

Virtual Reality as an Educational Tool

Alexia Filler

Abstract

In this proposal, I am writing to request funding to conduct research on foreign educational systems—specifically the educational system of Finland—to uncover flaws in the American elementary and secondary education system that virtual reality could ameliorate. To conduct this research, I plan on spending a week in Finland during the summer of 2018, observing classes and interviewing educators to learn about the Finnish education system and discover why it ranks so highly in comparison to the American system. By gaining insight into the reasons and methods behind the success of the Finnish education system, I will be able to draw concrete conclusions regarding shortcomings inherent in the current American education system and provide potential solutions to these problems using virtual reality.

Introduction

Virtual reality (VR) creates virtual environments in which one can become completely immersed both aurally and visually, typically through the use of a VR headset, headphones, and handheld controllers. VR environments appear three-dimensional and provide opportunities for interaction with the environment. The interactive and immersive qualities of VR make it conducive to successful learning; for instance, VR has been used for years in vocational training programs (8). However, VR does not yet have a widely accepted place in *classroom* education. The question then arises: how could virtual reality be used to improve the American education system on a larger scale?

Background

American students are generally brought up to believe that there is a definitive binary between people who are “smart” and people who are not, and that division is based on how well students are able to sit still, concentrate on and absorb a topic, and retain that information over a long while. The worth of a student is measured by their standardized test scores and ability to regurgitate information for tests and, as a result, receive high grades in school. But “sitting still and absorbing” is not the most effective way for many people to learn. Young students frequently exhibit incredibly creative, dynamic ways of thinking and looking at concepts—a skill which, unfortunately, fades over time as students are taught to think analytically and see questions as having only one correct answer (7). Teaching students in a way that would not hinder but strengthen their dynamic thinking capabilities would open up a world of possible ideas. This leads to the question: what must be done differently in education to facilitate this way of thinking?

In terms of educational success, the United States ranks well below the top nations in the world (9). This implies that the American education system may be employing educational

methods that are not conducive to successful learning. Not only does the American education system generally fail to stimulate dynamic thinking (7), it also fails to achieve success in standardized tests that it is supposedly geared toward. In a study of over 65 nations, the United States ranked 14th in reading, 17th in science, and 25th in mathematics (9). With the number of schools and resources in the United States, these statistics are a bit discouraging. Another question naturally arises: what are the nations that are highly ranked in education doing differently that allows their students to be so successful? Finland ranked 2nd in math and reading and 1st in science (9). What Finnish educational methods are helping the nation be so successful?

VR offers promising educational opportunities that can potentially address shortcomings in the American education system. VR is already used in technical training, from warehouse stocking to flight simulation to surgery (8). In these environments, VR has been a helpful tool because it allows learners multiple attempts at tasks with very high risk that do not allow for more than one opportunity if done wrong in the real world (8). VR has also been previously used in classroom settings, though mostly in single-subject activities (1, 6). It provides a “first-order” experience where students can see and interact with concepts in ways that are impossible to create in non-virtual learning environments, such as meddling with molecular compounds in an extremely magnified 3-dimensional space (1, 6).

The interactive aspect of VR is part of what makes it such a promising tool for education. People interact with the world in three dimensions, making clear the gross limitations of technology centered in simple swipes and taps on touch screens. VR makes possible physical interactions in 3-dimensional space. Interaction with concepts that may seem difficult in an abstract two-dimensional space may become much more natural when more of the body is engaged (12).

Overall, VR offers a promising addition to classroom learning; its interactive and immersive qualities would allow students to play and explore in their virtual environment, and give learners the opportunity to interact with concepts that might otherwise be invisible or entirely theoretical.

Methods

In conducting my research, I will interview educators from Finland, a country that has been ranked significantly higher than the United States in terms of educational success, to find out how that nation's methods of education differ from that in the United States and which methods seem to work best. I will visit Finland for a week, during which time I will visit several elementary schools, high schools, and universities. At each school, I will visit several classes and take notes on the methods implemented in the classroom. Afterwards, I will conduct interviews with teachers and professors. I will inquire on the specific techniques they implement in their classrooms, why they use those specific techniques, and why they believe their educational system is so comparatively successful. Furthermore, I will ask for their opinions on technology as an educational tool, particularly VR, and how they think varying learning environments affect students' abilities to retain information and learn concepts previously uncomfortable and/or unfamiliar to them.

Expected Results

I will create my own educational VR game utilizing the information I accumulate from my research and test it on an array of people. I will survey them to see how effective, comfortable, and enjoyable the VR learning experience was and how much they retained from the experience. I do not yet know the topic of study I will cover in this VR program, but in all my research I have not

encountered people using VR in either computer science or language-learning educational programs, so those are areas of interest for me in this project.

From this project, I will hopefully be able to bring fresh insight to the table regarding the ways in which technology can be utilized in educational environments to help students who do not necessarily learn well in a classroom setting, or who are easily deterred from an area of study because they feel they will never have an affinity for it.

Conclusion

The American education system undoubtedly has shortcomings; I propose VR as a potentially valuable solution to these problems. By interviewing various educators in Finland, a nation that is highly ranked in terms of reading, math, and science (9), I will gain insight into the methods Finland puts into action in its classrooms that allow its students to thrive. The specific downfalls of the American education system will become apparent, and I will thus be able to target those areas of potential improvement as I create my own educational VR program.

Ultimately, I believe my research could be used to expose not only the practices that are most successful in classroom learning, but what methods can be utilized to enhance varied types of learning and mental stimulation for people throughout their lives. While I recognize that there are improvements that can and should be made in American classroom learning, I also believe that the uses of educational VR could extend beyond just the mandatory classroom topics. I see potential for VR in educating people about current events, politics, and technology. While this research project will center on classroom learning, I believe that my work will be useful and applicable to future research that might be done on the subject.

Itinerary and Budget

May 13 – May 19

Arrive in Helsinki on May 13.

Begin research at The English School on May 14. Conduct interviews, sit in on classes. Return to residence to write up findings.

Visit Katajanokan ala-aste on May 15. Conduct interviews, sit in on classes. Return to residence to write up findings.

Visit Helsingin Kuvataidelukio on May 16. Conduct interviews, sit in on classes. Return to residence to write up findings.

Rest day on May 17.

Speak with professors at University of Helsinki on May 18.

Return to United States May 19.

Throughout the rest of the summer, I will work on producing my own educational VR program.

Budget:

Flight from Spain to Helsinki → ~\$200

Housing, food, transportation → ~\$100 per day

Flight from Helsinki to Phoenix → ~\$2000

VR equipment → ~\$800

VR laptop → ~\$1500

Emergency fund → \$150

Total cost: ~\$4750

Works Cited

- 1: Bell, John T. and Fogler, Scott. "The Investigation and Application of Virtual Reality as an Educational Tool." Proceedings of the American Society for Engineering Education 1995 Annual Conference, 1995.
- 2: "Bloom's Taxonomy of Educational Objectives." The Center for Teaching and Learning, UNC Charlotte, 2017, teaching.uncc.edu/services-programs/teaching-guides/course-design/blooms-educational-objectives. Accessed 16 Oct. 2017.
- 3: *Creativity and Reason in Cognitive Development*. Edited by James C. Kaufman and John Baer. 2nd ed., New York City: Cambridge University, 2016.
- 4: "Developmental Learning Theory." ATD, 15 Apr. 2014, www.td.org/Publications/Newsletters/Links/2014/04/Developmental-Learning-Theory. Accessed 16 Oct. 2017.
- 5: Kay, Alan. "Alan Kay: Doing with Images Makes Symbols (Full Version)." *YouTube*, uploaded by Kenneth Friedman, 29 April 2015, www.youtube.com/watch?v=p2LZLYcu_JY. Accessed 15 Oct. 2017.
- 6: Mikropoulos, Tassos A. and Natsis, Antonis. "Educational virtual environments: A ten-year review of empirical research (1999–2009)." *Computers & Education*, vol 56, no. 3, 2011, pp. 769-780.
- 7: Robinson, Sir Ken. "RSA ANIMATE: Changing Education Paradigms." *YouTube*, uploaded by The RSA, 14 October 2010, www.youtube.com/watch?v=zDZFcdGpL4U. Accessed 15 Oct. 2017.
- 8: Seymour, Neal E. "Annals of Surgery: Virtual Reality Training Improves Operating Room Performance: Results of a Randomized, Double-Blinded Study." *Annals of Surgery*, vol. 236, 2002, pp. 458-464.
- 9: Shepherd, Jessica. "World Education Rankings: Which Country Does Best at Reading, Maths and Science?" *The Guardian*, 7 Dec. 2010, <https://www.theguardian.com/news/datablog/2010/dec/07/world-education-rankings-maths-science-reading>. Accessed 27 Nov. 2017.
- 10: Terry, Krista and Cheney, Amy. *Utilizing Virtual and Personal Learning Environments for Optimal Learning*. Hershey, PA: IGI Global, 2015.
- 11: Vasagar, Jeevan. "Finland's Schools Flourish in Freedom and Flexibility." *The Guardian*, 05 Dec. 2010, 27 <https://www.theguardian.com/world/2010/dec/05/finland-schools-curriculum-teaching>. Accessed 27 Nov. 2017.
- 12: Victor, Brett. "A Brief Rant on the Future of Interaction Design." *Worry Dream*, 8 November 2011, www.worrydream.com/#!/ABriefRantOnTheFutureOfInteractionDesign. Accessed 15 Oct. 2017.