Using VR Technology for Graduate Education in Agriculture

Introduction

Agricultural educators commonly integrate Diffusion of Innovation (DOI) theory within graduate programs in agricultural education. Rogers (2003) defines innovation as "an idea, practice, or project that is perceived as new by an individual or other unit of adoption" (p. 12). Under the umbrella of innovation, graduate students learn both the importance of the theory, become familiar with the innovation-decision process, and gain a better understanding of how to bring innovation into their respective focus area within agricultural education. This supports research priority area two of the AAAE National Research Agenda, which focuses on new technologies, practices, and product adoption decisions (Roberts, Harder, & Brashears, 2016). Priority area four focuses on meaningful, engaged learning in *all* environments (Roberts, Harder, & Brashears, 2016). Unfortunately, obstacles including travel, arise that interrupt or prevent in-class learning, which often forces instructors to cancel class or provide alternate assignments to be completed independently and submitted online. These virtual environments deprive students of face-to-face interaction and immediate feedback from instructors and peers (Posey, Burgess, Eason, & Jones, 2010). We sought to explore if class sessions taught in Virtual Reality (VR) engaged students, adequately conveyed course concepts relating to DOI theory, and if it provides a sense of presence, normally absent from traditional distance education platforms.

How it Works

VR is a computer-generated, three-dimensional, interactive space that allows users to expand upon physical and sensory abilities (Ryan, 2001). During the ALEC 640 Diffusion of Innovations course at Texas A&M University, we utilized standalone VR head-mounted display (HMD), Oculus Go (OGo), and an existing VR software called Rumii, to teach graduate students DOI theory in novel and engaging ways.

Traditional, first-day-of-class activities provide students with information on the course, the instructor, and their peers. To help familiarize students with VR technology, we transformed these first-day activities with the use of OGo HMDs to allow students to virtually visit points of interest identified by their peers. Each student received an OGo and a brief tutorial. Using Wander, a VR application based on Google Street View data, students virtually transported their peers to specific locations that had an impact on their personal and professional development. Students discussed the relevance of each location as the class explored each location via immersive 360-degree photographs. We allowed students to check the OGo's out for two weeks to familiarize themselves with the operating system, installed apps, and the physical experience of virtual reality. Students explored apps like YouTube 360, Farm VR, Discover, and Wander. This provided students with an understanding of how to use the technology in order to be prepared to participate in a full class session in VR.

To prepare for the VR class session, we created a Rumii team room for the course and sent invitations to students. Rumii is an app that serves as a virtual classroom and includes a robust presentation board that can be used as a whiteboard, video player and slideshow viewer. The app allows the instructor and students to present information, interact and communicate through microphones built into the HMDs. After completing the sign-up process, students created a lifelike avatar to be used for interacting with others in the VR classroom. The avatars, controlled

by students, can raise their hands, speak, turn their heads, and provide visual emotional reactions via an emoji dashboard. This capability allowed the students to connect and interact with each other through embodied interactions as they spoke and discussed course material.

Results to Date/Implications

Throughout this particular course, students used virtual reality technology to digest course material on diffusion of innovations and apply those concepts through their own investigation of innovative technology. The graduate students noted that the VR technology eliminated the physical boundaries of the learning environment, provided a global perspective to the course content, and reinforced innovation concepts through active exploration of innovative products and teaching methods. The students also identified opportunities for using VR for future personal and professional development. The OGo VR HMD also allowed students to engage with course materials and their peers in new ways. Graduate students recognized that in design and function, the HMDs and the virtual environment eliminated distractions and allowed them to focus solely on understanding course content and communicating with one another. The rapid advancement of VR technology, specifically HMDs, holds promise for more connected distance education options for place-bound students. The embodied interaction via the avatar provides a sense of presence, immersion, and connection with others inside the virtual classroom. These feeling are difficult or impossible to evoke through existing distance education platforms.

The students were excited to utilize the VR HMDs. During the time students had the HMDs for personal use in order to familiarize themselves with the technology, they often provided demonstrations of the headset's capabilities to peers and other graduate students in the department. The students also shared that the use of VR should be continued for this course. Several positive comments about the use of VR were included in the course evaluation as well.

Future Plans & Advice to Others

The ALEC 640 course at Texas A&M will continue to leverage the transformational capacity of VR HMDs and will expand the number of course sessions offered in VR. In the context of the diffusion of innovations, future students and the instructor will explore the utility of VR HMDs and their potential to diffuse innovations through various communication channels. Additionally, engagement measures will be developed for students participating in the VR sessions. We recommend that potential users not familiar with VR HMDs test their experience beforehand to avoid potential issues such as nausea. A strong network connection is recommended for the best viewing experience inside the VR HMDs. Generally, university wireless networks have adequate bandwidth to handle the demands of VR HMDs. We estimate that it would take 2 hours for complete novices to learn how to operate the VR HMD and software platform.

Costs

The VR class session discussed required no financial investment from the students. The headsets utilized were available from the AggieXR Lab at Texas A&M. If headsets are not available for you to use, Oculus Go VR HMDs may be purchased for $199 to $250 for a 32GB or 64GB headset respectively. Rumii, the platform used to host the VR class session also operates on Windows and Mac Desktops, and mobile Android and iOS devices. The service is free for 5 users in ‘Team’ and ‘Personal’ rooms and can support up to 40 concurrent users depending on your network capabilities.

References

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