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## THE 11TH INTERNATIONAL INNOVATION, INVENTION & DESIGN COMPETITION INDES 2022

# **EXTENDED ABSTRACTS BOOK**



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Perpustakaan Negara Malaysia

Cataloguing in Publication Data

No e-ISSN: e-ISSN 2756-8733



Cover Design : Nazirul Mubin Mohd Nor Typesetting : Wan Nurul Fatihah binti Wan Ismail

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Organised by

Office of Research, Industrial Linkages, Community & Alumni Networking (PJIM&A) Universiti Teknologi MARA Perak Branch

and

Academy of Language Study Universiti Teknologi MARA Perak Branch



#### 3-DIMENSIONAL VIRTUAL REALITY APPLICATION IN EDUCATION TO IMPROVE STUDENT LEARNING

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#### ABSTRACT

The use of virtual reality (VR) technology in learning has been emerging in the past few years. The use of VR involving 3-Dimensional (3D) VR is limited. There is a need to explore 3D VR in a dynamic physical application. 3D VR is able to immerse an individual in a simulated environment created to be realistic and with meaningful goals. The potential impact is an improved outcome of learning among students. It may also reduce the cost of education as students can learn by themselves. The platform created will also serve as an access to the technology for teachers, lecturers and parents. The objective of the application is to design a 3D VR module for student learning and to evaluate the effectiveness of 3D VR in education learning. The novelty is, the use of 3D VR is currently not a conventional practice in education and the learning concept in this project is novel for both students and lecturers.

Keywords: 3 Dimensional Virtual Reality, Education

#### **1. INTRODUCTION**

The education system adapts to how technology has affected people's lives, working practices, attitudes, and professions. Basically, education develops the humanity of people in local, national, and global societies by providing basic practical skills (Zhao & Watterston, 2021). Recently, several educational policies have been introduced to improve education by focusing on students' learning and development (Burner, 2018). By introducing innovation that aims for efficiency and effectiveness, the rapid growth of technology and information in many areas of life, including education, attempts to build a bridge between both the present and the future (Lynch, et al., 2021). Information and communication technology's advantages are the speed to obtain information and facilitate learning to be more attractive, visual, and interactive (Akpan & Akpan, 2022). Furthermore, students can improve their thinking skills and gain broader, more in-depth insights (Darling-Hammond, 2019). Moreover, in order to develop a 3-dimensional virtual reality application, the equipment must not burden the student and use cheaper equipment, so that they can buy it by themselves (Hashim et al., 2020; Mohd Hashim, 2022).

#### 2. METHODOLOGY

The research method consists of four methodological phases. The four phases were theoretical investigation phase, implementation phase, testing phase and evaluation phase. In the



theoretical investigation phase, literature reviews were done to research the problem and develop proposed solutions. The main priority of literature review is to find out about previous research regarding the virtual reality in learning, and their entrepreneurship. The keywords used to search were 'learning using virtual reality', 'entrepreneurship education', 'the benefit of using 3-dimensional virtual reality in learning', and 'the previous virtual reality application for learning'.

Phase two consisted of two sections which were learning design and virtual reality development that are used for learning. In the learning design section, the flowchart was designed. In the testing phase, two activities were carried out which were selecting participants and the testing process of virtual reality application. Based on the Binomial probability formula, six students were needed for using virtual reality applications in their learning class. This experiment applied quasi-experimental design. During the testing process, there were five steps that should be followed. The first step was to set up the virtual reality room. Step 2 was getting the agreement with consent and photographic form. Step 3 was to use the virtual reality application, while Step 4 was conducting pre-test and post-test assessment, and Step 5 was answering post exposure questionnaires. In this application, the participants wore the oculus of virtual reality, to see and feel that they are in a 3-dimensional environment while learning. After using the virtual reality application, participants need to answer the post-exposure questionnaire and usability test questionnaire. All the data were collected, and the result is expressed in frequency and percentage. Below is the evaluation process. The participants consist of six students. For pre-assessment, we recorded students' score of learning after not using virtual reality application. After that, students used virtual reality applications and learned again the same topic of business education. The differences between pre and post assessments scores were analysed.

#### **3. FINDINGS**

In developing virtual reality applications, the software used is Unity 3D and the program languages used are C++ and C. The environment that students can see when they are using the HTC vive oculus virtual reality application during their learning. From the environment, students will be able to interact with the 3-dimensional environment. The design is a simulation for education learning that uses virtual reality technology. It is a computer-based learning simulation that involves players in realistic activities to acquire knowledge, improve negotiation skills, and promote good learning outcomes. Therefore, participants are required to walk around the environment.

#### 4. CONCLUSION

Applications of virtual reality technology are now being used in education and they will continue to advance. The results showed that virtual reality could increase the learning process's effectiveness. The findings of this study can tell future researchers that virtual reality is an



intriguing tool to be used in the teaching. It significantly affects the outcomes of the simulationrelated pre-test and post-test for students.

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