

## Chapter 16

# Challenges and Research in Virtual Worlds and Augmented Reality in the Educational Field

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### ABSTRACT

*New technologies and opportunities to modernize and make teaching more dynamic emerge, as well as to switch from the ordinary traditional teaching method to a different format, which makes the student the protagonist of the construction of his knowledge. It is precisely in this context that new forms of use of technology in the educational field emerge, among which are the virtual worlds (MV) and augmented reality (AR), which are the objects of analysis in this chapter. Taking the basic premises on these topics, this chapter aims to help the reader understand the process of development and application of virtual worlds and augmented reality in education in order to discuss the inherent difficulties, practicalities, advantages, challenges, and trends. Thus, this chapter aimed to present the reader with the importance of reflecting on this context, seeking to show how each of these technologies has been applied in the educational field, being based on reports of empirical and academic experiences of the authors and other researchers.*

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## INTRODUCTION

Information Technology emerged exponentially in the so-called Industry 3.0, in which there were a series of changes in processes, products and ways of working with technology in the most varied sectors of society. Based on three previous revolutions, the concept of Industry 4.0 is increasingly consolidated within society, with a special focus on technological evolution.

The term is adopted to characterize the use of the most modern to produce consumer goods: big data, Internet of things, artificial intelligence and much more (Inoue et al., 2019). It is a relatively new concept, which is the result of new technological knowledge that has been increasingly improved (Kolesnichenko; Radyukova; Pakhomov, 2018).

In this context, Silva et al. (2019c) explains that the discussion about Industry 4.0 takes place primarily in the fields of innovation, but, above all, with regard to productivity and the effective implementation of technology in the phases of the production process. It is important to emphasize to the reader that this scope is related to the most diverse sectors of society, among which, Educational is highlighted, in which, it has been defined in the literature as “Education 4.0”. The term “education 4.0” has been used to refer to the knowledge and skills necessary to adapt to the changes brought about by the emergence of Industry 4.0 or the Fourth Industrial Revolution. [...] That is, they are activities that involve a high degree of creativity, human contact, empathy, trust, dialogue, among other (Oliveira, 2019).

The creation and adaptation of different types of systems and methodologies favored the incorporation of Information and Communication Technologies into the students and teachers’ lives. According to Hetkowski and Dias (2019), although teachers and students live in a digital culture, with the use of smartphones, social networks, applications, games and the most varied resources that trigger new behaviors, we consider a mismatch between school reality and the use of technological instruments in more interactive learning processes. This is the mismatch and the great challenge of education in contemporary times and in digital culture (Hetkowski and Dias, 2019).

New teaching methodologies have emerged as alternatives to be worked on in the classroom, some of which, such as Active Methodologies, already have greater prominence and employment in the academic area. Active Learning Methodologies can be defined as instructional methods that place students at the center of the learning process (Mitre et al., 2008).

Therefore, it is in this context that new technologies and opportunities to modernize and make teaching more dynamic emerge, as well as to switch from the ordinary traditional teaching method to a different format, which makes the student the protagonist of the construction of his knowledge. It is precisely in this context that new forms of use of technology in the educational field emerge, among which are the Virtual Worlds (VW) and Augmented Reality (AR), which are the objects of analysis in this chapter. Virtual reality and augmented reality are two of the most powerful tools for education, in which it is still possible to notice that they are not definitively and expressively present in society (Kirner; Siscoutto, 2007).

For a more accurate understanding, it is possible to establish a contrast with the main characteristic existing between virtual and augmented reality, an aspect that allows to demonstrate the fundamental difference between these areas of study. Virtual reality allows the user to have the feeling of being immersed in a three-dimensional virtual environment, developed through a computer. Augmented reality seeks to combine the elements of a virtual environment with those of the real world. Azuma (1997) states that in virtual reality, because it is immersed in a synthetic environment, the user cannot see the real world around him, in augmented reality, the user can see the real world, with overlapping or composed virtual objects with the real world.

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