Teaching Statement

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When I was an undergraduate, several courses in the computer science (CS) curriculum had developed a reputation among my fellow students for being difficult. When the time arrived for me to take these courses, I was, initially, intimidated and worried about the challenging semester ahead. However, during these courses, I found that each class period drew my attention with increasing intensity. I later realized that this interest was nurtured by instructors that possessed interest in the material itself. Throughout my years as a student, I have taken note of a key ingredient in courses that I have learned the most from: the instructor possessing a contagious passion for the material.

These experiences in courses I had never expected to enjoy sparked my own interest in instructing. I realized that an energetic course, taught by someone interested in relaying difficult, but rewarding concepts, leads to an interactive classroom with students eager to absorb the material. I inquired about opportunities for teaching assistant (TA) positions at my undergraduate institution and was awarded appointments for Software Engineering 1 (FA 2013), Programming Languages (SP 2014), and tutoring positions for various courses. These appointments served to validate my idea that instructing was a career path that I wanted to pursue. Ultimately, I decided to attend graduate school, and obtain a PhD, to help educate and prepare the next generation of computer scientists for the professional world. During my time as a TA, I found that each class period drew my attention with increasing intensity. I later realized that this interest was nurtured by instructors that possessed interest in the material itself. Throughout my years as a student, I have taken note of a key ingredient in courses that I have learned the most from: the instructor possessing a contagious passion for the material.

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Teaching Strategy

My goal as an educator is to nurture a new generation of confident computer scientists, enthusiastic to continue learning and developing new technology to improve our society. I believe that students develop passion for a field and learn the most when they are engaged in the classroom. To engage students I follow a number of tenets that encourage a productive learning environment.

1. Making the material relatable is essential to building connections between what students know and what they are currently learning. I have found that students in my classroom relate to examples which reflect everyday problems. For example, when discussing graphs I utilize examples that are reliant on navigating the sidewalk systems around campus to travel between classes. I develop sets of “toy” examples to make the material approachable while including concrete examples to solidify student understanding.

2. Encouraging creative ideas is instrumental in developing critical thinking skills, especially in a field like CS where innovative ideas can lead to crucial developments. I foster creativity by encouraging questions and discussion in the classroom. Furthermore, I never claim that an approach or new idea is incorrect. I prefer to take time after class to understand the approach and then include a short discussion at the beginning of the following class period to discuss the feasibility of the idea.

3. Incorporating enthusiasm into my lectures is an approach that I have developed based on my own learning experiences with passionate instructors. Why should a student be expected to be excited about material if the instructor is not? As such, I always come into the classroom with a positive attitude and energy. This not only keeps students engaged, but makes the material more exciting.

4. Providing timely and meaningful feedback is vital to helping students learn from their mistakes. Since much of the material in the computer science curriculum is cumulative, learning from mistakes is critical to understanding new topics. Thus, to keep students engaged, I make sure that each mistake becomes a learning experience. To streamline the feedback process I have utilized the Gradescope platform in the classroom. Gradescope is becoming increasingly common on campuses and encourages the development of consistent feedback.

5. Inclusivity in the classroom is necessary to encourage diversity and unique approaches to problem solving. I believe that education is for everyone who seeks it and I will do everything within my power to provide accommodations for students in my classroom.

In the future, I plan to develop lesson plans which include more active learning to help maintain student attentiveness throughout my lectures. Furthermore, I am interested in developing exercises which encourage inductive learning to reinforce student confidence and help students relate information to knowledge they have already acquired.

I hold myself to high standards in the classroom because I expect the same of my students. I believe that these outlined approaches have led to the successes I experienced as an instructor for the Discrete Structures course at Montana State University (MSU). Furthermore, I am confident that by engaging students in the classroom with the aforementioned techniques I will cultivate a positive learning experience for the students while meeting my goals as an instructor.

https://www.gradescope.com/
Instructor - Discrete Structures (Spring 2019)

As primary instructor for Discrete Structures, my responsibilities included preparing lecture materials for a course which had 73 students enrolled at the end of the semester, assigning duties to a TA, grading homeworks, quizzes, and exams, holding office hours, navigating administrative problems that arise in the classroom, and entering final grades. My evaluations for the course showed an overall rating for "Excellent Teacher" of 4.8 on a 5 point scale. The student comments made it apparent that my goal to engage students was successful: “Your enthusiasm made it more fun to come to class”, “very engaging with his great attitude towards the subject matter”, “You could sense his enthusiasm about the subject and the success of his students”, and “You explained the course material so well and seemed excited and extremely well prepared every day”. Several students also commented on my ability to make the material relatable: “Sam is very helpful in breaking down highly technical concepts to understandable pieces”, “great examples and did an excellent job of describing how the materials and subjects we were learning fit into computer science”, and “took time to show how the material covered was applicable to real life and or computer science.”

Mentoring Experience

During my time as an undergraduate, I worked as a tutor for several introductory courses. I came to appreciate the feeling of helping somebody understand material and enjoyed being present for the “Aha” moment that arrives only after significant thought and hard work. These moments are ones that make us, as academics, put in long hours, dedicate our lives to complex problems, and work so hard to educate. I believe that as an educator, helping to facilitate an environment that leads to these “Aha” moments is crucial. I have several years of experience mentoring and assisting undergraduates in both coursework and research. For coursework, I have held office hours for many of the courses that I have assisted with, instructed, or tutored. During these office hours, I have spent substantial time working through problems with students to help them master the material.

Outside the classroom, I have worked on several research projects with undergraduate students. I worked closely with one undergraduate and several other graduate students on a research project we published, as a lab, in the Canadian Conference on Computational Geometry (CCCG 2018) [1]. I have continued to work on this project and, as recently as Summer 2019, oversaw an undergraduate working on an implementation of a related research problem, meeting weekly to troubleshoot problems and help develop manageable research tasks. Additionally, I have participated in the seminar series through the Computational Topology and Geometry (CompTaG) club for the last several years [2]. My role in the seminar has involved giving lectures on book chapters, recently published research papers, overseeing small groups presenting research papers, teaching fundamental concepts in topology and geometry, and critiquing presentations. At a new college, I would plan to start a seminar on algorithms related to computational topology and geometry where we would discuss fundamentals, recent research, and open problems.

Community Engagement and Outreach

My dedication to CS education is not limited to the classroom, I am very passionate about bringing CS to underserved communities. During my graduate studies, I participated in the Storytelling Project at MSU [3]. The Storytelling Project focuses on bringing CS education to Middle Schools in rural and American Indian communities in Montana using culturally appropriate stories in conjunction with the Alice programming environment [4]. I developed lesson plans, outreach modules, and participated in outreach events at MSU and rural schools throughout Montana. During these events, I refined my approaches to making complex concepts in CS accessible to groups of students with little to no prior experience, employed learner-centered teaching techniques, and developed my skills as a facilitator and instructor in an inductive learning environment. We are writing a paper based on our experiences with these outreach events [2].

During my time as a graduate student I developed an interest in student perceptions of plagiarism. I believe that many instances of academic misconduct arise from misconceptions about best practices for collaboration and citing work. We deployed a survey to gather information about student perspectives on what constitutes plagiarism in the CS classroom and we are writing up our results for publication [3]. As an instructor, I utilized the findings in this survey to develop a concise and understandable set of rules and scenarios in my syllabus to encourage collaboration and clarify my expectations for referencing external resources.

[1] https://www.cs.montana.edu/tda/
References

