Teaching, Advising and Service

My interest in teaching stems from my own curiosity about the world around me. In my desire to better understand the outside world, I have always been eager to learn more. As a teacher, my role is to elicit a similar enthusiasm toward learning among my students and help them understand that knowledge can provide them with powerful tools to solve complex problems.

To this end, my teaching philosophy is grounded in providing a sound theoretical basis supported with concrete examples. These examples are aimed at bringing theories to life by showing how they can be used to understand and analyze real-life problems. Examples are also important to illustrate practical limitations of theories. Going beyond the classroom, I see the design tradition of "Learning by Doing" as a key part of a human computer interaction (HCI) curriculum. It lets students acquire the basic skills to rapidly prototype, implement, and evaluate their work. In that context, I see myself as an amplifier of student inspirations, an idea which is best illustrated by this quote from one of my class evaluations:

> *"The biggest thing I learned in this class [is] that the key to success was just to quit whining and do it, and the lab materials available to us allowed us to do that. There was nothing impeding my success in the course except myself."*

COURSE DEVELOPMENT

The design process

To familiarize students with iterative design techniques, I developed an **Introduction to HCI** course around the conceptualization of the design process used by IDEO, a leading industrial design firm. Their seven steps approach (Accept, Analyze, Define, Ideate, Select, Implement, Evaluate) provides a natural framework to introduce key elements of the HCI curriculum including: capturing user requirements, brainstorming possible solutions, selecting the best solutions (based on a scientific understanding of human behavior), quickly creating a prototype, and, finally, conducting a sound evaluation. To re-enforce the intrinsically iterative nature of the design process, the main class project is designed to cycle at least twice through the 7 steps. This is admittedly a very demanding course, yet it provides a solid foundation on which students can draw as they approach real-life problems. This point is illustrated by the unsolicited feedback I received from this former student six months after taking the class:

> *"It's funny, I definitely felt like a lot of the work I did in your class with respect to the hard homework assignments and the KLM diagrams would not be much use. I was very wrong, even though I am not making KLM diagrams and long design descriptions, the stuff that I learned from those assignments ha[s] definitely helped a lot with the things I am doing on my job. Thanks for a great class."*

I have also developed a **Design Studio** version of the class, structured as a classical studio class meeting two full afternoons a week. This class was introduced in 2012, and was a very rewarding experience for both the students and myself. Since then, it was consistently requested by students, and I am very pleased to be able to teach it again in Spring 2017.

Physical computing

With the rise of ubiquitous computing, the focus of HCI is moving from desktop applications to a wide variety of devices. As a result, the ability to build hardware prototypes has gained in importance. At the same time, rapid prototyping tools such laser cutters, 3D printers, and the Arduino hardware platforms have made it possible, even for non-technical students, to build their own prototypes. With this in mind, I developed a class on **Physical Computing** (INFO 4320) to introduce students from a wide variety of non-technical backgrounds to rapid prototyping techniques. Each student is provided with a Physical Computing kit including an Arduino compatible board as well as everything needed to learn how to use

sensors, displays, and actuators. Through hands-on experiences during class periods, students acquire basic skills and learn to build a range of typical circuits.

Along with basic skill acquisition, students are involved in a semester-long group assignment in which they develop a complex project from start to finish. Students are encouraged to quickly arrive at a working prototype at which point they can fine-tune their project through testing. Past projects included: a gesture controlled remote-control car, several musical instruments, numerous cooking machines, a robotic table sweeper, and an ambient display for monitoring household energy use. At the end of the semester, the projects are presented at the ScienCenter, the local science museum, thus fostering public engagement in the design process. Several groups from INFO 4320 also presented their projects at Cornell's *Bits On Our Minds*, an undergraduate research showcase, with one group being awarded a price for their work. In combination, these teaching strategies have been very successful in increasing technical skills and confidence among non-technical students. This is illustrated by this unsolicited feedback from one of the students:

> *"I just wanted to tell you how much I enjoyed your class this past semester. While challenging at times, I really was proud of our project at the end. I felt like I really learned and accomplished a lot over the course of a few months. The class taught me things that I have not learned before in any other Information Science class. I was also really impressed with your willingness to help us and unending patience. I wish all professors could be as dedicated as you! Thanks again for everything. I really am very glad I ended up taking your course as I feel that my overall undergraduate education is more complete now."*

ADVISING

Advising students is a key aspect of professorial life. Both at the graduate and undergraduate level, my focus is on providing a safe scaffolding in which students can learn by doing, challenge themselves to reach their full potential, and understand the consequences of their decisions, yet avoid costly mistakes.

Graduate level

At the graduate level, I strongly believe in the need for students to find their own voice as a researcher and encourage them to quickly establish a research project they can call their own. In addition to providing conceptual guidance, I make sure to be readily available and to provide timely feedback to limit interruptions to students' work flow.

In the past, this framework has been very successful. My graduate students mostly publish at leading ACM conferences—some as early as their first year of graduate school. I believe that this early exposure to the highest standards is key to a successful career as a researcher (as exemplified by former students such as Chunyuan Liao who joined the research lab at FXPal or Nick Chen who is now at Microsoft Research UK).

Undergraduate level

I am a strong supporter of undergraduate research involvement (e.g. via the NSF REU program) and I have supervised numerous successful research projects and honors theses. Kevin Conroy, for example, was awarded the J.R. Dorfman Prize for Undergraduate Research at UMD for his work on paper augmented digital documents, and Morgan Dixon presented his work on ExperiScope at CHI'07 before being admitted at the University of Washington and being hired at Adobe.

I also take my role as an academic advisor very seriously. I do my best to quickly respond to my advisees' problems and help students plan a curriculum that allows them to challenge themselves and aspire to reach their dreams. This is best illustrated by this unsolicited feedback:

> *"I just wanted to thank you for all you've done for me as an advisor (and a teacher). I have so many friends who have complained about their advisor—how they never helped them with classes, never helped them with post-graduation plans, never have even talked to them—and each time I think of how lucky I am to have had you as my advisor. Without*

your urging I highly doubt I would have made the effort I did in pursuing a design career…"

SERVICE

Beyond serving at on a variety of internal committees, I have greatly enjoyed my tenure as the Director of Graduate Studies at Cornell (2009 – 2012). Our department was a nascent program at the time, and I enjoyed being given the opportunity to develop new standards for a multi-disciplinary curriculum. During my tenure, we redesigned the requirement structure to better serve our students. Following student feedback, it became obvious that the present requirements were too broad and slowed students' research involvement. In response, we developed a new system focusing on a set of core classes designed to establish a common Lingua Franca while offering the basis for further specialization under the supervision of each student's committee. The new system also establishes a framework to engage students in research projects as soon as they arrive at Cornell. During my current tenure as the Director of Undergraduate Studies, I hope to bring similar improvements to the undergraduate curriculum.

Within the broader scientific community, I have been a regular reviewer for UIST and CHI (as well as other venues) and served on multiple program committees for both of these conferences. I particularly enjoyed serving as the chair of the UIST'09 program committee, which gave me the chance to introduce the anonymous review process to this conference. In Fall 2013, I joined the editorial board of ACM Transactions of Computer-Human Interaction, the leading journal in my field.