

Ethical Concerns in Designing and Applying Virtual Reality Applications in the Social Science Field

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Manuscript received May 30, 2025; accepted September 18, 2025; published January 30, 2026.

Abstract—Many researchers recognize that Virtual Reality (VR) can generate new knowledge through immersive experiences that allow users to engage with different perspectives. However, when VR content is designed solely by those in power without including marginalized groups, it can lead to unfair decision-making and misrepresentation. This highlights the importance of focusing on ethics and morals, especially when creating VR content. This study investigates ethical concerns in applying VR technology within the Social Science (SS) field. By interviewing experts from both the VR and SS fields, the research uncovers some ethical concerns when designing VR applications, emphasizing the importance of involving target populations to ensure accurate representation. The findings highlight the potential of VR to foster empathy and understanding while cautioning against the risks of stereotyping. Ultimately, the study advocates for an inclusive and ethically aware approach to VR design, aiming to create meaningful experiences that reflect the complexities of social issues.

Keywords—virtual reality, ethical concerns, social science, design

I. INTRODUCTION

Virtual reality has earned the attention of people around the world. Many studies have shown that immersive VR experiences can be effective in developing participants' perspectives towards others from different races and other categories of difference [1, 2]. However, significant technological changes are always mixed blessings. For all of the potentially positive applications of VR, there are also moral and social risks associated with this technology [3]. One of the solutions that could solve this problem is to discuss it with experts within the VR field to take it into consideration when designing the VR content. In this study, we will interview experts in the virtual reality and social science fields and discuss with them about their point of view on how to integrate VR within the SS field. We aim to ensure that VR experiences foster a deep understanding of individuals' situations while prioritizing ethical considerations. Additionally, we will identify key elements for effective experience design that promotes knowledge, while ensuring that the VR experience avoids oversimplification or moralistic interpretations.

II. LITERATURE REVIEW

Virtual Reality (VR) is an electronic simulation technology that immerses users in environments through head-mounted displays and specialized equipment, allowing for interaction within realistic three-dimensional spaces [4]. Researchers have defined the virtual reality environment as “interactive computer simulations that allow users to immerse themselves and simulate an environment” [5]. By

utilizing VR, creators can craft a visible world that users can feel, engage with, and influence [6].

As VR technology becomes more prevalent and accessible, the challenges surrounding VR research have come to the forefront of scholarly discourse. Initially, VR was seen primarily as a means of generating new forms of knowledge through direct experiences of otherness [7, 8]. However, the current perspective has shifted to view VR as a powerful tool for evoking emotions, often referred to as an “empathy machine”. This evolution in understanding has led educational and technology experts to stress the importance of considering the ethical implications of VR design [7–14]. Neglecting or failing to acknowledge these ethical issues could pose significant risks to the physical, emotional, social, and privacy well-being of users, particularly children and vulnerable populations [15–17]. Therefore, designers must account for a wide array of ethical considerations, encompassing physical, psychological, moral, and social dimensions when creating VR and Augmented Reality (AR) products.

Moreover, the design of VR content often reflects the perspectives of those in power, frequently excluding the voices of stigmatized groups. This lack of inclusivity can result in unfair decision-making processes that disregard human judgment, leading to what has been termed “toxic embodiment and the production of racial empathy” [18]. Such dynamics suggest that VR operates on the concept of toxic re-embodiment, where users may simulate the experiences of others who do not even have agency over their own bodies [18]. While VR cannot literally place someone in another person's body, it can create misleading sensations of empathy that do not translate into genuine understanding. This form of engagement is ultimately superficial and harmful [18].

Despite claims that VR has the potential to mitigate racial bias by allowing users to “walk in someone else's shoes”, there are concerns that using VR to evoke empathy can result in oversimplified and moralistic narratives [18]. Many VR experiences that promise to offer common perspectives can inadvertently come across as insensitive or detached [19]. Digital technologies, including VR, may perpetuate stigmatized identities by emphasizing certain aspects of a group's experience while ignoring others. As a result, VR cannot truly transport someone into another person's body; rather, it can create misleading feelings of empathy that lack authenticity. Therefore, VR content should prioritize knowledge enhancement and promote a deeper understanding of specific groups [18]. It is vital to ensure that these experiences do not simplify complex issues or reinforce biases through perspective-taking, ultimately striving for a

more nuanced and respectful engagement with diverse social realities.

To enhance the quality of VR content, it is crucial to engage in discussions with experts in relevant fields. This study aims to interview specialists to explore their insights on integrating VR within social science field. Key areas of inquiry will include ensuring that VR experiences foster a profound understanding of others' situations, identifying elements that contribute to effective experience design that leads to knowledge, and determining how to avoid simplistic or moralistic interpretations.

III. METHOD

The aim of the study was to investigate the ethical and moral concerns when creating and applying VR to motivate students to social science activities. Participants were presented with a series of semi-structured questions relating to their experiences working with administrating/teaching service-learning courses. Participants were presented with examples of VR applications for social good to better understand how VR has been integrated to support learning for other contexts. Questions were refined based upon a pilot study undertaken with two experts.

Interviews were conducted by videoconference, lasting on average from 45–180 minutes. No payment was offered to participants. While the majority of interviews were conducted in English, others were conducted in Arabic (the interviewees' native language). A bilingual researcher transcribed all content, and translated responses from Arabic into English. Translations were then checked by another researcher. The data could then be coded by the research team.

IV. PARTICIPANTS

Twelve service-learning experts who tried and worked with VR tools were recruited for the IRB-approved study through personal contacts and through snowballing. Participants were (10 from United States, 2 from Saudi Arabia), (8 female, 4 male) who worked in educational settings ranging from high school (5) to mid-size universities (7).

V. ANALYSIS AND FINDINGS

The interview data has been analyzed via open and axial coding. Themes have been identified based on the codebook, and axial coding has been applied to these initial codes. The findings from interviewing experts provided a foundation to understand challenges of applying VR technology in the field of social science. They also described some concerns about using and applying this technology. These concerns included ethical concerns, stereotyping and bias, cultural sensitivity and design recommendation.

A. Ethical Concerns

Regarding ethical concerns, the main issue that experts were worried about was involving the target population, for example, people experiencing homelessness when creating a VR content that covers the homelessness. This would prevent any misrepresentation and result in a more accurate depiction of homelessness which would be a more ethical way to go about creating the VR content.

A further ethical concern that should be considered would be to mention to participants that virtual reality does not cover the whole situation. Therefore, stereotyping may happen and it is very important to interact with real people to best understand the whole situation and increase participant knowledge and develop empathy. VR can be considered as a first step and as a preparation tool but it should not substitute the real and lived experience of social science.

"The concerns that I have is that the subject will need to understand that virtual reality is not real and that they are only seeing what could happen and that they will need to be placed in a real-life example to fully understand." (P1).

One of the factors that may decrease the reality of this technology is adding gamification elements to the content or integrate Artificial Intelligence when designing the content. This may distract participants from gaining the needed knowledge which is one of the most important factors to participate in social science.

Discussing these concerns with experts led to another concern related to how to use VR to increase knowledge, especially in the SS field to prevent oversimplifying. This includes not only engaging individuals related to the field being studied to co-design the VR content to minimize the likelihood of stereotyping, but also adding reflection questions before and after the experience to determine the value and impact of the interaction.

"I also think it's really important for them to have the reflection piece before the experience and a good debrief after that so that they're not just taking kind of the stereotype or bias that they have from that one experience with them because it could still be different and that's the struggle with any orientation." (P5).

Minimizing the likelihood of developing stereotypes could be facilitated by determining participants' point of views prior to or after the VR experience. Questions could be asked regarding stereotypes that they have heard about associated with the population being studied.

B. Stereotyping and Bias

Stereotyping and bias in designing VR applications for social science field can negatively affect the authenticity, inclusivity, and effectiveness of this technology. When developers rely on generalizing or oversimplifying the representations of cultural, social, or demographic groups, they risk perpetuating harmful stereotypes and reinforcing existing biases. This can lead to the marginalization of certain communities, misrepresentation of their values and practices, and a lack of trust in the application itself.

"I believe that designers should be very careful when designing for a specific group especially if they are not part of that group, because they have to understand the background, history...etc. of this group" (P12).

In the social science field, where the goal is often to foster understanding, collaboration, and inclusivity, this misrepresentation can alienate users and diminish the impact of the initiative. For instance, portraying certain groups in a subordinate or one-dimensional role can skew user perceptions and perpetuate societal inequalities. To ensure ethical and impactful VR design, it is essential for developers

to actively involve diverse voices throughout the development process, critically evaluate assumptions, and adopt inclusive design frameworks that honor the complexity and dignity of all communities. This requires thoughtful storytelling, inclusive design practices, and ongoing collaboration with people from marginalized groups. Ultimately, the goal should be to create immersive environments that encourage critical reflection, challenge assumptions, and promote respectful engagement with the complexities of social identity and inequality.

C. Cultural Sensitivity

Other ethic design recommendation focuses on the visual and design elements that experts believed are very essential to include when designing for specific group of people, for example, international students. This includes language barriers, tone of voice, images, and colors as it may have different meanings in different cultures.

“I think choosing the right word or color is very important because some people may understand things in a different way than others based on where they came from.” (P7).

Therefore, VR content should be thoroughly tested with the target audience to ensure its cultural, contextual, and experiential accuracy before being widely deployed. User testing allows designers to identify potential misrepresentations, misunderstandings, or unintended cultural offenses that could arise within immersive environments. It also ensures that the content is intuitive, meaningful, and relevant to the intended users' lived experiences.

Furthermore, three experts emphasized that when developing VR experiences with cultural elements, it is critical for designers to deeply understand and respect the traditions, values, and norms of the communities being represented. This includes recognizing nuances such as non-verbal communication, social hierarchies, religious customs, and customary greetings, which may vary widely across cultures. For example, if a culture emphasizes bowing as a formal greeting rather than shaking hands, this distinction must be accurately depicted in the VR scenario to maintain authenticity and avoid cultural insensitivity. Ignoring such differences may not only reduce the educational value of the experience but could also result in the alienation or misrepresentation of the cultural group involved. Designers should, therefore, collaborate with cultural experts and community members to co-create content that is respectful, inclusive, and contextually appropriate.

D. Design Recommendations

Experts discussed virtual reality features and disadvantages, especially in the social science field. This included how accurate virtual reality is to capture the experience of the real life and transfer it to VR content, for example, capturing homeless population life. Therefore, when designing any virtual reality content, designers should be careful about the way they depict people experiencing homelessness in their community. This includes doing interviews with specialists before designing the content as well as meeting with many non-profit organization representatives.

“Because if this is about service learning, kind of taking care of your community. Is this an accurate kind of representation of homelessness? Or did you get something different when you actually spoke to the people in your region, in your neighborhood that was affected. How was it similar? How was it Different graphic organizers kind of comparing the virtual versus the reality?” (P11).

A further disadvantage of VR that was discussed relates to VR applications not having the ability to capture all the details that a real world experience has. For example, VR can share a real story of people experiencing homelessness, but cannot replace the services that are provided by the community to help those people, such as soup kitchens and rebuilding homes. Two experts felt that including certain features in the VR content could lead to long-term behavioral change. For example, they suggested incorporating real people's stories in the VR content.

“If there are ways to incorporate real people or real people's stories and you are seeing an actual person telling that story to make it again more real and connect to reality versus just inside the world.” (P3)

VI. DISCUSSION

Researchers have raised significant concerns regarding the trend of allowing individuals in positions of power to design VR content without involving those who may be stigmatized by the very issues being represented. This practice often results in alternative forms of unfair decision-making, as it strips away the nuances of human judgment and lived experience [18]. This phenomenon has been termed “toxic embodiment and the production of racial empathy”, highlighting how VR can create misleading simulations that do not accurately reflect the realities faced by marginalized groups [18]. The implications of this are profound, as VR is increasingly founded on the concept of toxic re-embodiment, where users may occupy the experiences of others who may not even have agency over their own bodies [18].

In our study, experts recognized several challenges associated with the lack of involvement from individuals who are directly impacted by social issues when designing VR content. They expressed a keen interest in incorporating these voices into the design process, believing that doing so would significantly reduce the likelihood of misrepresentation. By including those who experience homelessness, for example, VR designers could create a more authentic and nuanced depiction of their realities. This approach not only enhances the ethical integrity of the content but also contributes to a more accurate and respectful representation of marginalized communities.

Another critical concern raised in the literature is the tendency for VR to evoke empathy in ways that can lead to simplistic or moralistic framings of complex social issues [18]. Despite the optimism surrounding VR's potential to reduce racial bias by allowing users to “walk in someone else's shoes”, many studies suggest that experiences intended to foster empathy can come across as insensitive or callous [19]. These experiences may inadvertently reinforce stereotypes rather than challenge them, as they often present a one-dimensional view of complex societal problems.

Additionally, other study highlights the importance of considering stereotypes and bias when designing VR applications by demonstrating that virtual embodiment can significantly reduce implicit racial biases [20]. Participants who embodied a black avatar in a virtual environment showed lower implicit bias scores compared to those who experienced a sham VR version. Our findings confirmed that VR can be a powerful tool for perspective-taking. Therefore, it is very important for developers to design virtual experiences in a way that avoids oversimplifying complex social issues or unintentionally reinforcing existing stereotypes through perspective-taking. VR applications should aim to foster deeper understanding and empathy by accurately reflecting the lived experiences of diverse communities.

Discussions with experts have indicated that these concerns can be effectively addressed by engaging members of the community being depicted in the VR experience during the content creation process. By collaborating with these individuals, designers can mitigate the risk of stereotyping and create experiences that are more representative of real-life complexities. This collaborative approach would not only empower marginalized voices but also enhance the educational value of the VR content.

With these insights in mind, this study advocates for VR designers—particularly those focused on social good—to actively involve target populations who are affected by social issues in the design of VR content. Such involvement is crucial for preventing toxic embodiment and ensuring that the content does not misrepresent or oversimplify the lived experiences of marginalized groups. Ultimately, by fostering a participatory design process, VR creators can develop more ethical, impactful, and transformative experiences that resonate authentically with diverse communities.

VII. CONCLUSION

Many researchers view Virtual Reality (VR) as a technology that can create new knowledge through direct experiences of otherness. However, when VR content is designed solely by those in power without involving stigmatized individuals, it can lead to unfair decision-making, emphasizing the need for ethical considerations in VR content creation. This study aims to explore ethical concerns related to applying VR technology in Social Science (SS). Experts in VR and SS fields were interviewed to gather insights and recommendations for ethical VR applications. The study emphasizes the importance of consulting experts to ensure that VR experiences lead to meaningful understanding rather than simplistic or moralistic portrayals.

CONFLICT OF INTEREST

The author declares no conflict of interest.

FUNDING

This work was supported in part by the Deanship of Scientific Research at King Saud University.

ACKNOWLEDGMENT

Special Thanks extended to Dr. Anita Komlodi and Dr. Ravi Kuber for their feedback during the author's PhD research.

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