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MOBILE APPLICATION: LEARNING BASIC MATHEMATICS OPERATION USING AUGMENTED REALITY

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ABSTRACT

In school, students need to learn mathematics not only for taking the exam but also can use their knowledge to solve the problem in daily life. When students are dealing with numerical information, they tend to have a negative feeling or fear, and this situation is known as mathematics anxiety. This aim of the project is to develop a mobile application to learn basic mathematics operation by applying augmented reality and to evaluate the technology acceptance of the mobile application. This project implements a mobile application that has augmented reality technology. This project split into 5 phases in methodology: planning, design, analysis, implementation and testing. The user requirement is gathered from the interview with the teachers. This mobile application is implemented by using Unity. The software development kit (SDK) for making the augmented reality in Unity is by using Vuforia.

Keywords: augmented reality, mathematics

1. INTRODUCTION

Mathematics is a fascinating subject, and by learning math, it can solve problems in daily life, such as counting money and calculating distance. In Mathematics, it can make up a large part of children's life because they will use their knowledge through mathematics from primary school to university. Currently, in primary and secondary education, the most frustrating subject for the students in mathematics, and it is the most percentage of unqualified students among all the subjects in school (Huang, 2013). Based on the Primary School Evaluation Test (UPSR) in 2016, 34.67% of the students get at least minimum 1D which the student gets at least 1D in any subject and it can become an issue and problems that can be highlighted in the mathematics subject. One of the alternatives uses of augmented reality (AR) in combination with print resources, in educational contexts, it has reached popularity in the research literature and the business industry (Estapa & Nadolny, 2015).

2. METHODOLOGY

In this project, it has five main phases of the project framework: planning, design, analysis, implementation, and testing. The first methodology is planning, which is a stage of planning of any project that brings together the elements of knowledge that indicate if a project is possible or not. Then, the analysis phase, which studies the problem, learn and study software related, study C# programming and gather user requirement by interview. For the interview, two teachers are helping for the user requirement. Both teachers are teaching mathematics for more than 15 years at SK Permatang To' Jaya, Butterworth, Penang. The first teacher is Madam Khalilah Binti Hussain, who is the head of the

Mathematics committee. The second teacher is Madam Noorazah Binti Razali who is a remedial teacher. Based on their experience, both of them said that there is not much time to focus the basic operation mathematics, because nowadays there is a lot of topics that they need to cover. They also give some suggestion about the functionality and content that be implement in this mobile application. One of the suggestions that might be interesting is the Content should be made from easy level to a difficult level, and that method is called forward gradually "ansur maju" which start with fun at the beginning of the show. Then, the design phase which design application flow, design system architecture, design user interface and storyboard. The next phase is the implementation which UI development in Unity, video production, upload image target on Vuforia and add the target in the scene and coding C# for the button functionality. The last phase is testing which testing the functionality of the system and test for the cross-platform compatibility.

3. FEATURES OF THE MOBILE APPLICATION

Firstly, this mobile application needs an AR marker. If the user does not have any AR marker, there is a button at the main page which is "Muat Turun Bahan AR" for the user to get the AR marker. If the user has the AR marker, they can continue using this mobile application. After that, the user can choose the topic what they want to learn in the main menu page. There are four topics which are addition, subtraction, multiplication and division. After the user chooses one of the topics, it will go to the AR camera. At the AR camera, the instruction will appear when the marker is not detected. There are two buttons on this page which is "Latihan" for the user to do the exercise about this topic and also exit button for the user to exit the application. The instruction is disappearing because the marker is detected. When the marker is detected, three-button are appeared on this page which is play, pause and stop button. The video will appear when the user scans the AR marker. For each basic mathematics operation, there is three card that shows the difficulty of the operation. Besides, another feature of this mobile application is the exercise section. In the exercise section, there is the main page part and the question part. The main page is to instruct the user for doing this exercise. For the question part, the user will answer the question with multiple-choice style. When the answer is correct, the correct sound will appear and the score will be added. There is also has a song at this page. If the answer is wrong, the wrong answer will appear and the score will not be added.

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2. Pihak Perpustakaan ingin memohon kelulusan YBhg. Profesor untuk membuat imbasan (*digitize*) dan memuat naik semua jenis penerbitan di bawah UiTM Cawangan Perak melalui Repositori Institusi UiTM, PTAR.
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Kelulusan daripada pihak YBhg. Profesor dalam perkara ini amat dihargai.

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