Yen-Chia Hsu | Teaching Statement

I have served as a teaching assistant, mentored a research intern and a course project, presented six times in academic conferences, and given 30 invited talks. From these experiences, I organize and describe a primary learning goal, researching in the wild. Then, I provide a commitment to creating supportive and diverse learning environments.

Learning Goal: Researching in the Wild

I believe it is vital for students to understand and practice researching in the wild, which reflects my core belief: from research to practice to impact. I am interested in creating courses that emphasize hands-on experiences. My cross-discipline background (computer science and architectural design) in co-designing systems with local advocacy groups makes me suitable for bringing community field research to the university. To connect science tightly to local concerns, I plan to integrate computational and design thinking into curricula, which involves *(i)* understanding local concerns through community fieldwork, *(ii)* forming the research question, *(iii)* co-designing technology infrastructure with communities, and *(iv)* evaluating the social impact after system deployment. For instance, in studio-type courses on designing interactive systems, students will be asked to conduct a semester research project individually or in groups. Students will define problems with site analysis and develop interactive systems through iterative design. There will be periodical group discussions and project presentations to receive feedback from peers and instructors. I envision that this type of learning can also foster sustainable community-academy relationships in the long term. In this way, we can go beyond the mindset of "citizens as scientists" to "scientists as citizens" when community concerns, sustainability issues, and technological ethics are at the forefront of global social discourse.

Understand and practice design thinking. Design thinking refers to the skill of developing strategic processes when tacking real-world issues. To help students practice design thinking, I plan to create study groups to discuss topics related to the class before I formally give the lecture. For instance, when introducing citizen science, I can ask students to form groups and brainstorm ideas about how they can invite citizens to participate in their research. Then, I will ask each group to present the ideas, organize them on the blackboard, and discuss insights about how they are related to citizen science. In this way, I can encourage students to actively think about citizen science research and review the ideas from their peers before I provide the background knowledge. Besides collaborative learning, I also plan to ask students to define, implement, and present research projects. In the project reports, students will need to document step-by-step the process and rationality of the design outcomes for evaluation.

Understand and practice computational thinking. Computational thinking refers to the skill of articulating the problems and the procedures of their solutions in a way that computers can execute. To teach students computational thinking skills, I will emphasize hands-on experiences and assign coding homework in my courses. For instance, when I served as a teaching assistant in a living labs workshop, I taught non-CS students Arduino programming in interaction design projects. In the lectures, I motivated students to explore unfamiliar areas by starting with simple concepts and real examples. I first guided students in writing a hello-world program that turned on an LED. Based on this simple program, I further introduced the if-else rule by teaching them how to use light sensors (photoresistors) to control LEDs. Then, I explained the for-loop syntax with an application that made the LEDs display different colors. In this way, they can learn the connection between real-world applications and the abstraction of programming.

Commitment: Creating Supportive and Diverse Learning Environments

I believe that learning environments, such as classrooms and research laboratories, need to be supportive and diverse. My top priority is to empower students to become independent learners. I will assist them in developing their potentials, learning styles, and confidence by providing rigorous and positive support. Also, I am committed to ensuring diversity, inclusion, and equity in learning environments.

Be rigorous and open-minded. When mentoring summer research, I worked with the intern in creating a rigorous plan that included goals, paper reading list, video lectures, tasks, and timeline for the tasks. We also met every week to discuss research questions and ensure reasonable productivity. When the intern encountered difficulties, instead of providing solutions directly, I guided the intern in finding the source of the problem and brainstorming possible

improvements. Moreover, I encouraged the intern to take risks and experiment with new research ideas. When encountering frustration due to the failure of an idea, I encouraged the intern to be open-minded to challenges, such as "Because of your effort, we now understand that this direction may not work, which is an important implication for our research." After the summer research, the student could confidently communicate the research topic, perform a literature review, develop methods, conduct experiments, and write a technical report.

Provide positive support. To assist students in building confidence, I provided positive support and feedback in learning environments. When I served as a teaching assistant for a math course for robotics, I held office hours to guide students in solving math questions. I gave praises such as "You did a great job in this part!" to students when they derived the math correctly. Even if the derivation was incorrect, I reacted to the situation positively such as "You did great in thinking about the problem deeply! But this part still requires more work." Moreover, during the conversations with students, I paid attention to what they may need (or were interested in) and later introduced them relevant topics with materials. In the future, I will keep supporting students positively in classrooms and research laboratories. Also, I will distribute anonymous surveys with self-efficacy measures periodically to evaluate learning outcomes. The survey will contain Likert scale questions about their confidence in learning, such as "I feel confident in my ability to research relevant course topics." The survey will also use open-ended questions to collect feedback about changes that can be made in building confidence, and I will improve the course based on the feedback.

Ensure safety and diversity in the classroom. As a teacher, I am responsible for creating safe learning environments where students are free to speak their minds and learn to embrace differences. When teaching and communicating, I use gender-neutral terms (e.g., they, we, the person) and culture-independent examples that everyone can understand. During Q&A or discussion sessions, I try to make sure that people from diverse backgrounds have the opportunities to speak. I will also select teaching assistants who represent diverse groups of people. In the course policy, I will explicitly include a diversity and inclusion statement, such as "Class members are expected to treat others with mutual respect and appreciation regardless of any differences." For studio-type courses that involve frequent group conversations, I will work with students to collaboratively define "safe space" at the beginning of the course. Then, these definitions can be used to create a safe learning environment. To evaluate the equality and inclusion in the class, I plan to distribute anonymous surveys to students periodically during the semester. The survey will contain Likert scale questions about the sense of belonging to the community, such as "I am treated fairly and equitably in classrooms and other classroom settings." I will also adjust the course based on the feedback of open-ended questions in the survey about improving diversity, inclusion, and equity in the classroom.

Example Courses

I am excited to teach programming (e.g., introduction to Python programming), statistics (e.g., applied statistics), AI techniques (e.g., applied machine learning and computer vision), and research (e.g., introduction to empirical research methods). Also, I am interested in developing the following specific courses:

- **Introduction to Citizen Science:** A seminar-type class that communicates the citizen science research area with in-class discussions and paper presentations. Covered topics include crowdsourcing, human computation, citizen science, participatory design, research through design, and community-oriented action research.
- **Designing Interactive Systems for Community Citizen Science:** A studio-type class on designing systems to tackle social and sustainability issues in local regions. The implementation can be tangible or intangible. There will be a final project presentation for students to explain and demonstrate the interactive system.