JON FROEHLICH | TEACHING STATEMENT

Ask a roomful of successful people how they got to where they are and you will likely hear a wide range of responses involving "creativity", "intelligence" and "hard work". Ask *who* helped them get to where they are and the responses will likely include two sources: family and teachers. Teachers enjoy a special position in life; they have the ability to profoundly influence the thoughts and future directions of generations. **I look forward to a career intermixing research, teaching, and inspiring new generations of students to innovate and create technologies to positively impact the world**.

TEACHING PHILOSOPHY

From my experiences as a student and as a teacher, I draw five core pedagogical beliefs—all of which are relevant for classroom teaching and advising: *passion is contagious*, *doing is learning*, *creative environments foster creativity, communication is critical*, and, perhaps most paradoxical, *teach for good questions, not just for good answers.*

Passion is contagious. I am an extremely passionate and energetic person. I have seen how skilled educators can use their own passion for a subject to engender the same level of passion in their students. Passion is not a panacea; but at the very least, it demands attention and at best, it can serve as inspiration.

Doing is learning. Computer science is fun—it involves skills and thinking strategies to overcome challenging problems. To me, computer science is like playing with LEGOS—an activity that I spent countless hours doing as a child. Like LEGOS, computer science is about building things from smaller pieces and fitting them together in a systematic fashion; however, one does not learn how to build fantastic structures by watching a lecture or reading a manual, one learns by doing. In my courses, I will strive to create plentiful opportunities for hands-on learning through projects and laboratory assignments.

Creative environments foster creativity. Creating an environment where students feel open and confident to share and communicate ideas is paramount to learning and research. The ideation process can be a sensitive one; students should feel secure in offering their ideas. My role as a teacher is to help students come up with lots of ideas and then help refine and organize those ideas into possible pursuits.

Communication is critical. Being an effective communicator is central to any career: industry or academic. As an advisor, I think it is important to teach my advisees how to write scientific papers and how to successfully structure and give talks. Similarly, as an instructor, I will emphasize the importance of writing and speaking about technical concepts through writing assignments and oral presentations. In terms of communicating directly with students in advising and one-on-one situations, I believe constructive yet candid communication works best.

Teach for good questions, not just for good answers. This is, perhaps, my favorite pedagogical belief. I learned it from one of my mentors, Professor Jacob Wobbrock, and have found it to be invaluable. In science, it is important to know how to seek and find answers. It is, however, similarly important to know how to ask good questions. I want to engender a spirit of constant inquiry. Persistently asking questions like *why? what if? how?* forces one to think differently and find better answers.

TEACHING EXPERIENCE

My formal teaching career began my senior year at Iowa State University as a teaching assistant in the embedded systems course Computer Engineering 211 (CprE 211). During this time, I was fortunate to be involved in a complete redesign of the class curriculum. The department wanted CprE211 to use newer hardware and software programming tools that were more reflective of industry standards. During the first semester teaching with the new curriculum, we conducted several surveys to obtain student feedback. We found that student learning improved both in terms of depth and breadth. The detailed results from the course redesign were published at the 32nd ASEE/IEEE Frontiers in Education Conference in a paper entitled *Enhancing Student Learning in an Introductory Embedded Systems Laboratory*. From this process, my interest in hands-on-learning was reinforced and I learned the importance of creating laboratory assignments that both challenged students and reflected real-world scenarios. I also learned the importance of establishing specific learning goals in a teaching curriculum and measuring the progress of students to evaluate whether those goals are being met.

At the University of Washington, I have been a teaching assistant on three occasions, twice for the embedded systems undergraduate course (*Intro to Digital Design*) and once for the advanced human-computer interaction course (*User Interface Design,*

Prototyping, and Evaluation Part II). My teaching responsibilities for the digital design course were similar to those at Iowa State; namely, give a brief lecture at the beginning of each two-hour laboratory and answer student questions on lab and course assignments. The HCI course had never been taught before. As such, Professor James Landay and I worked together on creating assignments and projects for the students. The course focused on teaching human-centered design. Throughout the term, students worked in diverse teams composed of at least one designer and one engineer and produced a series of milestones that culminated with final project presentations to invited guests at a project fair. The course was structured with weekly design critiques and bi-weekly presentations that required full class involvement. Here, students filled out feedback forms on the designs and presentations of other students—at a minimum, this forced the students to pay attention but, more optimistically, this allowed the students to learn from the mistakes and successes of their peers and to think critically about what comprises a good design. In this way, the most effective teaching during this course did not come from Professor Landay or me but rather from the students themselves. I plan to use a similar teaching paradigm when appropriate in my own classes.

In terms of advising, some of my most rewarding and gratifying experiences in graduate school have occurred during my interactions and mentorship with undergraduate and junior graduate students. I feel strongly that my role as an advisor is not just as a teacher but as a collaborator. My co-mentorship with Scott Saponas of undergraduate student Alireza Garakani led to a *Best Senior Thesis Award*. Other undergraduates I have mentored have gone on to successful HCI graduate careers, such as Sunil Garg, now at Georgia Tech. These successes stem largely from the undergraduate's own dedication and enthusiasm for research; it was my role to simply direct this enthusiasm towards solving a specific research problem. One undergraduate student, in particular, illustrates the fulfillment and excitement of mentorship. I met Tim Campbell in a course on *Water and the Environment* a few years ago; he approached me after hearing me speak about my water sensing work (HydroSense). Since that day Tim has worked with me on HydroSense and related projects resulting in four co-authored publications, of which Tim was first author on one (*WATTr: A Method for Self-Powered Wireless Sensing of Water Activity in the Home* at UbiComp 2010). Through these experiences, I have found that there is often a delicate balance between guiding a student towards a solution and allowing them to discover one on their own. I have also found that finding a project that is actually inherently interesting to a student is one central key to a project's success.

FUTURE TEACHING PLANS

I am confident that my background and educational experiences have prepared me for teaching a variety of undergraduate and graduate courses. I would be confident in teaching courses in Human-Computer Interaction, Ubiquitous Computing, Software Engineering, Introductory Digital Design, Introductory Programming, and Mobile Phone Programming. I would also be interested in developing senior level undergraduate or graduate courses in Information Visualization and "Computing for Good." This latter course would involve a curriculum centered on topics involving health and environmental sustainability, two research areas that I have focused on in graduate school. My ultimate goal is to not just teach fundamental concepts of computer science and human-computer interaction, but to teach how those concepts can be applied to positively impact the world.