Teaching Statement

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The opportunity to teach and mentor students is one of the main reasons why I am seeking to become a professor and leave my current industry position. I have always enjoyed giving lectures in seminars and explaining mathematical concepts to my friends or family members. I like helping people understand new ideas and on a personal level, I find the challenge of coming up with effective explanations rewarding for its own ability to provide me with new insights.

My teaching philosophies are generally shaped by experiences as a student. As a student, I found that the most effective way to really understand something is to spend the effort to figure out parts of the material myself whenever possible. The most obvious way to allow students to work out material on their own in lecture is to ask questions, but this is itself a somewhat tricky thing to do. I have taken classes in which questions were met with silence, or in which only one or two students ever answered. I have observed that a good technique for avoiding these scenarios is to ask questions that poll the students, e.g. with multiple-choice answers. That way students need less confidence in their answers and are more likely to actually think about the question and respond. This is also a better way to measure overall comprehension in the class in order to adjust the lectures and to avoid losing students.

My personal teaching experience includes teaching math workshops for middle school students when I was in high school, being a teaching assistant for several mathematics and computer science classes as an undergraduate and graduate student, giving expository lectures in various reading groups and seminars, and mentoring an AI resident at Google. I was a teaching assistant for a math 25a and 25b at Harvard, an honors linear algebra and analysis course, and at Stanford for both CS 161, algorithms and data structures, and CS 140, operating systems. These experiences have taught me the value of simple explanations. If at all possible, one should endeavor to demonstrate an idea in just a few minutes or lines, as anything more than this usually requires students to think hard about the concept on their own in order to internalize it, making it hard for them to understand whatever idea is presented next. However, when I cannot come up with such simple explanations, I find a three-tier strategy tends to work best. First, I like to come up with a motivating example of the concept. It doesn't have to be particularly practical or realistic, but it should illustrate the main idea, and should be accompanied by a diagram whenever possible. Next, I try to find a high-level intuition for the concept that *can* be described in a simple way. This can be thought of as a kind of "proof sketch" when the concept is a proof. Finally, a full detailed explanation can be given, but this explanation must tie back to both the high-level sketch as well as the example extremely frequently.

In regards to mentoring graduate students, I think one of the most important qualities in a good mentor is the ability to find topics and problems that motivate a student. This is a multi-faceted problem: not only should the topics be interesting in their own right, the problems should be pitched at a level that the student can understand. I think a good approach for developing this is to make sure students are exposed to a broad range of topics outside of what they see in classes. This can be aided by having regular group meetings in which students present on topics of interest to them, but it is also important to regularly have frank one-on-one discussions with students about how they feel about their current work. I am firmly of the opinion that working on a topic which isn't personally exciting to a student not only makes it hard to make progress but also negatively effects the overall morale of the student. I would much rather have a student who takes the time to explore and decide on a thesis topic that they really enjoy than one who quickly commits to something they find only mildly intriguing.

Finally, in my own graduate education, I attended several reading groups facilitated by professors in which students regularly presented texts on disparate topics. These sessions not only taught me more than all of my coursework combined, they also helped me develop an interest in and the ability to understand a much broader swath of research than my own individual work. As a professor myself, I intend to invest in supporting or starting a similar practice.

Overall, I am eager to communicate and collaborate with future generations of students. This is one of the really unique opportunities provided by faculty positions, and I am looking forward to both teaching courses as well as mentoring individual students.