GNG1103 - VR Climate Change Simulation

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Abstract

Governmental and academic institutions are working to leverage the unique immersive capabilities of extended reality to deliver education on climate change. Simulations made thus far struggle to show environmental impacts and future consequences in a message that sticks with users. This report analyzes statements from the first client meeting to filter out a concise problem statement. Further research into existing VR applications and climate change data should be conducted to identify pinch points of the medium and guide content development.

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1 Introduction

Extended reality (XR) technology has shown promise as a way to more personally involve audiences in the consequences of climate change. Traditional media such as diagrams, videos, and climate prediction models often fail to generate lasting concern, and so new technology is being harnessed to immerse audiences in a simulation that has them engage directly with environmental consequences. By demonstrating tangible effects on daily life, a tailored XR experience can more effectively build empathy for and understanding of the cause.

1.1 Related Work

Previous projects in creating VR climate change experiences have been developed within the last few years by other climate-concerned organizations, such as one from the UN that visualized the scale of a person's carbon footprint as a virtual reality video [1], or another from the UBC Faculty of Forestry which showed the effects of the climate crisis in the arctic which allowed user exploration and a narrated story [2]. Both were made to function on VR headsets as well as regular computers and mobile devices.

2 Analysis and Statement of the Problem

Following the first client meeting, some design criteria were provided: the simulation must deliver an immersive story in 1-3 minutes, and the survey must be 3 questions taken before and after the simulation that can measure the impact of the experience on climate change perceptions. Beyond these constraints, we analyze the client's stated intentions and concerns to develop concrete goals for the project and identify knowledge gaps.

2.1 Identifying and Organizing Needs

To render down the client's provided information into something actionable, we sort and group their statements below by interpreting and rating the client's needs from their statements.

Table 1: Translating Statements to needs

User Statement	Interpreted Need	Importance
The simulation should use some form of mixed, augmented, or virtual reality. The simulation must be interactive and not passive. The message should be conveyed through a story rather than just facts and figures.	The simulation immerses and engages the user in the effects of climate change to be impactful.	5
The simulation must be realistic and must pull from historical or data evidence. It must not use false information or sensationalism.	The simulation educates and informs users with evidence-based facts without being apocalyptic or political.	4
The survey must be 3 short questions, presented before and after the simulation.	The survey quickly measures how the user's perceptions have changed.	3

The simulation must be ethical (Cannot use children for research).	The simulation complies with ethical, moral and legal standards.	3
The simulation must be accessible (Lighthouse standards). This includes bilingual options.	The simulation is inclusive to all users and takes into account accessibility and language barriers.	3
The simulation must contain a content warning at the beginning. Stereotypical depictions of people of any ethnicity, race, or gender is not allowed.	User sensibilities are anticipated, avoiding offensive depictions and providing explicit warning for sensitive content.	3
The simulation should only contain one topic (do not mix multiple topics together).	The simulation focuses on simulating one aspect of climate change to best use the limited project scope.	2
The target demographic is not assigned but should consider what group would benefit most from the experience.	The UX design is tailored to best engage the critical audience.	4

The demand for the experience to be a story implemented through extended reality, as well as the emphasis on making the simulation interactive, have been gathered under need as they all point towards a need for immersion both emotionally and audio-visually. We decided to merge the statements on using data/real scenarios and on avoiding sensationalism as they work in tandem to define how the experience balances educational and informational value against emotional impact. We include bilinguality with other general accessibility features such as large and high-contrast fonts or colour-blind settings as they encompass how the user is able to interact with the simulation based on factors outside our control. This is separate from the sensitivity criteria, which deals in what the content and less how it is engaged with.

2.2 Problem Statement

"To teach the importance of climate change and measurably change attitudes towards it, a simulation is needed to expose Canadian students to its consequences with a short and informational story-driven experience that is immersive, interactive, and personal."

We chose to target Canadian students, specifically those in the late-high-school to university age bracket, as their educational status indicates a higher willingness to learn and potential to progress into more influential career positions where they can act on their new understandings.

2.3 User Benchmarking

While there are many articles that espouse the strong potential for VR in influencing perceptions on climate change [3], direct reporting on how users feel about these simulations is fairly limited or inconclusive [3,4]. A more comprehensive analysis would require studying the form of simulation delivered in each and interpreting how that affected their data on change in user opinions. Previous studies have suggested that certain implementations of immersion can detract from the story [5] and educational potential [6] as a form of distraction. Realism is found to be important to the sense of presence the simulation can provide, but visual cohesion and authenticity are more valuable for the learning experience [6].

3 Conclusions and Recommendations

In summary, the lack of user involvement in typical climate change advocacy media limits its ability to impart understanding and awareness. Current simulation models tend to focus on virtual reality, recognizing the value of immersion in making a lasting impression, but they have a very limited scope of deployment close to research and government groups. In developing a short and focused climate change story that appeals to students in Canada, we can deliver a better understanding of the issue to people who can be equipped and eager to drive change for the future.

4 Future Work

One of the most threatening aspects of climate change is how one issue can propagate other effects. This complex feedback structure is beyond the scope of our project, but it may be invaluable in communicating the true risk of climate change and how seemingly far-off events carry into local consequences. Other matters more pressing to this project are:

1. Determine Design criteria, looking to understand all constraints and functional aspects to building the simulation.
2. Research more on XR models created in the past and the user feedback to them in order to enhance our own model.
3. Choose a target demographic, the demographic will have to be local in order to maximise the empathy with the users.
4. Collecting data from a small group of individuals regarding their knowledge of climate change.
5. Investigate the cost of a prototype simulation.
6. Communicate with clients in order to attain more information regarding the project.

5 References

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