

Usability of Immersive Environments for Academic Outreach

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Abstract

This paper discusses the development of a virtual environment for pre-college and college students to have more interactive, and educational out-of-classroom experiences. This can be achieved by initially developing a virtual environment, testing with local educators, adding revision, and implementing changes.

1 Introduction

Reimagining diVersiTy is a collaborative project comprised of researchers from Virginia Tech's Human Factors Engineering group within the Grado Department of Industrial and Systems Engineering, Sociology Department, and the Applied Research in Immersive Environments and Simulations (ARIES) program within University Libraries, in addition to strategic partners across various university administrative groups, colleges and departments, centers, and outreach programs.

The overall project is based on a perceived need for research and development specific to informational and recruitment campaigns that focus on the University's goals of substantially increasing diversity by the year 2022. Due to the rapid transition to online education formats, platforms such as Mozilla Hub have emerged as viable tools for social engagement as well as research. Expansion to testing for varying education levels was started. Through initial demos with local educators, it has been shown to have the potential to positively impact educational experiences for varying age groups.

The Virginia Tech Science Festival, a project that was created by two researchers within the Reimagining diVersiTy team had one main focus: to provide an educational experience, centered around STEM concepts, to students in a fully virtual, VR-based setting.

2 Study

1. Purpose
2. Methods & Materials
3. Results

Purpose: The purpose of the proposed research project is to develop and showcase an interactive, virtual-reality learning experience for students to learn more about the VT Science

Festival topics. More specifically, this research will consist of client consultations, usability testing, and progress documentation to allow for a successful development of the VT Science Festival Mozilla Hubs.

The presence of web VR and online information sharing is crucial, even more so when considering the isolating effects COVID-19 has had on American society at large. Adobe, a large developer of VR technology, says that, “VR allows us to bridge the gap between educators and learners. With VR, distance learning tools can put educators and students together in the same room with digital representations of themselves.”¹ Therefore, the development of web VR spaces, like Mozilla Hubs, is a necessary byproduct of this season of virtual learning; and as these virtual spaces begin to house interpersonal interactions, research into efficient usability of these spaces must increase in proportion.

Methods & Materials: The Science Festival space was developed on Mozilla Hubs, a VR-friendly platform that was created by the Mozilla Mixed Reality team. Hubs not only serves as a virtual collaboration platform that can be used universally, but also as an open-source project that explores how communication in mixed reality can come to life. This concept specifically was what this research aimed to explore: exploring the realm of virtual reality, to create effective learning experiences, based around science, for kids ages 8 to 14.

A mixed-methods approach, involving real-time data collection and academic retention surveys (quantitative) and usability surveys (qualitative), will be used for the purpose of researching three specific avenues of Mozilla Hub's VR platform: usability, efficiency, and academic retention.

Users will enter a virtual world and navigate through various rooms, that are connected to each other via walkways. Each room will be tailored to represent a specific STEM experiment or VT organization/team, and users will be able to observe the various artifacts and embedded videos distributed around the rooms. After navigating through the main rooms, users will be guided to a final room, in which they will be prompted to complete an academic retention survey as well as a usability survey to document their experience. Data will be extracted, based on their various movements and actions around the hub space, to be compared and analyzed to find the optimal settings for academic retention.

Results: Showcasing to a group of over fourteen educators and administrators from the Montgomery County Public School System. Gained positive feedback from all and the desire to work further with the space from two educators. To view a video portraying the displayed scenes inside the Mozilla Hub space, scan the following QR code with a phone:



YouTube Link: <https://eqrcode.co/a/UFB193>

3 Conclusions

Although this research project is relatively new and still ongoing, our team has already begun to find and improve the transfer of science education and curriculum to students ages 8 to 14. The work that has been done so far has already shown positive outcomes, through the creation of learning environments, based around science, that are conducive to learning. With the impacts that the COVID-19 pandemic has had, not only on educators but also on students around the nation, technology such as Mozilla Hubs and other virtual reality technologies can be the next step in reinventing virtual STEM education.

Regarding future objectives and goals, we aim to continue development of the current Virginia Tech Science Festival Mozilla Hubs space. We are currently seeking ways to collect and measure usability data, not only within the hub space but also outside of it, as users begin to interact with our world.

4 References

- [1] 19, N., Babich, N., Silveira, D., Rae, M., Lindberg, O., & Allen, E. (2019, September 19). How VR education will change how we learn & Teach: Adobe XD Ideas. Retrieved May 13, 2021, from <https://xd.adobe.com/ideas/principles/emerging-technology/virtual-reality-will-change-learn-teach/>