Learning Impact Award Finalist Submission
Synapse VR
Southern New Hampshire University with Nucco

Link to Submission Video: https://youtu.be/bQ_CHzHf5MQ

CHALLENGE

The SNHU Labs R&D team at Southern New Hampshire University (SNHU) develops prototypes, pilots, and products that explore some of the most innovative digital technologies for teaching and learning. Research into immersive technology, including virtual reality (VR), culminated with the design, and development of a bespoke VR learning experience for implementation in a SNHU classroom. The SNHU Labs team, in collaboration with SNHU Psychology Professor, Dr. Peter Frost, and the digital innovation studio, Nucco, co-created *Synapse VR. Synapse VR* includes three VR learning modules for a course called Biopsychology. The SNHU Psychology degree requires students take a course in Biopsychology, which involves learning the physiological and neurological aspects of psychology, notably including what is happening in the human brain at the neuronal level to facilitate corresponding psychological states. Because this course deals with numerous concepts that can be difficult to grasp, the goal for designing *Synapse VR* was to support learning and deeper understanding of many of the biological processes using immersive, experiential, three-dimensional, larger-than-life neurons with problem solving activities, as a comparison to the non-interactive two-dimensional text, images, or video content that is commonly used for teaching most subject matter By leveraging the affordances of VR we sought to minimize student challenges and frustrations with the most difficult course content. The overarching challenge-question we sought to understand with *Synapse VR* was, *when carefully designed and implemented, does the use of VR reliably improve student interest, motivation, and engagement with course content?*

SOLUTION

The goal with *Synapse VR* was to leverage virtual reality to get students moving and interacting with the Biopsychology content in large virtual spaces. The learner experience in *Synapse VR* utilizes approaches to teaching and learning that emphasize problem solving, construction and movement – constructivism, constructionism, and dynamic skill acquisition. Conversely, it deemphasized approaches focused on the organization and transmission of information. The expectation was that more traditional media — textbooks and websites, for example — were sufficient tools for efficiently organizing and delivering information. Constructivist learning theory emphasizes the personal construction of meaning through one's own experience. It emphasizes use of learners' existing beliefs and ideas to develop conceptual understanding. Emphasis on constructivism in the design of *SynapseVR* led to a prioritization of problem solving tasks that prompted learners to investigate a model neuron, learn about dependencies between its component parts, and manipulate them to solve a series of problems. Constructionist learning theory also emphasizes learning through one's experiences but privileges engaging learners in constructing or creating things that they are interested in. The emphasis on constructionism motivated our providing students with opportunities to assemble a digital neuron in order to learn the basic anatomy and physiology to understand how neurons conduct and transmit signals in the human brain. Here too, the emphasis is on problem solving. The problem activities in *Synapse VR* are strategically designed to require increasing levels of skill and knowledge primarily by manipulating the task or environment.

LEARNING IMPACT OUTCOMES

Our preliminary research shows that immersive VR learning experiences can spark student interest, motivation, and engagement. After participating in each VR experience, students responded to a survey containing questions about their reactions to the use of VR in the classroom using a measure of interest, motivation, and engagement from a recent study of immersive learning by Jocelyn Parong and Richard Mayer[1]. A total of thirty-two student survey responses were received. With regard to our interest in

[1] Parong, J., & Mayer, R. E. (2018). Learning science in immersive virtual reality. Journal of Educational Psychology, 110(6), 785–797. https://doi.org/10.1037/edu0000241

student interest, motivation, and engagement in every measure approximately ninety percent of the student's agreed with statements about feeling motivated to understand the material treated in VR, being interested in learning more about the subject, and finding the lessons engaging overall. And students expressed enthusiasm for VR-based learning, with again approximately ninety percent of all responses indicating that the VR lesson was useful, enjoyable, and something students would like to learn with in the future. These preliminary reactions from students are encouraging and suggest that immersive learning experiences may be able to support motivation, interest, and engagement in learning.

RETURN ON INVESTMENT

Overall, this project expanded collaboration across disciplines at SNHU, challenged our team to ground the experiences in learning outcomes, encouraged thinking about teaching and content delivery in new ways, and built up a new toolset based on our emerging understanding of the possibilities in VR. We answered our original research question and generated some new ones. Students at SNHU are presently using *SynapseVR*, and SNHU Labs continues to study a variety of dimensions of immersive media for teaching and learning. At the conclusion of our initial study of the *Synapse VR* project, SNHU published a VR Playbook that documents our process of 1) evaluating the benefits of VR for learning; 2) designing immersive experiences - our methodology and insights; and 3) implementing immersive experiences in the classroom. The VR Playbook will guide future VR projects at SNHU and has been made available for the benefit of all educational institutions interested in immersive media for teaching and learning.