Chapter 11
Effects of Virtual Reality Learning Platforms on Usability and Presence:
Immersive vs. Non-Immersive Platform

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ABSTRACT

The effectiveness of the learning process in the virtual reality (VR) environment and the presence and immersion components of the VR environment are among the most important variables for students to feel as if they are part of the 3D environment and function in the environment. The objective of this chapter is to determine and compare the presence and usability levels of primary school students participating in VR environments with different immersion characteristics (immersive and non-immersive). According to the findings, there was no significant difference between immersive and non-immersive VR environments in terms of presence and usability. It was also determined that the level of presence of students in both groups did not vary depending on usability. The results are regarded to be useful to educators, researchers, and instructional designers who want to integrate VR technology into their educational environments.

INTRODUCTION

Virtual reality (VR) is a trending topic that has become increasingly known in academia and industry in recent years (Guo et al., 2020). According to Burbules (2006, p. 37), VR can be defined as a 3D, interactive and computer-aided simulation environment that allows the user to act as if they are in an external world, and can appeal to more than one sense. VR is an interactive environment that perceives the user's position and actions, provides feedback to one or more of their senses, and enables them to be mentally present in the real world in the simulation environment (Sherman & Craig, 2003, pp: 13).

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It is predicted that this technology, which is foreseen to be a sub-field of computer technologies in the near future, will be widely used in education with many different disciplines such as gaming, aviation, medicine, and psychology (Cipresso et al. 2018). In particular, VR is expected to be widely used in classrooms and adopted by educators and students in the next two or three years (Freeman, Becker, & Cummins, 2017). Some meta-analysis results support this situation (Chauhan, 2017; Merchant et al., 2014) because it is stated that with a sharp increase in the rate of application and software developed for VR technologies, the cost of this technology is also in a constant tendency to decrease (Jang & Park, 2019). In addition, according to current systematic research on VR, it is emphasized that the education category is among the most popular areas where VR is used (Radianti, Majchrzak, Fromm & Wohlgenannt, 2020). Based on these developments, technologies such as VR are shaping the future of education by constantly creating new tools and platforms in students' learning experience in a modern world with opportunities to create innovations (Harfouche & Nakhle, 2020).

In the VR environment, students are immersed in a realistic environment in which they can imitate the real things, explore, interact, and modify objects in the environment through their avatars representing themselves (Jensen & Konradsen, 2018). Students are able to feel the presence of objects in the VR environment more like the real world, receive instant feedback from the tutorials, and experience the feeling of being in a real environment (Monahan, McArdle & Bertolotto, 2008). Environments presented in the VR environment can be representative of real places or can be presented to users as completely fictitious environments. For instance, entering up to the nucleus of an atom or moving around on the surface of a star, such as the sun, are actions that cannot be explained or performed by real-life physics rules. However, the user can interact with objects, move, communicate verbally or nonverbally with other users, create objects, and even play games in the designed VR environment (Zinchenko et al., 2020). Siegle (2019) also points out similar features of VR. In particular, he claims that VR allows users to experience and feel environments in which they are not physically present. Lau and Lee (2015) observed that, according to a study they conducted, students were largely involved in the learning process while in the VR environment. Based on their research findings, they noted that learning activities in the VR environment are exploratory and fun. Thus, they underlined that students could be motivated to explore new ideas through the unique features of the VR environment. In this context, VR technologies are real-time and interactive technology that goes beyond textbooks and allows the development of flexible and appropriate learning strategies (Chung, 2012).

VR technology, which is seen as a 3D environment above technologies such as computer screen, interactive whiteboards, virtual world, games or simulation, is regarded as an interesting and interactive environment that increases the efficiency of the learning process in schools and universities and enables students to keep up with the technological developments of the new day (Merchant et al., 2014; Zinchenko et al., 2020). By using some of the attraction of using virtual simulations and games in learning environments based on VR systems, learning activities can become more enjoyable and motivating (Vogel et al., 2006). Such environments provide users with a high degree of autonomy and allow users to perform actions in an environment where they can perform their abilities (Slater & Sanchez-Vives, 2016). Unlike other environments, the VR environment enables students and educators to participate directly in the environment rather than using the environment. To this end, it is advocated that students in the VR environment can learn more easily through exploration and repetitive practices (Dawley & Dede, 2014).

In order for learning activities in the VR environment to reach their objectives, activities that will enable students to perceive the VR environment as a real experience should be designed (Silva, Donat, Rigoli, de Oliveira & Kristensen, 2016). That the students feel as if they are part of the VR environment,