

Course: CS279: Research Topics in Human-Computer Interaction

<i>Course level:</i> Graduate	
<i>Course instructor(s):</i> Elena Glassman, Nada Amin	
<i>Course description:</i> “This year’s course offering co-locates two advanced graduate seminars in HCI (CS 279r) and PL (CS 252r). From HCI, students will learn new design and evaluation methods focused on utility and usability. From PL, students will learn new PL techniques relevant to building user-centric systems. Students enrolled in 252r will select and present papers on PL topics including type systems, program synthesis, and metaprogramming. Students enrolled in 279r will select and present systems HCI papers about communicating intent between humans and computers, such as programming by demonstration and representing transformations on large piles of data. Activities will include a small number of lectures, discussion of relevant literature in each field, and a project, in which students from 252r and 279r will work together in groups to propose and carry out research at the intersection of PL and HCI.” <sup>1</sup>	
<i>Module title:</i> Making Programming Inclusive	
<i>Module author:</i> Cat Wade	
<i>Semesters taught:</i> Fall 2019-2020	
<i>Tags:</i> disability [phil], rights [phil], harms [phil], equality of opportunity [phil], HCI [CS], programming [CS], digital environments [CS], inclusive design [both]	
<i>Module Overview:</i> In this module we consider the practice of inclusive design, highlighting two objectives: first, enabling all users with diverse backgrounds and needs, and, second, drawing on the experience and expertise of people who represent “the full range of human diversity.” <sup>2</sup> We discuss what is implicit in the call to design for the ‘full range of human diversity’, namely, that there are individuals, groups, identities, who are systematically left out and unheard from in the design process. Students are asked to identify some groups and identities that might be systematically shut out and how they are shut out. The discussion is then explicitly focused on individuals with disability, prompting the class to evaluate the ethics of inclusive design with a	<ol style="list-style-type: none"> <li>(1) The aim here is to make sure the students see the pros and cons of both models. It can be easy to write off the medical model as ‘callous,’ but in many cases the medical model is what pushes research towards bettering the lived experiences (e.g. pain levels) of people with a range of disabilities.</li> <li>(2) Possible tip depending on who the audience is: popular YouTuber <a href="#">Molly Burke</a> is a great person to reference when building the definition of disability.</li> <li>(3) This discussion is largely student generated. There are many examples of CS helping people with disabilities with which students are nearly always familiar,</li> </ol>

<sup>1</sup> <https://pl-hci-seminar.seas.harvard.edu>

<sup>2</sup> <https://www.microsoft.com/design/inclusive/> we worked with the definition as provided by Microsoft Design

specific type of user in mind. Two different models of disability are described and evaluated: (1) the medical model, which emphasizes the biological components of disability and defines disability as a statistical deviation from the 'norm'; and (2) the social model, which views disability as a mismatch between certain individuals' needs and our environment (social, physical, digital) (see annotation 1). Together, the class develops a definition of disability, drawing from the WHO definition<sup>3</sup> and the preceding discussion of the two models (see annotation 2). We then cover in very general terms the ways in which HCI and CS more broadly play a particularly fruitful role in facilitating the aims of inclusive design (for users with disabilities) (see annotation 3). The CS professor then delivers a 15-minute lecture on how HCI can be done with inclusive design in mind (see annotation 4). The final third of the session turns to ethical arguments that can be made in favor of the two objectives of inclusive design (see annotation 5). With respect to the process of enabling users with disabilities, three possible ethical perspectives are considered: two are 'rights-based' (one that endorses exclusively negative rights, such as a more libertarian view, and one that endorses both positive and negative rights), and one is 'harms-based.' A concise discussion of the difference between harms and rights is used to help the students see the difference between these perspectives. The students are then asked to generate reasons from each ethical perspective that would call for inclusive design that enables disabled users (see annotation 6). Finally, we turn to the ethical reasons in favor of drawing on the experience and expertise of users with disabilities. For this we consider two cases studies: Chieko Asakawa<sup>4</sup> and the case of cochlear implants. The upshots of this section are that disabled culture is important and needs to be respected, that without working with disabled communities we run the risk of giving too much credence to the 'medical

from screen readers to robotic limbs. This is also an opportunity for students to refer to and engage the assigned reading which provides both specific examples of how HCI can be used to enable users with disabilities *and* explains the importance of drawing on the experience and expertise of users with disabilities (see readings below).

- (4) There are many ways HCI can be done inclusively. This need not, however, be a segment on HCI. Any CS professor could discuss the ways in which their field designs or could implement inclusive design. This whole module, thus, could be appropriated for a number of different CS courses.
- (5) We also touch very briefly on some economic and empirical reasons in order to really drive home the importance of this work in this context.<sup>5</sup>
- (6) An example from within the positive rights view: the right to 'equality of opportunity' requires that users be able to access and use tech with the same ease as their peers (e.g., job hunting websites ought to have the capacity to change the color scheme to be readable by users who are color blind). An example within the negative-rights view: all users of home security tech have a right to not have their private property trespassed upon; therefore, home security tech needs to include voice activated features for users with motor disabilities. An example from within the harms-based view: it is needlessly harmful to users with motor disabilities to be unable to participate in the social good of online gaming when gaming companies have the resources to make controllers adaptive to these users' needs; therefore, they should design controllers with these users in mind.

<sup>3</sup> <https://www.who.int/topics/disabilities/en/>

<sup>4</sup> <https://thegroundtruthproject.org/one-programmer-used-disability-advantage/>

<sup>5</sup> These facts and figures will obviously change over time, but I got my information from:  
[https://disabilitycompendium.org/sites/default/files/user-uploads/2017\\_AnnualReport\\_2017\\_FINAL.pdf](https://disabilitycompendium.org/sites/default/files/user-uploads/2017_AnnualReport_2017_FINAL.pdf)  
<https://elearningindustry.com/use-of-technology-in-special-education>  
<https://www.myhandicap.com/en/information-disability-chronical-illness/school-and-employment/emplyoment/diversity-management-advantages-enterprise/>

<p>model' of disability, and finally that our own biases run the risk of ignoring the critical input of programmers, HCI researchers, and people in tech who have disabilities.</p>	
<p><i>Connection to Course Material:</i> For this specific iteration of CS279, the course is co-located with another graduate seminar on programming languages. As such, the students consider the ways in which developing programming techniques might be used for the end of creating systems that were user-centric, i.e., the subject of HCI.</p>	<p>It would be possible to focus on inclusive design as it pertains to HCI more broadly (as the PL component is taught with HCI in mind). However, we believe it is more relevant to PL students if the class considers how HCI might be designed in order to enable <i>programmers</i> themselves. This is why the Gajos video is assigned (see assigned readings).</p>
<p><i>Module Goals:</i></p> <ul style="list-style-type: none"> <li>● Familiarize students with the concept of 'inclusive design' and emphasize the implicit message behind the design program, i.e., that existing design systematically ignores the needs of certain users.</li> <li>● Introduce students to two models of disability, the 'medical model' and the 'social model', and structure discussion in stages so as to bring out a nuanced evaluation of both (see annotation 1).</li> <li>● Familiarize students with the difference between "rights" and "harms" and use this to introduce them to three different kinds of ethical frameworks.</li> <li>● Guide students in identifying the different reasons the three ethical frameworks give in favor of inclusive design.</li> <li>● Allow students to consider the existence of disabled culture and the importance of its survival through drawing on the experience and expertise of users with disabilities in the design process.</li> </ul>	<p>An associated pedagogical goal, especially with respect to the discussion of model of disability and of disabled culture, is to give the students experience discussing difficult social issues with their peers</p>
<p><i>Key Philosophical Questions:</i></p> <ul style="list-style-type: none"> <li>● What does it mean to have a disability?</li> <li>● What does the concept of 'inclusive design' entail? What are its objectives?</li> <li>● What are the ethical reasons in favor of the two objectives of inclusive design?</li> </ul>	
<p><i>Key Philosophical Concepts:</i></p> <ul style="list-style-type: none"> <li>● Disability, and models thereof</li> <li>● Rights-centric ethical perspectives</li> <li>● Equality of Opportunity</li> <li>● Right to private property</li> <li>● Harms-centric ethical perspectives</li> <li>● The difference between rights and harms</li> </ul>	

<ul style="list-style-type: none"> <li>● Representation and representational harm</li> </ul>	
<p><i>Assigned Readings</i></p> <ul style="list-style-type: none"> <li>● Krzysztof Gajos, <i>Design and Discrimination</i>, (from timestamp 6:31 to 20:41, link to timestamp here: <a href="https://youtu.be/QEh8S7A4Cuc?t=391">https://youtu.be/QEh8S7A4Cuc?t=391</a>) <a href="https://youtu.be/QEh8S7A4Cuc">https://youtu.be/QEh8S7A4Cuc</a></li> <li>● Bragg, D., Koller, O., Bellard, M., Berke, L., Boudreault, P., Braffort, A., ... &amp; Vogler, C. (2019, October). Sign Language Recognition, Generation, and Translation: An Interdisciplinary Perspective. In <i>The 21st International ACM SIGACCESS Conference on Computers and Accessibility</i> (pp. 16-31).</li> </ul>	<p>The Gajos video lecture is assigned before class for three reasons. First, it introduces students to many of the <i>philosophical</i> concepts. When presenting individuals with disabilities it implicitly uses the social model of disability. The examples are highly useful to refer back to in the discussion of the models. The video lecture also implicitly draws on the idea of the right to equality of opportunity by endorsing the idea that people with disabilities ought to be able to pursue the career of their choosing. Second, it examines two perfect case studies of individuals with disabilities who sought to work in CS as programmers. Third, it explains the way in which HCI, in particular, can be used to enable users with disabilities.</p> <p>The CS reading highlights the second of the aims of inclusive design – the importance of drawing on the expertise of individuals with disabilities. In particular, it considers the harms that can arise when the deaf community and culture are erased by blanket policies that prescribe cochlear implant surgery to all deaf babies.</p>
<p><i>Class Agenda:</i></p> <ol style="list-style-type: none"> <li>1. What is inclusive design? Introduction and conceptual analysis.</li> <li>2. Who should we design inclusively for (part 1)? Discussion: those who are systematically left out of ‘typical’ design processes.</li> <li>3. Who should we design inclusively for (part 2)? Two models of disability and working towards our own definition.</li> <li>4. How to design inclusively for disabled persons using HCI (section taught by CS professor).</li> <li>5. Why should we design inclusively (part 1)? 3 ethical perspectives (including discussion of rights vs. harms).</li> <li>6. Why should we design inclusively (part 2)? Ethical reasons for drawing on the experience and expertise of users with disabilities (featuring two case studies).</li> <li>7. Concluding discussion.</li> </ol>	
<p><i>Sample Class Activity:</i> This module involves a lot of breakout and group discussions that are structured by both their assigned readings and by questions prompting the students throughout. A</p>	<p>Because this module is a graduate-level course the students do a lot of the evaluative work in small groups. These sessions last between 2 and 5 minutes, depending on the question. The</p>

<p>particularly challenging breakout session happens right after we discuss the three ethical perspectives and the associated difference between rights and harms. The following is presented to the students on the board:</p> <p>RIGHTS-BASED (1): Individuals have both negative and positive rights, including the right to equality of opportunity.</p> <p>RIGHTS-BASED (2): Individuals have only negative rights, including the right to be free from interference/theft/bodily harm.</p> <p>HARMS-BASED: We should strive to do things that will cause the least amount of harm and/or the most amount of pleasure possible.</p> <p><i>Which of these perspectives would give us ethical reasons to design inclusively, in the sense of creating design that enables?</i></p>	<p>Embedded EthiCS TA moves around the room and partakes in the group conversations in order to encourage analysis and discussion.</p> <p>The students are being asked to apply what they have just learnt about these ethical perspectives and to articulate for themselves the different kinds of reasons each position would generate.</p> <p>Each framework gives us reason to use inclusive design in certain contexts. The pedagogical task is to help the students generate those reasons for themselves.</p>
<p><i>Module Assignment:</i> The final project for the HCI students is to design a product or system. Students are asked to provide an accessibility statement and are encouraged to draw explicitly on this module in order to support their design choices. In many cases the students choose <i>not</i> to design inclusively because of financial or research constraints. In which case they are able to use the module to explain why, ethically, this might be problematic, and to explain their long-term accessibility plan with the ethical reasons we discussed in mind.</p> <p>In other cases, students elect to design inclusively for types of users that are not users with disabilities. The students are nonetheless able to work out the implications of these different ethical models for users who are marginalized along different dimensions.</p>	
<p><i>Lessons Learned:</i> Student response to this module was positive. We believe that is due to a combination of: (1) frequent breaks for small group discussion before collecting thoughts together as a whole; (2) consistently using examples and references that were contemporary and relevant to the lives of the students (e.g.,</p>	

finding programmers with disabilities as case studies, drawing on popular culture for examples); and (3) the application of ethical concepts to the content of the course does not feel forced (it is easy to grasp how design choice can have ethical implications).

Note: this module involves co-teaching. As such, it comes along with the standard challenges of co-teaching (e.g. finding time to meet and coordinate, time management of the class session, etc.).

