Chapter 17. Empathy, Access, and Engineering: Empathy Maps in a Disability Studies Course for STEM Students

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Abstract. In this chapter, the authors describe an empathy map assignment in a cross-disciplinary introduction to disability studies course. The course, co-taught by a professor of English and a professor of biomedical engineering, asked students to integrate engineering design skills with human-centered approaches. The chapter includes three lessons about using empathy maps in the classroom: keep maps simple and focused on accessibility, embrace digital communication as a way to interact with users, and emphasize opportunities for enhanced team and cross-disciplinary communication.

Empathy is hard work, but it is a skill well-suited to the classroom. As empathy researcher Brené Brown (2018) argues, "if we can't be learners, we cannot be empathetic" because empathy is intimately linked with curiosity and the ability to make connections (p. 145). In this chapter, we describe three lessons learned by using empathy mapping to teach human-centered design skills in an introduction to disability studies course for STEM students.

Often, STEM students compartmentalize their educational experience, focusing on technical knowledge and design in their major area courses and "soft skills" in their required arts, humanities, and social sciences courses. As Graham Pullin (2011) notes, this separation often extends into design for disability "where teams still tend to come exclusively from clinical and engineering backgrounds, [and] the dominant culture is one of solving problems."

Our introduction to disability studies course, co-taught by a professor of English and a professor of biomedical engineering, asked students to integrate their engineering design skills with human-centered design by focusing on empathy research. This approach allowed the instructors to emphasize the human dimensions of engineering design and highlight the integration of the liberal arts and engineering for which human-centered design is known. For the final project of the course, we asked multidisciplinary teams of students to design and develop a conceptual prototype of a new product for a person with a disability, focused on encouraging full participation

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in life. We wanted to move students from solving a problem (e.g., designing a tool to make it easier for someone with a tremor to put on jewelry) to playfully reimagining an experience. Thus, the design project reinforced a foundational concept of the course—people with disabilities deserve to have full, fun, enjoyable lives.

We introduced students to concepts of design thinking, focused on the role of empathy in the design process (Hess, 2016; Schmitt, 2016). As part of the project, students were required to make empathy maps—a UX tool that encourages a focus on user needs and perception—by talking to real stakeholders and listening to their experiences (Figure 17.1). Students had to talk to at least two potential users of their product as well as other stakeholders, including community organizations and our institution's accessibility coordinator. This research alerted students to challenges like cost, comfort, and the desire for some users to blend in with friends that students might not have otherwise considered.

In designing and refining this assignment, we've learned three lessons about using empathy maps in disability studies and with STEM students more broadly.

1. Keep Empathy Maps Simple and Focused on Accessibility

A Google image search will return several different templates for empathy maps. Some of the most popular examples, including innovation coach Dave Gray's (Gray, Brown, and Macanufo, 2010) original design (Figure 17.2), include sensory experiences that don't make empathy maps accessible for all potential research subjects. For example, categories for "see," "hear," and "say," assert these abilities as the norm and do not align with a disability studies framework.

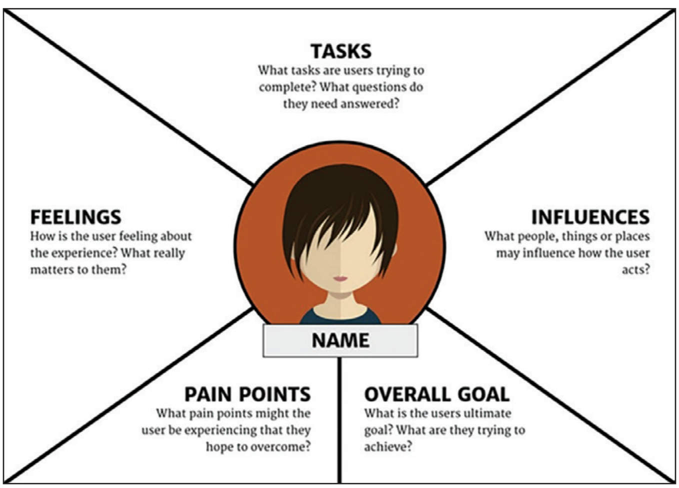

Figure 17.1. Empathy Map Template: Students began with this online template (Smyk, 2017) and added information based on interviews and secondary research. In the completed maps, each section included at least three statements with a superscript that corresponded to a reference list of interview subjects and sources.

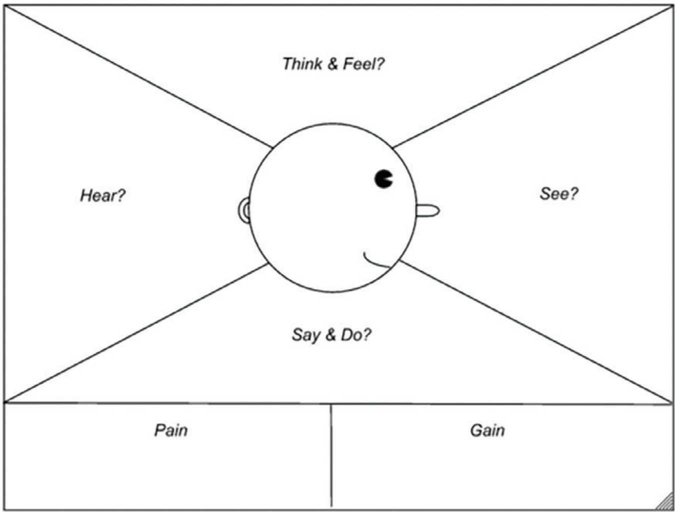

Figure 17.2. Traditional empathy map template that does not account for disability. Note. This empathy map template assumes sensory experiences like sight and hearing are universal and thus was adapted to reflect all potential users. Image from Solutions IQ.

Our students used and modified UX consultant Paul Boag's updated empathy map. Boag (2015) adjusted the original map because he felt it was too generic, not to account for accessibility. However, because Boag's adapted version removes sensory experiences, it is a better starting place for students focused on addressing the needs of diverse users.

We asked students to create empathy maps with three to four categories focused on user goals, perceptions, and challenges. To keep the map focused on user experiences, as opposed to stereotypes or their own assumptions, students used superscripts to link each experience to its source on a separate reference page. Later, when students wrote a rationale for their design, they were required to link every decision to one or more points on their empathy map.

2. Embrace Digital Communication as a Way to Connect with Users

Many students didn't have immediate and personal access to the target audience for their product. On top of that, for many college-age students the idea of calling someone on the phone is just as bad as the idea of not completing an assignment. Student teams turned to resources like podcasts and documentaries to get additional perspectives, but that didn't allow them to fulfill the requirements of speaking to two potential users of their design. The most creative teams used digital communication to meet this challenge. For example, the team that created the empathy map in Figure 17.1 was designing for rock climbers without upper limbs. They joined online forums for climbers with disabilities and chatted with potential users in those forums. They gained valuable insight from these users that was reflected in their maps. In particular, they learned the importance of haptic feedback to users to help them feel safe using the device. In the rationale that accompanied their final design, they described the safety mechanism that locks the climbing hook to the prosthetic:

> The purpose of this mechanism is to provide rotary articulation and locking capabilities, however, as we have learned from our research, these features must give physical feedback to the user in order to be truly functional. The locking mechanism as well as the rotation socket will both "click" when used. With these functions we hope to achieve dynamic adjustment while climbing, which was an issue brought to our attention by [name of climber they spoke to during empathy research].

As this excerpt demonstrates, students were able to connect their empathy research directly to design choices meant to improve the user experience.

3. Empathy Maps Provide a Connection to a User's Experience that Enhances Team Communication, which is Useful Across Disciplines

The empathy map was a simple, easy-to-develop, and easy-to-understand visual that helped novice designers in the disabilities studies course understand and communicate the needs of the audience for their product. Specifically, the empathy maps emerged as an effective way for students to share with the group the research that they had conducted individually. The empathy maps also helped instructors communicate design feedback to students. For example, the empathy map content was populated with short phrases such as "lack of dexterity" or "limited sensory feedback" which could prompt deeper discussions about how a team's design concept addressed the issue. After seeing the direct benefits of improved team communication and linking design requirements to specific empathy map content, empathy maps were introduced as a requirement in a first-year student design course in biomedical engineering. The empathy maps were used to establish common ground among the team members, prioritize user needs, and align design priorities to address the pain points for a team's proposed product. Medical school professionals have also identified empathy maps as framework to improve the communication and empathy levels of medical students (Cairns et al., 2021).

Conclusion

The students in the disabilities studies course received formal instruction on how to develop and incorporate an empathy map into a design project. Most design courses in engineering emphasize the importance of correctly identifying "user needs," but struggle to teach students a coherent framework for capturing and communicating information that sets aside their own assumptions so that they might develop insight beyond a user's "needs" that includes perceptions, emotions, and feelings. The framework presented here introduced and reinforced best practices by treating empathy mapping as an ongoing activity where a successful team must revisit the empathy map as their understanding (of the project and the person) grows and evolves. Once students leave the controlled environment of higher education, they may work on larger cross-functional teams where it is not practical or possible for every member of a team to interact with every potential user. The success of the team working on a human-centered design will depend on the ability of a team to communicate and describe user personas. The empathy map framework will serve as a solid foundation for those conversations. Because they help students design with a user in mind, empathy maps can augment any authentic assessment that students create for an audience. From writing assignments to community action assignments, empathy maps encourage students to think beyond their own experiences and problem solve with a larger context in mind. Students can then create more useful projects and learn how to integrate others' values and experiences into their work.

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