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Teaching Philosophy

Since my recent experiences with teaching have revolved around design courses or courses that focus more on the application of computing concepts and skills, this portion / version of my teaching philosophy is most related to these sorts of classes.

My teaching philosophy revolves around the idea that an important part of learning is developing agency through making personal connections at multiple levels such as with the tools, materials, and concepts themselves as well as how to apply these in systems and in the world. Digital technology has reached an unprecedented level of ubiquity and influence on our lives. The underlying value system that governs the creation of these devices revolves around speed, utility, and immersion. While there are often elective-style classes that touch on these topics such as a Tech Ethics or specialized Design Studio, my approach is to also integrate these ideas and this type of thinking more often in other courses.

For example, AI systems are often trained on datasets from the real world. When humans in the real world make decisions, there are many hidden biases such as gender and race that influence their decisions. Building an AI on that data only reinforces those problematic power structures. Or in the field of HCI, questions about the ethics of various interaction techniques are coming into focus as digital technology reaches an unprecedented level of influence on our well-being. For example, the infinite scroll technique, a seemingly elegant and benign alternative to making the user click a button to go to the next page, has recently been discussed as a dangerous and unsettling since it doesn't give a natural stopping point for users to decide if they are finished. As students develop the technical skills for how to implement these things, they should also develop the skills to consider how these technical skills might be applied and the implications of technical decisions.

Concepts and ideas should not be presented to students as benign; rather they should be brought into focus along with room for discussion about what they mean. This not only embeds discussion of ethics into the entire learning experience, but it also gives students the opportunity to develop literacy and voice, and thus agency over the seemingly small aspects or decisions they make in computing.

We have known for a while now that learning happens best when students are actively doing rather than passively listening. This concept has been translated into classroom techniques such as flipped classroom, project-based learning, and lightweight teams for in-class group activities. I facilitate class time drawing upon these strategies as much as

possible. This gives students the opportunity to work through problems in a safe environment, learn soft skills such as working with others, and allows me to understand what the students are thinking to adjust or provide different scaffolding. I draw upon an inquiry-based learning method during flipped classroom sessions, where I ask students questions about what they are thinking and their rationale behind it. In design classes especially, students often do not think through all the possibilities and it is only through dialogue-based facilitation that I can provide feedback on their ideas in an effective way.

Each student is different, as is each population of students. Drawing from sensitivities I have developed as an HCI researcher, I anticipate that I will always be adapting teaching methods to meet the students' personalities and provide the appropriate level of scaffolding to the students I am working with. For example, in some classes I have found that students need some guidance for how to best work in a group and need scaffolding at the beginning for how to structure their in-group communication.

Overall, I hope that through giving students the opportunity for personal and unique reflection on what they are doing I can contribute to fostering a body of computing students who are thoughtful, deliberate, and mindful about the technology they are putting into the world by helping them realize that they have agency over the tools they are learning and ideas that are worthwhile.

Teaching Experience

Fall 2019 - Guest Lecture in Rapid Prototyping and Design Patterns Class

Course Overview

The Rapid Prototyping Course is part of a suite of classes that focus on various aspects of HCI. These classes include HCI, which involves learning how to conduct a user-centered design process and what aspects of human cognition and capabilities we should be sure to consider as we design interfaces. The Interactive Systems Design and Implementation class picks up where the HCI class leaves off and focuses on web APIs and the actual building of the website. The Interaction Design Studio is a project-based course that incorporates a real world design prompt and real implementation. The rapid prototyping course re-iterates many of the design principles from the HCI course and focuses on techniques for prototyping, teaching students how to rapidly apply them towards prototypes of varying levels of fidelity using different software and approaches.

Lecture Overview

I was invited to teach the module on Physical Prototyping to the undergrad and graduate sections of the Rapid Prototyping course. Dr. Wilson wanted the unit to incorporate digital fabrication tools such as 3D printers, though some challenges of incorporating these tools in a short module of a course is that they require skill to operate and utilize, they are slow to utilize within a class period, and we only have a limited number of them on campus for a large class of students to use outside of class. Nevertheless, there is great benefit to giving students exposure to these tools and it is worthwhile to overcome these challenges.

The module I created centered around a group activity of creating and evaluating a prototype of a tangible interactive system for learning a concept or idea of the group's choosing. The module was divided into three segments: introduction, design activity, and evaluation.

Introduction to Physical Prototyping (1 hr 15 min)

I began the class with a rapid prototyping activity: use the cardboard, legos, tape etc. on the tables to prototype a possible technology from the year 2070. Students had 10 minutes and then discussed their prototypes in groups. The goals of this activity were to 1) spark creativity and get students away from thinking just about websites 2) give students a sense of agency over the materials and the type of prototyping we would be doing that day and 3) reflect on some of the benefits and reasons why we prototype.

I then led an interactive lecture to introduce physical prototyping. I broke the concepts into two categories: physical computing, and techniques for prototyping physical technologies. Since most of the class is website and mobile app based, students needed an introduction to types of computing that had form factors beyond screens, mice, and keyboards, which is why I needed to introduce the students to fields of research and development such as Tangible Interaction, Embodied Interaction, Internet of Things, and Ubiquitous Computing. I introduced these concepts through a sketching activity that we did as a group and through reflecting on our sketches together.

Introduction to techniques for physical prototyping was lecture-based. I talked through some examples of low-fidelity prototypes made from cardboard or clay and an overview of digital fabrication technologies. I felt as though I was losing the students' attention at that point and that it was a whirlwind introduction to a lot of different ideas. In the future I might figure a different way to convey that information.

Prototyping Activity (1 hr 15 min)

The prompt for the activity was to work in groups of 5 to create a prototype of an interactive system for learning. Their prototype did not need to be fully interactive, but it needed to be a prototype of a system that would eventually have an interactive element. They needed to use at least one of the following 5 physical prototyping techniques / machines:

- 3D printer
- Cameo paper cutter
- Sewing machine
- Makey Makey
- Manual 3D printing pen

Evaluation (1 hr 15 min)

The evaluation component involved students designing a user study that would test the extent to which the system helps the user learn what it is supposed to. Students had to first make a plan that involved pre-questions, post-questions, and a description of the task. They then conducted the evaluation with students from other teams.

Reflections

In the graduate class, students had solid ideas almost immediately and got to work prototyping. Many were using the makey makey devices and making prototypes that were actually interactive. The second most popular technology was the cameo cutters and a few were using the 3D printing pens. In the undergraduate class, some groups had a more difficult time coming up with an idea. Some of the ideas were not interactive or did not represent any novel differences from existing systems. The undergraduates were primarily using the 3D printing pens and the makey makeys. One group had a student who has prior 3D printing experience, so they 3D printed a piece for their design.

We decided to give the undergraduates another whole class period (1 hr 15 min) to finish or iterate on their prototypes. If I ran this again, I would give more time for the prototyping and scaffold the design prompt. Perhaps the students needed more examples of tangible systems for learning or could have been led towards a feasible idea with sub-prompts such as “pick an abstract concept that is difficult to learn”.

Summer II 2019 - Instructor of Record for Human-Centered Design

Overview

As the instructor of record, I was responsible for creating the canvas page, setting the assignments, leading class, and communicating with the TA. The HCD class is taught

regularly, so I had a few different versions of the curriculum to work with. I based it mainly off of the same version that I was TA for in 2015 since it was most familiar to me. The course introduces a number of principles to keep in mind when designing interactive systems as well as the user-centered design process that keeps the user at the forefront at all stages of the design process.

The course was flipped classroom, where students watched video lectures to prepare, had a short quiz at the start of class on the video content, and then the rest of the class was dedicated to group activities. There was also a semester-long group project that involved designing a website or app using the user-centered design process from start to finish. Part of class time was dedicated to project work as well.

Reflections

A challenge for any summer class is that all the content is squished into a small segment of time. This made the group project challenging since students did not have much time to iterate. I found it difficult to get the students to buy in to the flipped classroom teaching method. I changed the policy to allow the quizzes to be open notebook, where students could look at their notes from the videos during the quiz.

The students responded well to feedback I gave in class. The class was small enough that I could visit each group multiple times. Often, the students did not think through their answers at first and would need prompting to go deeper. Their semester-long projects were alright. They would have had more time outside of class in a regular semester for iterations and development. Accompanying the project milestones were write-ups that justified and grounded the design decisions they made and documented their design process. I emphasized the write-ups and was explicit about what should be in there because I thought the opportunity to reflect would deepen their learning or at least make them more capable of articulating what the class is about. Part of design is the product, but another part is being aware of and intentional about all the decisions one makes along the way. Their writing improved over the semester as they became more aware of what I was looking for. I gave them the option on several assignments to revise their work before getting a final grade. There was room for improvement on many of the designs submitted at the end of the semester. If I taught this course again, I would have more milestones for feedback on the designs themselves.

Spring 2019 - ITIS 4011 / 6011 - Instructor for Interaction Design Studio

Overview

I was the instructor for the Design Studio course under the supervision of Dr. Mary Lou Maher. I created the theme of the course, the assignments, and led the classes with her guidance. The Interaction Design Studio is an upper level capstone course that centers around a semester-long project with a different design challenge each time it is taught. Past iterations have focused on designing interactive systems to prompt elderly people to be more physically active or design something relating to 3D printing prosthetic devices for children who have limb differences. When I taught it, the theme was design an interactive wearable garment to make people think about something. Students also displayed their pieces in Statement Making, a digital fabrication fashion show hosted by several fab labs on campus.

In the course, I created the activities around the idea of playing with things and playing with ideas. To learn the digital fabrication tools, students had tinkering assignments, which were open-ended explorations. We also did some design fiction exercises, which was how we played with ideas. We reflected on some of these assignments to come up with a definition of play and understand how play could be a useful technique in design. This is very different from the structured user-centered design process they are used to and we discussed how there was a time and a place for each. As the course went on, at various points I realized that students were getting onto a different track in their thinking, so I added some in-class activities to focus or collect their thinking to ensure the scope of the course wasn't too broad.

As a studio course, the students were expected to complete significant work outside of class and come to class ready for reflection and discussion. Much of the work was open-ended since each group had a different focus and different challenges. In class, sometimes there were structured activities to prompt a certain type of thinking, sometimes there was semi-structured discussion, and sometimes it was dedicated to students getting and giving feedback on their semester design projects.

Reflections

All groups successfully made something that they displayed as part of the fashion show at the end of the semester. The finished products in many cases were different from their original visions, but the design process certainly sparked interesting conversations amongst the students in class, which was one of the goals. Some of the students were

really engaged with the project and were clearly very driven to create something great. I tried to help groups structure their communication by helping them set up a document where they would keep track of who is doing what tasks by what time, but since I wasn't grading these documents, groups did not continue using them.

There were a lot of concepts packed into a semester long course, which may have been a lot. Students had to learn how to 3D print, laser cut, program electronics, think about computing and design in a different way, and apply all of this to a functioning piece of clothing that would be seen by many people. In the future, I might do a series of mini rapid garment design / prototypes throughout the semester to build confidence and help them understand how to scope things in a reasonable way.

I spent a lot of time one-on-one with the groups. The class-wide discussions were not always the most fruitful, particularly because I couldn't get a sense for what percent of students were on board or if it was just the few vocal ones who understood. In the one-on-one time, I could ask more specific questions about what each student was thinking and where they thought they were headed. The type of design we were doing was certainly less directly "useful" more typical HCI design, so I wonder if some personalities were turned off by that.

CTL workshops

Fall 2019 - Viewpoint Diversity Workshop

I attended the Viewpoint Diversity and Civil Discourse workshop by Kim Buch. I was drawn to this workshop in particular because of how polarized things are in the United States currently and our typical strategy is to avoid certain topics rather than learn how to have a healthy conversation.

The workshop introduced the idea of Viewpoint Diversity as a type of diversity to consider in the classroom in addition to racial, gender, and socioeconomic diversity which are discussed more frequently. We discussed what it is, what the challenges are including environmental and personal factors, some psychology that explains why it is so difficult to accept or even listen to viewpoints that differ from our own, and some strategies for how to deal with opposing viewpoints in the classroom. Discourse happens when both sides speak listen, and respond to what the other has said. An important part is to not shut down dissenting opinions, but rather to let both sides speak and manage escalation. I found the workshop insightful and it led me to a series of reflections on how it applies to

discussions we have about technology in the classroom, in particular the way I led discussions about technology in the Interaction Design Studio course that I taught in Spring 2019.

In general, we too often present and discuss technology as neutral, but there are so many biases inherent in it, it reinforces so many things that we don't think about, and every decision we make as we create new technology aligns with a value system that we never discuss. A number of people have called attention to the fact that tech ethics are not discussed enough; there is sometimes a tech ethics course tacked on or added as a module, but in reality, ethics should be part of every discussion in tech and an integral part of technology development. There are also still a lot of grey areas with tech ethics and many situations in which there is not one clear correct answer. If we consider viewpoint diversity relative to tech ethics, this means that tech ethics needs to not be communicated as a list of things to think about regarding each tech concept students are learning, but rather tech ethics needs to be integrated as a space for students to learn how to generate those lists on their own and figure out new questions to ask. The tech ethics of today likely won't be relevant or complete enough to deal with all the issues that we face tomorrow.

The Design Studio course was not dealing directly with tech ethics, though we were provoking some questions about ethical dilemmas of current and future technology. I'm thinking about how I could have fostered more civil discourse around the topics. Particularly relevant was the prompt I gave the students, which was to design technology to provoke thought or represent a critical perspective about our relationship with technology. Embedded in that prompt is the shadow of my own agenda for and my own viewpoint in regards to technology. I think I managed to give students with similar agendas to explore and express that through technology, but I'm not sure I provided room for students who didn't have that agenda to speak. I saw a range of levels of engagement in my class which was perhaps due to the prior viewpoints of the students- those with a certain viewpoint related to the design prompt and readily took ownership of the project, while the others were less engaged. The prompt hinted that students needed to do something contrary to the status quo. Should we have had more of a discussion about the status quo before doing something contrary to it? I know something we did not do enough of was interpreting other designs, perhaps this would have been relevant for viewpoint diversity as well. I wonder how I could shape the design studio where I teach students how to think about and develop opinions about current and future technology for themselves.