VINEET PANDEY

TEACHING STATEMENT

Integrating learning with social computing has given me a front-row seat to observe and improve how people learn and perform complex tasks. Building on learning science and my research, I plan to create student experiences that are both deeply rooted in conceptual understanding (learning) and rich in pragmatics (doing).

1 Complement conceptual knowledge with empirical investigations

Human-computer interaction students increasingly work on complex problems in interdisciplinary areas like healthcare and education. Challenges in these domains do not directly map to concepts taught in class. My research and teaching experiences show that students struggle to generate and implement ideas when faced with incomplete information in complex settings. Furthermore, focusing on finding one right solution reduces valuable exploration [2].

My teaching will seek to provide conceptual frameworks to help students get started and complement this with prototyping to rapidly unearth hidden variables and make progress. I will foster a culture of doing: making incremental changes, measuring outcomes, learning from the process, and iterating. For example, my introductory HCI class will assess students on process metrics (e.g. evolution of their idea based on empirical investigations) in addition to the quality of final artifacts. Asking great questions is both an important skill and a key predictor of learning and engagement. I will begin my lectures by presenting a real-world situation and then asking students to raise questions that the lecture will answer [4].

2 Personally meaningful goals provide purpose and context for learning

As a teaching assistant and a studio instructor, I have noticed a gap between what the learning materials seek to cover and what students want to learn. As a teacher, I will strive to enable students to solve real-world problems as designers of future social computing and HCI systems. Problems where the students already possess rich contextual insights provide a good starting point. My undergraduate HCI class will ask students to design and build systems that solve their problems or help someone they know: a family member or a friend. Leveraging personally meaningful contexts for teaching connects personal observations with existing knowledge [5,6], and improves empathy. I will use a guided discovery learning approach where expert-curated learning materials help participants start, with discovery following [3]. By enabling learners to draw on their context, interests, and motivation, I intend to teach people, not students.

Mentoring experience

Being a mentor helps shape people's experiences with respect to research, work, and learning [1]. In the past 4 years, I have mentored 13 students (including 4 women): 2 graduate, 10 undergraduate, and 1 high school. All my major projects in graduate school have been done in collaboration with them. Most students have worked with me to design, program, and learn how to present their research. For example, Chen helped me implement *Docent*; Aliyah prepared tutorials; and Dingmei and Liby designed *Galileo*'s review module. For all the students, this was their first HCI research experience. Most continued contributing to projects after the summer; one (Chen) has continued working with me for over 2 years. We have stayed in touch discussing design questions, and sharing career updates. Here are two lessons mentoring has taught me:

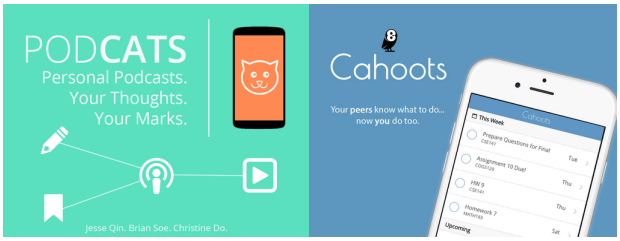

Figure 1 *Undergraduate students in my HCI studio created multiple functional apps by following human-centered design process. Steps included needfinding, making paper prototypes, running user studies, developing the app, running experiments, and sharing results.*

1 *Onboard and share best practices:* Students are motivated, but struggle to identify key tasks amid research ideas and complex software. Providing basic tasks and codifying basic practices helps students get started and develops confidence. Over 4 years, I created a step-by-step onboarding guide about

initial setup and implementation tasks for new students: from cloning the repo to reaching out to other members on slack. All students have described putting their technical skills to use at companies including Coursera, GoDaddy, TaskRabbit. Others are applying to graduate school.

2 *Provide a full-cycle research experience:* While students begin with pre-defined bite-sized tasks, they own their question/feature from week 2. Aside from helping students develop their technical skills, I care about their independent thinking and ability to communicate ideas. For example, my experiences have taught me that posters provide the right-sized artifact for students to communicate their research. A research paper is too open-ended and difficult, especially with students being busy through school year. Most students have presented their posters at departmental events, university wide research expo, and outreach around San Diego. 2 Early Research Scholar Program students (with little background in programming or HCI work) showcased their poster at the UCSD Research Expo to acclaim from Professor Christine Alvarado, organizer of the program: "From my perspective, this group is one of the stronger ones. Thanks for your strong mentoring!".

As an undergraduate student, I led the students' Computer Science Association to its best tally at the annual technical festival, organized research talks from alumni for 4 years, and mentored junior students. Explaining course concepts to juniors as a teaching assistant provided me with the skills to initiate the Systems Interest Group my senior year.

Example Courses & Seminars

For all these courses, I plan to build on existing excellent teaching material by HCI academics. I will add my lessons from doing research on these topics and building real-world systems.

Introduction to HCI/Design (undergraduate): A hands-on course that teaches the fundamentals of human-computer interaction and design. Includes needfinding, rapid prototyping, design, and user studies. I TAed the undergraduate HCI class at UC San Diego (Figure 1) (18/21 students recommend me) and the inaugural Introduction to Design class (overall effectiveness in helping students learn rating = 4.2 /5). As a design studio TA, I mentored 11 project teams by helping them ideate, simplify, implement, and solve collaboration issues.

Web Programming (undergraduate): How to build scalable web applications using different languages, architectures (client-server, event-driven, reactive), and databases. Deliverables include a summative assessment of concepts in the class and a working prototype. This class draws on my experience creating web applications.

Social Computing (undergraduate): Teaches key ideas, opportunities, and challenges in social computing. Key deliverables: design a novel social computing system; and analyze an existing social computing system.

Research Topics in HCI (graduate): Foundations of HCI and doing research. Tasks include reading seminal papers and a term-long project advancing current knowledge. Topics include user interfaces, social computing, technology and society. Deliverables include a complete tiny research project, a term paper, poster, and a final talk. As many graduate courses do, I will encourage students to build on their research projects, so their work adds to their dissertation. I TAed graduate HCI at UC San Diego (14/15 students recommend me).

Social Computing (graduate): Foundations of social computing and doing research. Tasks include reading seminal papers and a term-long project advancing the stage of knowledge. Deliverables include a complete tiny research project, a term paper, poster, and a final talk. This class is based on my lessons reading and performing social computing research.

Seminars, Workshops, Outreach: While classes and assignments provide conceptual framework and hands-on practice, seminars and workshops expand our domain of ideas. I plan to organize HCI and social computing seminars, workshops (3-hour design and prototyping sessions), and talks. Finally, people outside academia appreciate learning about the latest science and are

curious to find ways to contribute. I plan to draw on local examples and challenges for both my research and teaching, and in turn share my research with local communities. I have conducted 50+ outreach activities with communities in San Diego including presenting to Lyme Disease patients and demonstrating my platform at Maker Faire.

As faculty, I look forward to teaching, mentoring undergraduates in research, and encouraging them to tackle real-world problems. I love teaching; I am excited to share my lessons and learn from others.

References

1. Ken Bain. 2011. *What the best college teachers do*. Harvard University Press.
2. Trina C Kershaw and Stellan Ohlsson. 2004. Multiple causes of difficulty in insight: the case of the nine-dot problem. *Journal of experimental psychology: learning, memory, and cognition* 30, 1: 3.
3. Richard E Mayer. 2004. Should There Be a Three-Strikes Rule Against Pure Discovery Learning? The case for guided methods of instruction. *American Psychologist* 59, 1: 14–19. https://doi.org/10.1037/0003-066X.59.1.14
4. Naomi Miyake and Donald A Norman. 1979. To ask a question, one must know enough to know what is not known. *Journal of verbal learning and verbal behavior* 18, 3: 357–364.
5. Vineet Pandey, Justine Debelius, Embriette R Hyde, Tomasz Kosciolek, Rob Knight, and Scott Klemmer. 2018. Docent: transforming personal intuitions to scientific hypotheses through content learning and process training. In *Proceedings of the Fifth Annual ACM Conference on Learning at Scale*, 9.
6. John R Savery and Thomas M Duffy. 1995. Problem based learning: An instructional model and its constructivist framework. *Educational Technology* 35, 5: 31–38. https://doi.org/47405-1006