Teaching Statement

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I believe that to have a strong and long-lasting impact on our society, the best way is to educate, since this can provide an exponential expansion of future engineers, scientists, teachers, etc., who will successfully accomplish what some today might consider impossible. Along with my desire to become a life long learner, I have discovered a passion to teach and mentor all those willing to listen.

I first officially started tutoring and mentoring students in 2012 while in my last year of undergraduate studies. It was while I was a tutor in the campus learning center that I received training on learning techniques, cross-cultural communications, critical thinking and became a certified tutor through the International Tutor Training Program of the College Reading and Learning Association. At this point I knew I had a strong passion for teaching, but was unsure at which level of education I wanted to teach, so I tested the waters of doing research while obtaining my master's degree. I found that I enjoyed both and decided the most suitable career path would be to obtain my Ph.D. and thereafter become a professor. With this in mind, I will now discuss in more detail my experiences and philosophies for teaching and mentoring, and efforts to build a stronger community. This is followed by my anticipated courses and goals based on my academic background.

Teaching Experience and Philosophy

Over the last 7 years, I have taken numerous roles in teaching ranging from co-instructor with my advisor's graduate and undergraduate courses, to being a teaching assistant and giving introduction to programming lectures. In addition, I also taught K–12 students through community outreach opportunities. My first experience in lecturing was for the *CSE231: Introduction to Programming I* course at Michigan State University during the 2016 Fall semester, which covered materials ranging from basic variable assignment up through object-oriented programming (OOP). I quickly learned that the students appreciated my enthusiastic teaching style and that a little bit of humor can keep the students engaged in even the most seemingly dry topics. Therefore, although provided lecture materials, I started making my own lecture slides and have since shared the ones I created with other TAs/lecturers of this course. For instance, I would insert a few slides of inspirational/motivational quotes into my lecture slides, so that whenever these slides would come up, I would take a moment to check for questions while making eye contact with the students (also giving them a moment to perhaps read the quote). Similarly, I would deliberately insert question slides into the lectures where I made it clear to the class early on that we would not move forward in the lecture until someone was willing to answer. From my experience, this strategy allowed for widespread participation from the students including even the students in the back of the class.

Based on the above experiences, which significantly improved my communication and leadership capabilities, and after having strengthened my knowledge in my own research domain, I felt both comfortable and capable to co-instruct the undergraduate *CSE482: Big Data Analysis* during Fall 2018 and 2019 semesters and graduate level *CSE881: Data Mining* course during the Spring 2018 semester with my advisor. On the student evaluations from CSE482 of Fall 2018 I received a 3.8 out of 4. The evaluations included anonymous comments such as, "Tyler is super helpful and great personality. He is always open to communicate and help, regardless of how busy or where in the world he may have been traveling."; I presented my research at international conferences during that semester, but yet still maintained communication and helped the students with their assignments/questions. The core to my teaching style is based upon (1) energy and motivation, (2) alternative explanations, and (3) collaborative learning.

Energy and Motivation. For someone to effectively learn I believe there needs to be energy and motivation. If a student is motivated and energized, they will actively engage in class discussions and diligently work to learn the materials. Throughout many years of being a student myself, I can attest to the fact that students will typically follow suit and rise to the instructor's energy level.

Alternative Explanations. Although I believe this technique is used more commonly in lower levels of education, unfortunately it seems to not be included enough in higher level education. When teaching, I make sure to explain concepts in relation with real-world examples and use analogies. For instance, in *CSE231: Introduction to Programming I* to teach encapsulation in OOP I demonstrated that when opening an app on their phones, they only need to touch the screen over the icon and all the internal details are hidden; and that they should take a similar ap-

proach when designing their class structures focusing on the way we interact with these objects at a higher level. By providing the students with multiple explanations, and especially on difficult topics, asking them to try rephrasing the concepts/intuitions (e.g., Neural Networks) can increase the probability that they themselves and others in the class can understand.

Collaborative Learning. While most of a student's education is spent working on assignments individually, I attempt to foster collaboration and better communication by encouraging some assignments/projects to be done in small groups. Furthermore, when placed in groups/pairs the students can work together in a feedback loop where those that understand something can explain to others, which results in not only everyone understanding, but the one who had explained likely also developed an even deeper understanding. I believe no matter the direction a student takes after graduation, these skills are essential and need to be developed through practice. For instance, in *CSE231: Introduction to Programming I* I had the students work in pairs for the course exercises and in the courses I've co-instructed the students have semester projects working in teams of 2-3 students. Lastly, I always use Piazza, as it not only allows for an efficient communication channel for the students to get help from TAs and the instructor, but also it promotes students to help answer questions. More specifically, I gave bonus points to the top contributors who made a significant effort towards answering their peers questions during the semester.

Mentoring Experience and Philosophy

According to Dr. Beronda Montgomery, "Advising consists of recommendations for anyone on a particular path of achievement", while "Mentoring is based on offering advice and recommendations based on a personal understanding of a specific individual, their experiences/capital and their path of achievement". Furthermore, through discussing with Dr. Montgomery, I've learned that mentoring is also not imprinting, which is essentially the process of training someone to follow in your footsteps.

My first mentoring experience was during my Master's when I mentored a high school student who was nominated as Google Science Fair Regional Finalist in 2014. While a Ph.D. student I've had the privilege of mentoring 4 Ph.D., 2 Master's, and 6 undergraduate students, which have led to co-authored publications and writing them letters of recommendations towards obtaining a fellowship or admittance to a master's program. I strive to be inclusive and mentor students from all backgrounds. For instance, 5 of the 12 students identify as from an underrepresented group in computing, mentored through an independent study in our department, Graduate Women in Science Mentor Program (GWIS), MSU Professorial Assistantship Program, and Summer Research Opportunities Program (SROP). My role has been in training these students in the fundamentals of research from helping to design a problem, implementing the ideas, performing an evaluating, and finally presenting the outcomes in posters and/or papers. However, for one student I focused on the development of their skills required to successfully obtain their position in industry.

In an effort to have an even larger impact, this year as an MSU Graduate Leadership Fellow, I am currently focused on creating an online system for students to search for available undergraduate research positions on campus. This is in an effort to improve the inclusion and diversity among those finding these critical experiences that can make all the difference of whether a student will decide to continue on to graduate school or not. Furthermore, over the last few years I have volunteered at both elementary and middle schools to give lessons on introductory computer science, provided feedback as a judge at poster sessions, led activities for K–12 students on campus, participated on a panel and also led small group discussions for underrepresented undergraduate students on what life is like as a graduate student. As a professor I will surely continue these efforts to support an inclusive and diverse lab while helping to strengthen the surrounding community.

Anticipated Courses

My academic background in computer science equips me to feel comfortable teaching the typical core computer science courses. Furthermore, my research background and having been a co-instructor of the graduate *CSE881: Data Mining* and undergraduate *CSE482: Big Data Analysis* course, allows me to be well-suited to continue teaching courses that I have already been a co-instructor of and also a variety of related courses including Data Science, Machine Learning, Artificial Intelligence, and Network Analysis. In anticipation of my new role as an Assistant Professor I am already developing an Introduction to Network Analysis course. I am especially excited to develop courses specific to my unique interdisciplinary research experiences such as Computational Social Science, and also advanced special topic courses such as Advanced Topics in Graph Mining.