

Reflections on Remote Learning and Teaching of Inclusive Design in HCI

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Impacted by the disruptions due to the pandemic as students, teaching assistants, and faculty, in this paper we employ a reflexive self-study to share our perspectives and experiences of engaging in an HCI course on Inclusive Design. We find that we were able to overcome some of the anticipated challenges of transitioning in-person experiential learning components. However, the timing was critical with course meetings being too long for a Zoom setting but too short to fit all desired interactions. The lack of impromptu interactions and the steep learning curve of new technologies for blind students in the class were also identified as critical obstacles.

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1 INTRODUCTION

With the recent COVID-19 pandemic, both instructors and students are forced to shift and adapt to a new way of teaching and learning [11]. The transition to working and schooling from home, as well as the use of new technology for remote teaching and learning, rapidly become the “new normal.” While the pandemic has raised opportunities to re-think education, it has also brought instructional and learning challenges. A growing number of reports detail students’ challenges to cope with a new learning environment affected by their technological capacity, housing conditions, or loss of social connections [3, 26, 29], and instructor’s difficulties in implementing effective online learning models that come with a unique set of requirements by subject taught and students involved [14, 33, 36].

The authors of this paper have also been impacted by the disruptions due to the pandemic as students, teaching assistants (TAs), and faculty. We are brought together in Inclusive Design in HCI, a 3-credit course in Fall 2020 offered in a graduate program at a public university in the United States. Activities in this course are typically engineered to help students first develop an inclusive mindset, then build upon it with actionable knowledge, and translate it to inclusive practices in designing, prototyping, and evaluating technology. One of the anticipated *challenges* was that activities and project assignments, originally designed to be in person, often include experiential components making it difficult to teach or participate remotely in an inclusive way. Having an inclusive learning environment is important for all courses; more so when they focus on being “*inclusive*”. However, one could also anticipate that moving this course to an online format, there would be new *opportunities* such as engaging a broader set of speakers with lived exclusion experiences who otherwise may not be able to travel and broaden the pool of people from communities of interest that can participate in students’ projects (often a challenge for students that do not have connections or family nearby).

In this paper, we reflect on our perspectives and experiences of engaging in Inclusive Design remotely during a pandemic. When comparing these to the challenges and opportunities anticipated, we observe that we were able to work around some of the in-person experiential components by fostering remote activities, nurturing personal connections,

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supporting interactivity, and practicing inclusive interactions. Remote office hours seemed to be attractive, and remote participatory design projects were seen as fulfilling experiences. In contrast, we were not able to leverage opportunities such as a broader set of speakers as there was no lecture time. Time, the lack of impromptu interactions, and the steep learning curve of new technologies for blind students in the class were identified as some of the main challenges.

2 RELATED WORK

Inclusive design and accessibility courses play a critical role in HCI and broader computing education. Through these courses, students can develop an understanding of the diversity of technology users; upon entering the workforce, they can go on to build more inclusive technology with and for under-represented and under-sourced communities about which they are encouraged to think critically, creatively, and empathetically; and they are prepared for the increasing number of technology jobs requiring knowledge about accessibility [18, 25]. Thus, it is not a surprise that the past few years has seen a steady growth of literature related to teaching inclusive design (e.g. [12, 18, 20, 23–25, 28, 30, 39]) with the majority having an emphasis on accessibility. These efforts strengthen initiatives for promoting and sharing resources such as Teach Access [2] and the ACM SIGCSE on What and How to Teach Accessibility [19]. A common theme across prior work is identifying challenges and barriers. Many relate to inclusion and accessibility topics not being built in computing curriculum [19, 30], missing pedagogical content knowledge [23, 30], perceived lack of interest from the students [25], and lack of institutional support [24]. This work is complementary to these prior efforts. We share our perspectives in navigating some of these barriers with the additional challenges imposed by COVID-19 such as the need to adapt to changing established routines and expectations [8]. Prior work has shown that instructors find it challenging to adapt pedagogical approaches to online teaching in a short period of time [35] as they lack the pedagogical content knowledge [31], and must facilitate a meaningful online learning experience [27] usually without technical support [15]. People’s home environments become part of the collective learning experience [35]. Using an unfamiliar teleconferencing software such as Zoom increases the cognitive load in contexts where attention is focused elsewhere such as teaching and learning course material [35]. We are not aware of prior work that explores this shift to online teaching and learning for Inclusive Design or broader HCI courses. The closest work to ours is that of Tigwell *et al.* [35], where perspectives from both students and teachers are included though the focus is on sign language learning.

3 REFLEXIVE SELF-STUDY

Our study describes the context of a previously in-person, graduate-level Inclusive Design in HCI course being adapted and conducted remotely and the retroactive perspectives of those who were involved as students, TAs, and an instructor.

3.1 Method

In this study, we employ ethnographic methods, typically used in HCI to understand the context where complex human interaction with technology occurs in naturalistic settings [21], such as in physical environments like people’s homes [9, 34], their work [22, 32], and in the case of this study, in an educational setting [10, 16, 17, 37, 38] and virtual spaces [13]. By adapting reflexive multi-ethnographic methods, we sought to balance the power structure within the phenomena’s context (*i.e.*, the three role types of a remote, graduate educational setting). Specifically, we included perspectives from four graduate students (S1–4), two graduate teaching assistants (TA1–2), and one professor (P1); all participating in a remotely conducted course in Fall 2020. These methods provided an opportunity to compare and contrast the researcher’s experience with other participants “to avoid the hegemonic style of meta-narrative found in autoethnography” [6]. Members brought different backgrounds, meanings, and perspectives to the shared experience.

In our study, each researcher-subject asked each other and “themselves thoughtful questions about their own influence on their findings and research” [5]. We triangulated several types and sources of data (e.g., artifacts from previous and current semesters, assignment rubrics, class discussions, emails, interviews, essays, and final project prototypes at various stages) to validate our observations [4]. During our feedback loop of conversations and interviews, we performed member checking by reading and re-reading content and returning to recorded unstructured interviews, following up with clarifying questions and providing an opportunity to add or alter previous statements. We disconfirmed evidence and performed peer debriefing by drawing other study member’s attention to the data throughout the collaboration. Additionally, we analyzed and wrote the content in mixed pairs to co-construct the study’s final product.

Limitations. Although our data is rich, the nature of our reflexive self-study limits the internal and external validity of our interpretations. Despite the limitation, we believe that insights from these reflections can help future work in learning and teaching Inclusive Design in HCI amid and post pandemic.

3.2 Authors’ Roles and Biographies

To better understand the authors’ roles within both the classroom and the study, we describe their backgrounds, personal reflexivity statements, and motivations for their involvement in the course. The reflexivity details point to the variety of unique perspectives and provide an additional background that invariably contributes and may potentially bias the observations authors make, as well as how they frame their interpretation of fieldwork and reality.

S1 is a part-time graduate student who currently works full-time while pursuing her M.S. in HCI. S1 is a straight cisgender white woman who grew up in a religious family in the Midwest region of the United States. S1 was the first person on her father’s side of the family to attend college, and S1 and her husband have resided in four different regions of the U.S., and exposure to new people and places has considerably expanded her worldview. S1 was motivated to take the Inclusive Design course because it directly relates to her job duties. She is responsible for disseminating guidance and best practices to her colleagues to help make their digital content more accessible.

S2 is a second-year Ph.D. student in Information Studies focusing on the democratization of participatory design and collective creativity. S2 was motivated to take the course to learn how to incorporate elements of inclusive design in her research and to further hone her participatory design skills. S2 is an Arab-American and Muslim woman from the southeast region of North America. Her longstanding interest in design stems from her childhood, which motivated her to learn more about how design could be inclusive. S2 was also specifically interested in learning more about accessibility, which she was first exposed to in an introductory HCI course the year prior.

S3 is a second-year first-generation graduate student enrolled in the HCI Master’s Program. S3 identifies as a Muslim straight black man. He moved to the US about 30 years ago from Gambia West Africa. As a college student, he critically examined family cherished beliefs and values, which led to changes in personal identity and political values. He is a father of three daughters. He had a life-altering setback after surgery left him blind in both eyes. His research focuses on accessibility and UX design. He is a research member of the lab directed by P1. As a blind student, he has a personal interest in understanding how to inclusively design products that impact or are impacted by users.

S4 is a first-year Ph.D. student in Information Studies. S4 is a non-monosexual married cisgender white woman from the southeast region of North America. While she grew up in a highly religious, politically conservative middle-class blended family, she departed from those belief systems. She experiences chronic pain and will, on occasion, walk with a cane. Her research area of interest is how technology can better support the needs of people living with a brain injury. She took the Inclusive Design course to develop and incorporate Participatory Design methods into her skill set.

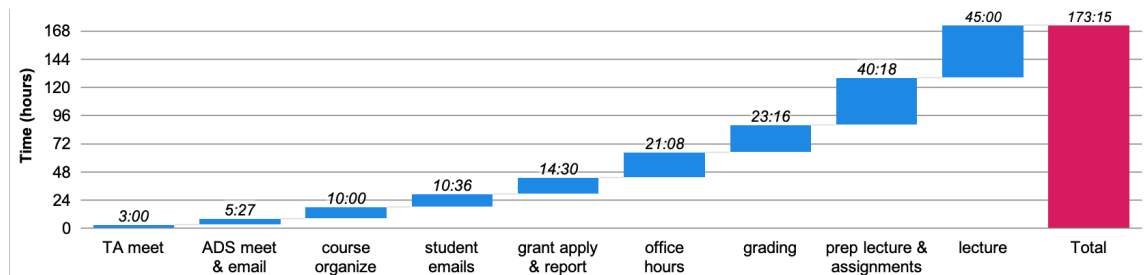


Fig. 1. About 173 focused hours were spent by P1 towards the Inclusive Design course during COVID-19. Data based on self-tracking.

TA1 is a first-year Ph.D. student in Information Studies working with P1. She was raised in a Japanese household in California. Her education background is in Interaction Design applying User-Centered Design practices in the design process. TA1 has been working with people with visual impairments since 2015 to address their navigation challenges. Her research focuses on understanding and mitigating practical challenges of design for accessibility and inclusion. It was her first time taking a TA role for a class, and she has never taken the Inclusive Design course. Although she had to manage her fall semester with three classes and a research assistantship, she accepted this TA opportunity to understand students' challenges in practicing design and how they had to experiment remote co-design methods.

TA2 is a fifth-year Ph.D. student in Computer Science. He has been working with P1 on assistive egocentric vision while pursuing a Ph.D. degree in Computer Science. He is a straight cisgender Asian man from East Asia. It was his first time helping to run an online class remotely. Ever since the outbreak of COVID-19, TA2 quickly adapted an instant switch to online activities, including his learning, researching, and communication activities. Through the years of working with P1 on accessibility problems, he has learned the importance of inclusive designs for everyone and developed a broader and deeper understanding of existing accessibility issues. He agreed to serve as a TA for this course when asked by P1, hoping for an opportunity to share with students his personal and professional experiences with inclusive design.

P1 is an assistant professor in Information Studies, affiliated with Computer Science. With a background in computing, she has been working in accessibility for almost 15 years. She is a straight cisgender white woman born in Albania when it was a communist state and witnessed the violence and instability during the transition to democracy. Her family immigrated to Greece, where along with the opportunity for stability came societal discrimination. Education was her escape and perhaps what led to her research focus on inclusive education and technology. Her personal motivation for teaching the Inclusive Design course was to share her passion for inclusion and diversity with a focus on disability while accounting for other dimensions such as age, gender, race, and low-resource settings.

4 RESULTS

Reflections are grouped by course components such as lecture, office hours, assignments, and project highlighting *what worked* and *what could be improved*. P1, who practices self-tracking, observed that she spent 30% more time preparing and teaching the course online when compared to the first time she developed the course for an in-person setting. She shared a breakdown of time spent in Fig. 1, thoughts, activities such as meetings with TAs are undercounted as additional discussions may have occurred in individual mentor-mentee meetings.

4.1 Lecture

The class met a total of 15 times, weekly on Tuesdays at 11am–1:45pm on Zoom. The session was open 30 minutes earlier to create a space for informal discussions, simulating what would typically happen in in-person classes. A typical lecture consisted of four parts: 1) administrative updates from P1; 2) students' feedback on each other's storyboard; 3) students' 5-min presentation on their interests; and 4) lecture with discussion on a preassigned topic.

4.1.1 What worked. Fostering class activities. P1 and TAs promoted regular class activities, such as small discussion groups in the beginning of the class and short student presentations with their topics of interest related to inclusive technology. TA1 mentioned, *"this was important especially in online classes which are harder to engage with other students, having less chit chats before, during, and after class."* All described that Zoom's features such as breakout rooms and screen sharing facilitated these activities. Students acknowledged that they were able to meet different students, which would be difficult in in-person classes. S1 remarked, *"If the class had been conducted in person, I probably would have spoken to and sought feedback from the same few people sitting near me in the classroom; with the randomness of the Zoom breakout rooms, I had the opportunity to share sketches with many different classmates as the course progressed."* Also, S3 highlighted, *"This idea of having students in random breakout rooms was important to promote diversity."*

Nurturing personal connection. Compared to in-person classes, perhaps the most important but difficult to fulfill in online classes is personal interaction. The online class activities however seem to serve as the opportunity for all to interact with each other and thus get connected. TA1 shared, *"It's easy to see which students are engaging or participating in class; even if the interaction was remote, I was passively knowing the students more as the semester went."* Also, students' presentations helped students learn about each other. S1 described, *"It was a passive way to learn more about the interests of my fellow students (so many other gamers in the class!)"* When discussing about Zoom being open 30 minutes before class. S3 commented *"It was a nice warm up. It allowed me to catch up with my classmates."*

Supporting interactivity. During lecture and after each student's presentation, students were asked to provide their feedback via Slido [1], where they can leave comments anonymously and see everyone's comments. P1 said, *"Having real-time input from the students appear in the slides (e.g., using Slido) seems to be a success."* In particular, in comparison to an in-person class, the professor acknowledges, in the online class, *"Students provided more in depth feedback to the students presenting and to the questions in class."* Moreover, S4 commented, *"I felt the use of the Slido app was a smart way to elicit interaction and feedback from students in the remote learning environment,"* and found, *"The anonymity of the app also allowed students to be less self-conscious about their responses, which is why so often in an in-person classroom setting you typically always have the same few students talking."* P1, who shared lecture slides with students giving them editing rights to add their storyboards before the lecture, observed an interesting pattern *"Students started using the speaker notes at the bottom of slides to provide feedback to each other; this was more prevalent midway through the semester with more than 80% of storyboards receiving asynchronous feedback by at least one other student."*

Championing inclusive mindsets. During the course, P1 emphasized, *"Reducing ableist and non-inclusive language is one of my main goals, and it is one of the most difficult to achieve."* Everyone in the class appreciated the professor's efforts in this direction. TA1 emphasized, *"(The professor) was cautious with her words to use and shared ethical concerns to students so that they can be also cautious when communicating with or describing participants for the class project."* This effort indeed helped students transfer this learning into their lives. S4 said, *"During lectures, students were also asked to describe themselves and their surroundings prior to speaking up to be more inclusive of non-sighted students; I found myself wanting to start every video conference this way once it became an ingrained habit,"* and S1, *"I appreciated the practical focus on language surrounding disabilities as well as being encouraged to add alt text to images contained within any slides"*

we contributed to the class; I felt like I was actively building good habits for the professional world.” S3 highlighted “As a blind student I appreciated fellow student describing themselves so that I know who they are and have a sense about their appearance. It is only fair because they can see me and know how I look like.” noticing that “male students didn’t conform as much to this practice.” When looking at the storyboards that students uploaded, P1 noticed that “By week 6, the majority of students started adding alt text to their storyboards with mixed level of detail, though, as the workload in the course during the last weeks increased, that number dropped from 83% to 52%.”

4.1.2 What could be improved. Lack of visual interactions through the camera. Some students mentioned feeling awkward when other students turned off the camera during small discussion sessions where students in pairs exchanged feedback on sketches. TA1 expressed her concern regarding this issue by saying, “We also cannot force people to turn the camera on because we have to understand the house situations they are in.” P1 also remarked, “Given the participatory nature of the course, it helped when students had their cameras on; it helped me do a better job, but also it helped students participate (those who did not have their camera on tend to engage less in discussions).” However, she commented, “Having your camera on for 2 hours and 45 minutes is a hard ask.”

More difficult to interact with others than in in-person classes. Despite the online class activities, all acknowledged that the online environment made it more difficult for them to interact with others than the in-person environment. TA2 described, “Online classes made it more difficult to get to know students than in-person classes, since students were unable to interact with me before and after the class or during the break time,” and sometimes felt, “I am interrupting their discussion whenever joining and leaving their breakout room on Zoom.”

Insufficient time and cues to ask questions in the online class. As shared earlier, the online class was already packed with the class content and activities and often went a bit over the 2-hour and 45-minute lecture time. It seemed to make students reluctant to ask questions related to assignments, projects, and others, which they could have done more easily in in-person classes. Both the professor and students had feedback on this issue. P1 and S4 shared, “Everything took much longer. I thought I would bring more speakers now that they don’t have to travel. But the opposite. I barely fit one guest lecture. The course had to be broken into more days.” and “I would have liked to split the course time into a longer lecture on one class day and the focus on the other class day could be on assignments, small group peer critiques, and projects,” respectively. Also, S3 highlighted that “there was not enough time in the breakout rooms to exchange storyboards feedback because it would take so long to provide a line by line audio description of the storyboard image.”

Furthermore, as Zoom does not provide cues that students can use to determine their participation in the class (e.g., asking questions), students said that it was more difficult to gain the teacher’s attention than in in-person classes. More specifically, S2 remarked, “As an introvert, it was also hard for me to insert myself and make my voice heard or to ask a question if I had one; I think in smaller class settings and in-person it is easier to pick up on cues of when it is possible to speak, but online not as much.” On the other hand, S3 said “As an extra extrovert I didn’t have that problem.”

Other issues with online learning during the pandemic. Students shared that they needed more time to consume the content of each lecture and engage with other class activities at the same time. S4 commented, “We almost always went over our time in class...This was not from an inefficient class structure, but was the result of a high level of student interest and engagement.” Indeed, P1 recognized, “Transitioning between different parts of the class took longer, students would also take longer when sharing their perspectives (longer pauses, self-description, input in sli.do that had to be read out loud to be accessible etc.).” Moreover, students sometimes felt that they could not participate in remote synchronous interactions effectively. S2 shared, “Sometimes I felt rushed and that I couldn’t get all my thoughts out with Slido since there was no timer and I did not know usually how little or how much to write in there before the Slido closed for responses.”

Another issue observed in the students' reflections was fatigue caused by the online environment. In particular, S1 mentioned, *"In general, time management felt like a struggle during lectures; Two hours and 45 minutes is a very long time to remain engaged in a virtual meeting of any kind."* The pandemic indeed seemed to aggravate the fatigue as S4 shared, *"By the end, I found myself less inclined to have my camera on; It became especially difficult to have it on after several students experienced personal family tragedies as a result of the pandemic."* Noticing students got more tired at the end of class, P1 suggested, *"Perhaps moving this [lecture] part earlier on, e.g., right after the storyboards, could have helped."*

4.2 Office Hours

The professor and the two TAs held virtual office hours weekly distributed across different days to best accommodate students. Office hours were announced at the beginning of the semester and published on Canvas for future reference. During the designated times, individual appointment slots were made available using Google Calendar, where students could sign up for unclaimed time slots. Each week the professor offered six 15-minute time slots, and each TA offered four 15-minute time slots. Additional office hours with P1 were introduced later in the semester as project deliverable approached. The professor required each student team to attend office hours at the start and midpoint of the project.

4.2.1 What worked. Availability of office hours. Virtual office hours were appreciated and attended by students, who indicated that they found them helpful. S3 commented, *"I have taken advantage of both the professor and TA's scheduled office hours often to learn more about assignments that were not clear to me. Office hours were often beneficial."* S2 added that, *"Our professor offered plenty of office hours this semester... Every time my teammates and I met with our professor, we always came out of the session with a pointer or suggestion of how to move forward, which I really appreciated."* In keeping with the theme of inclusivity, virtual office hours offered opportunities to students who had not regularly attended office hours in the past. S1 indicated that she had never taken advantage of a professor's scheduled office hours before. S4 also was not a regular office hours attendee, stating, *"I can count on one hand the number of times I have gone to office hours and on one finger the total number of classes in which I went more than once prior to this year."*

Ease of scheduling. All indicated that they enjoyed the ease of scheduling appointments using Google Calendar. TA1 mentioned, *"I know this is a little thing, but I had a less stressful time...managing [office hours]."* While it seems that students most often reserved time slots with the TAs to ask questions related to assignments and projects, some of the TAs' office hours time was also spent helping S3 overcome accessibility challenges with specific online tools.

Lack of physical location. One student and one TA specifically commented that the office hours not being limited by a physical location was advantageous. S1 mentioned, *"Having the office hours offered virtually made it easier to attend because the barrier to entry felt lower when I didn't need to trek across campus and find a potentially obscure office location just to ask a quick question or two. It made me more likely to seek out the professor during office hours."* Because of the virtual nature of the appointments, students could easily add other students to the Google Calendar invitation in order to attend office hours together during the same appointment time. This scheduling method eased the burden of scheduling appointments with multiple students at one time. TA2 stated, *"Since the remote office hours were not limited by physical locations, it seems to help more than one student come to the office hours at the same time to ask common questions."* Relatedly, P1 indicated that her favorite part of office hours was *"the brainstorming sessions related to student projects."* She took advantage of office hours as *"an opportunity to observe team dynamics and leverage any opportunity for balancing air time (e.g., by asking a question to the student that was most quiet about their opinion)."*

Power balance. Virtual office hours had other advantages. S1 suggested that *“meeting for office hours via Zoom seemed to partially equalize the power dynamic between students and the professor; both parties meeting remotely from their own spaces felt distinctly less formal than approaching a professor in their physical office space.”*

4.2.2 What could be improved. Addressing requests for extensions. TA1 noted the difficulty of handling concerns without cross-checking with P1 to ensure consistent answers and to make decisions on deadline extensions. She shared, *“I received a couple of ‘I cannot complete the assignment because of XX’ from the students. The reasons range from the difficulty to meet the deadline because of other classes/projects, or the fact that people in their family were sick or the students themselves got sick. I wish I knew the best way to respond to the students’ concerns on the spot.”* S4 suggested, *“Maybe the TAs needed an FAQ of their own with appropriate responses so you all can be consistent in how you approach difficult student subjects like this.”* P1 responded *“I want to be aware and bear the responsibility for such decisions.”*

Lack of interactivity. TA2 mentioned that during *“in-person office hours, I used to use a whiteboard or notebook to deliver my feedback to students more clearly. Remote office hours settings lacked this kind of interaction and thus became less effective in my opinion. I tried using other online resources, such as Google Docs and Jamboard and screen share, but felt [it was] not enough to replace the physical interaction experience.”*

More office hours. Some students indicated that office hours with P1 did not always provide enough time. S1 suggested, *“As the semester progressed and student questions became more project-specific, being able to book longer appointments would have been helpful. I felt guilty monopolizing two 15-minute appointments knowing that other project teams likely had questions, too.”* However, S4 indicated that even 30 minutes was not always adequate, adding that *“there were several instances across the semester where my group scheduled 30 minutes of time only to find ourselves still needing more time...During the latter half of the semester when the final project deliverables were due, it may have helped to schedule in advance regular team meetings to make sure all students were able to have access to the professor or TA’s time.”*

4.3 Assignments

Assignments fell into one of two categories: weekly recurring and individually occurring. Weekly assignments involved sketching and engaging with topical asynchronous videos and articles via short-essay reflection. Individually occurring assignments consisted of individual student presentations on inclusive technologies of students’ choice, improving webform accessibility, evaluating website accessibility, and an end-of-semester reflection.

4.3.1 What worked. Overall, all of the students found value in the variety of assignments and the skills they developed over the course of the semester. S2 reflected on the range of assignments. *“It allowed for people with diverse skill sets the opportunity to learn new skills or practice old ones.”* Students like S2 reported higher satisfaction levels when the sketch prompt was more challenging, especially the prompt that occurred late in the semester asking students to redesign a previous sketch to function in low resource communities. Students also reported enjoyment when sketching scenarios were rooted in a specific person’s lived experience. S4: *“Centering my design choices around an actual person inspired me to think about how a design could more effectively meet their needs.”* Students reported that having a minimum of pre-lecture content to go through made them want to read all of the week’s articles S1, S2, and S4 citing the excellence of the curated content and a good mix of academic and UX practitioner-focused content. S4 *“This seemed to support the various kinds of students that made up the class, as their various goals often seemed to be reflected in the materials we needed to read.”* Students, such as S2, liked the flexibility of topics to choose from for the individual student presentation and selected something related to her Ph.D. research. S4 reflected that the assignment allowed *“students [to] immerse themselves in cutting-edge inclusive projects ... and allowed us to practice presenting work in a concise way.”*

4.3.2 What could be improved. Students experienced some confusion regarding technical assignments. S1: *"We always seemed to run out of time at the end of lectures and thus could not accommodate logistical discussions about assignments."* TA2 also reflected on his previous experiences as a student with others TAs, *"TAs explained the details of an assignment with some examples and answered questions from students. It seems that it is really important to have this kind of separate sessions for remote classes, as the online environment often lacks after-class interactions."* TAs and P1 also worked with S3 over the course of the semester to ensure that assignments and the tools necessary to complete them were accessible to him. TA1: *"S3 and I went through online resources and documents together for any accessibility features to use certain mediums for class (e.g., Google Slides, Slido, Google Forms). We found that the tools were not easy to manage with a screen reader and come with a steep learning curve, although they are supposed to be accessible according to the documents."*

4.4 Projects

Throughout the remaining two months of the semester, students worked as teams of three alongside a participant from the disability community or an older adult to *"apply user research and design methods to create new technology prototypes that improve accessibility."* All teams were advised and decided to utilize the participatory design approach with a single participant and submit intermediate deliverables culminating in a final video presentation and report (Medium article).

4.4.1 What worked. Gaining professional experiences. S2 and S4 both stated that the project was a great way of practicing and honing one's design and research skills. They thought it was nice to collaboratively design a solution that participants felt could benefit them. S2 said, *"The project was one aspect of the course I felt remained quite unchanged between having the course run in-person versus online because of the distributed nature of it."* Students appreciated how P1 secured a grant for compensating participants, with S4 saying how *"Being able to actually pay my participant for a class project was a personal highlight"* and S1 adding that *"this was fulfilling and made me feel very professional."*

4.4.2 What could be improved. Forming teams. S1 and TA1 thought it was difficult to find teammates for the group project, especially if students did not know anyone already in the course even though students had all introduced themselves in the class with two slides each that were accessible by all. They resorted to *"shooting in the dark reaching out to classmates via email"* in order to find a team. TA1 suggested that *"maybe incorporating the sketch sharing session effectively for finding teammates"* could have been a better way of approaching this. TA2 expressed similar qualms about students forming teams, but said that *"Although students were not physically located in the same place, it seems that students were able to get to know each other throughout other class activities, such as sharing their sketch ideas and reading summaries, and find other students who have similar interests in the project."* S2 also suggested that a discussion board be set up on the course website where *"people can write down their interests and comment on other people's posts or reply to comments stating their interest and willingness to pursue further contact."* S1 provided another suggestion, which was to have *"students fill out a survey that was used to help place us on various project teams. The idea is to balance skills but also account for team member availability."* However, P1 said, *"Even though I emphasized diversity as the main objective for teaming up, students still rank skill set/work experience and having had prior interactions as main contributing factors to their teaming decisions; both are more susceptible to things in common rather than differences."*

Conducting a co-design project during the pandemic. Had in-person meetings been permitted, S1 asked, *"Do you think we should have conducted at least the co-design session in-person rather than remotely?"* S4 responded, *"I would have liked to since our participant wasn't too far away. It would have been fun to draw together and move paper components around together."* In addition, S1 noted that *"I think a few of the remote meetings could have been eliminated with short in-person conversations before and/or after class (if we had been in a physical classroom setting)."* In terms of length of

co-design sessions, S1, S2, and S4 all suggested that they be lengthened from their original allotted hour time to account for technical difficulties as well as the nature of some tasks taking longer remotely than had they been in-person.

While P1 secured funding for participants, it had not been cleared in time to allow for an explicit promise of an incentive. S1 recounted, *“Especially during the COVID-19 pandemic, I felt guilty about asking for so much of a participant’s time knowing we may not be able to pay them.”* S4 added, *“We were lucky enough to have someone willing to do the project with us for free. Fortunately, the funds did come through in the end, but only after a bit of whiplash. Being able to actually pay my participant for a class project was a personal highlight.”*

Discussing participatory design methods. Even though many of the reading assignments involved participatory design methods, S1 and TA2 thought that students would have benefited from discussions regarding the logistics of how to run a session and would have liked dedicated class time to discussing the design approach further.

Students and TAs felt differently about a *“class session that was used to pair our final project team with another team to practice and offer feedback on each other’s co-design session protocols.”* S1 and her *“team’s protocol differed greatly from the team we partnered with for this particular class session”* and they used up a lot of the available time explaining the background of their study and participants, not to mention how the timing did not allow for her team to run through their entire protocol and receive feedback. This differed from the perspective the TAs held, which was generally positive since it was one of the *“few times I had a chance to engage with other students about design, rather than for grades or assignments,”* according to TA1, and *“Zoom breakout rooms allowed me to get to learn each team’s project during these project discussion sessions without distracting their attention”* according to TA2. However, TA2 mentioned the caveat that *“it was more difficult for me to hop in and out each team’s discussion than it would have been in in-person classes,”* which TA1 agreed. TA1 added, *“In-person workshops are easier to monitor what people are doing and blend in.”*

5 DISCUSSION AND CONCLUDING REMARKS

The goal of our study was to share reflections on our experience in remote learning and teaching Inclusive Design in HCI during the COVID-19 pandemic. We successfully employed different technologies, such as Zoom during lectures and meetings, Google Slides shared with editing rights to support in-class activities, Slido, and Google Calendar for office hours. While largely accessible, many of them had a steep learning curve for blind students and required many hours of support by the faculty and TAs. Looking at a high level what worked in this remote setting, we found that:

- Even though lectures were attended remotely, they were able to foster in class activities, nurturing personal connections, and supporting interactivity. Practicing inclusive interactions (e.g., describing self, being attentive of inclusive language, and adding alt text to sketches) helped towards a more inclusive mindset.
- Remote office hours that allow for time slot booking can make office hours more attractive to students for reasons that can be practical but also related to the power dynamic between students and professors.
- Students gained meaningful experiences interacting with end-users even in a remote setting. Compensating participants for their expertise and time was a fulfilling experience that made some feel *“very professional.”*

Transitioning to online an HCI course that relies in experiential activities forces us to be creative and surface practices that can promote inclusion such as describing self, providing alt-text, reducing power-dynamics, and demonstrating the value of lived experiences. As we transition back, it is important that we carry over these inclusive practices [7].

There were also many challenges. Some related to broader remote learning and others to the nature of the course:

- Time was a common thread, reported by all. Lectures were too long for a Zoom setting, but they were too short to fit all the desired interactions. While an online format could afford a broader set of invited speakers, we had only

one compared to seven when in person (same lecture slides and class size). With an already developed course and more support, the faculty spent 30% more time than when teaching it for the first time. There were more office hours and more TAs for the students, but they were not enough. Students needed more time to complete tasks due to varying factors. More flexibility with deadlines and deliverables for some lead to confusion for others.

- The lack of impromptu interactions that are typically available in an in-person setting was often cited as a source for challenges (e.g., more difficult to find team members, resolve questions, coordinate, and practice co-design).
- Even technologies that are deemed accessible can be non-inclusive – steep learning and need for sighted support.

Advances in technology and playful initiatives could help with some of these challenges (e.g., reduce Zoom fatigue, encourage students to turn the camera on with themed days, connect with platforms or events that afford more interactions, such as Discord social hour). However, they can also be taxing on time. Thus, we recommend that online HCI courses related to Inclusive Design decouple the curriculum focused on instilling accessibility and inclusive design practices from implementation components (e.g., web accessibility). It can provide the much needed space for supporting remote co-design projects with participants and invited speakers with lived experiences, researchers, and practitioners.

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