toronto, I learned to plan tutorials around group discussions and opportunities for students to discover the material for themselves. For instance, I once led a group discussion about the function $\sin(1/x)$, in which the students discovered for themselves that the correct definition of continuity is not the conclusion of the intermediate value theorem. I applied the same technique leading tutorials for a University College London course introducing computer science students to linear algebra and group theory: I was able to have my students intuit many of the basic facts we needed about matrices by simply having them apply different matrices to shapes and vectors in GeoGebra [Geo].

[1] See attached student survey results.

Assessment. While working within time and budget constraints, I do my best to emphasize assessment methods that focus on improving mastery rather than assigning scores. I am inspired by the idea of *mastery-based testing*, which is known to encourage students to learn from their mistakes and see assessment as a form of feedback rather than an objective measure of their intelligence [Col+19]. In the last two years, I have consistently given students the opportunity to resubmit assignment solutions after receiving feedback on their work. Student feedback regarding my resubmission policy has been extremely positive: In my experience, students learn more from trial and error than value an opportunity to improve their standing scores are generally much higher because most students happily take the opportunity to produce more detailed solutions, and low scores are taken less personally.

Experience. I began at the University of Victoria as a teaching assistant for Calculus I, II, and III, Precalculus, and Introduction to Logic and Proofs. Being a teaching assistant taught me how to manage a classroom, design grading rubrics, and deliver engaging lectures. Prof. Jane Butterfield and Prof. Christopher Eagle organized a math education reading group at UVic, where I as first exposed to the scientific study of math pedagogy. The scientific perspective on pedagogy was helpful during my year at the University of Toronto, where I had the pleasure of assisting with Prof. Alfonso Gracia-Saz's course *Calculus!* (MAT137). Much of what I know about teaching as a science I learned from Alfonso, whose courses essentially proved that a flipped classroom structure can work on a large scale [Web]. I spent my time as an instructor at GEC Academy and Xidian University and my time as a teaching assistant at University College London applying what I learned from my previous teaching mentors.

More recently, I designed and taught a semester of computer science courses at Saint Mary's College of California, where I am currently an assistant professor. Students at St. Mary's are more receptive to group work and less receptive to lecturing than I was accustomed to. My time at St. Mary's has taught me how to adapt my teaching style to my students and to the institution where I work. For example, in my current semester, I am running a flipped class on automata and the theory of computation in response to the positive student feedback I received regarding the group work in my previous classes.

Online teaching. The sudden demand for virtual teaching was an unfortunate surprise for most educators, myself included. Active discussion in virtual classrooms can be cumbersome, and it is often impossible to work with students one-on-one. Adapting active learning to the virtual setting has required a high proficiency with educational software—managing breakout rooms, posting announcements, using collaborative whiteboards, and moderating course forums have become second nature.

The increased accessibility of a virtual classroom is undeniable. I both taught for and held a leadership position in an outreach organization in London that offered mathematics courses to high school students around the city. By adopting a virtual classroom setting, we were able to offer our courses to more students, especially those who lived outside of London. I look forward to teaching in person in the future, but I am also happy to offer hybrid classroom experiences to students that require increased accessibility.

Concluding remarks. A substantial portion of my career so far has been spent thinking about pedagogy. Teaching is an important part of my academic experience, and I am excited to continue thinking about pedagogy and how to apply what I have learned.I am happy teaching courses at any level, in mathematics and computer science. I also intend to return to academic outreach, especially in underrepresented communities, and am interested in playing a mentorship role to younger students interested in research.

References

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