Chapter 13
VR/AR Technology Adoption in Architecture Education:
Student Acceptance at Taylor's University

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ABSTRACT

In recent years, many architecture practices are reinventing themselves to adapt to the aspects of technological needs, such as virtual and augmented reality (VR/AR). Keeping up with the industry, architecture schools are slowly moving towards the adoption of the technology. However, it is important to note that the students' acceptance and confidence in the technology are crucial for the successful implementation of the technology. The findings demonstrated that the students perceived the technology as useful and are willing to adopt it. Therefore, the architecture school demonstration on the innovation process is crucial to have successful adoption of the VR/AR technology.

INTRODUCTION

In recent years, Taylor's University in Malaysia has taken an initiative in developing an independent learning approach by implementing a Virtual Learning Environment (VLE) which comprises different e-learning features. The institution is also on the way innovating and transforming the architecture education with more advance technology such as Immersive Learning Technology (ILT) to have a further enhancement in architecture and methods of learning.

One of the ILTs, VR/AR technology, slowly establishing a track record in assisting design processes. It is evidence that immersive VR/AR is an effective mechanism not only as a tool for visualizing architecture (Portman et al., 2015), but also as an evaluative visualization tool in the design process (Freitas

DOI: 10.4018/978-1-6684-5119-9.ch013

& Ruschel, 2013). Bullinger et al. (2010) stated further that immersive VR/AR has a positive impact to the design process as it is able to evaluate a design at different stages of design development.

The VR/AR technology provides virtual displays surrounding users with three-dimensional stimuli that enable the users to better understand the spatial qualities based of their design intermediately, and will be able to immerse and experience their works by walking through a simulated virtual environment as to visualize its colour and texture of assigned materials (Milovanovic et al., 2017). Due to its immersive nature, the VR/AR technology is able to facilitate collaboration and other social interactions. In building construction, the technology also allows the visualization of scale and proportions of the internal spatial layout and its aesthetic expression of structural elements. This effect of the technology helps to increase a designer's spatial awareness as they design the structural property as well as component assemblies of the structural system. The use of VR/AR technology eases imagination and thus focuses on the relation between an architectural design process and its structural system (Abdelhameed, 2013).

Additionally, Castronovo et al. (2013) noted that to a certain extent VR/AR leads to improved spatial awareness among viewers, as it has the ability to present spatial information more accurately and in more quantity than conventional means. The VR/AR's ability to increase spatial-related factors has motivated the design discipline to apply the technology not only for the visualisation of the design output, but also in early design processes. Several studies among landscape architecture students (George, 2016; Sleipness & George, 2017) confirmed further that the VR/AR is not only able to assist the student to conduct a remote site analysis, but it is also enable the students to interpret spatial site qualities effectively and accurately. As Immersive Learning Technology (ILT) can assist students in reflecting the functional, formal, and material qualities of architectural spaces; the technology can improve the visualization, spatial perception, and broad conceptual design abilities of architecture students (Valls et al., 2017).

Hence, VR/AR technology is rapidly developing to become an essential tool for architectural teaching and learning. However, before implementing any new forms of technologies and software, it is necessary to understand the users' understanding and perception in adopting the new technologies into their course, to ensure the users are well aware and prepared for the implementation. Often the perception of students towards the adoption of new technology is mostly underexplored. Fleishmann (2018) noted that there is substantial evidence of limited research studies investigating the students' perceptive view in a transition to a hybrid learning environment making it difficult to propose design direction in an innovative learning experience. Few studies have addressed issues around the architecture students' adoption of Immersive Learning Technology. Most of the studies often do not discuss the students' characteristics, such as gender, prior knowledge or skills (Abdullah, Kasin & Sanusi 2017; Vals, et al, 2017; Ummihusna & Zairul, 2022). Therefore, this research attempted to explore the architecture students' acceptance and usage of the VR/AR technology at Taylor's University in Malaysia by using the Technology Acceptance Model (TAM) as the theoretical base. Accelerated by the Covid-19 pandemic, higher educational institutions in Malaysia are racing to include technological advancements into their educational environments, and joining this race, Taylor's University is developing the Virtual Online Future Technology and Extended Reality Laboratory (VORTEXR Lab). The state of technology and the social structure of developing countries are different from developed countries. Hence, it is becoming necessary to understand how Malaysian students perceive and use the new Immersive Learning Technology. Thus, this study attempt to explore the

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