Teaching Statement

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My teaching philosophy derives from answering the question: why do students need a teacher to learn? For most college-level courses, there exist high-quality textbooks that cover concepts comprehensively. So what role should a teacher play in the learning process? I believe a good teacher should be a motivator and a knowledge organizer.

A motivator inspires students and leads them to appreciate the beauty of the concepts. This goal is hard to achieve. To get students engaged in a course, I believe the best motivation is to let them feel that the material taught in the class has relevance to their future career. To achieve this goal, I will spend time learning my students’ background and goals (in large classes, by surveying) so that I can tailor the course materials to fit their interests best.

A motivator also encourages students, especially when they are facing obstacles. Learning is a difficult process, and occasional frustration is inevitable. As an experienced student, I know how encouraging and heartwarming it is to receive intellectual and emotional support from your instructor. Such support can sometimes turn things around. I personally had an experience with a student who struggled early in the graduate OS and distributed systems course that I TA-ed and was on the verge of dropping the course. The student was a non-system Ph.D. student at CMU and took our class for department’s breadth requirement. The instructor (my advisor) and I quickly noticed that they were capable of doing well but their initial frustration had formed a strong psychological resistance to the course. To help them get through this, I arranged weekly one-on-one meetings with them to go through the concepts and papers covered in class with patience to make sure that they had resolved all their confusions. The student gained confidence and made substantial progress on the course materials that we worked on together.

The second role that I believe a good teacher should play in the learning process is a knowledge organizer. An organizer connects pieces of (seemingly unrelated) knowledge to form useful and easy-to-remember structures for the target students. Such context-based reorganization is often difficult for a student to achieve simply by reading a textbook. As an instructor, my goal is to think beyond textbooks and existing slides by developing my own knowledge structure that makes the most sense to my students in the class. I prefer the top-down approach, where students get a clear big picture first before I dive into details. I will form an interactive class environment to encourage students to learn through active thinking and discussion under my careful guidance.

As a Ph.D. student at Carnegie Mellon University, I was the head TA for the undergraduate database class (15-415) and the graduate OS and distributed systems class (15-712). For the former, I designed B-tree implementation assignments to show the student how real database management system internals look like. For the latter, I had more opportunities to teach. I designed a lecture to review the classic system papers required for the course. I also hosted recitations to go over basic OS concepts for students who lacked the background. Furthermore, I took full charge of the final project presentation and feedback classes because the instructor departed on an earlier-than-expected parental leave.

In addition to my teaching responsibilities, I have advised many masters and undergraduate students on their capstone/thesis projects. The most successful one among those is the OpenBw-Tree project, where the leading master student implemented an open-sourced version of Microsoft’s Bw-Tree. I helped the student design the experiments based on my previous index benchmarking framework and guided him in how to make fair comparisons among data structures, how to visualize and analyze results, and how to refine experiments to identify performance bottlenecks. The work appeared at SIGMOD’18, and the student is now pursuing a Ph.D. in computer science at CMU.

Overall, I find teaching to be a rewarding experience. As a new faculty member, I hope to design new seminar courses related to my research such as “Practical Succinct Data Structures” and more broadly, “Data Structures in the Real World,” with an emphasis on implementing algorithms efficiently from a systems’ perspective. Beyond the seminar courses, I am excited to teach courses in databases, operating systems, and distributed systems at both undergraduate and graduate levels.