Teaching Statement

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I owe my understanding of computers and the world overall to all the wonderful teachers in my life. I feel excited to lead the next generation of students towards thinking analytically, advancing technology and benefiting society. I enjoy teaching operating systems, compilers, and software engineering to both undergraduate and graduate students and also enjoy teaching elementary algorithms and programming courses to undergraduate students. My passion for teaching is broader than just one field, and thus much of this statement is about teaching in general.

As the programming club coordinator at IIT Kanpur, I took several lectures on Basics of Programming (BoP) over the course of one year which were attended by over 150 freshmen students. The BoP lectures complemented the formal university curriculum and encouraged students with little to no prior programming background to get early hands-on experience. I gained extensive mentorship experience over the course of many years- mentored half a dozen electronics and robotics projects as my hostel's science and technology secretary, mentored over a dozen students to build 8 ambitious summer projects as programming club coordinator, mentored 3 students on building robotics software as the software lead in Boeing-IITK project, mentored 2 graduate students as a senior graduate student in my Purdue research lab, and most recently am mentoring 4 engineers as the CTO of Mobile Enerlytics. I developed my teaching philosophy from the years of learning, teaching and mentoring experiences.

My teaching philosophy focuses primarily on making a long-term impact on students instead of focusing on just the timescale of one course. From my past mentoring experiences, I find my teaching is successful when I achieve three important goals with my students.

First, I aim to teach my students how to think and how to learn effectively. Due to our human society's large knowledge base and its rapid advancements, I believe any university curriculum is bound to be incomplete positioning each of us as a lifelong student. Universities can best prepare their students for successful careers by distilling passion for learning in general and helping them to think and learn effectively. From my mentorship experiences, I found that a storytelling approach works the best for achieving these goals. A good course story builds concepts on top of one another instead of presenting a list of disconnected concepts. Before learning any new concept, lecturers must always pause and encourage thinking about *why* a new concept is required and *why* the concepts learned so far are insufficient or suboptimal and brainstorm with students on different possibilities on how the identified gaps can be filled.

Second, I consider my teaching successful if I am able to empower my students to challenge the status quo. I want my students to lead technological advancements and benefit society. I believe this is best achieved by additionally presenting historical context around the invention and adoption of the concepts presented in the course story. Concepts presented in a matter of factly manner tend to either trivialize them or put their inventors on a superhuman status. In my

learning experience, I found a lot of inspiration can often be derived from the human journey of the inventors and empowers students to believe in themselves in challenging and advancing the status quo.

I further assist graduate students in advancing the status quo by keeping a flexible curriculum. Graduate students are often already working on research problems when they join a course and are looking to understand how they can advance the status quo in their research areas by applying course concepts. I perform initial surveys of their research areas and what they expect to learn from a course and tailor the course to empower them in advancing the status quo.

Third, I aim to commit the core concepts of the course into students' long-term memory through true understanding and active learning. I do not want my teaching to become yet another example of this joke:

> "What is the difference between good and bad students?
> Bad students forget the course material *before* the exam."

There're a few strategies I have found effective to commit concepts into long-term memory.

First, I encourage students to deeply understand the concepts which is much more effective to commit to long-term memory compared to cramming. I am strictly against students cramming the subject matter, where the students just memorize every small detail of the subject, do well in exams, and then forget everything about the course. Deep understanding is absolutely necessary also because real-world problems hardly ever follow the exact formulation like an exercise in the course book and require conceptual understanding to be able to solve them. Thus, I give frequent exams and quizzes and make sure that these exams and quizzes test students' understanding of the concepts and not just ask them to spill facts.

Second, intuitions stick the best when students keep concepts in their working memory for a long time with deep concentration. This is achieved the best by providing students hands-on-experience in solving challenging but rewarding problems. I put a lot of creativity to make sure that the assignments are focused on core concepts requiring substantial thinking and concentration, and upon solving the problems, provide a joyful and rewarding experience.

Third, active learning is known to be more effective in increasing retention than just passively listening to course lectures. I design course curriculum to always have a collaborative course project component. When students explain what they've learned to their peers fading memories are strengthened significantly increasing retention.

In summary, I view teaching students as a true privilege. It gives me a deep sense of purpose in life. One of the primary reasons I decided to leave the startup and join academia is teaching. I cherish many of my wonderful teachers starting from my parents all the way to graduate school and hope to make a similar life-long impact on students through my own teaching.