Teaching Statement
Edward Talmage

Philosophy
Teaching is tricky. The goal is not just to present the material, but to actually accomplish its absorption in such a way that students can remember the material, use it to solve future problems, and perhaps even extend their knowledge independently. This is necessarily a shared endeavor between students and teachers, so the responsibility for successful teaching lies on both. But a teacher cannot solely rely on students’ efforts. If we could rely wholly on students, then we wouldn’t need teachers. But at the same time, teachers cannot force unwilling students to learn. Instead, we work to entice their interest, showing the possibilities that are achievable with the knowledge we present, all while challenging them to push themselves to learn.

Balancing the presentation of material with support and encouragement is the heart of teaching. We must challenge students, without overwhelming, and support them, without coddling. If we can continually encourage them to push themselves harder and harder, then they can learn effectively.

I believe that specific teaching methods serve to achieve and maintain the balance of material presentation, encouragement of student engagement, and understanding reinforcement. Flipping a classroom for students to work semi-independently is excellent for the latter two of these goals, but sets presentation aside. Interactive presentations of algorithms or other complex topics that students may need to grasp, handle, and play with to understand is better suited for introducing new topics. Traditional lectures can serve any of the three purposes, but only as they are carefully prepared for that end. I believe in flexibility of method, to accommodate changing material and different levels of student background, understanding, and interest. I like to maintain a classroom atmosphere in which students are comfortable asking for clarification or reinforcement, where learning is a group effort, not entirely the teacher’s responsibility. This flexibility and joined effort to a common goal are, I believe, essential elements of balancing the requirements for teaching.

Mentoring
I consider mentoring, in the sense of working one-on-one with a student to help them develop their skills and knowledge, the ideal form of a student-teacher relationship. As such, it carries all the challenges of classroom teaching, but in a distilled form. For example, because there is only one student, presentations of new information should be more finely tuned to their current level of understanding. This requires more effort from the mentor, to track the student’s progress precisely and understand their thought processes to be able to present new material with a structure and timing that maximizes the student’s ability to absorb it.

Particularly in a research context, though, the mentor’s role is not primarily to teach the student a set of facts. Instead, the goal is to develop less precisely-defined abilities, such as asking the right questions and creative problem solving. This kind of learning requires more independent effort from the student, and a careful mixture of encouragement, setting challenges, and working side-by-side to teach by example. I expect this to be a greater challenge than classroom teaching, but from my experience with mentoring summer undergraduate research students, I also expect it to be one of my most productive and fulfilling activities as a faculty member.

Experience
I first struggled with the balance of teaching new material and encouraging students when, as an undergraduate, I tutored students in an introductory programming course. My experience there was largely about encouraging students without a strong computing background to stay focused and committed to the course, though it felt foreign and difficult to them. After that, my next significant experience was a teaching assistant running labs for 5-week summer computer science courses. Here, some students struggled with
motivation from a lack of confidence, and some from an excess of hubris. Others were self-motivated, and just needed me to provide as much material as possible for them to absorb. That experience was a good introduction, but lacked the responsibility and motivation for the teacher that comes with being primary instructor.

I have since had the opportunity to be the primary instructor for a junior- and senior-level algorithms course as a Graduate Teaching Fellow in the Texas A&M University College of Engineering. In that case, the only teaching assistant was shared with two other sections, so not only was I primarily responsible for teaching the students, I was nearly the only resource for my 50-odd students. This both allowed and required me to try to work directly with each student and find their needed balance of encouragement, new and interesting material, and repetition to cement concepts. That was challenging, and occasionally a little exhausting, but I enjoyed being able to dive into the material with my students. I think I was able to encourage some students to stay committed when they otherwise would have given up, to convey information that students understood and appreciated, and to spark an enthusiasm for the subject in at least one previously indifferent student. I have a lot to learn still, but I’m eager for the chance to continue teaching. I first have that opportunity this fall, teaching a course on Discrete Mathematics for computing, again through the Graduate Teaching Fellows program.

I have also had the privilege during my Ph.D. of helping to mentor two undergraduate summer research students. These students had no background in distributed computing, but within a summer were each able to produce new research that could be incorporated in publications. It was energizing, though at times exhausting, to try to keep up with the students’ energy and excitement. It is very encouraging to see students excited to learn, and the new perspectives on familiar problems led to significant new progress. I am excited at the opportunity as a professor to mentor more students, helping teach them to conduct research and learning from their perspectives and ideas.

**Interests**

My teaching interests are primarily in algorithms and theoretical areas. I have enjoyed teaching an undergraduate algorithms class, and am excited to teach that subject again. Other courses focusing on the theory of computation, mathematical tools for computing, and further study of algorithms are also appealing to me. I’m interested in teaching introductory courses, both theoretical and programming-focused, as they are a perfect opportunity to instill and foster excitement about computing in students. I believe that a strong foundation is vital for every computer science student, and am looking forward to being involved in laying that foundation.

For more advanced students, I expect to teach specific topics related to my research in distributed computing. As our computers become more connected, it is important that computer scientists appreciate the connected nature of the world in which they will work, and the possibilities and constraints inherent to it. There are both theoretical aspects, such as the difficulties of coordination, and practical aspects, for example learning to think through the possible behaviors of concurrent code execution, that lend themselves well to a classroom learning setting. I am interested in teaching such a course, to share my knowledge and perspective to further students’ readiness for modern computing in either the workforce or academia.

Beyond the classroom, I am excited for the opportunity to engage students, undergraduate and graduate, in research. I believe that the challenges of research are an excellent preparation for computer scientists, giving skills that will be valuable in any field. I look forward to developing a research program in which students of all levels can work both together and independently, learning to think critically, mentor each other, and contribute meaningfully to a highly relevant field of computer science.