Chapter 7
Wonders of the World:
Metaverse for Education Delivery

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ABSTRACT

This chapter overviewed several existing works being conducted on the metaverse in immersive education. Most of the reviews have clearly stated that the metaverse would be a promising asset and tool in education besides the conventional method. The metaverse gives space where real-world specifications can be replicated via digital twin technology. This enables smarter problem-solving in industries like construction, architecture, healthcare, life sciences, and more. Reviewed studies on the effectiveness of those technologies for education found moderate evidence for the metaverse to assist students in their daily learning. The application of the metaverse to the education sector has been well studied and widely accepted as an engaging and effective method of delivering learning experiences. Hence, the metaverse might be a promising tool to provide immersive learning experiences to users nowadays. An application named wonders of the world (WoW) has been developed using XR technology to provide immersive learning experiences to the users.

INTRODUCTION

Ever since Mark Zuckerberg renamed his company Meta, a large talk in social media has built up around the idea of the metaverse, a venue that Zuckerberg claims we'll all be using in the very near future. He describes artificial intelligence (AI) as "the key to unlocking the metaverse," with AI assistants integral to creating a seamless virtual experience. But is the metaverse just another hype, or a genuine new phase in online interaction? In fact, many of the 3D images, animation, speech and even metaverse artwork

will be generated by AI. Also, AI will be called upon to automate smart contracts, decentralized ledgers and other blockchain technologies to enable virtual transactions.

Thus, education and training are evolving at an accelerated rate along with an increased level of integration with ICT systems. Growth in this area will only continue. Education and training integrated with ICT systems is progressing in two ways: one is in the use of virtual digital information without the use of devices, and the other is in the use of both virtual digital information and sensor devices. Both types of education and training will expand based on the advance of ICT including virtual reality (VR) and augmented reality (AR). Note that mixed reality (MR) is a mix of real and virtual reality and is therefore presumed to be included in the continuum of VR and AR in this paper. Virtual education and training systems are typical applications for systems integration. They are based on the technologies of VR and AR with sensors. Although education and training areas are diverse, virtual education and training systems can have unique information modeling, as well as common functionalities. Common teaching and learning technologies for virtual education and training systems can be determined by categorizing use cases for education and training based on VR and AR.

The concept of the metaverse was popularized in the science-fiction novel *Snow Crash* by Neal Stephenson to refer to a digital universe that can be accessed through virtual reality. This bold, exciting space has been part of many recent works of science fiction, such as *the Matrix* and *Ready Player One* movies primarily.

Metaverse maximizes human engagement with digital content and computer-related tasks while it hides the intricacies of the hardware and software from the user. In terms of learning applications, the user is fully immersed in the experience and learning content, and through multimodal or nature interactions, access to the digital content is intuitive, with little to no learning curves for the user in interacting with the metaverse world itself (Nichols, 2018).

Metaverse is defines as a network of 3D virtual worlds focusing on social connectivity. In simple words, metaverse is a second universe instead of our real world. Metaverse utilizes Extended Reality (XR) technology, and the term has been interchangeable over the current period in the industry. The XR term denotes to the new theory of human-computer interaction that is currently predominantly realized with Augmented Reality (AR) and Virtual Reality (VR) as the human-computer interface. The 'X' in XR is a variable that can stand for any letter, and it covers all the computer-altered reality forms comprising of AR, Mixed Reality (MR) and VR. In recent years, there has been an increasing interest in XR technology for various industry such as healthcare, education, and entertainment. The impact and benefits outweigh the cost and provide industry tremendous return while minimize risk at work (Mubin, Thiruchelvam, & Andrew, 2020).

The convergence of three key factors indicate that it could possibly be at a genuine inflection point in the following areas;

- Software: Seeing the creation of meta platforms and standards which enable interoperability and creation of multiple applications in a functioning value chain well beyond just gaming.
- Hardware: Accelerating advances in hardware, at both the infrastructure and consumer levels, are reducing barriers to widespread adoption of VR such as limited quality of the user experience and its relatively high cost.
- Consumers: The user base for VR is exploding, not only among younger consumers, but also across all demographics, thanks to the shared familiarity with virtual interaction brought about by the pandemic.

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