

# Chapter 18

## Integrating Virtual Reality Tools Into Classroom Instruction

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### ABSTRACT

*Virtual reality (VR) is an emerging possibility for delivering educational content and experiences to students. Virtual Reality's use in education has long been discussed however; one of the main challenges is that VR was unaffordable. Today VR has evolved; the technology is mainstreamed, inexpensive, and more accessible. This chapter will examine the benefits of using VR tools (Google Cardboard), a 3D viewer in conjunction with Smartphone, for educational applications. Related studies suggest that VR tools are effective in subjects where an interactive environment is needed.*

### INTRODUCTION

The evolution of technology has permitted the use of new approaches in the teaching-learning process. Educational software benefits the learning process and makes it more interesting for students (Chen, 2013). One of the innovative technologies for education is Virtual Reality (VR). Virtual reality (VR) is a computer technology of simulating or replicating a physical environment to give users a sense of being there and physically interacting with the environment (Ausburn & Ausburn, 2004). VR technology breaks down barriers between humans and computers by immersing viewers in a computer-generated stereoscopic environment.

Virtual Reality offers tridimensional (3D) computer environments with advanced forms of interaction that can provide motivation to the learning process. VR comprises of collection of technologies: 3D displays, motion tracking hardware, input devices, software frameworks, and development tools. The fully immersive learning experience of VR can be used to enhance the acquisition of student knowledge and skills. The use of VR technology can contribute to motivate the learning experience through the 'experiencing of real phenomena'; being free of the consequences the real world imposes. Thus, new educational possibilities can arise from the VR integration.

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Traditionally, VR was not accessible for classroom use due to cost and as it required a desktop or laptop computer. However, with improvements in technology tools, VR today can be adapted to any mobile phone using headworn 3D devices. Thus, VR has now become an affordable visualization tool that can be used in classrooms. Virtual Reality offers unique learning experiences through its ability to provide real time 3D visualization and afford various types of interactivity within virtual learning environments (Chen, 2013).

Research suggests that VR is an effective tool that enhances learning in areas such as engineering (Sulbaran & Baker, 2000). In addition, VR engages the intellectual, social, and emotional processes of learners. The impact of VR is due to its ability to encourage interaction and ability to motivate learners (Winn et al., 1997). According to Clark (2006), VR can be used to make the learning experience more interesting and fun with the purpose of improving student engagement. VR makes it possible to explore real world situations that were impossible to visit previously. For example: exploring a planet like Mars or visiting historic locations. The underlying reason for the rapid rise in the use of VR technology for instruction is the uniqueness it offers in enhancing learners' cognitive skills (Merchant, Goetz, Cifuentes, Keeney-Kennicutt, & Davis, 2014). Research suggests that VR instruction has positive results when students use it in their learning. The research provides evidence that VR-based instruction is an effective means of enhancing learning outcomes (Merchant, et al. 2014).

Although there are many advantages in VR applications, it is important to consider challenges in integrating VR into classrooms. Mobile applications cannot take over the traditional ways of finding information for a specific topic but rather used as a tool to introduce and help the users understand the topic in a different way. Bricken (1991) identified three challenges by comparing VR to pedagogical practice and theories: cost, equipment usability and fear of technology. There is little guidance regarding the instructional design and classroom facilitation of VR technologies (Ausburn & Ausburn, 2004). These challenges include lack of necessary computing equipment for testing VR applications (Riva, 2003), lack of standardization of VR systems (Riva, 2003), and difficulty in establishing equivalent control groups (Crosier et al., 2000).

With so much energy going into development, and so much consumer interest, VR just might be the next big wave of computer technology. This chapter examines the use of VR tools and application in education including higher institutions. The chapter also considers how the use of new technology in the classrooms affects faculty and students.

## **BACKGROUND**

Virtual reality is an artificial environment or an electronic simulation created with computer hardware and software and presented to the user in such a way that it appears and feels like a real environment (Kimer, 2012). Virtual reality utilizes an interactive 3D computer generated environment which can be interacted with and explored by users (Yoh, 2001). The 3D images can be experienced with a mouse and a keyboard or with headsets designed to immerse the user in a virtual simulated environment. In addition, some recent VR applications enable users to “feel” and interact with objects through force feedback (Adams, 2016). The user becomes part of this virtual world and is able to manipulate objects or perform a series of actions.

Chesher (1994) believed that VR originated in subcultures of science fiction, cyberpunk, and computer hacking simultaneously with large institutions, such as NASA, computer companies, and the military.

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