Teaching Statement

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Teaching Approach

My teaching approach is shaped by my teaching, research, and industry experiences. My education philosophy focuses on empowering students to pursue computer science and technology careers by integrating active learning, providing real-world examples, and creating diverse and inclusive learning environments.

Active Learning: I plan to implement active learning activities into classes for students to better understand and practice course materials. Rather than teaching lectures just for students to take in information, I plan to make learning effective for students by emphasizing project-based learning in courses I teach with original, collaborative, and hands-on programming assignments and class activities. I also believe it's important to encourage students to participate in productive development practices that are often taught in computer science courses, including pair programming, requirements engineering, code reviews, and more.

Real-World Examples: I believe the best way to teach concepts and skills necessary to succeed for a computer science career is through experience. This includes creating and presenting lectures that include material based on real-world software engineering practices and research. I also envision tying in my own personal industry experiences at Bank of America, Blackbaud, and Red Hat into course lectures and materials. Furthermore, I believe it is important to include relevant research findings into computer science courses to increase awareness of important research concepts to students, and plan to integrate my own work on improving developer behavior and productivity into courses I teach. Lastly, I plan to provide realistic projects and assignments for students to practice skills necessary to develop and maintain production-quality software. For example, one way for students to gain real-world experiences in a course is to encourage contributions to open source projects for class assignments.

Diversity and Inclusion: I plan to create classroom environments that foster equal opportunities for everyone to learn and succeed no matter their experience or background. As the instructor for a course, I believe it is important to be an active listener and support the needs of students from various backgrounds in classroom and one-on-one settings. This includes making course materials accessible for all students, accommodating different learning styles in lectures, making course requirements and expectations clear, diversifying project groups, and providing interdisciplinary materials. Additionally, I would aim to provide multifaceted active learning opportunities for computer science majors and non-majors who may not want to pursue predominately coding careers, and ensuring all students have the opportunity to participate and succeed in class activities no matter their race, gender, age, sexual orientation, programming experience, etc.

Experience

Instructor of Record: I was the primary instructor for the introductory Java programming course, *Introduction to Computing: Java* (CSC116), at NC State for the 10-week Summer 2020 semester. As the instructor of record, I was responsible for preparing lecture materials, delivering lectures, holding office hours, assigning and grading projects, labs, and homework, managing teaching assistants and graders, and more. Due to COVID-19, the class was taught remotely over Zoom instead of in-person. To incorporate active learning and increase student engagement virtually, I instituted a flipped classroom by prerecording lectures for students to watch asynchronously then integrating programming lab activities based on the lecture content during the designated lecture time. This was a valuable opportunity to motivate my teaching approach and provide experience as an instructor to communicate Computer Science concepts to undergraduate students.

Teaching and Communication Certificate: I am currently enrolled in the North Carolina State University Graduate School Teaching and Communication Certificate program to gain additional experience and training for effective communication skills. The Teaching and Communication Certificate requires completing 100 hours of approved activities and creating a professional development portfolio. Through this program, I have taken useful courses to improve my teaching approach such as *Accessibility in the Classroom* and *Teaching about Identities, Diversity, and Equity* (ECI509), courses providing information and techniques to create accessible and inclusive content and materials for students.

Teaching Assistant: I was a Teaching Assistant (TA) for two undergraduate computer science courses as a Ph.D. student at NC State: *Software Engineering* (CSC326) in Fall 2015 and *Programming Concepts - Java* (CSC216) in Spring 2016. For CSC326, I was expected to teach two lab sections emphasizing concepts taught in lectures, act as the Scrum Master for teams during the final project, grade programming assignments and exams, attend lectures, answer student inquiries via email and Piazza, and hold office hours. For CSC216, I aided students during in-lecture activities, graded assignments and exams, and held office hours. These TA opportunities allowed me to gain experience interacting with students and performing instructional tasks such as grading and holding office hours.

Research: My research interests also motivate my teaching approach. As an undergraduate researcher, I studied integrating programming concepts into K-12 education. My graduate work also spans topics in Computer Science education. For an independent study project, I developed a grading algorithm that incorporates automated program repair concepts to improve student feedback and performance in introductory programming classes. Compared to a baseline approach, I found the algorithm increased student grades and only took slightly longer to run on a benchmark suite. For my dissertation work, I implemented `class-bot`, a system that automatically updates GitHub issues to notify students of their progress following software engineering processes. We found `class-bot` improved the productivity of students and quality of their code. Additionally, I am currently working on a bot to increase student engagement and encourage consistent contributions to team programming projects. These projects explore automating instructional activities and improving student programming behaviors to prepare them for real-world software engineering positions.

Tutoring and Service: I have also gained teaching experience through various one-on-one tutoring opportunities. In Summer 2019, I worked for The Coding School *codeConnects* program to increase participation of underrepresented groups in STEM. Through this mentorship and tutoring program, I spent 10 weeks teaching Python to a high school student online. Additionally, through the NC State Students and Technology in Academia, Research and Service (STARS) Computing Corps, I was a tutor for CSC116 students. I have also worked as a tutor for students in Java and C++. Additionally, I have participated in many service and outreach opportunities focused on teaching Computer Science. With the NC State Minority Engineering Graduate Student Association (MEGSA), I volunteered at an INTech Mini-Camp to teach HTML and website design to African American middle school girls. Additionally, I have volunteered at outreach events through STARS to help teach Scratch, a 2D block-based programming language, to underserved local middle school students. These tutoring experiences and volunteer opportunities strengthened my knowledge in these programming languages and helped me gain practice teaching concepts to students.

Example Courses

Based on my experiences and interests, I believe I am equipped to teach undergraduate or graduate level *software engineering* courses to help students gain the necessary skills to build and maintain software systems. I can also teach *introductory programming* classes to introduce basic coding concepts to students with little or no experience. I would be most effective teaching these courses in Python or Java, but would also be able to use other programming languages. Below is a sample list of additional courses I would be excited to teach based on my interests, experiences, and current topics within the field:

- ***DevOps:*** A graduate or advanced undergraduate level course that focuses on providing an overview of DevOps concepts. In the course, students would learn about development and operations industry practices and tools for continuous integration, deployment, project builds, and more. The course would involve learning about these processes as well as completing a final project to automate software development tasks.
- ***Open Source Software:*** Another software engineering undergraduate or graduate level course focusing on contributing to open source software (OSS). This class would go over topics such as the importance of OSS, licensing, open data, and civic tech. Students would be required to contribute to real-world open source repositories throughout the semester.
- ***Software Engineering Research Seminar:*** An undergraduate or graduate level course that explores current topics in software engineering and computer science research. This discussion-based course would involve students reading publications, learning research practices, and designing a study to complete for a publication-quality paper.

Overall, I believe I can excel as a computer science educator by helping undergraduate and graduate students gain real-world knowledge and skills through course lectures, assignments, and projects. With my teaching approach, prior experiences, and interests, I aim to create engaging and inclusive classroom environments with relevant materials for students to prepare them to succeed in the class and in their future careers as computer scientists.