

# Chapter 1

## This History and Evolution of Virtual Reality

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### ABSTRACT

*Virtual reality (VR) is a continuously evolving technology that is gradually being integrated into the teaching-learning process, within institutions of higher education. VR has the potential to transform the instructional process, enhance student learning, and engage students in a more interactive manner than has occurred historically. While technology integration within the instructional process has been initiated within institutions of higher education, mass adoption among faculty has not yet occurred. This chapter provides an introduction to VR, discusses the evolution of VR, applications in higher education and other fields, and a progression of features, tools, and functionality that can be used to innovate learning in higher education.*

### AN INTRODUCTION TO VIRTUAL REALITY

Virtual Reality (VR) is a computer-generated environment designed to simulate three-dimensional (3D) physical environments that provide user interaction. Three-dimensional immersive virtual worlds are one of the most exciting emerging technologies being used today and have been shown to improve learning satisfaction while providing opportunities to practice and apply professional skills (Hodgson et al., 2019). While these emergent technologies offer a unique venue to enact learning and practice skills, they also require training, support, and opportunities for experimentation. Therefore, it is important to understand the broad scope through defining VR, identifying characteristics of VR, and describing VR in practice.

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## Defining Virtual Reality

While there are countless uses for VR in education and industry, there are equally as many definitions; definitions of VR have shifted as the related hardware and software applications have evolved, moving from a single user interface to massively multiplayer online worlds (MMOW). For example, in 1996 Schroeder first posited that computer-generated display allows or compels users to have a sense of being present in an environment, other than the one they are actually in, and to interact with that environment (Schroeder, 2008). By 2003, Sherman and Craig expanded the definition of VR when they defined it as “a medium composed of interactive computer simulation that senses the participant’s position and actions and replaces or augments the feedback to one or more senses, giving the feeling of being mentally immersed or present in the simulation (a virtual world)” (p. 13). In 2010, Kapp and O’Driscoll defined a virtual world as an “immersed 3D virtual environment in which a learner acts through an avatar to engage with the other avatars for the explicit purpose of learning” (p. 55). As time and technology progressed, the concept of immersive learning in VR expanded significantly to represent the user being physically present in a non-physical world (Freina & Ott, 2015).

More recently, Sherman and Craig (2018) defined VR as having elements that include: “the virtual world, immersion, interactivity, as well as people on the creating and receiving sides of the medium” (p.6). Immersive Virtual Reality (IVR) often uses head mounted displays and integrates motion sensors to bridge the gap between the simulation environment and real-world conditions (Frederiksen et al., 2019). Hence, as the capabilities and applications of the VR and IVR functions have expanded, definitions and instructional uses for VR have changed. Often, visual, auditory, manipulation and other perceptual stimuli are incorporated within software and hardware applications of technology in a sequence of programmed events to which a person is expected to react and with which to engage directly through a complete sensory experience.

## A Broad Overview of Virtual Reality

VR can be overwhelming to understand, particularly given the nuanced uses of evolving technology, terms, applications, and more. Therefore, this section will provide a broad overview of VR and pertinent language. Given the expansive growth of VR in recent years, (and with the inclusion of immersive virtual reality (IVR), mixed reality (MR), augmented reality (AR), and new functionalities within all), a new term, “Extended Reality” (XR) is used to encompass all of the terms used for co-existing realities. The Horizon Report Panel “expanded the definition of redesigning learning spaces from a trend accommodating more active learning in the physical classroom to one that includes attention to the learner experience in emerging learning spaces programmed into extended reality (XR)” (Alexander et al., 2019, p. 6). Figure 1 below, adapted from Vera (2019), offers a helpful figure to demonstrate the progression of realities and the differences between each.

*Figure 1. Extended Reality*

*Adapted from Vera, L. (2019, Apr 10). What does extended reality mean? Premo.*

*Retrieved from: <https://3dcoil.grupopremo.com/blog/what-does-extended-reality-mean/>*



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