Toward Building Design Empathy for People with Disabilities Using Social Media Data: A New Approach for Novice Designers

Tamanna Motahar  
University of Utah  
Salt Lake City, USA  
tamanna.motahar@utah.edu

Eliane S. Wiese  
University of Utah  
Salt Lake City, USA  
eliane.wiese@utah.edu

Noelle Brown  
University of Utah  
Salt Lake City, USA  
noelle.brown@utah.edu

Jason Wiese  
University of Utah  
Salt Lake City, USA  
jason.wiese@utah.edu

ABSTRACT
Design empathy is a core HCI concept for understanding user perspectives in design processes. Although researchers advocate for leveraging design empathy in the design of assistive technology, educating novice designers about this is challenging; this is especially true in HCI classrooms when the target population includes people with disabilities, and students who do not have a disability are less aware of the diversity of disability. To help students better understand disability experiences, HCI education often adopts “be-like” (mimicking disabled-experience) approaches. However, accessibility researchers advocate adopting the “be-with” approach—learning about other’s experiences through companionship. To mitigate the logistical challenges of being-with in a classroom setting, we developed a “be-connected” approach, which facilitates learning about the disability experience through the narratives of real individuals. Using social media posts from a spinal cord injury subreddit, we developed and deployed an activity aiming to develop design empathy. Our qualitative evaluation showed a notable transformation in students’ design thinking process, suggesting an opportunity to leverage social media data to learn about disabled perspectives and develop design empathy.

CCS CONCEPTS
• Human-centered computing → Accessibility design and evaluation methods.

KEYWORDS
Design empathy; Spinal cord injury; Social media

INTRODUCTION
Designing assistive technologies is not only about building, modeling, or creating technology, but about developing empathic connections between designers and users [7, 73]. This design empathy requires designers to seek to understand users’ needs by hearing directly from users about their lived experiences [7]. It is therefore crucial to include people with disabilities within the design process [47]. However, participants with disabilities are frequently excluded from the design process due to lack of access and accommodation or because of implicit exclusion criteria [33, 46, 53]. Thus, researchers often adopt methods that aim to understand to some extent what a user might experience by “being-like” the users (e.g., disability simulation, creating personas). Mimicking an unknown disability experience with no apparent bodily impairment may provide the designers a “glimpse” of the disability experience—similar to “situationally-induced impairments” [59]—which can be valuable for a design team as a complement to other HCI methods (e.g., interviews). However, prior research showed that these approaches are inadequate to comprehend many other facets that people with disabilities encounter socially, psychologically, and culturally. For instance, Bennett and Rosner [7] strongly argued that such mimicking activities might fall short of capturing many other aspects of a disability experience:

...simulations, an especially controversial empathic modeling activity, reproduce negative stereotypes and fail to highlight infrastructural and social challenges. (page 4, [7])

Bennett and Rosner [7] further argued that designers should adopt a model that involves users with disabilities as companions to develop empathic connections: the “be-with” model. In the “be-with” model, they offered a new perspective for the empathy-building activities that focus on “building partnership” with individuals with disabilities, instead of “representing” them. More precisely, this model suggests that, instead of imitating a disabled experience, HCI scholars and practitioner designers should: (1) re-evaluate their initial understanding of a disability experience, (2) know that learning about disability is not an achievement, but rather an ongoing attunement; and (3) recognize that the design space is asymmetric—not all challenges can be addressed by technology. These three
commitments are equally important for HCI educators to consider while teaching students or novice designers how to design technology for individuals with disabilities. Often, HCI classrooms face similar challenges to those researchers face when attempting to accommodate and access people with disabilities. This may be one reason why many contemporary HCI education approaches often follow a “be-like” model (e.g., simulations, personas, lectures, class projects [56, 57]) to teach accessible design; these methods do not involve the target population in the classroom to help students learn the holistic challenges people with disabilities face in their lives. In addition, because of the dominance of ablest systems, people with disabilities are segregated, making them invisible and othered in many instances. Thus, students with no disability are not often exposed to the full extent of human diversity. Even students with disabilities may lack awareness of disability experiences and culture for disabilities that are different from their own.

To follow a “be-with” model, we were interested in exploring whether reading actual lived experiences from people with disabilities could help develop students’ design empathy. To do this, we leveraged social media posts from people with disabilities as educational material. We call this approach “be-connected,” as it aims to help the novice designers become more “connected” with the intended users instead of bringing them in the same physical space to truly “be-with.” This approach shares real disability experiences in the form of the target users’ own narratives from an external source to help build design empathy.

In this paper, we investigate the following research question:
**How can a learning activity based on reading social media posts serve to build novice designers’ design empathy for people with disabilities?** As a part of a different project, we had collected 960 posts from two public spinal cord injury (SCI)-specific Reddit groups, and analyzed and grouped them into thirteen broad categories according to the posts’ topics. We used curated, anonymized, and rephrased versions of some of these posts and their associated categories as a reading activity for an advanced HCI class. Students answered design questions on two assignments: one due before students completed the readings and another due after the readings and an in-class discussion.

We later qualitatively analyzed students’ responses to explore how their design thinking changed after reading the social media posts. We qualitatively analyzed our discussion notes and found that reading the posts helped the students identify the limitations of their prior perceptions about disability. They realized that learning about multifaceted disability experiences is a continuous process, and learning from social media can be a good stepping-stone, but more exploration is required. Similarly, comparing student responses from the two assignments showed that the reading activity helped students recognize more challenges of designing in the disability space, realize the shortcomings of the “be-like” model for developing empathy for disability, develop an accurate sense of empathy, and understand that there is still much to learn. Taken together, all of our findings demonstrated growth in building students’ design empathy for users with disabilities.

**Note of Caution:** We encourage anyone who implements this approach to exercise caution, as scraping social media posts of such vulnerable individuals could violate their privacy and trust. We strongly recommend following the guidance put forth by Fiesler and Proferes [18]: always anonymize and rephrase the posts before using them in similar work.

## 2 RELATED WORK

This section examines the literature to establish a foundation for our work by introducing the concept of design empathy (Section 2.1), illustrating how building design empathy is crucial for designing assistive technologies (Section 2.2), establishing the importance of teaching design empathy for people with disabilities in HCI education (Section 2.3), and exploring how data from social media can facilitate learning about people’s lives (Section 2.4).

### 2.1 Design Empathy in HCI: an Ingrained Approach for Designing for Diverse Populations

Design empathy has become a critical component of HCI research in designing personalized experiences for diverse populations. Over several decades, researchers have developed and studied new methodologies and research practices to facilitate building an understanding of diverse users’ experiences—namely for “knowing the user.” For instance, Battarbee and Koskinen [6] identified three broad approaches to demonstrating user experience in HCI: (1) measuring—using only measurable aspects of user experience to understand and improve, (2) empathic—building a rich understanding of people’s holistic lives like their experiences, dreams, expectations, and life contexts, and (3) pragmatic—focusing on the embodied nature of experience and interaction.

In that line of work, Suri [65] and Mattelmäki and Battarbee [48] foregrounded the importance of empathic approaches in interaction design and conceptualized design empathy for designing for personal experiences and private contexts of users. For instance, Mattelmäki and Battarbee [48] defined design empathy as:

> ...a personal connection between designer and user that facilitates seeing and understanding users from their own position and perspective and as people with feelings rather than test subjects. [48]

While many HCI frameworks ask designers to imagine themselves in users’ shoes, Kouprie and Visser [37] suggested “understanding users from designers’ own position” and introduced a four-phase framework illustrating empathy as a designer’s conscious act of stepping in and out of users’ lives: entering into the user’s world, wandering around in the user’s world, achieving emotional resonance and meaning, and leaving the user’s world to use that experience to inform design. They also delineated the differences between taking users’ perspectives through the psychological concepts of “becoming” (becoming the empathic) and “staying-beside” (staying beside the empathet). Here, “becoming” argues for diminishing any barrier between the designer and the user, but “staying beside” advocates for keeping the barrier when observing the user in the user’s environment. Thus, “being beside” the user is important because the designer is aware of their limitations and their role to play. In the next section, we discuss building design empathy for people with disabilities, where the distinction of designers’ perspective-taking is a crucial but also delicate matter.
2.2 Developing Design Empathy for Designing Assistive Technology for People with Disabilities

Recent work advocates for building design empathy among designers working for users with disabilities [1, 7, 8]. Accessibility research has attempted to build design empathy by getting designers to step into the user’s shoes. However, technology designers are often unfamiliar with the challenges and lived experiences of people with disabilities. Access to participants is one reason for this; past work shows that it is difficult to recruit participants—such as people with an SCI [33] or people with low vision [46]—for HCI research. People with multiple accessibility needs (e.g., deaf-blind, motor impairment with speech difficulties) are often excluded because accommodating them in a research setting is challenging [64] or because ability-based assumptions unintentionally exclude them through implicit exclusion criteria [33, 46].

In response, accessibility research sometimes adopts disability simulation to facilitate learning about the disabled experience [17] or creating personas [32] to generalize techniques for attending to disabled experiences [7]. These approaches provide some insight into the disabled experience, but often they do not grasp their holistic lived-experience, which diminishes their power and agency, and limits the potential for partnerships between designers and users. Researchers [7, 24] also pointed out that these techniques can lead to the “slipperiness of empathy” [30]—the ways empathy and design thinking can go wrong.

For instance, personas are used in design to help designers keep in mind the perspectives of users, such as their demographics, behaviors, desires, and needs. Persona creation involves building empathy for particular segments of users who possess certain attributes that designers are interested in; however, it often results in a stereotypical view of users that is based on assumptions [12]. Data-driven personas attempt to mitigate this issue by using data to guide persona development; this involves an algorithmic approach wherein personas are made from large amount of online data (e.g., web or social media) [31]. In this approach, users are segmented by various statistical techniques and analytical tools using users’ quantitative data—such as their usage of a specific product or their demographic information—instead of aiming for a more holistic perspective. While on the surface it might seem that the approach we employed in this paper is similar to data-driven personas, they differ along multiple important dimensions. First, our work does not aim to create data-driven personas, but rather to use publicly available social media posts to help students understand perspectives. In contrast to data-driven personas, our approach does not attempt to quantify anything from this source data, nor does it attempt to synthesize the source data for the user.

Unfortunately, the above mentioned empathy-building techniques may generate a negative impact due to the “design savior” complex where designers perceive themselves as “superior” and that they have adequate training and ethical tools to quickly assess and innovate solutions to problems in an unfamiliar domain, like accessibility [29].

In contrast, Bennett and Rosner [7] argue that designing for people with disabilities requires shifting a designer’s thinking outside themselves: “...shift understandings of empathy in design from a position that rests on the ability [to] put oneself in the other’s shoes to one that foregrounds shared experience and historicity,” similar to the concept of “being-beside” [37]. Inspired by disability activism [15], Bennett and Rosner [7] advocated for adopting techniques for observing users with disabilities as companions and introduced the term “being-with.” Bennett and Rosner [7] also conceptualized the term “being-like,” where designers aim to put themselves in the users’ shoes. The goal of our work is to develop and deploy a new empathy-building learning activity and examine whether it helps shift students’ design thinking processes from “being-like” to “being-with.”

2.3 Teaching Design Empathy for People with Disabilities: Still an Unsolved Challenge in HCI Education

HCI education researchers have provided instructors with different tools to teach students to consider inclusiveness in the design process. For instance, GenderMag [10] can be used to explore instructors’ challenges and required pedagogical content knowledge [21] to teach gender inclusiveness. Similarly, the CIDER [57] technique can be used to teach students to consider their implicit or explicit assumptions before making a design decision. HCI educators have also conducted week-long lectures, projects, and guest lectures to teach students to consider the needs of users with disabilities [55, 62, 68, 74]. While these approaches are tailored to teach inclusive design, teaching design empathy in the HCI classroom remains an unsolved challenge [5, 52].

Some educators have made efforts to teach design empathy in HCI classrooms. Motahar et al. [52] mentioned their experience of using cognitive walkthroughs with persons with disabilities [69], WCAG software development guidelines [70], and video demonstrations of assistive technology [58, 60]. However, many approaches to teaching accessible design do not allow students to develop a holistic understanding of their users. For instance, after conducting a week-long activity unit on accessibility, Ludi et al. [45] found that students had a partial view on disability and the unit did not shift student’s mindset towards designing technology considering the breadth of aspects relevant to people with disabilities. Similarly, Tseng et al. [68] revealed that guest lectures, assignments, and project interventions related to disability fell short of helping students identify the connection between assistive technology and accessibility. Further, our current classroom and academic structures are often not designed to accommodate guest lectures from individuals with disabilities even if instructors want to bring them in [46].

While these methods and techniques are invaluable for taking a first step toward teaching inclusive and accessible design [55, 57], HCI education could benefit from additional directed interventions to help develop students’ empathetic connection with users with disabilities [45, 68, 74].

Therefore, students need a holistic perspective of individuals with disabilities in order to consider accessibility barriers in their designs or conceptualize how assistive technology relates to accessibility. Our work addresses that challenge by creating and evaluating lightweight educational materials for HCI students that employ descriptions of day-to-day challenges and lived experiences of people
with disabilities that were publicly shared on social media platform. Next, we discuss the potential for social media to provide rich insights into the lives of people with disabilities.

2.4 Online Social Spaces Leverage the True Needs of People with Disabilities

People with disabilities use online social spaces for sharing their day-to-day activities and challenges [38, 41, 43] in information seeking [28], health discussions [19], and making connections [66]. Users benefit from these platforms because they are free of physical or social status cues [14] and thus they can make connections easily [23]. Thus, social media is a useful tool that enables social integration [16], and facilitates opportunities for users with disabilities to share their lived-experiences.

Users with disabilities can also leverage online social activities to share their holistic accessibility needs [4, 41, 43]. Li et al. [41] examined YouTube videos made by people with visual impairments to know about their cooking practices and associated technology needs. Li et al. [43] also explored the practices of doing makeup by individuals with visual impairments by analyzing their YouTube videos to understand accessibility barriers. Thus, social media data contains useful information on challenges that people with disabilities encounter. With proper ethical considerations and curations [18], these data might facilitate a para-social connection between technology designers and users and help build design empathy.

3 PHASE 1 METHODS: COLLECTING AND ANALYZING SOCIAL MEDIA DATA

First we scraped data from SCI-specific subreddit groups and grouped them according to the type of life factors (Table 1) people shared. For this paper, we adopt SCI as our application area and use some of those collected posts (curated and rephrased) to create the educational material. Before collecting the social media data, we obtained a non-human subjects study determination from our Institutional Review Board (IRB). In this section, we provide additional background on SCI and our data collection process from Reddit.

3.1 Background: Spinal Cord Injury—an Incident that Results in Disability

SCI is a traumatic event that can happen due to motor vehicle accidents, acts of violence, falls, and sports, resulting in different levels of disabilities: loss of sensation and functional abilities [25, 42] either through paralysis of only legs (paraplegia) or both legs and upper body (tetraplegia). In contrast to other progressive reasons for motor disabilities, an SCI unexpectedly causes motor disabilities that instantly change an individual’s life [40]. The impacts of an SCI are varied between individuals, from imposing little or no limitation to causing minimal motor function [11]. More severe injuries often require a powered wheelchair or other assistive technologies for mobility and the support of caregivers for activities of daily life [11, 54].

Research shows that individuals with an SCI frequently use the internet after sustaining an SCI [22, 27] for gaining health-management knowledge, acquiring self-care information, and making positive changes in their behavior [26, 44]. People with motor impairments also use social media to improve their mental health through seeking support from peers [39]. Thus, social media posts may provide rich information regarding the day-to-day challenges of people’s post-SCI life.

3.2 Data Collection: Creating Post-SCI Life Factors from Reddit

3.2.1 Rationale of Using Reddit Data. To create the list of life factors that are impacted by an SCI, we collected and analyzed publicly available data from reddit.com. Reddit is the seventh most popularly searched website in the United States and the seventeenth worldwide [36]. Further, Reddit facilitates topic-specific subgroups that are publicly accessible [3], and it is well known for fostering engaged communities, particularly for health and sensitive disclosures [2, 13]. In addition, pseudonymity is prioritized in Reddit so users can share and discuss topics without fear of judgement or stigma [13, 34]. Additionally, people mostly use Reddit as a collaborative platform, as it uses collective intelligence to answer questions, find advice on difficult situations, or reach agreement on controversial topics [75]. Further, it is important to note that Reddit is a public, open data source, which makes it more accessible to researchers than other social media platforms, such as Meta or X—formerly Twitter. Thus, we chose Reddit as a data source to acquire a breadth of topics concerning post-SCI life factors for this study.

3.2.2 Reddit Data Collection. We collected and analyzed 960 publicly available subreddit posts created by individuals with an SCI, and identified the life factors they discuss in the SCI-specific subreddit. We used the PRAW model’s subreddit.hot() function to scrape an initial dataset of 1069 posts from two SCI-related Reddit communities, the subreddits r/spinalcordinjuries and r/spinalcordinjury, which was reduced to 960 posts after removing irrelevant posts (e.g., survey links, advertisements), as displayed in Figure 1.

3.2.3 Reddit Data Analysis. The first author, with an undergraduate researcher, performed content analysis on the collected data and identified the high-level topic of the posts (e.g., mobility, treatment, medicine). The coders read each post and tagged the topic of the post (e.g., mobility, transportation, relationship). After analyzing every 200 posts, the coders met to discuss the precision and uniformity of the topic tags; thus, the topic tags were cross-checked and validated several times. Finally, the researchers combined all the topic tags and identified 13 broad categories (see Table 1) of life factors that are impacted by SCIs. Figure 1 describes our overall analysis flow.

We used the life factors and associated posts (rephrased and curated) to create and evaluate a learning activity that was designed to help HCI students better understand the holistic needs of users with SCIs by reading their real experiences from the social media posts (described in Section 4). Using that activity, we address our research question: How can a learning activity based on reading social media posts serve to build students’ design empathy.
for people with disabilities? We provide detail of those methods in the following section.

4 PHASE 2 METHODS: USING POST-SCI LIFE FACTORS FROM SOCIAL MEDIA TO DEVELOP DESIGN EMPATHY AMONG HCI STUDENTS

In this phase, we developed, deployed, and evaluated a learning activity to help develop design empathy in an HCI class, leveraging the social media posts described above. We hoped students would gain new perspectives from reading the social media posts regarding designing for people with SCIs that they may not have previously considered. We viewed this activity as a lightweight method for understanding some of the lived experiences of people with SCIs.

4.1 Defining the Learning Goals

We first defined the learning goals (LG) [71] that we wanted students to understand by the end of the activity with respect to Bennett and Rosner [7]'s commitments of "being-with" (described in 2.2):

LG1: Re-evaluating the designer’s initial understanding about disability through partnership development with the user.
   (a) Identify the limitations of their own perspectives as people who have not lived with the circumstances of the target population.
   (b) Identify elements (emotional, surprising) that could broaden their understanding of the needs of the people they are designing for.

LG2: Knowing about disability is an ongoing attunement rather than an achievement of understanding:
   (a) Recognize that developing design empathy is a continuous, aspirational process.

LG3: Recognizing the asymmetry of the design space:
   (a) Critique the perspective of "being-like" from the lens of "being-with" or "being-connected."
   (b) Explain the pros and cons of using social media data as a lightweight method for understanding users with disabilities.

4.2 Designing the Activity

Once the learning goals were made explicit, we designed a learning activity consisting of four parts: (1) a pre-reading assignment, (2) the social media post readings, (3) an in-class, small-group discussion, and (4) a post-reading assignment to see whether reading the social media posts developed design empathy among the students. We visually display the chronological progression and components of the learning activity in Figure 2.

4.2.1 Creating the Pre- and Post-Reading Assignments. To help students ground their design decisions, we first developed four fictional scenarios involving imaginary people who sustained an SCI (full scenario descriptions can be found in Table 3): (1) planning for a vacation, (2) planning for air travel with a toddler, (3) planning for returning to school, and (4) going grocery shopping. To generate these scenarios, we used the life factor categories described in Section 3.2, but not specific posts. Later, we used sample posts from the categories to develop the reading assignment (see Section 4.2.2). Each scenario was designed to be relatable for the student participants to comprehend, while requiring consideration of various life factors.

Students would be assigned to answer questions about one of the four scenarios, and would be grouped with students who read each of the other three scenarios for the in-class discussion such that all scenarios were represented by one student in each small group.

We then wrote questions for the pre-reading and post-reading portions of the activity using the fictional scenarios. Students would answer three design questions in the pre-reading portion, and four for the post-reading assignment. The first three questions in the post-reading assignment asked the students to revise their pre-reading answers. The fourth question asked them to reflect on their perception of the activity. Table 2 shows our pre- and post-reading questions, along with the learning goal each pre-post question pair aimed to assess.

4.2.2 Adding Relevant Social Media Posts for the Reading Assignment. Among the 13 life-aspects categories we identified from the Reddit posts (see Section 3.2), we selected nine categories that we felt were most relevant to our fictional scenarios (Table 3): self-care, transportation, leisure activities, assistance, activities of daily living (ADL), relationships, mental health, professional activities, and health problems. We wanted to expose students to a variety of life factors, while being mindful of the time required to complete the assignment. Additionally, we wanted to explore whether students could find value in posts related to other scenarios that were brought up in their small-group discussions, but that they had not read themselves. However, we also thought that having students read some of the same posts as their other group members could be helpful for initiating discussion by having some common ground. With all of these considerations in mind, we designed the reading groups such that each student would read four categories of posts: one category (self-care) was read by all students, two other categories would also be read by one other student in their small-group, and one category was unique to each student in the discussion group. The assigned reading categories for each scenario are detailed in Table 3.

The first author then handpicked five to six sample Reddit posts for each category. Posts were chosen that detailed the poster’s lived-experiences (physical ability, challenges they are facing, or support they are seeking) to some extent. We then selected two to three posts for each category, ensuring the chosen posts were relevant to the scenario and would be understandable to students either as a standalone post or with a brief explanation of potentially unfamiliar terms or concepts brought up in the post. The only exception was the “self-care” category, which had 5 posts associated with it and was part of the assignment for all scenarios.

4.2.3 Ethical Considerations. We did not directly interact with the users of this subreddit groups while collecting data on Reddit. We consulted with our Institutional Review Board (IRB), and they ultimately determined that the data collected in this study did not meet the criteria to be considered a human subjects study. Despite
### Table 1: 13 life factors that are affected by the transition a person goes through after sustaining a Spinal Cord Injury.

<table>
<thead>
<tr>
<th>Life factor Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Health problem</td>
<td>Treatment: Diagnosis, symptoms, feedback of treatments, frustration with treatment Finding physicians: Finding SCI specialists, communication and visiting physicians Medication: Side-effects, doses, and alternatives of medicines, availability of medicine</td>
</tr>
<tr>
<td>2. New self-care</td>
<td>Bladder management: Chronic UTI, catheterization, bladder control Pain management: Managing chronic/ sudden and severe pain, spasticity, muscle spasms Exercise/ physical activity: Specific exercises for non/less functional body parts Bowel management: Using ostomy bag, managing bowel movement Pressure relief (PR): Performing PR every 20 minutes, examining skin Sitting behavior and transfer: Maintaining sitting posture, WC to bed Diet: Easily digestible diet, water, concern about foods Respiratory management: Ventilation, managing breathing control</td>
</tr>
<tr>
<td>3. Functional Ability</td>
<td>Mobility: Depending on mobility assistive tools, challenges with assistive tools Motor functions: Starting walking, standing, regaining muscle strength Sensation: Gaining back sensation, Newly developed sensation, sudden numbness</td>
</tr>
<tr>
<td>4. Mental Health</td>
<td>Positivity: Self-journaling, hope, gratitude Frustration: Frustration, lack of motivation Suicidal: No meaning of life, voluntary assisted dying, suicidal thoughts</td>
</tr>
<tr>
<td>5. Sexual Function</td>
<td>Sexual function: Genital sensation, adaptive devices Female re-productivity: Pregnancy, menopause, menstruation</td>
</tr>
<tr>
<td>7. Relationship</td>
<td>Social connection: Connection with people with similar injury, support group Family members: Relationship with partner, parents, siblings Dating: Finding a new partner, communication Parenting: Parenting while in a wheelchair</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>Travelling: Rental cars, ride share, self-care during travelling Driving: Hand control driving, driving with wheelchair Flying: Boarding an airplane with mobility assistive tools, self-care during flight</td>
</tr>
<tr>
<td>10. Activities of Daily Life (ADL)</td>
<td>Dressing up: Easily wearable clothes, changing clothes, hairstyle Cooking: Cooking tools, accessible kitchen surfaces Other daily tasks: Daily life work</td>
</tr>
<tr>
<td>11. Professional activities</td>
<td>Work: getting into work, preparing for work School: Getting back to school, completing courses</td>
</tr>
<tr>
<td>13. Accommodation</td>
<td>Accommodation: Rehab, finding accessible housing/hotel</td>
</tr>
</tbody>
</table>
Table 2: Pre-reading and post-reading assignment questions provided to the students, along with the learning goal associated with each question (from Section 4.1). We evaluated student responses by looking at the changes from the pre-reading question to the corresponding post-reading question.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Questions Provided to the Students on Their Respective Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Reading Questions</td>
<td>1. What potential challenges could [the imaginary person] face during this [given scenario]?</td>
</tr>
<tr>
<td></td>
<td>2. Imagine you are on a design team that wants to improve current technologies (or create new ones) for people like [the imaginary person]. If you could use [the person's] chair for a day, what are some challenges you think you would encounter?</td>
</tr>
<tr>
<td></td>
<td>3. Your design team is considering developing a mobile app to help people like [the person's] to plan [an activity in the given scenario]. What features do you think would be important to include in the app?</td>
</tr>
<tr>
<td>Post-Reading Questions</td>
<td>1. Can you think of any more challenges that the person mentioned in the scenario might face? (LG1)</td>
</tr>
<tr>
<td></td>
<td>2. What additional challenges would someone like the person from the scenario face that being in the wheelchair for a day would not allow you to understand? (LG3)</td>
</tr>
<tr>
<td></td>
<td>3. What additional features do you think would be important to include in the app mentioned in question 3 of the pre-reading assignment? (LG1)</td>
</tr>
<tr>
<td></td>
<td>4. Please reflect on your experience reading the social media posts and discussing them with your group.</td>
</tr>
</tbody>
</table>

This, we recognized that there were potential privacy and ethical concerns with this study. We looked to guidance by Fiesler and Proferes [18] regarding using the publicly shared posts of a specific online community, and took the following steps to curate the posts:

1. We did not collect any additional profile information or information beyond the specific post including their comments in other posts or activities on other subreddits,
2. All posts were paraphrased [9, 51] and completely anonymized so that the post cannot be easily traceable by a search [9, 51],
3. We omitted any potentially identifiable information such as location, age, or year of injury,
4. Readings that differed across scenarios were edited to ensure they were all relatively similar in length.

4.2.4 Designing the Discussion Prompts. Our research team then drafted prompts for the class-discussion portion, in which students would be grouped with peers with different pre-reading assignment scenarios. This format would allow students to exchange views on a variety of life-aspect post readings and scenarios, beyond their assigned one. Table 4 shows the discussion prompts.

4.3 Deploying the Activity

We deployed the learning activity in a university-level HCI course on ubiquitous computing and assistive technology. We aimed to evaluate whether this effort could shift students’ design thinking processes and help build design empathy for people with an SCI.

4.3.1 Description of the Class. The class, instructed by one of the authors of this paper, consisted of 12 students (a mix of both undergraduate and graduate students). Ten of the twelve students had some prior knowledge of HCI concepts, and methods like contextual-inquiry and interviews. The course met twice a week, with two to three HCI readings on accessibility research (e.g., papers from CHI, ASSETS, IMWUT) assigned per class meeting. These readings provided students with some background of different types of disabilities and ongoing research on assistive technologies.

4.3.2 Deployment. The assignment was assigned during week 11–12 of the 15-week semester. For the day of the discussion, there were no other readings assigned to the class so that they would have ample time to dedicate to this assignment. The components of the learning activity happened over the course of one week. First, the individual scenarios and pre-reading questions were released to the students. Immediately after the submission of pre-reading assignment, each student was given access to their social media posts to read. Students were given four days to complete the pre-reading assignment and to read the posts. On the fifth day, students were divided into groups of four to participate in an 80-minute class discussion. Groups consisted of one student assigned to each of the fictional scenarios (Table 3) from the pre-reading assignment (and
Table 3: The mapping of the imaginary scenarios with the life-factor groups for the associated reading assignment. Students were provided the reading assignment with an anonymous identifier for the group names (e.g., Group A etc.), not the title of the life-factors, to give students the opportunity to consider what each reading group was about (discussion prompt 2, Table 4).

<table>
<thead>
<tr>
<th>Fictional Scenarios</th>
<th>Reading Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scenario 1: Planning a Vacation - Ali</strong></td>
<td>Self-care, Transportation, Leaside activities, Assistance</td>
</tr>
<tr>
<td>Ali is a college student who sustained a traumatic spinal cord injury, two years ago. He now has less functionality in his arms and wrists, and in his lower body, therefore he uses a power wheelchair. With the limited functionality in his hands, Ali can control the wheelchair but cannot use the wheelchair’s touchscreen. Ali is planning to fly to Florida for vacation during his upcoming spring break.</td>
<td></td>
</tr>
<tr>
<td><strong>Scenario 2: Planning a Flight - Nancy</strong></td>
<td>Self-care, Transportation, Activities of daily life, Relationship</td>
</tr>
<tr>
<td>Nancy has a three year old toddler, Nina. Nancy sustained a traumatic spinal cord injury six months back. She has lower body impairment and she uses a manual wheelchair. Next Friday, Nancy will be flying to Atlanta from New York City with Nina to visit her family.</td>
<td></td>
</tr>
<tr>
<td><strong>Scenario 3: Returning to College - Lia</strong></td>
<td>Self-care, Activities of daily life, Mental health, Professional activities</td>
</tr>
<tr>
<td>Lia is a college student at an University. After completing her junior year, she was in a terrible car crash at the beginning of the summer and sustained a traumatic SCI. In addition to a lower body impairment, she also now has less functionality in her fingers. After three months of rehabilitation training, now she can live independently, using her power wheelchair. She can use her fingers to move the wheelchair joystick, however, she cannot use the touchscreen or mouse on her computer or phone. After taking the fall semester off to recover, Lia is planning to enroll for the spring semester and planning to enroll for the spring semester and make progress toward finishing her degree.</td>
<td></td>
</tr>
<tr>
<td><strong>Scenario 4: Grocery Shopping - Ravi</strong></td>
<td>Self-care, Health Problem, Assistance, Mental health</td>
</tr>
<tr>
<td>Ravi is a software engineer who works for a software company from home. Ravi had an accident while skiing last year and sustained a traumatic SCI, resulting in impairments in his upper and lower body. Ravi can move his arms but can barely use his fingers. After six months of rehabilitation training, he started living independently again. Now Ravi uses a power wheelchair. Ravi can use his wrist to move the wheelchair joystick; however, he cannot grasp anything with his fingers. Ravi lives alone. He likes grocery shopping because it is the only time he gets out of his home.</td>
<td></td>
</tr>
</tbody>
</table>

associated social media post readings). One of the researchers (non-instructor) joined each group to take notes. Students first discussed each discussion prompt within the group (Table 4), then joined in a class-level discussion anchored by the instructor.

The post-reading questions were released after the discussion session (Table 2). There were four questions: the first three questions asked students to include the additional perspectives (if any) on their pre-reading assignment answers—stemmed from the reading assignment and discussion session. The last question asked the students to reflect on the overall learning activity. Students were given two days to complete the post-reading assignment.

4.3.3 Consent Process and Ethical Considerations. Our study process and materials were approved by our university IRB prior to the deployment. After finishing the activity deployment (pre and post-reading assignments), the non-instructor researchers took written consents from the students to use their pre- and post- answers and synopsis of their discussions. Participation in the study was voluntary, and students had the option of opting out. Our goal was to minimize the likelihood that students would feel coerced into signing the consent form by the instructor. Notably, the instructor-researcher was not present during the consent process to ensure that students were not under pressure to participate and that consent forms were signed voluntarily. All 12 students consented us to use their activity materials for analysis. After collecting consent, the non-instructor researchers collected test responses from the instructor. Then, the non-instructor researchers removed the identifying information from the responses, and placed them in the IRB approved shared folder for all researchers’ access.

4.4 Data Analysis

The first two authors worked collaboratively to analyze the data to develop themes from student responses and to evaluate whether students had accomplished our learning goals (Section 4.1).
Table 4: Discussion prompts provided to the students during the class discussion, along with learning goals that each discussion prompt aimed to evaluate (from Section 4.1).

<table>
<thead>
<tr>
<th>Discussion Prompt</th>
<th>Learning Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What did you learn from the social media posts you read that was surprising or interesting to you?</td>
<td>LG1</td>
</tr>
<tr>
<td>2. Each person in the group had posts related to different life facets. Share which groups of posts you read, and what was important about each group.</td>
<td>LG1</td>
</tr>
<tr>
<td>3. Consider your reading of the posts as a lightweight HCI method for gathering data about a target user population. What did you learn from this method? What are the strengths and weaknesses of this method?</td>
<td>LG3</td>
</tr>
<tr>
<td>4. How can you apply what you learned from these posts and this discussion to your scenario from Part 1?</td>
<td>LG2</td>
</tr>
</tbody>
</table>

and "engagement of student." Finally, through several more rounds of iteration, we clustered the groups into three broad themes: (1) students’ emotional reactions after reading the posts, (2) more learning through the discussions, and (3) students’ reflection on the learning activity. We report them in detail in the findings section.

4.4.2 Pre- and Post-Reading Assignment Data. We analyzed changes in students’ thought processes after the reading and discussion. We first matched students’ answers on the pre-reading assignment (questions 1–3) to their corresponding answers on the post-reading assignment (questions 1–3), and coded any new challenges students mentioned in their answers, along with additional features they identified for their design solution. The first and the second author carried out this phase of analysis together, discussed repeatedly, and finally made two broad groups: recognizing challenges that were previously unknown, and perspectives that cannot be captured by imitating the disabled experience.

For question four of the post-reading assignment, the first and second authors individually open-coded each answer in separate spreadsheets. The coders applied multiple codes for each answer when necessary. Later, both coders compared their coding, then discussed, consolidated, and finalized the codes. Initially, we had 94 consolidated codes, such as “people with disabilities are isolated and lonely,” “trivial things are major obstacles for independence,” “easy navigation facility in the airport,” and “cascading effect of problems.” Then, we grouped the codes into 10 code groups, including “discussion helped to broaden perspectives,” “effective starting point,” and “empathetic growth.” Finally, we grouped the codes into three themes: (1) factors that had an accurate sense of empathy, (2) students’ reflection on their design empathy growth or learning, and (3) overall reflection on the activity.

5 FINDINGS

We first present findings from the class discussion, and then the pre-/post-reading assignments. Overall, students engaged well with the activities: all students present in class participated in the small-group discussions, and all students submitted substantive responses to the pre-/post-questions.

5.1 Class Discussion: Connecting the Threads

During the discussion session, students shared important points from the posts they read, and made connections between posts they had read and posts that others had read. Students also spontaneously reflected on how the posts had changed their thinking. Discussions focused on the life experiences of the authors of the posts and students’ self-reflections, but students also added suggestions for assistive technology design. We organize the discussion themes by learning goal.

5.1.1 Identifying Limitations of their own Perspectives, and Identifying Emotional Elements to Broaden their Understanding (LG1a and LG1b). Students’ responses to all four discussion prompts reflected on life facets they hadn’t previously considered, and on emotional elements in the posts. When sharing ideas that were “surprising,” “interesting,” or “important,” (in response to the first and second discussion prompts) students across all discussion groups noted that they did not consider complexities like exercising from a wheelchair and using a catheter for bladder care. Some posts that highlighted students’ limited perspectives were also emotionally charged—students were incised that airport security confiscated a poster’s cane, and brought this up in the whole-class discussion. On a deeper emotional level, in both the small-group and whole-class discussions, students were shocked by level of disruption to the posters’ jobs, social lives, and families. In particular, students commented on partners and spouses leaving, and the mental health challenges of trying to get used to a new set of abilities while struggling with relationships and loneliness. Students also reflected on the emotional impact the posts had on them, with one saying “these things are very hard to read.” Another student was visibly frustrated at the catch-22’s involved in self-care: posts described the anxiety and risk of using catheters in unhygienic public restrooms, but not emptying the bladder is also dangerous; injuries make people reliant on wheelchairs, but posts raise concerns about the health risks of staying sedentary. Students responded emotionally not only to the factors of posters’ lives that were different from their own, but also to factors that were the same. In class discussion, students brought up the posters’ use of social media to search for “normalcy,” such as getting advice on going out to drink a beer with friends (given the complexities of bladder management).

In response to the third discussion prompt (reflecting on the method), two student groups acknowledged that reading the posts brought up issues that they had never considered before, forcing them to recognize their own limitations. Another student group noted the emotional impact of the posts as a strength of the method, describing them as “raw” in the whole-class discussion. For the fourth discussion prompt (applying what they learned to their
scenario from the pre-reading assignment), students commented that they had initially focused on the mobility impairments in isolation, without thinking about the user holistically. For example, students with the grocery shopping scenario had not considered using the bathroom at the store, chronic pain, or the emotional aspects of grocery shopping as an outing: students with the college student scenario had considered accessibility of classrooms, but not the complexities of full participation, such as writing out calculus problems with limited finger dexterity, or the mental health strain of being excluded from social events. One student explained that during the pre-reading assignment he had tried to imagine himself as the user, but reading the posts made him realize how much he didn’t understand.

5.1.2 Recognizing that Developing Design Empathy is a Continuous, Aspirational Process (LG2a). While students reflected during the discussion that they had learned a lot from the posts, none of them considered their knowledge to be complete. All students characterized their readings as useful starting points for generating additional questions. Some students started this process within their discussion groups: considering a post about limited finger dexterity in the context of closing a zipper, students in one discussion group wondered about rotating packaged foods to read the nutrition facts, or pressing elevator buttons. Students in another group related the posts to systemic issues, such as how the opioid epidemic in the US may have led to medication restrictions resulting in additional barriers for the posters to access pain relief. These students also considered how an SCI would affect course scheduling for a college student, and how map applications could estimate times needed to go between classes, or help the student navigate to accessible bathrooms. Eventually, the students questioned why buildings weren’t more accessible in the first place, and if classes could be scheduled such that students would not need to rush between them.

5.1.3 Explaining the Pros and Cons of the Activity (LG3a and LG3b). Through the third discussion prompt students discussed the strengths and weaknesses of the reading activity. All groups noted the benefit of raw, authentic data from real people. Two groups mentioned the usefulness of quickly getting a breadth of perspectives. In the whole-class discussion, students raised several points: The anonymity of Reddit users may make it easier for them to share sensitive information, but may not provide the context necessary to evaluate their experiences; posts are useful for understanding problems, but not for anticipating responses to possible solutions; the curated posts were valuable, but students could not tell how many non-informative posts had been filtered out. Students also compared the reading activity with interview methods: interviews might include irrelevant questions, whereas the posts reflect issues that are important to the posters. However, interviews allow for follow-up questions. Students proposed that this method of reading social media posts could be complementary to more traditional methods and could help designers plan more useful interview questions.

5.2 Reflection through Comparing Pre- and Post-reading Assignment: Outside and Beyond the Box

We examined changes in students’ thinking by comparing their answers on the pre- and post-reading assignments and by examining their post-reading assignment’s self-reflections. Specifically, we looked for consideration of: additional factors of the disability beyond the mobility impairment, the broader context of the user’s life, and factors of the user’s life experience that cannot be anticipated by a student imagining themselves in the user’s position. Additionally, we looked for emotional impact on the students because having an emotional response is evidence of empathy.

5.2.1 Recognizing Challenges that were Previously Unknown (LG1a). Students illustrated their recognition of new challenges in their post-reading assignment answers. Students pointed out the challenges that they weren’t able to think of when answering the pre-reading assignment questions. For instance, for Ravi’s grocery shopping scenario, students initially mentioned wheelchair and accessibility-related challenges in their pre-reading assignment answers, including narrow aisles for wheelchair movement, challenges with grocery loading/unloading, difficulty picking stuff from high or bottom shelves, and difficulty putting groceries on the conveyor belt. However, in the post-reading assignment answers, they exhibited broader perspectives on a person’s lived experience in a wheelchair. They indicated the challenges of finding a clean bathroom in the grocery store for catheterization, being stigmatized in the wheelchair, trivial tasks being burdensome, and lacking autonomy. Here is an example of a student’s post-reading assignment answer reflecting that recognition:

Another challenge I thought of was social stigma around shopping with an accessibility device. In the group discussion, we talked about how having a bulky/abnormal device might draw unwanted attention. Ravi might not want someone starting or people to treat him differently when grocery shopping. From the posts, I saw a lot of mental problems that can arise when one loses mobility. Although not constrained to just grocery shopping, I could see how [what] was once a fun activity could become burdensome for Ravi as tasks they used to do in seconds take minutes to perform.

Similarly, for the scenario of Lia returning to college, students stated several challenges in the pre-reading assignment, including campus accessibility (navigating around campus, classroom accommodations), completing school work, making friends, dating, attending social events, campus employment, and loneliness. Although students identified many life factors beyond accessibility in their pre-reading assignment answers, they still learned about more challenges from the learning activity beyond and above their previous thinking. Here is a snippet of one student’s post-reading assignment answer:

When I was answering this question [for the pre-reading assignment], I didn’t really think about cooking/eating, but that is a challenge that Lia would face that was brought up in our group discussion... I think that eating with reduced abilities is a challenge that I hadn’t even
thought about in this class until now, and yet its one of the most important things that needs to get done multiple times a day.

For Ali’s vacation planning scenario, students identified the challenges of accessing flights, navigating places to visit, and finding accessible hotels and transportation. However, on the post-reading assignment, students thought more broadly about possible challenges like doing catheterizations frequently, finding clean bathrooms, the lack of space to perform pressure reliefs in the plane, the lack of support from the airlines for transporting the wheelchair, social perception, stigma, and the risk of getting sick during the vacation. One student mentioned that they did not think about the mental toll of being in the wheelchair and negative interactions as a consequence during the vacation previously:

...a new challenge I hadn’t considered was the idea surrounding the social perception of their wheelchair. I think this is a particular challenge given the context of it being a spring break trip to Florida.

For the scenario of Nancy planning for a flight with her toddler, students’ pre-reading assignment responses frequently mentioned the accessibility challenges in the airport, in the airplane, transportation of luggage, and care for the toddler. On the post-reading assignment, students brought up challenges regarding anxiety, non-cooperation of the airline staff, seating and using a bathroom in the plane, narrow space for mobility, and hazards of carrying assistive devices in the plane.

The first challenge I can think of is anxiety... Reading the posts I felt that the sheer anxiety due to just thinking about how the journey is going to be is so valid. Such a crippling effect it has on the individuals mental health which the abled-[bodied] people don’t really consider.

Thus, through the post-reading assignment, students demonstrated their capability of recognizing a broader spectrum of challenges a person with an SCI may encounter beyond the physical impairments.

5.2.2 Perspectives are not Well Captured in Imitation: “Be-Like” vs. “Be-With” (LG3a). On the pre-reading assignment, we asked students what they might learn from using a wheelchair for a day. On the post-reading assignment, we asked: What additional challenges would someone like the person from the scenario face that being in the wheelchair for a day would not allow you to understand? These questions were intended to evaluate whether students could identify the differences between imitating a disabled experience and the true experience of having a disability. In their pre-reading assignment answers, students expressed their concerns about operating the wheelchair and navigating with it. For instance, for Lia’s return to college scenario, students listed the possible difficulties related to getting around the campus: maneuvering through narrow doorways or around crowded areas, adjusting to different flooring materials, mental and physical fatigue, stigma, and the challenges of navigating in different weather conditions. On the post-reading assignment, students considered a broader set of needs, such as balancing study and the mental and physical fatigue that this injury results in, balancing focus between studies and self care activities (e.g., pressure relief), relationship tolls, and managing medical appointments. Further, students identified that using a wheelchair for a short time will not give them a holistic understanding of a person who has sustained an SCI and needs a wheelchair for life.

For Nancy’s flight scenario, students on the pre-reading assignment could imagine several accessibility challenges assuming themselves in Nancy’s shoes. On the post-reading assignment, students elaborated on relationship challenges with the toddler, mental fatigue and self-care issues. Most importantly, students understood that their assumed experience would be very different from Nancy’s:

...the first one is anxiety. I can not comprehend it because I know in the worst scenario, I would just get up from the wheelchair. The second would be having to be dependent on other people. For me, it would just be a day of asking people to help me out. But for Nancy it could be many times...

On the post-reading assignment, students expressed similar ideas for the scenario of Ali planning a vacation, identifying the differences between the mimicked experience and true experience of a disability:

I don’t think I could understand the mental battle going on. One day in a wheelchair is not the same as viewing a lifetime of change.

Overall, the learning activity revealed many more life factors than what students imagined in a “being-like” model. Indeed, students could identify drawbacks of the “being-like” model after considering the nuances of real-life challenges:

...This [toll in mental health] was something that I knew in theory would be an issue, but became apparent after hearing about the posts surrounding this topic from my [discussion] group... These experiences are not achievable by an individual in a day by being in a wheelchair.

Another student phrases their critique more explicitly:

...the experience of reading the posts was very powerful, especially after trying to put myself in the shoes of a wheelchair user. It hit home how ineffective of a method it is for an abled person to “imagine” the obstacles a disabled person might face. After reading just a few posts my whole outlook on the scenario completely shifted, I can only imagine how much it would change to interview a disabled person more in-depth on the topic.

5.2.3 Emotional Impacts on Students: Building Design Empathy (LG1b). Through the reflection answers, students highlighted five life factors from the reading assignment and discussion that struck them emotionally: challenges to accomplishing trivial things that impede independence, tolls on mental health, impacts on relationships, social stigma, and needs of accessible and inclusive environments. Those emotional responses are important for developing design empathy. Students also shared the emotional impact of learning about the challenges described in the social media posts:

I struggled reading it, very emotional, cried. ... Hard to balance discussing challenges of disabilities while also not reducing people to their disabilities as a result.
5.2.4 Activity Reflection: Learning Continues. Students also reflected on the overall reading and discussion activity. They mentioned this activity as a good starting point to gain very high level overview that could prime a designer for the next steps of the study. Particularly, knowing that the posts are from real people helped them to understand the challenges better. We provide example quotes of students in Table 5. Finally, students expressed that making things accessible is not the only requirement, rather, they want to help to make these people’s lives better holistically.

6 DISCUSSION

In this work, we respond to a call from the HCI and accessibility research community to adopt an empathic lens in design for people with disabilities [7]. We created educational material from publicly available social media data of people with disabilities to help build design empathy among HCl students. The rich data of social media interactions often reflects glimpses of users’ lived-experiences by narrating day-to-day challenges and needs [67]. This is our first-ever initiative to categorize those unstructured data and to leverage the narratives as a learning tool for technology designers. While we deployed this method in an HCI classroom to teach about disability, similar initiatives might be taken to help build an empathic connection between novice designers (e.g., a new researcher in a research lab, a new employee in a design team) and other marginalized and underrepresented target user groups.

6.1 Reflecting on Our Learning Activity to Build Design Empathy: the Model of “Being-Connected”

To answer our research question, we evaluated our data in the context of the commitments that Bennett and Rosner [7] laid out for designers following the “be-with” model, where designers would learn about disability experiences through companionship. As such, we propose a model called “be-connected,” considering that designers might learn about disability experiences from social media posts made by individuals with disabilities. Our findings answer the research question by showing how the assignment facilitated students’ learning to: (1) re-evaluate their initial thoughts and understanding regarding a disability experience, (2) acknowledge that learning about disabled experiences is a continuous process, and (3) recognize the asymmetry of the disability experience— it impacts all factors of life. Our results show evidence that reading and discussing the posts broadened the students’ perspectives about the lives of people with disabilities and helped them to apply a “be-with” model. This approach helped us to overcome some of the typical methodological and accessibility challenges that HCI educators encounter when teaching design empathy in the HCI classrooms for historically marginalized populations. In Table 6, we consolidate our findings and map them with our learning goals that stemmed from Bennett and Rosner’s [7] vision of using the “be-with” approach to build design empathy. These findings illuminate exciting opportunities to use social media data as educational material to help students or novice HCI researchers become familiar with and empathize with various user populations.

Overall, our evaluation of students’ pre-reading and post-reading assignment answers showed that students met our learning goals (section 4.1), demonstrating that our “be-connected” approach helped students make empathic connections with intended users. For instance, through this activity, students recognized challenges related to disabilities that they were unfamiliar with. They also experienced their own emotional impacts and could discuss posters’ emotions across multiple facets of their life experiences. Together, these reflections fulfilled our LG1: students’ ability to re-evaluate their initial understanding. Likewise, the evaluation delineates students’ capability of going beyond the specific scenario and continuously learning through transferring the knowledge across scenarios and personal experiences. Students also expressed their awareness of the limits of their own insights. That capability meets our LG2: acknowledging that knowing about disability is an ongoing process. Finally, students showed their understanding of the differences between the “be-like” (mimicking) and the “be-with” (truly observing) approaches, that the disability experience is broader than what someone may experience by mimicking. They also realized that technology is unlikely to be able to address all of the challenges that the social media posts depicted. This understanding of the design space’s complexity fulfilled our LG3: recognizing the asymmetry of the design space.

6.2 Using Social Media Data to Better Understand Disability Experiences: A Non-Reductionist Perspective

Usage of assistive technology does not happen in a social vacuum [63]. Based on our findings, we reflect on the structure of social media data that contemplates a non-reductionist critical realism perspective described by Frauenberger [20], which acknowledges that life with disability is multilayered and complex. According to Frauenberger [20], designing assistive technology should consider more than just compensating functional limitations or removing social barriers. Instead, it should work beyond the purpose of accomplishing tasks (e.g., navigation, accessing information, etc.) with a clear understanding of how it will interact with all levels of the disabled experience. Considering the challenges of “in the wild” exploration and not depending on a single person’s perspective, the unstructured form of social media data of thousands of people’s stories may help to grasp the breadth of disability facets. While we acknowledge that there are possibilities of data bias due to lack of proper background context, too much personal opinion of the poster, or a biased sample of posters (section 5.1.3), these experiences are still valuable and can help avoid making design decisions on distorted or shallow perceptions [52, 56].

Further, developing educational material with such diverse data can help future HCI researchers know more about their target population’s challenges so that they do not need to reinvent the wheel. These social media posts reflect honest and organic reactions of real people, as identified by the students in the activity. When posting about life factors anonymously, users are less likely to perceive or be impacted by power differentials that can occur between a researcher and a participant [72], particularly when the participant is from a disabled population or is otherwise marginalized.

Another question is whether other kinds of user-generated online content—videos from platforms like YouTube and TikTok—might be an effective tool for accomplishing this same objective of
teaching design empathy in HCI classrooms. Through our experiences, we think it is worth exploring these avenues further, as they may complement this work well. However, it is also important to note the differences in the type of content one is likely to find in these different venues. In particular, content posted on Reddit is often seeking informational or social support, where content posted on YouTube is often intended to provide information [61], such as how-to videos or to share one’s experience. Similarly, TikTok videos are less likely to be about information seeking as much as entertainment or information sharing [49]. Thus, they would provide different, but perhaps complementary perspectives in comparison to Reddit data. Further, accessibility researchers could surface similar social media data of people with disabilities. This approach might leverage nuances about their day-to-day challenges, which is invaluable for designers who are unaware of them. Thus, we recommend more research exploration using the rich social media data of people with disabilities. However, it is important to emphasize that the data must be properly rephrased, and to consider ethical factors as we aimed to do in this work.

### 6.3 HCI Education Tool for Building Design Empathy for People with Disabilities

HCI education researchers acknowledge the importance of teaching diversity and inclusion [55–57, 74] in the classroom and having a connection with a diverse population to improve the designs students produce. However, there are challenges to facilitate easier access and participation of the target population and to more accurately depict the breadth of diverse lived experiences, if the students are not well-informed about disability. Although HCI education literature has started to explore possible ways to make connections between students and real users [52], guidelines (rubrics, evaluation methods) are not well explored yet. This is our first effort to use social media data of people with disabilities as educational material to achieve the goal. Notably, students had already spent nearly three months studying assistive technology, accessibility, and disability through the course before the assignment was delivered. Still, students’ thought processes developed over the course of the assignment and became more empathetic toward people with disabilities. Additionally, this activity helped the students to see a more accurate view of people’s lives, which they knew only theoretically before. Thus, such efforts can be adopted as a companion to theoretical learning to understand how those insights might be applied in real-world contexts.

Finally, beyond accessibility, this kind of approach might help to better understand people from other marginalized communities or people from geographically distributed places and ethnicities to inform technology design. Overall, we observed that using social media data as educational material can help HCI students empathize with the user population and we believe it can be a useful companion method in the HCI accessibility researcher’s toolbox.

### 6.4 Limitations

We used publicly available social media data as a reading assignment to build design empathy among HCI students. However, we have yet to deploy this learning activity in other large, or introductory HCI courses. Different courses might require additional support for this assignment to be effective, such as an initial lecture on accessibility fundamentals and concepts like ableism and design empathy. This remains an open question and is an opportunity for future work. In addition, while the posts that we used had some sad valence, there
were also posts with hope and positivity in the original dataset. Including some of those positive posts in the reading for future work might help students develop a more holistic understanding of the lives of people with disabilities, including hopeful and positive aspects. Further and most importantly, we do not advocate for our approach to be a substitute for including the target users in the design process or in the classroom; there is no substitute for “being-with” the user. In addition, we acknowledge that different levels of technology literacy, access to social media platforms, and openness to sharing personal challenges on such platforms might exclude a part of the target population. However, we hope that our approach can still be valuable in helping to develop design empathy in a feasible and scalable way. Finally, this method is not all-encompassing, and even the data presented here indicates some shortcomings in what students learned. For example, in their post-reflections some students used stigmatizing language such as “bound to a wheelchair”, or “crippling effect”. Future research should explore additional efforts beyond “being connected” and “being with” to teach the cultural competency regarding disability to the novice designers.

7 CONCLUSION

In this paper, we report on our effort to build design empathy among HCI students using curated and anonymized social media data as educational material. These data stemmed from a disability-specific (spinal cord injury) social media space. We used those posts, made by real people, to conceptualize “being-connected,” a process of developing design empathy among HCI students when they cannot “be-with” [7] or have direct interaction with the intended users. We deployed this educational material in an advanced HCI class with 12 students and qualitatively evaluated how their design thinking perspectives changed by analyzing the class discussion and their pre-and post-reading assignments. Our analysis shows that students realized their pre-perspectives were limited and had shortcomings, that they understood the limits of their understanding and the importance of exploring more about the disability space, and that they could develop empathic connections with the intended users. While there is truly no replacement for “being-with,” student experiences in this work suggest that our approach of leveraging social media posts to facilitate “being-connected” may be a practical and effective way to help build design empathy in situations where students’ access to the population of intended users is infeasible.

ACKNOWLEDGMENTS

We thank our participants — the students in our class — for their time and support of our research efforts. We also thank Thomas Kauffman for his contributions to some of the initial analysis of the social media data. Finally, we appreciate the feedback from the anonymous reviewers and our fellow lab mates; they truly helped improve this work. This material is based upon work supported by the National Science Foundation under Grant No. IIS-2146420, and a Google Award for Inclusion Research.

REFERENCES

Toward Building Design Empathy for People with Disabilities


