

# Lectures and Discussions in Semi-Immersive Virtual Reality Learning Environments: The Effect of Communication Modality on Learner Satisfaction and Mental Effort

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## **EXECUTIVE SUMMARY**

*This chapter describes a study that was conducted in a semi-immersive desktop virtual reality environment. The study investigated teacher trainees' perceptions of their mental effort in Second Life, their satisfaction with the communication modalities, and their perceived social behavioral changes. In the first event, only the instructor (host) used voice to communicate while all participants as well as the in-text facilitator (co-host) used text chat only. In the second event, not only did both hosts use voice, but the participants also had the option to use voice rather than text. The majority of teacher trainees appreciated the freedom to choose either modality. The integration of voice was perceived as humanizing the discussion, increasing the flow, and making the conversation more engaging. However, the addition of multiple voices was believed to increase their mental effort. While some teacher trainees felt more relaxed and more open in a virtual discussion, others reported a lack of attention and honesty as well as a tendency to ignore social conventions.*

## **INTRODUCTION**

Participants who are engaging in a virtual reality learning environment (VRLE) for the first time may experience cognitive stress as they negotiate an unfamiliar educational resource. Although there is ample research with regard to the challenges of using semi-immersive virtual worlds in education, there is limited research with regard to the successful implementation of lecture events and discussion groups set in such virtual environments. In the present study, one of the goals was to develop a better understanding how online educators may address potential challenges hindering students' effective participation in a virtual lecture and discussion event. These challenges include a variety of factors that may put the success of a learning event in a VRLE at risk. For example, individuals may be frustrated over communicative challenges that prevent them from fully participating in a virtual lecture and discussion event.

The goals of this study were to gain a better understanding of the role that the communication modalities play during a lecture and group discussion set in Second Life, a 3D virtual world. The participants' mental effort expended during this event, their satisfaction with the communication modalities (text chat and voice), and their perceived behavioral changes were explored.

## **BACKGROUND**

### **Semi-Immersive Desktop Virtual Reality**

Desktop virtual reality (VR) runs on low-cost personal computers and enables multiple users to work collaboratively in a game, simulation or virtual world (Lee & Wong, 2014). Although desktop VR is less immersive than fully immersive, augmented, and mixed VR (Huang, Rauch, & Liaw, 2010), users of desktop VR still experience a sense of presence and immersion, depending on the degree of representational fidelity and the degree of interaction among users (Dalgarno, Hedberg, & Harper, 2002).

The use of desktop-based VR technologies for educational purposes is widespread. 3D virtual worlds are categorized as semi-immersive VR systems (Virtual Reality Society, 2018) and offer partial immersion without the need for VR gear, such as data gloves or head-mounted displays. The results of a meta-analysis suggest that semi-immersive virtual reality-based instruction is an effective means of enhancing learning outcomes (Merchant, Goetz, Cifuentes, Keeney-Kennicutt, & Davis, 2014). A total of 69 studies was categorized into three forms of desktop-based virtual reality technologies, namely, simulations, games, and virtual worlds. Real-time visualization and interaction emerged as the key factors that make 3D virtual worlds, such as Second Life, a valid alternative to fully immersive VR (Huang et al., 2010; Merchant et al., 2014), without experiencing the potential caveats of motion sickness, nausea, headaches, and fatigue commonly associated with true immersive VR (Herold & Molnar, 2018; Tax'en & Naeve, 2002).

The authors carefully considered which virtual world might be best to host the learning events described in this study. Conrad (2011) suggested evaluating virtual worlds against four dimensions, namely, their contexts, the immersion level, cost, and their persistence. The participants' level of digital literacy, the available computer equipment, and the participants' bandwidth needed to be taken into account. As a result, the authors chose to conduct the lecture and discussion events in Second Life due to its popularity among educators and its easy and free access. A review of over 100 articles on educational uses of virtual worlds (Duncan, Miller, & Jiang, 2012) indicates an overwhelming use of Second Life because

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