Learning *Bahasa Melayu* using augmented reality (AR) mobile application for primary school

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ABSTRACT – The study aims at evaluating the augmented reality (AR) mobile learning application in enhancing the understanding of *Bahasa Melayu* among students. The methodology involves two parts; ADDIE model for development part and the Game-Based Learning (GBL) model for Instructional Design (ID) part. The AR mobile application was designed for primary students, aged 7 to 12 years old, to learn *Bahasa Melayu*. The resulting Subject Matter Expert (SME) approved that this application can increase the interest of students to learn *Bahasa Melayu*. Moreover, the respondents agreed that AR mobile application is very helpful in enhancing student's understanding in learning *Bahasa Melayu*.

1. INTRODUCTION

In Malaysia, everyone must learn *Bahasa Melayu* during primary school, where they learn how to read, write and communicate in *Bahasa Melayu*. In addition, *Bahasa Melayu* is a compulsory subject up to the secondary level and meanwhile at the tertiary level, it is an elective subject that is often being ignored unless the individual is majoring in language or communication. There are two main problems that needed to be addressed. First, schools insufficient of auxiliary tool and ineffectiveness of teaching strategy for learning *Bahasa Melayu*. This problem occurs because in traditional way, the teaching and learning process is conducted within a long period of lecture and this make the students does not interested in learning *Bahasa Melayu.* Thus, using AR in learning process, will provide the students in situated learning through gamification, which is engaging activity [1]. Second, students are lack of mastering *Bahasa Melayu*. Nowadays, most people have problem in mastering *Bahasa Melayu* because of improper usage of the language. This happened when someone mixed his/her sentences with English language and we called it *Bahasa Rojak*. Therefore, we purposed this project in order to help students in learning *Bahasa Melayu* using AR. In fact, AR empowers learning experiences due to the capabilities providing meaningful context [1].

2. METHODOLOGY

Instructional Design (ID) can be defined as the creation of instructional materials, modules or lessons [1]. In this project, we have two parts of methodology. First, our development model is based the ADDIE model. Second, our ID model is based on Game-Based Learning model.

2.1 Development model

ADDIE model is one of the models in ID [2]. Therefore, the development of this project is based on ADDIE model. We chose ADDIE model because it is a model that widely used in developing e-learning. The flow of the ADDIE model is as shown in Figure 1.
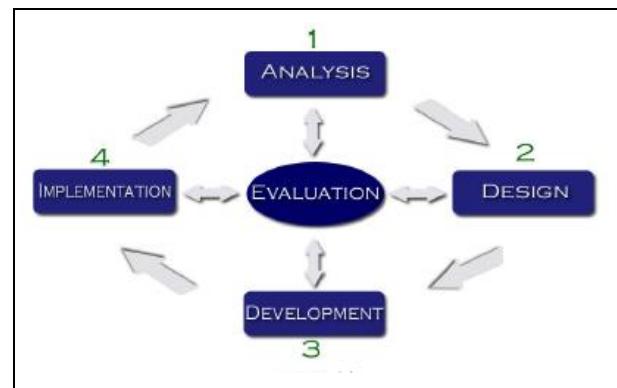

Figure 1 ADDIE model [2]

Based on the ADDIE model, it has five phases which are analyze phase, design phase, development phase, implement phase and evaluation phase. In analyze phase, we have created a list of question in order to help us to analyze the problem and the objectives of this project. Moreover, in this phase, we also collect the data especially the content (collective nouns and proverbs in *Bahasa Melayu*) from the subject matter expert (SME).

Next, in design phase, we created a simple prototype and designed the flashcards using Adobe Illustrator (AI). Then, in development phase, we used Unity engine to develop this mobile application. During the implementation phase, a procedure for training the educators and the learners is developed. This is also the phase where the bugs are being fixed and any technical issues is being resolved.

Lastly, the evaluation phase is where the AR mobile application was evaluated by five random people who know about AR technology located at Faculty of Information and Communications Technology (FTMK), UTeM.

2.2 Instructional design model

In design phase, we use GBL model, as shown in Figure 2, in order to design the AR features and assessment in this mobile application.
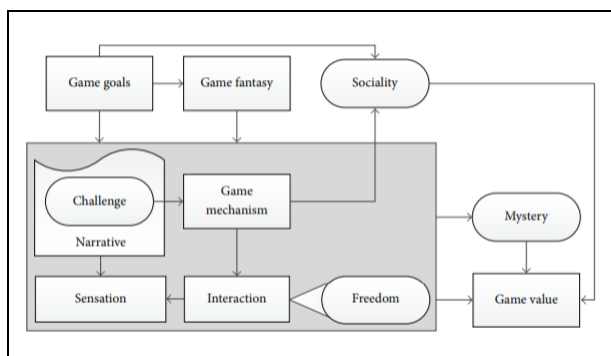
Figure 2 Game-Based Learning (GBL) model [3]

In designing this mobile application, we have followed the several elements based on GBL model [3]. Therefore, the GBL elements that have implemented in this mobile application are *Game Goals, Challenge, Game Mechanic, Interaction, Freedom, Game Value, Narrative.*

3. DESIGN AND DEVELOPMENT

In this section, we will discuss about our final product. We have designed and developed this mobile application based on ADDIE model. For the design phase, we have designed the flashcards as the markers for the AR section by using AI. Next, in the development phase, we have developed this mobile application by using Unity engine. In our mobile application, we have two sections which are AR and assessments. Therefore, the design for the flashcards and mobile application is shown in Figure 3 below.
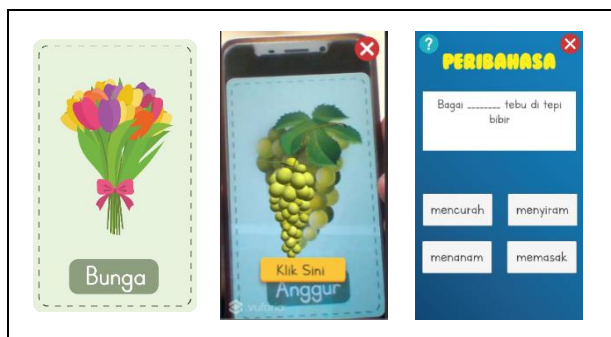

Figure 3 Flashcards and mobile application interfaces

4. FINDINGS

Based on the usability testing, our SME that approved this application can increase the interest of students to learn *Bahasa Melayu* especially proverbs and collective nouns. The result from our SME is shown in Figure 4.

In addition, we can conclude that most of the participants found that this mobile application is very helpful in enhancing the understanding of students in learning *Bahasa Melayu*. The result from our respondents is shown in Figure 5.
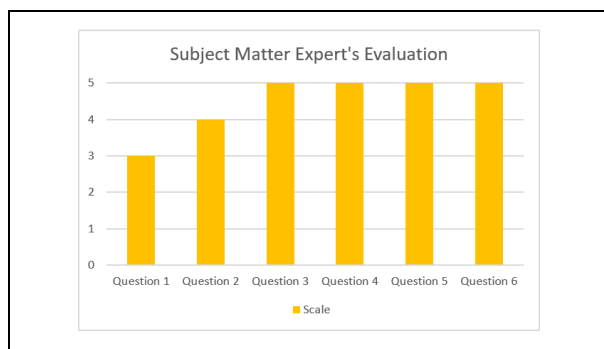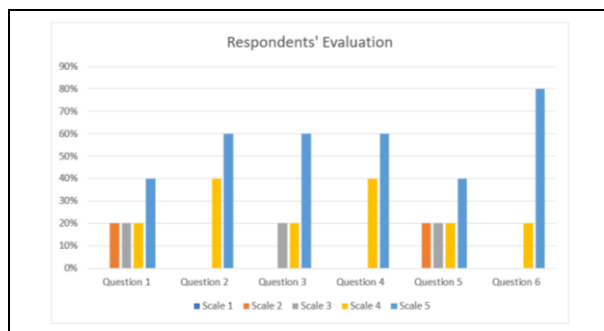

Figure 4 Subject matter expert's evaluation result

Figure 5 Respondents' evaluation result

5. CONCLUSIONS

In conclusion, we have achieved all the objectives for this project. Overall, this project is expected to help students to learn *Bahasa Melayu* in interesting way that have powerful elements that can lead to more effective learning and stay engaged. However, since we have limitation of time in completing this project, we decided to evaluate the AR mobile application among students who know about AR technology. Therefore, in the future, we hope this project can be evaluated by primary school students age 7 to 12 years old.

6. ACKNOWLEDGEMENT

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