Chapter 5
Virtual Reality:
Learning by Seeing in 3D

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ABSTRACT

Moving beyond the traditional K-12 classroom environment, this chapter examines the pedagogical benefits virtual learning offer gifted and talented students. The use of virtual reality as a learning tool is relatively new in the field of education. A discussion is provided how virtual reality promote and support learning theories such as Gardner's Theory of Multiple Intelligences, Constructivism, and Connectivism. The benefits of virtual reality in terms of spatial awareness and the use in STEM (science, technology, engineering, and mathematics) areas the technology offers to K-12 gifted and talented students are also discussed. On a global level, the use of three-dimensional software and computer devices can help students discover and understand abstract and complex concepts. This chapter provides an overview of current research and projects relating to the use of virtual technology devices within the field of education.

INTRODUCTION

Globally technology is evolving at an immense pace forging innovation and generating new inventions and ideas designed to enhance how we communicate, educate, conduct business, travel, and develop programs to how we are entertained. Simsek (2016) supports this statement arguing "the rapid change in science and technology has made information more valuable in the information age we live in" (p. 1).

The education world is not alone from the influences of technological advancements. New technologies offer exciting and expanding ways for students to learn new concepts, develop skills, and interact with each other. Scott, Soria, and Campo (2017) recognize the influence technology has upon the learning process arguing "new ways of learning have emerged in the last years by using computers in education" (p. 262). Stosic (2015) claims that technology plays a vital role in education by stating, "educational

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technology is a systematic and organized process of applying modern technology to improve the quality of education (efficiency, optimal, true, etc.)" (p. 111). According to Stosic, technology offers three main uses in education. First, technology is a tutor; it provides instruction and guidance to the student. Second, technology acts as a teaching tool delivering concepts and content to be learned, and finally, technology is a learning tool, a tool in which students can utilize, or manipulate to express their learning process.

Identifying technology that supports these three perspectives offers students the opportunity to explore concepts in a supportive learning environment designed to promote collaboration, critical thinking, and problem-solving activities. If used effectively by well-trained teachers, technology can help to facilitate the learning process, offering unique learning tools and multiple approaches to processing information. In a report to Congress, Dynarski et al. (2007) argue that technology not only provides assistive devices to help gifted students and ones with disabilities to learn concepts and skills but also to help all students learn difficult or challenging concepts that would not be feasible from textbooks or class lectures. In addition to this, Dieker, Grillo, and Ramlakhan (2012) and Siegle (2019) argue that advanced technology, such as augmented and virtual reality, also plays an important role in the learning environment for gifted students. Such advanced technology allows gifted students the opportunities to extend their learning experience beyond the regular classroom environment.

BACKGROUND

21st Century Schools

Today's society offers an abundance of rapidly advancing technology platforms such as Smart devices, Google applications, and Apple products, to name a few, on how we communicate globally and how we learn new concepts that go beyond the traditional classroom or formal teaching environment. In this perspective, Simsek (2016) argues that it is only through the inclusion of technology within the current K-12 education system that will meet the skills and expectations of students.

Sarkar, Ford, and Manzo (2017) claim that students in schools today learn differently from students of an older generation. Surrounded by multiple technologies, social media, and gaming devices, today's students naturally embrace the use of technology not only in their lifestyle but also as their approach to learning. These students are known as *Digital Natives*.

Originally coined by Prensky (2001), Digital Natives are students born into a digital age and are immersed within a multisensory technological world comprising of computers, video games, Smart devices, social media, and cell phones. Digital Immigrants are those individuals who have migrated to a digital age and have chosen to adopt and adapt to new technologies. Prensky contends that the Digital Native, due to their constant interaction with evolving technologies, has enabled them to think and process information differently from their predecessors. It is crucial, therefore, as stated by Prensky, that teachers today need to recognize that their students learn differently, and that the educational environment needs to be conducive to meet the needs of Digital Natives.

Sarkar et al. (2017) believe there is a need for significant educational reform as current practices and learning environments, which are not technologically supported, are not addressing the individual needs of the digital generation. In his book, *Catching Up or Leading the Way,* Zhao (2009) supports