12-9-2022

Teaching How to Recycle Through the Medium of Virtual Reality

Nathan Kassai

University of Nevada, Las Vegas, kassan2@unlv.nevada.edu

Follow this and additional works at: https://digitalscholarship.unlv.edu/durep_posters

Part of the Educational Methods Commons, Educational Technology Commons, and the Environmental Health Commons

Teaching How To Recycle Through The Medium of Virtual Reality

Nathan Kassai
University of Nevada, Las Vegas

UNLV

DASL
Drones and Autonomous Systems Lab @ UNLV

Abstract

Students, especially children in elementary and middle school, have difficulty focusing and or absorbing information from their courses. The problem lies in the scarcity of hands-on/interactive elements in classrooms as most lectures contain topics most students would be interested in but are presented in a monotonous way. To properly educate and inspire students to work on improving their academic knowledge, alternative educational mediums must be sought. Such mediums like Virtual and Augmented Reality allow students to interact with virtual objects to learn more about a wide variety of subjects, hence increasing their engagement and enjoyment in any particular topic. The educational platform used for this research allowed students to engage and participate in activities that allowed them to learn more about a particular subject, in this case, recycling. Results showed that those who used this platform had retained information better than those who used traditional classroom methods to learn by comparing test scores between the two groups. Such platforms should be integrated into classrooms to enhance students' learning experience. For this research project, an Oculus Quest HMD was used to place students in a virtual environment. However, this HMD was priced around $300-$400 and many other HMD's on the market are priced in the thousands. Despite this drawback, other mediums exist to educate students such as Augmented Reality (AR) since these types of applications can run on any smartphone. Future research entails exploring the medium of AR and determining what types of educational applications can come from it.

Objectives

The purpose of this research is to create a Virtual Reality (VR) simulation to allow people to interactively learn how to recycle, what constitutes a recyclable item, and the damages caused if not properly managed.

Methodology

To generate the proposed educational platform, a software development environment containing a series of tools to create a game, known as a Game Engine, must be selected. Many popular game engines currently exist such as Unreal Engine, Godot, GameMaker, and Unity, among others with their own respective advantages and disadvantages. Unity was chosen for this research project as it enables seamless VR integration with various VR headsets, contains an Asset Store full of pre-designed 3D models, and ease of use. For this project, the educational subject, recycling, was chosen as studies have shown that people do not know what or how to properly recycle. The protocol is to then create the same educational content, but to present it in alternative forms; one through the medium of VR, the other through a reading test, and compare the scores from the tests that students will take afterwards. Furthermore, a standalone Head Mounted Display (HMD), known as an Oculus Quest was utilized for this research.

The VR simulation contains the following: recyclable sorting games, short videos containing important information regarding pollutants, Graphical User Interfaces (GUIs) with buttons that allow a user to transport to various locations (ocean, parks, and streets) and provide trash pollution statistics and facts regarding those locations, short interactive quizzes, and general interactions with the environment (picking up trash from floor, taking trash off of animals, etc). Each VR simulation session and reading exam lasted roughly 15 minutes to ensure that users are able to enjoy the experience and digest information provided to them.

Results

The tables below showcase the post test scores and post participation survey scores, respectively. As seen in Fig A, the scores between the control and the experimental group shows a mean score of 72% and 87% respectively. On average, the experimental group had scored 15% higher than those in the control group. Additionally, a survey was provided to all participants afterwards to evaluate overall enjoyment and whether participants felt like they had learned as seen in Fig. B.. While both groups had felt like they had learned, the experimental group not only outperformed the control group, but had also had a much more enjoyable experience with their interactive learning session.
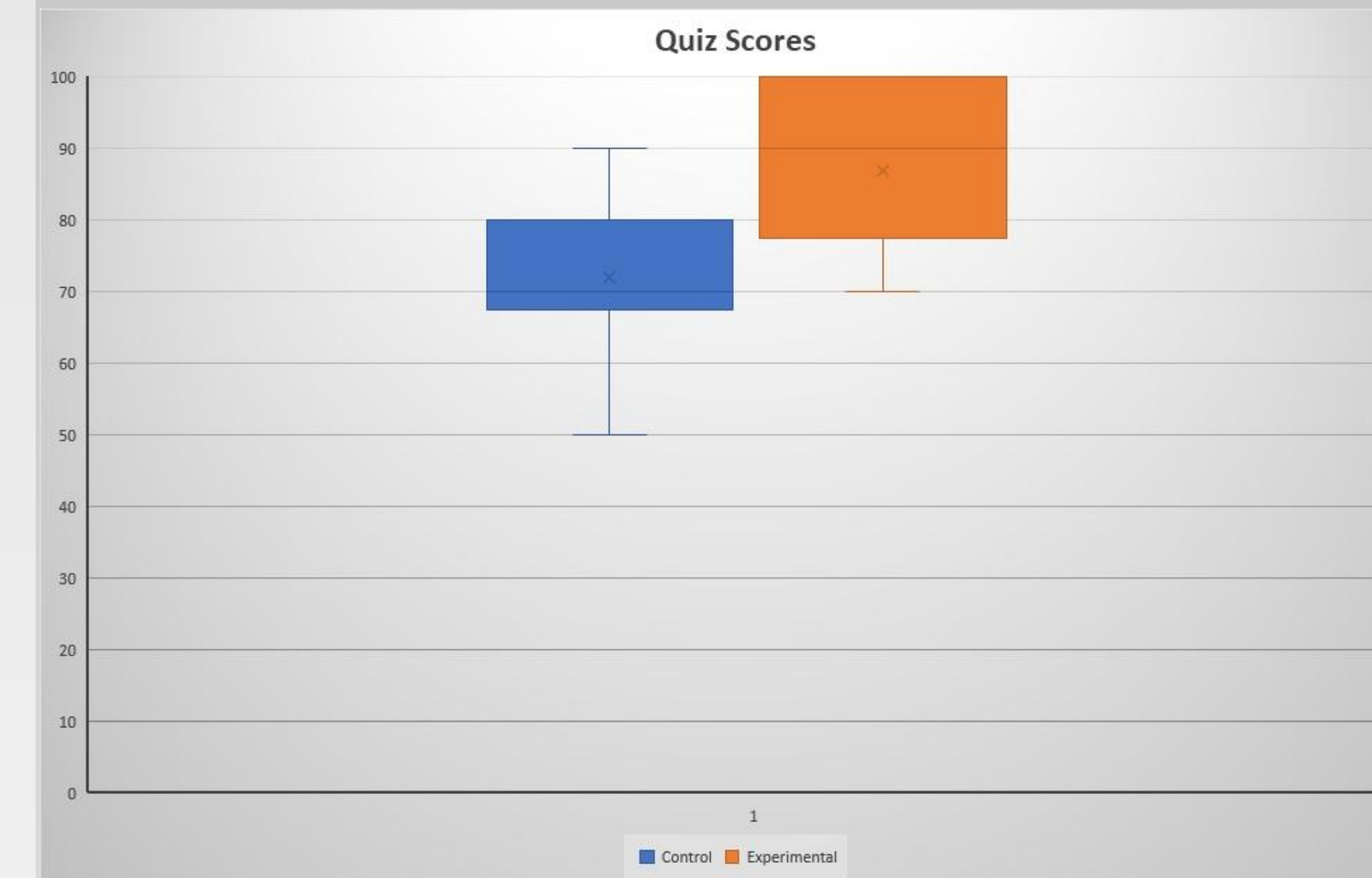
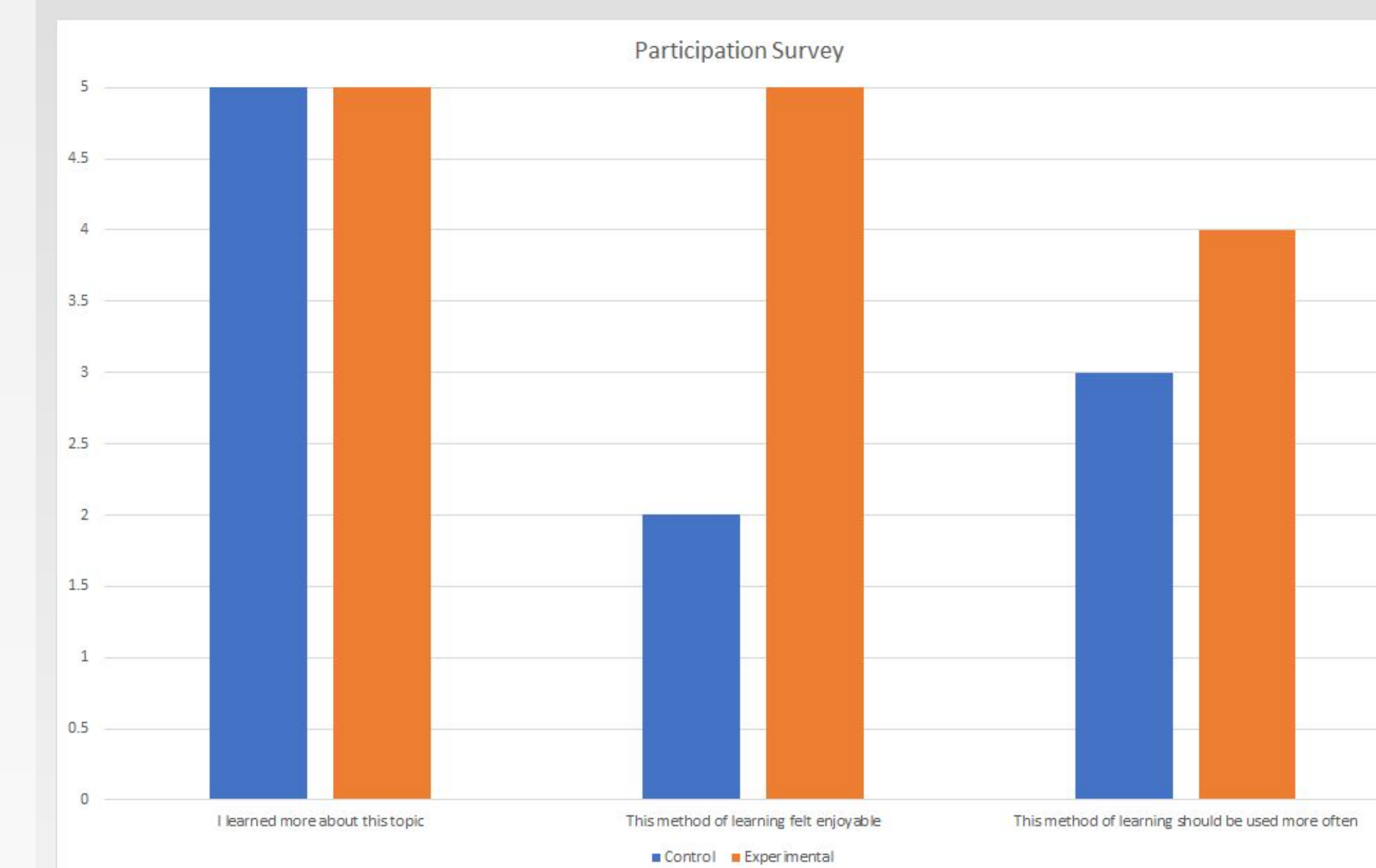Fig. A – Test scores between the control and Experimental Groups

Fig. B – Post participation survey results

Conclusion

The educational platform used for this research allowed students to actively engage and participate in an activity that allowed them to learn more about a particular subject, in this case, recycling. The results showed that those who used this platform had retained information better than those who used traditional classroom methods to learn. Such platforms should be integrated into classroom lectures to enhance the learning experience for students. Despite these successes, this HMD was priced around $300-$400 and many other HMD's on the market are priced in the thousands, making these types of platforms expensive. However, other mediums exist to educate students such as Augmented Reality (AR) since these types of applications can run on any smartphone. Future research entails exploring the medium of AR and determining what types of educational applications can come from it.

References

[1] Ritchie, Hannah, and Max Roser. "Plastic Pollution." *Our World in Data*, 1 Sept. 2018, ourworldindata.org/plastic-pollution.

[2] "Guilford County, NC." County News | Guilford County, NC, 17 Feb. 2021, www.guilfordcountync.gov/Home/Components/News/News/2362/.

[3] "Marine Plastic Pollution." *IUCN*, 17 Nov. 2021, www.iucn.org/resources/issues-briefs/marine-plastic-pollution.

[4] 23, Waste360 Staff | Apr. "Covanta Survey: 'Americans Don't Know How to Recycle.'" Waste360, 23 Apr. 2019, www.waste360.com/recycling/covanta-survey-americans-don-t-know-how-recycle.

[5] "The Stanford Ocean Acidification Experience." VHIL, stanfordvr.com/soae/.

Acknowledgements