

Teaching Statement

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I have always had an interest in education, and my time in academia has turned that interest into a passion for teaching. To realize that passion, I have completed formal educational training, created educational software for engaging learners, conducted research in Computing Education, systematically developed curriculum, and taken many opportunities to work with students. I am excited to develop new learning experiences for diverse audiences in a wide array of topics.

Teaching and Educational Experience

In graduate school, I earned a Certificate in the Learning Sciences. The 4 classes I took on academic motivation, instructional design, and theories of learning taught me to approach curriculum development like I develop software: using data, theory, and best practices to iteratively improve learning experiences. Later in graduate school, I applied this knowledge to help develop a new course on Computational Thinking. This course serves a broad audience of non-computing majors from the arts and humanities, without sacrificing technical content - students learn fundamental programming topics in abstraction and algorithms. Students typically enter with low self-efficacy, so the course has numerous technological and pedagogical scaffolds. I have written several major educational software tools to support these students, including a dual block/text web-based python environment with immediate feedback. The environment directly supports the course's context of using real-world data to solve domain-specific questions via computing. The analysis of assessments and survey data have found the course to be successful for both student learning and motivation, and I have published numerous papers on this technology, one of which won the Best Research Paper award at SIGCSE 2017.

After graduating, I was hired as a Visiting Assistant Professor to redesign an Introductory Python Programming course with more modern pedagogy. This course, for non-computing majors in engineering, serves a very large audience (300 students per section). Working with an Instructional Designer, I developed a new iteration of the course from a model of over 200 lesson-level learning objectives. This redesign uses a flipped classroom model with short, 2-4 minute video lessons followed by practical programming and conceptual problems. Lecture is minimal, and is mostly used to highlight misconceptions. Instead, the majority of class time is spent answering students' questions as they work. I have extensively documented the course into a format that will be easily adoptable by future instructors and adaptable for external users.

Teaching Philosophy

I approach curriculum development from a systematic perspective, using learning objectives and student data to regularly evaluate the effectiveness of my curriculum. Every lesson I develop incorporates a blend of presentation, participation, and feedback. Until students are active, they have not had a chance to learn. It might be on paper, it might be out loud, or it might be in a code

editor—the important thing is to externalize students' understanding and receive feedback. Collaborative and independent learning are both useful strategies for facilitating this interaction cycle at scale. Immediate feedback tools, many of which I have developed in my research, are also crucial for managing larger courses. These tools make it easier to support Mastery Learning and a culture where students feel comfortable trying and sometimes failing, as often as they need. In general, I make my classrooms' culture support many diverse learners, and motivate them to learn. Of course, there is no substitute for sitting down next to a student and socratically walking them through issues. I plan each classroom experience to maximize the time I spend interacting with students - not just speaking at them, but engaging one-on-one and in groups. I always attempt to leverage, manage, and train teaching assistants to multiply these effects. Ultimately, I try to create the best environment I can for learners, and find opportunities to inspire, develop, and nurture. By showing students how passionate I am about Computer Science, I hope that students will grow their own passion for computing.

Plans for Future Courses

The majority of my teaching experience so far has been developing and teaching introductory level courses, and particularly for non-computing majors. I am eager to teach similar courses in the future, to build on the expertise and material that I have developed. However, I am also interested in teaching advanced students within Computer Science, particularly in the areas of programming languages, web development, and data science.

My personal philosophy is that all computer scientists should experience multiple language paradigms, from functional to logic and beyond; to this end, I look forward to teaching Programming Languages. Students would have hands-on experience with a wide range of languages in the context of solving real-world projects, to better understand the tradeoffs of each paradigm. This course would also talk about topics in parsing, compilers, and program analysis.

In an increasingly web-focused world, computer scientists need practical experience designing software for web platforms, and I want to teach a project-focused web development course. This curriculum would cover enduring web principles, and not just the modern framework or standards of the day. My vision has students developing from the first lesson, and building on that experience to learn best principles of both code and user experience.

During my graduate studies, I became interested in the field of Data Science and how it informs our understanding of the world. Although I never had any formal education in the subject, I have developed a practical understanding to support my own research. My goal for a course on Data Science would be "full-stack", including the creation and preparation of data, experience with advanced computational techniques for processing data, the use of statistical analysis to distill evidence for a hypothesis from the data, and the communication of a story for stakeholders.