Teaching Statement

Mary McGlohon
Carnegie Mellon University
mmcgloho@cs.cmu.edu

I believe that teaching is a critical component of a scientific career. Not only does teaching further scientific knowledge within the community, but the activity allows the teacher to gain new perspectives on the content and problem solving. I have had the opportunity of a wide range of teaching experiences, beginning when I was an undergraduate TA and tutor. More recently I have served as a TA for an undergraduate Introduction to AI course and for a Master's-level Machine Learning class, where I was responsible for designing homeworks and exams as well as giving recitations and holding office hours. I have gained other experience by helping junior students in my lab and presenting several tutorials and invited talks. I am completing the Documentation of Teaching Development Program with the Eberly Center for Teaching Excellence at CMU, which has broadened my knowledge base and made me a more effective teacher. These experiences have helped me develop a philosophy both toward classroom teaching and individual instruction for graduate and undergraduate advising.

Classroom teaching: While a teacher serves a critical role in students' learning, in a semester-long class there are only 50 hours of classroom face-time where he or she can have a direct impact on students' learning. It is important to design a course to reach beyond the classroom. It is my goal not only to teach core principles that students may apply later, but also to inspire confident learners, for helping students gain the ability to learn for themselves is the one of the few ways I can influence what happens after they leave the final exam room.

This dual-purpose of teaching principles and training confident learners forms the basis of how I intend to conduct a class, which is something I have been able to practice as a teaching assistant in recitations and guest lectures. Students internalize learning more effectively when they have some understanding of what route a course will take inside the classroom and can form connections between the class content and what they already know. Therefore, I would strive to present a well-organized curriculum with clear connections to real-world problems and to design assessments that are aligned with course objectives.

As a means for creating confident learners, I encourage participation in course lectures. Participating in a lecture may be daunting for students, so I capitalize on questions students do ask, since it often seems that students are most comfortable offering input when another student has already begun. For example, once in a recitation on the topic of reinforcement learning, a student asked if Q-learning could be used for spam detection in email. I felt that was an opportunity to stretch the concepts further, so I asked the class how we might go about setting up such a system. With some input from various students, we built a framework on the board. I was surprised at how willing other students were to interact when one student initiated discussion with an interesting and relevant example. Discussions

do not always "flow" so easily, but in lectures I strive to create an environment that can facilitate such interactions, including taking into account different cultural and academic backgrounds students may have.

I have the most experience instructing in machine learning or AI electives, and I believe that as more industries depend on large data stores in their operations, knowledge of machine learning methods is critical to computer science graduates. Courses like these provide an excellent opportunity for students to gain hands-on experience in real-world problems– in course projects I have had students undertake problems using real data from finance, text corpora, and local water systems. However, I also find that teaching material from outside my immediate field helps me gain an exciting, fresh perspective on both old and new problems. Based on my background, I feel qualified to teach any lower-level computer science or programming courses. Through my research and graduate studies I have also gained knowledge of algorithms, numerical methods, and scientific/statistical computing, so would enjoy teaching electives and graduate seminars in these subjects.

Individual instruction: My teaching role extends to one-on-one instruction as well as classroom time. I have been able to practice this to some degree by advising course projects as a TA. I approach individual advising as I do course instruction: I seek to inspire confident learners while teaching core principles. Undergraduates and early graduate students are still building basic skills as researchers, and can benefit from a more structured research environment. For course projects, I try to start these students on problems with clear goals– sometimes students have extremely ambitious goals, and it is the task of the advisor to help simplify the project to something that can be done in a reasonable amount of time while still maintaining the student's interest. At the beginning of a project we also agree on a proposed timeline for completion–research does not always run on our schedule, but the proposed end date allows a time for re-evaluation. I would follow a similar model to course project advising for undergraduate research. In the case of graduate students, I would also begin with a more "hands-on" approach, but as students mature as researchers, I would seek more input from them on what direction their projects should take, so that when it is time for them to complete a dissertation they may do that with minimal guidance.

A difference between course instruction and advising is that one-on-one situations allow more flexibility. Students with different personalities may respond to different instructional styles. The goal of a graduate program is to produce new researchers, not to produce copies of existing faculty; therefore, it is my responsibility to adapt my advising style to each student as much as possible while still challenging them. In the position of an advisor, I would strive to be liberal with positive feedback and allow students to set their own research direction and deadlines. However, if a student is flailing or would prefer a more direct approach, I would try to accommodate by providing more steering in meetings.

While I find being a "scientific evangelist" and increasing human capital to be internally rewarding, I also derive personal benefit from teaching. Interacting with new learners allows me to see problems from a different angle, and this interaction can inspire new ideas. Therefore, I consider teaching both a central part of my mission as a researcher and a member of the scientific community, and an activity from which I have as much to gain as my students.