

# Chapter 1

## Pandemic and Post-Pandemic Use of Immersive Learning Technology

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### **ABSTRACT**

*Immersive learning technology has the potential to increase student engagement and learning. With the onset of the pandemic in March of 2020, the delivery of education changed, and the use of immersive learning technology was impacted. This chapter considers changes and impacts at the K-12, CTE, and post-secondary level—with on-site, remote, and hybrid learning models—during the COVID-19 pandemic. Anticipated trends in education post-pandemic include an increased need for personalized learning; continued growth in remote learning, virtual learning, and online content and resources and increased demand for career and technical education. Consideration is also given to the implications for immersive learning technology post-pandemic. Specific consideration is given throughout the chapter to the use of zSpace in the United States.*

### **INTRODUCTION**

Immersive learning involves the use of digital technology to provide the learner with an experience of being immersed in an artificial environment. Immersive learning can include augmented reality (AR), virtual reality (VR), mixed reality (MR), extended or cross reality (XR), and 360-degree content. Since immersive learning technology is an evolving technology, the terminology associated with it has been changing and will continue to change over time.

To develop an understanding of immersive learning, it is important to know what it might be composed of in the educational field.

Virtual reality (VR) refers to a computer-generated simulation in which a person can interact with 3D objects. VR use developed in industries outside of education including medicine, manufacturing, and

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defense. In education, VR is often accessed through the use of a headset, which may include a mobile device or may be free-standing.

Augmented reality (AR) refers to technology that allows a person to interact with virtual objects overlaid on real-time images. AR has gained popularity in recent years both with the public and in education through the widespread availability of mobile devices and applications with built-in capabilities. There has been some limited adoption of AR within education.

Mixed reality (MR) refers to technologies that feature elements of both augmented and virtual reality. The use of this term is declining; immersive environments that combine elements of real and virtual environments are more frequently referred to as extended reality (XR). This is also known as cross reality.

In addition to including VR and AR, immersive learning technology can include 360-degree content. 360-degree content provides an audiovisual environment that surrounds the user, allowing them to look around in all directions, just as they can in real life. With 360-content, the user can only look at objects, not interact with them. Like VR, 360-degree content is often accessed through the use of a headset. Some educational applications replicate the 360-degree experience on a flat screen.

While immersive learning technology remains an emerging field, several reviews have been published on the use and effectiveness of VR and AR in education (Bacca et al., 2014; Martín-Gutiérrez et al., 2017). Based on these reviews, there are opportunities for teaching in virtual environments that are impossible to visualize in physical classrooms, including accessing virtual laboratories and visualizing machines, industrial plants, and medical scenarios. AR was shown to be an effective educational tool with the main advantages of learning gains, motivation, interaction, and collaboration. Augmented reality has been shown to increase attention, satisfaction, and confidence factors of student motivation (Khan et al., 2019).

Educators have focused on using immersive learning to address the four “C”s of learning: critical thinking, communication, collaboration, and creativity (Castelo, 2020). Jeremy Bailenson, founding director of Stanford University’s Virtual Human Interaction Lab, has created the acronym DICE to determine whether VR is the appropriate technology to be used in a learning environment. DICE stands for Dangerous, Impossible, Counterproductive, or Expensive and rare (Bailenson, 2018).

zSpace has developed VR/AT—in other words, XR—hardware and software designed for use in an educational setting. Students interact with 3D models in zSpace through the use of tracking glasses and a hand-held stylus associated with a desktop and laptop computer (as opposed to a headset). zSpace includes a range of applications to address educational needs for K-12, post-secondary, and career and technical (CTE) education. Learning is supported through guided content accessible to the student. Teaching is supported through educational resources such as activity plans and curriculum alignment provided by zSpace.

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