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Empathy Talk with the Visually Impaired in Design Thinking

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Abstract

Empathy – *a core element in Design Thinking* – enables designers to view the world through users' perspective, leading to successful design practices and outcomes. Yet, engineering students tended to prioritize design solutions to satisfy other stakeholders rather than target users. Such misalignment between theory and practice leads to a research question: how today's engineering students generate and are engaged in empathic conversations with users with visual disabilities in user experience (UX) research. Hence, this study aimed at addressing the knowledge gap by analyzing transcripts of interviews administered by engineering students. In addition, transcripts of interviews by one faculty member were included to be compared with the students. The transcripts were coded by using pre-defined themes, including empathic opportunities, opportunity terminators, and empathic responses (naming, understanding, respecting, supporting, and exploring). This study found that the student researchers had a lack of empathic communication skills. Engineering programs should be adequately amended to train and produce engineers who are equipped with empathy and yield effective design solutions to meet user needs. Future research will, thus, focus on designing educational interventions to properly train students to be competent with empathically connecting with participants in Design Thinking.

Keywords

User-Centered Design, Emotional Intelligence, Designer, Participant, Blind, Visual Impairment.

Introduction

Design Thinking is a systematic design process where a designer is engaged in opportunities to elicit user needs, create designs, evaluate prototypes, gather feedback, and refine designs (Brown and Wyatt; Razzouk and Shute). Empathy – one of the most important elements in Design Thinking – is the ability to view the world through another person's perspective, e.g., to see what users see, to feel what users feel, and to experience things as users experience. Empathy in Design Thinking will help designers to gain a deep understanding of challenges the target user group encounters, discover their latent needs, and create solutions that accommodate adequately the target user group (Kouprie and Visser; Smeenk, Sturm and Eggen). Empathy is also necessary for designers working with users with visual disabilities (Kim).

Education of empathy has traditionally been focused on children and adolescent development, but there is a growing attention to students in post-secondary education systems (Hess and Fila; von Unold et al.). For example, Bairaktarova et al. introduced a conceptual framework to integrate empathic design thinking in the engineering curriculum and also empirically conducted empathy-based design practices with over 100 engineering students. They found that the students were able to better understand user needs, resulting in more feasible design solutions.

Yet, there is evidence that engineering students are less likely to conduct user experience research with empathy. Congruence between *belief* of importance of empathic designs and *behavior* of applying empathic design approaches is necessary. However, Guanes et al. observed that engineering students often failed to prioritize design solutions for the target user group although they were aware of importance of applying empathic design approaches. Such misalignment leads us to the research question: *how today's engineering students generate and*

share empathic conversations with users while conducting user experience research.

This study aims to advance understanding of the degree to which engineering students have empathic conversations with users in user experience research. A faculty member who has extensive experience with Design Thinking is also invited to be compared with engineering students.

Methods

This study used the transcripts of interviews that were administered by an undergraduate research assistant, a graduate research assistant, and a faculty member. The undergraduate research assistant was a senior student who took human factors courses and was previously engaged in a human factors research project that aimed to develop a multimedia-based user guide for smartphone users with visual disabilities. The graduate research assistant was a second-year doctoral student who took human factors courses and was previously engaged in several human factors research projects for people with visual disabilities. The faculty member was engaged in multiple research projects over 16 years, aiming to improve the quality of life for people with various visual acuity levels (ranging from normal vision to blindness). The three researchers completed an educational program for the protection of human subjects in research via the Collaborative Institutional Training Initiative (CITI).

This study was based on a *N-of-1* trial approach to produce a large set of data. In 2019, the faculty member conducted interviews with 20 participants (a total of 200 hours). In 2020, the undergraduate and graduate research assistants also did so with seven participants (a total of 70 hours) and 23 participants (a total of 230 hours), respectively. The participants met inclusion criteria: visual impairment/blindness (visual acuity equal to or poor than 20/70), no other sensory impairments, and community-dwelling adults (age 18 or older). The participants were instructed

to share their experiences and challenges associated with vision loss. A semi-structured interview was employed in which a short list of guiding questions were supplemented by follow-up and probing questions, depending on the participants' responses. For example, they were asked to think about how they became visually impaired/blind and how they have performed daily activities at home, workplace, and/or community, which was followed by the question "*What functional challenges have you encountered associated with vision loss?"* They were asked to think about how they were engaged in social interactions with family members, friends, and/or colleagues, which was followed by the question "*What social challenges have you encountered associated with vision loss?"* At that time, all the researchers were not aware that the interview transcripts would be used for this study. Hence, their behaviors were reasonably assumed to be natural.

The transcripts were coded by referring to the codebook of Suchman et al. and the code book of Back et al., The codebook of Suchman et al., helped to code empathic interactions (i.e., empathic *opportunities*, empathic *responses*, and empathic *opportunity terminators*). The empathic opportunity terminator refers to a researcher's statement that immediately follows an empathic opportunity but directs the interview away from the stated emotion. The codebook of Back et al. helped to code "empathic responses" in more detail, by breaking them into *naming, understanding, respecting, supporting,* and *exploring*.

Results

Participants' Expressions of Emotions and Researchers' Responses

Table 1 shows the frequency of cases where *Empathic Opportunity, Empathic Response, and Empathic Opportunity Terminator* occurred. Between- and within-subject data analyses were also presented in the following sections.

Table 1. Frequency of cases on average for empathic opportunities, responses, and terminators.

Participant type	**Empathic opportunity** (Mean ± SD)	**Empathic response** (Mean ± SD)	**Empathic opportunity terminator** (Mean ± SD)
Undergraduate student	5.43 ± 1.51	2.00 ± 1.53	4.86 ± 1.68
Graduate student	5.65 ± 1.67	4.52 ± 2.61	4.52 ± 0.99
Faculty	7.37 ± 3.88	5.95 ± 4.14	2.68 ± 2.60

Between-subject Data Analysis

Empathic Response. A Kruskal-Wallis test found a significant difference in the frequency of Empathic Response between the three researchers, $H(2) = 6.90$, $p = 0.03$. Mann-Whitney tests were used to follow up on the significant finding. The frequency of Empathic Response of the undergraduate student was less than that of the graduate student and the faculty, $U = 31.50$, $r = -0.44$ and $U = 29.5$, $r = -0.42$, respectively.

Empathic Opportunity Terminator. A Kruskal-Wallis test found a significant difference in the frequency of Empathic Opportunity Terminator between the three researchers, $H(2) = 13.57$, $p < 0.01$. Mann-Whitney tests showed that the frequency of Empathic Opportunity Terminator of the faculty member was less than that of both undergraduate and graduate students, $U = 24$, $r = -0.49$ and $U = 85$, $r = -0.53$, respectively.

Within-subject Data Analysis

Undergraduate student. A Friedman's test found a significant difference in the undergraduate student's responses, $\chi^2(2) = 6.09$, $p < 0.05$. Wilcoxon signed-rank tests were used to follow up on the significant finding. The frequency of Empathic Response was less than that of Empathic Opportunity, $z = -2.21$, $p < 0.05$, while the frequency of Empathic Opportunity Terminator was not significantly different from that of Empathic Opportunity, $z = -1.34$, $p = 0.18$.

Graduate student. A Friedman's test found a significant difference in the graduate student's responses, $\chi^2(2) = 9.46$, $p < 0.01$. Wilcoxon signed-rank tests showed that the frequency of Empathic Response was less than that of Empathic Opportunity, $z = -2.14$, $p < 0.05$, but the frequency of Empathic Opportunity Terminator was less than that of Empathic Opportunity, $z = -2.96$, $p = 0.03$.

Faculty. A Friedman's test found a significant difference in the faculty member's responses, $\chi^2(2) = 21.17$, $p = 0.00$. Wilcoxon signed-rank tests showed that the frequency of Empathic Response was less than that of Empathic Opportunity, $z = -2.53$, $p = 0.01$; the frequency of Empathic Opportunity was greater than that of Empathic Opportunity Terminator, $z = -3.38$, $p < 0.01$; and the frequency of Empathic Response was greater than that of Empathic Opportunity Terminator, $z = -2.80$, $p < 0.01$.

Researchers' Empathic Responses in More Detail

The three researchers' empathic responses were broken down into exploring, understanding, naming, respecting, and supporting (see Figure 1). The dominant type of empathic response was "supporting" in the undergraduate student, "understanding" in the graduate student, and "respecting" in the faculty member. Between- and within-subject data analyses were presented in the following sections.

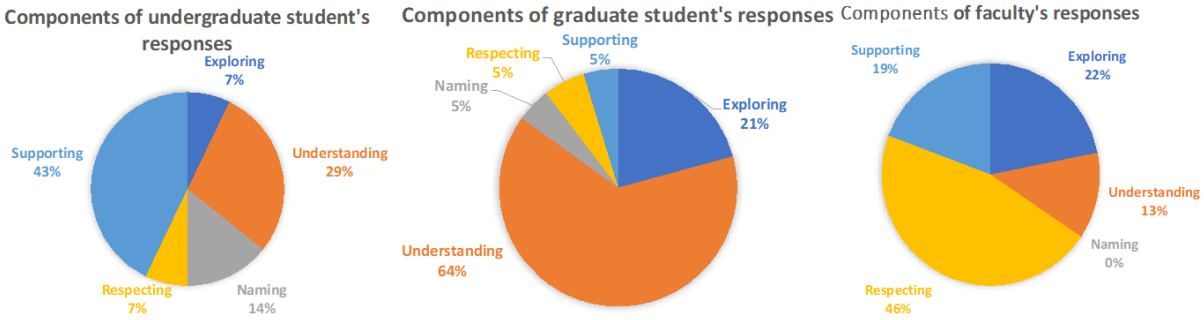

Fig. 1. Different types of empathic responses between the three researchers.

Between-subject Data Analysis

Understanding. A Kruskal-Wallis test found a significant difference in the frequency of *understanding* between the three researchers, $H(2) = 19.78$, $p < 0.01$. Mann-Whitney tests showed that the frequency of *understanding* of the graduate student was greater than that of the undergraduate student, $U = 17.50$, $r = -0.57$ and that of the faculty member, $U = 66$, $r = -0.61$.

Respecting. A Kruskal-Wallis test found a significant difference in the frequency of *respecting* between the three researchers, $H(2) = 18.08$, $p < 0.01$. Mann-Whitney tests showed that the frequency of *respecting* of the faculty member was greater than that of the undergraduate and graduate students, $U = 21.50$, $r = -0.53$ and $U = 80$, $r = -0.59$, respectively.

Supporting. A Kruskal-Wallis test found a significant difference in the frequency of *supporting* between the three researchers, $H(2) = 7.52$, $p = 0.02$. Mann-Whitney tests showed that the frequency of *supporting* of the graduate student was less than that of the undergraduate student and the faculty, $U = 48$, $r = -0.38$ and $U = 133.50$, $r = -0.40$, respectively.

Within-subject Data Analysis

Undergraduate student. A Friedman's test found no significant difference in the undergraduate student's empathic responses such as *exploring, understanding, naming, respecting,* and *supporting*.

Graduate student. A Friedman's test found a significant difference in the graduate student's empathic responses, $\chi^2(4) = 52.01$, $p < 0.01$. Wilcoxon signed-rank tests showed that the frequency of *understanding* was greater than that of the other response types, i.e., *exploring* ($z = -3.60$, $p < 0.01$), *naming* ($z = -3.94$, $p < 0.01$), *respecting* ($z = -3.95$, $p < 0.01$), and *supporting* ($z = -4.13$, $p < 0.01$). In addition, the frequency of *exploring* was greater than that of *naming* ($z = -2.42$, $p = 0.02$), *respecting* ($z = -2.35$, $p = 0.02$), and *supporting* ($z = -2.44$, $p = 0.02$).

Faculty. A Friedman's test found a significant difference in the faculty member's empathic responses, $\chi^2(4) = 23.15$, $p < 0.01$. Wilcoxon signed-rank tests showed that the frequency of *naming* was less than that of all the other response types, i.e., *exploring* ($z = -2.95$, $p < 0.01$), *understanding* ($z = -2.41$, $p = 0.02$), *respecting* ($z = -3.31$, $p < 0.01$), and *supporting* ($z = -2.84$, $p < 0.01$). Another significance was that the frequency of *respecting* was greater than that of *understanding* ($z = -2.59$, $p < 0.01$) and *supporting* ($z = -2.50$, $p = 0.01$).

Discussion

Participants' Expressions of Emotions and Researchers' Responses

The participants made emotional comments (i.e., empathic opportunities) while interacting with the researchers (the undergraduate student, the graduate student, and the faculty). However, all the three researchers tended to miss many opportunities of responding to participants' emotional comments. The results suggest that there has been a lack of adequate training for the researchers to develop empathic communication skills.

Several efforts (Bairaktarova et al.; von Unold et al.) have been made to incorporate Design Thinking in curriculums for college students; however, many students still tend to encounter a difficulty empathizing with users (Smeenk, Sturm, Terken, et al.). Shambaugh and Beacham argued that there have been limitations of teaching Design Thinking; for example, Design Thinking was considered as a subjective idea in many design-related curriculums and not considered as an explicit learning outcome. Hence, Design Thinking often occurred as an incidental learning outcome, instead of a well-planned learning outcome (Shambaugh and Beacham). Afroogh et al. also pointed out that creating and sustaining an inclusive and effective community resilience approach requires empathy, which was often disregarded in the existing engineering education and practice. Smeenk, Sturm and Eggen argued that a lack of empathy

tends to occur under various circumstances, e.g., when designers fail to meet, collaborate, and/or connect with users in person; when designers struggle with insufficient time or budget; and when designers have a lack of ability or willingness to obtain empathy. Given the results, this study recommends that existing engineering programs should adequately be amended to produce engineers who can yield effective solutions to meet user needs while being emotionally connected with users, which has also been voiced by other studies (Evans; Razzouk and Shute).

Researchers' Empathic Responses in Detail

The response of *understanding* was significantly observed in the graduate student as compared to the undergraduate student and the faculty. The result suggests that the graduate student had a stronger tendency to confirm and summarize what he was hearing while conducting interviews. On the contrary, the response of *supporting* was significantly missing in the graduate student as compared to other researchers. The results suggest that the graduate student might have focused more on "accurately" and "objectively" gathering data; thus, the graduate student made less efforts to "subjectively" making emotional connection with participants. Emotional connection between an interviewer and an interviewee contributed to a rich interview experience, resulting in a deep comfort with one another (Ross). Yet, Thomas and McDonagh pointed out that it would be challenging to design "with" users instead of "for" users. Despite the challenge, interactive co-design practices must be secured to produce design outcomes that accommodate user needs. Such design practices could be facilitated via shared language, collaboration, and empathy (Thomas and McDonagh).

The response of *respecting* was significantly observed in the faculty as compared to the undergraduate and graduate students. The faculty showed a stronger tendency to pay attention to and praise participants' coping strategies for emotional struggles. It would help the faculty to

develop a deep emotional connection with participants. The importance of building strong connection with participants is well documented in the literature (Anderson et al.). For example, Råheim et al. conducted focus groups to explore the experiences of health researchers who conducted qualitative research. The health researchers considered that it was essential to listen to participants' stories, show respect, and gain trust from the participants because the effectiveness of their qualitative research was likely to be influenced by participants' willingness to share their experiences and thoughts about topics in question. Bay-Cheng argued that it is important for researchers to make an opportunity to develop positive, non-judgmental relationships with participants during interviews as participants' comfort increases, participants are more likely to share details of their experience. Bay-Cheng also argued that such positive, non-judgmental relationships are applied to both qualitative and quantitative research because researchers interact with participants during recruitment, informed consent, and debriefing. This study suggests that researchers should be well trained to emotionally connect with participants throughout the entire research processes by pursing mutual respect and shared goals in design.

Conclusion

In Design Thinking, empathy is critical for designers to deeply understand users' needs for whom they are designing. Several tools and techniques have been introduced to facilitate empathic design processes, aiming to support designers to "*step into the user's shoes*" and "*walk the user's walk*" in order to produce products that meet the user needs (Ghajargar et al.). However, this study found evidence that engineering student researchers are less likely to empathically connect with participants due to a lack of empathic communication skills. Future research with a larger sample of researchers (undergraduate, graduate, and faculty) will focus on developing educational interventions to properly train students to be competent with

empathically connecting with participants.

Acknowledgments

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