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MORE THAN A FEELING: EMPATHIC REFLECTION THROUGH VIRTUAL EXPERIENCES

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ABSTRACT
Reflection enables individuals to derive meaning from experiences. It is deeply ingrained in an empathic interaction that fosters a nuanced understanding of varied perspectives through reflection. While empathy is recognised as a transformative tool in design education, a limited number of studies explore students' empathy development. By leveraging Virtual Reality (VR) capabilities, including perspective-taking and emotion elicitation, combined with the innate human capacity for reflection, this research investigates a structured approach through a qualitative study to enhance design students' empathy and integrate it into design education. Driven by the need for human-centred design (HCD) practices to foster more-than-human perspectives, participants were invited to step into the world of a tree using VR, followed by a reflective activity in which they recalled their thoughts and emotions during the virtual experience. This research introduces a novel framework for eliciting augmented empathic experiences by heightening design students' awareness of a unique perspective and deepening their insight into their personal experience. The framework is designed to facilitate long-term evaluation of empathy responses, providing opportunities for sustained empathy development. By broadening students' understanding of diverse perspectives, this study creates an opportunity for a new generation of human-centred design solutions that embed inclusive, social, and ecological values within design education.

Keywords: Empathy, empathic design, reflection, virtual reality, Human-Centred Design

1 INTRODUCTION
Empathy enables designers to develop a thorough understanding of user needs [1]. It involves both emotional and cognitive processes, including the capacity to emotionally connect with others' feelings and the ability to understand their perspective intellectually [2]. Empathy is increasingly recognised within design education as a transformative tool [3] that goes beyond technical skill development to cultivate a holistic approach involving interaction with diverse stakeholders [4]. These abilities are crucial in design education, not only because designers frequently create solutions for users with varied physical and cognitive characteristics, requiring them to address a diverse range of needs [5], but also because empathy contributes to learning [6]. However, few studies investigate how students' empathy develops or the factors that influence its growth [3]. Therefore, this research aims to develop a more structured approach to enhancing design students' empathy towards their users and embedding it within design education.
A novel framework is presented that merges virtual empathic experiences with human reflection as tools to evoke and enhance design students' empathy. The framework was developed through a qualitative study in which design students were invited to take the perspective of a tree using Virtual Reality (VR). Inspired by trees' stillness and observational nature, this perspective addresses the need for human-centred design (HCD) to incorporate more-than-human perspectives [7] and support sustainability in design [8] amid the climate crisis and eco-social challenges [9]. Following the virtual intervention, participants recalled their thoughts and emotions from the experience through a self-reflective activity. These reflections enabled the students to gain a deeper awareness of their experience and their empathic responses, contributing to the knowledge required for effective HCD practice. Additionally, this research provides an opportunity to facilitate students' empathy development through long-term evaluation.

2 EMPATHY AND REFLECTION FOR DESIGN EDUCATION

Research categorises empathy into two main dimensions: cognitive empathy, which refers to understanding another person's perspective, and affective empathy, which involves an emotional response toward others [2]. Empathic understanding, which refers to a thorough understanding of someone else's experience, is hypothesised to be highly situated [10]. Kouprie and Visser [2] describe empathy's core mechanism as a balance between emotional resonance with another person's feelings and the cognitive ability to reflect on that experience through perspective-taking. This dynamic interplay allows designers to shift between immersing themselves in the user's experience and stepping back to analyse it critically. Additionally, Chang-Arana *et al.* [11] highlight that a key implication of applying empathy in design is recognising it as an interactive and reflective process. This indicates that reflection is an integral part of the empathic experience in its elicitation, underscoring its significance in this research. Moreover, Ickes [12] investigated reflection as a means of analysing an empathic interaction, by prompting individuals to infer another person's thoughts and assessing their accuracy by comparing these inferences to the other person's reflections.

Research on reflection supports its relation to empathy, as it is described as a mental process involving both cognition and emotion [13]. Reflection is further described as a conscious, intentional process of revisiting an event to deepen understanding and extract insights, making it influential in learning [14]. Boud *et al.* [13] argue that reflection leads to effective learning only when emotions are tied to the triggering event, indicating the criticality of emotion elicitation from a pedagogical perspective. However, the effectiveness of reflection within design education remains largely unexplored [15]. This research provides a deeper understanding of how reflection can be applied to contribute to students' empathic and learning experiences through VR technology.

2.1 Embedding Empathy and Reflection through VR for Design Education

Empathy experienced in VR has been widely explored in research due to its enhanced first-person perspective-taking capability [16, 17], including in the design field [18, 19], amongst other factors. Additionally, VR can evoke intense emotion [20], establishing the groundwork for reflective learning [13] and highlighting its relevance for this study. Moreover, VR offers several benefits relevant to empathy in design education. Designers must shift between stepping into the user's experience to immerse, and out of the user's experience to reflect – a process that requires flexibility, a crucial element in empathy training [2]. VR facilitates flexible and repeated access to user experiences, reinforcing its potential for empathy development. Kouprie and Visser [2] also highlight that empathy requires a structured investment of time, yet time constraints pose a significant barrier. Research exploring empathy in VR has involved interventions lasting between 5 and 15 minutes [17, 21, 22]. This suggests that even brief, targeted interventions in VR can evoke powerful reactions, although further empirical evidence is required. VR has also been positively linked to reflection. Stavroulia and Lanitis [23] examined empathy and reflection levels following a VR experience that immersed teachers into the perspective of students. The findings suggest that participants who engaged in the virtual environment demonstrated greater reflection and empathy towards the students than those in the control group, which involved a real-world setting. This outcome was attributed to VR's capability of generating a greater understanding of multiple perspectives, leading to higher levels of reflection. This research takes the concept further by introducing a new framework to enhance design students' empathic and reflective capacities through VR, cultivating a deeper understanding of diverse perspectives.

3 METHOD

The framework was developed through a qualitative study involving 40 students from product design and engineering design fields. Participants were predominantly within the 18–24 age group (85%), with 58% identifying as male, 40% as female, and 2% as non-binary. Foundational knowledge on empathic design was provided before the study. The virtual experience invited students to take the perspective of a tree, aiming to enhance their empathy towards nature. Figure 1 illustrates the three main phases of the study and the activities comprising each phase. The immersive 360° video experience, lasting approximately six minutes, was accessed through a VR headset and guided with visuals and audio narration. It consisted of three main scenes: an initial nature scene transported participants to peaceful surroundings, followed by participants witnessing a gradual destruction of their environment due to human influence. In both scenes, students took the tree's perspective. In a final reflective scene, the students observed the tree in a space scene.

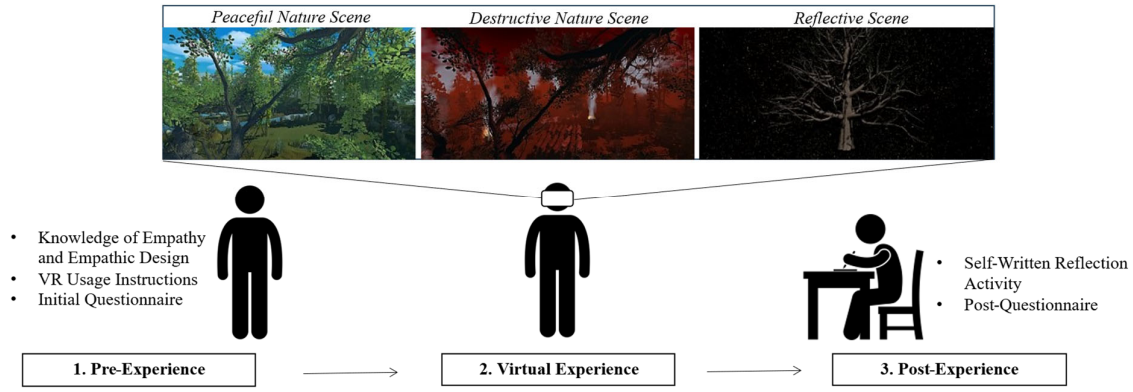

Figure 1. Phases of Qualitative Study Highlighting VR Scenes

The VR experience was followed by a self-reflective task that invited participants to recall their thoughts and emotions elicited during the three scenes. Documenting the rationale behind their reflections was essential, as examining the intentions behind students' actions encourages them to reflect on their understanding of the situation, along with the thoughts, emotions, and assumptions that shaped their responses [24]. Participants were then invited to further reflect on their experience and its relevance to a HCD process through a questionnaire consisting of 21 multiple-choice and open-ended questions.

4 RESULTS

Reflections related to the peaceful effect of the natural surroundings of the initial nature scene were predominant. Feelings of anxiety and powerlessness were reported during the destructive nature scene, alongside reflections on human involvement. The final scene was mostly interpreted as representing the death of the tree which led to reflections on human life. The results were qualitatively aligned to common themes of Observational, Empathic and Activity Reflections, as shown in Figure 2.

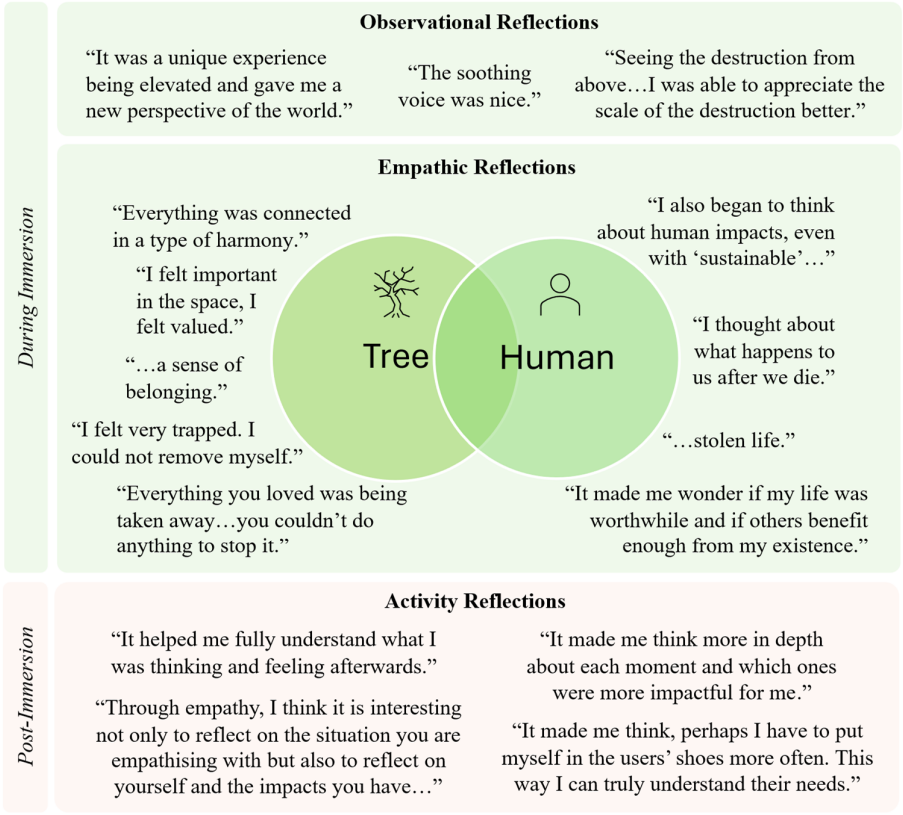

Figure 2. Common Themes Reported During and Post Immersion

The recalled reflections during the VR experience were grouped into the themes of Observational and Empathic Reflections. The Observational Reflections involved a top-level description of the experience, such as the audio and the perspective. Empathic Reflections were further categorised into two sub-categories: reflections from the tree's perspective and those from a human perspective. In the post-questionnaire, participants were asked whether and how the reflection activity supported the empathic process, represented by the Activity Reflections theme. Several participants noted that it helped them decipher their thoughts and emotions as well as identify the reasons behind them. The reflection task also enabled them to recognise their impact on their surrounding environment and its value. It also encouraged deep diving into the experience and idea expansion. In the post-questionnaire, participants were also asked to consider which phase of HCD they would apply this experience to - whether for inspiration, ideation, or implementation. The results were varied; whilst the initial inspiration phase was the most frequently reported stage for applying this experience, several participants also noted that this type of experience could be tailored to all phases of the HCD process and supporting activities such as emotion mapping and idea consolidation.

5 DISCUSSIONS

By leveraging VR technology, this research facilitates empathic reflections by introducing virtual empathic experiences that integrate VR capabilities with human reflection. The thoughts and emotions reported in the reflection activity suggest that empathy was successfully elicited from both cognitive and affective perspectives. Moreover, the empathic reflections (Figure 2) from the tree and the human perspective indicate that the virtual experience effectively facilitated perspective-taking, even when applying the more-than-human perspective of a tree.

Figure 3 presents a novel virtual empathic framework, represented as a cycle of affective responses towards the tree and human reflective responses through perspective-taking. This aligns with literature highlighting empathy's mechanism as an alternating process between the *'other'*, represented by the results in the tree sub-category, and the *'self'*, reflected in the human sub-category [2, 11]. The reported reflections supported the students to decipher their thoughts and emotions, creating increased awareness of the reflective element of their empathic experience. This, in turn, facilitates the analysis of empathic outcomes supporting subsequent HCD activities. Additionally, through training and repeated practice in self-reflection, this framework cultivates reflective skill development, which directly reinforces empathy's perspective-taking mechanism. As a result, an opportunity for enhanced empathic elicitation is presented whilst positioning reflection as a tool for long-term empathy development.

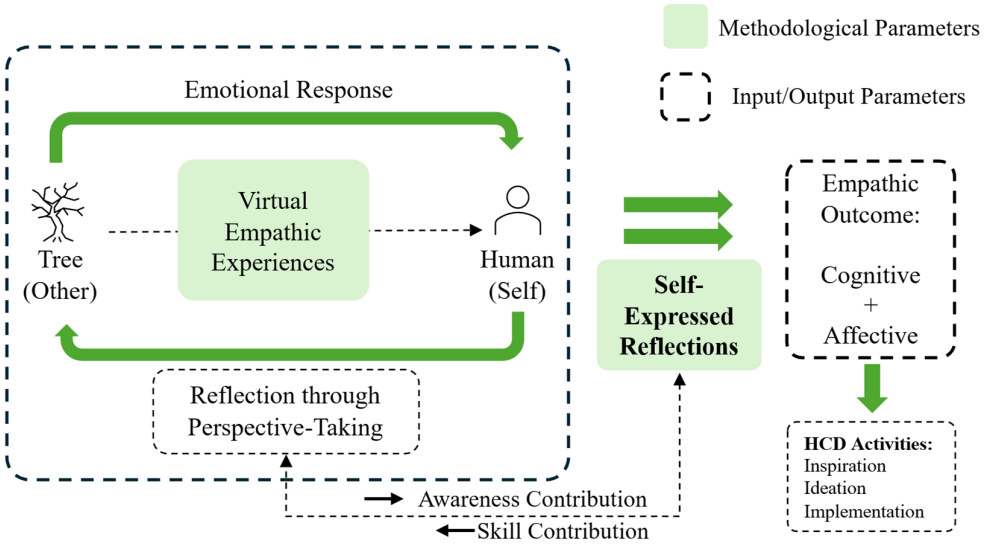

Figure 3. Integrating Reflection into a Virtual Empathic Framework for Design Education

The thoughts and emotions reported by the participants varied in intensity, ranging from general observations of the environment, such as: "It was a unique experience to be elevated…" to deeper cognitive and emotional references to their relatability to the experience [25], for instance: "It made me wonder if my life was worthwhile and if others benefit from my existence." This implies that the six-

minute duration of this virtual experience was sufficient to elicit strong empathy responses. These findings corroborate VR's potential to enhance empathy through a structured and efficient time investment, a critical element of empathy in design [2].

5.1 Limitations and Future Work

This qualitative study is limited by potential participant biases due to a relatively small and culturally homogeneous sample [26]. Future research should aim to increase both sample size and diversity by including design students with varying experience levels, as well as participants from different institutions and cultural backgrounds. In addition to the perspective and the duration of the experience, other factors within the virtual experience influenced the empathic outcome. These factors include elements from the VR environment itself, such as visuals and audio [27], human factors, such as the willingness to empathise [2] and the role of the tree itself versus other species or entities. Future work will involve empirical evaluation of these factors to support the creation of virtual empathic experiences for design education. Additionally, this research aims to further leverage VR's capability for flexible and repeated access, addressing the need for flexibility in empathy training [2] and enabling longitudinal analysis of empathy development and evaluation.

6 CONCLUSIONS

Empathy involves a process that extends beyond understanding someone else's emotions but encompasses deep reflection through perspective-taking. This paper presents a qualitative study conducted with design students, in which participants adopted the perspective of a tree in Virtual Reality (VR), followed by a self-reflection activity. Results corroborate the effectiveness and efficiency of the virtual experience in eliciting powerful empathic responses through a brief six-minute intervention. The findings led to the development of a novel framework for enhancing design students' empathy towards users by integrating virtual experiences with post-experience reflection. Within design education, this framework enables educators to equip students with the intrinsic motivation for being empathic towards others and themselves, which is necessary for tackling systemic challenges. This is achieved by enhancing students' awareness of their unique empathic experience, which enables the analysis of empathic outcomes. Long-term empathy development is facilitated through empathy's reflective perspective-taking mechanism, potentially shaping a generation of designers who are attuned to the emotional, social, and cultural dimensions of their work. The findings provide a foundation for further research and curriculum development, paving the way for a more empathetic, responsive, and inclusive approach to design education. As one student highlighted, "This experience has been a game-changer, highlighting the importance of empathy and understanding diverse perspectives."

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