Augmented Reality: Historical Figures of Tanah Melayu for Form 3 History Subject

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***Abstract*— There are many historical figures who fought for our freedom against colonizers such as Dato Bahaman, Tok Janggut and many more. The purpose of this study is to create an Augmented Reality(AR) application that will help Form 3 students in Malaysian secondary school to learn about these historical figures as described in their History subject book. This application will be used alongside an AR book. For this research, the ADDIE model is used. The research will also evaluate the students' level of understanding of historical figures before and after using the application. Lastly, it is hope that this application will benefit both teachers and students in teaching and learning the History subject.**

Keywords—augmented reality; historical figures; history subject; AR book

I. INTRODUCTION

Augmented Reality is an advance technology which expands our real world, adding numerous of digital information onto it. AR appears in direct view of an existing environment, adding sounds, videos and graphics to it. According to Milgram and Kishino, Virtual-Reality is the conceptualized continuum that takes into consideration four systems: real environment, augmented reality (AR), augmented virtuality, and virtual environment. AR can be defined as a new technological system in which virtual objects are added to the real world in real-time during the user's experience. [1]

Relating AR to education, Malaysia former Prime Minister, Tun Dr. Mahathir Mohamad said that the government is expected to introduce new learning materials in schools to help teachers with their syllabus in the classroom. This will be used particularly in the teaching and learning of subject [7]. Tun also mentioned that technology can help students to learn much better.

People nowadays spent more time using their gadget. Statistic shows that from year 2019 to 2020, the number of user for smartphone has increase about 900,000 users. People uses their phone more, example to read newspaper online and watch news. Currently, students learn history the old ways, the same way which is through reading textbook or reference book. Student can't visualize the history that has happen [6].

This project was developed to help students to visualize the historical figures whom struggle to fought for our freedom against invasion. The application combines reality-world and 3D model to make it more attractive and also interactive. The application is hoped to attract student to learn history in a more enjoyable way from the current or existing method of learning

The objectives of this project are to develop an AR application of historical figures for secondary school students learning History subject, to serve as an alternative learning method for student to learn about historical figures and finally to evaluate the effectiveness of the application in delivering the content.

II. LITERATURE REVIEW

A. Augmented Reality

Augmented Reality (AR) is an immersive experience of a real-world environment whose real-world objects are improved by computer-generated perceptual awareness, often by various sensory modes, including visual, auditory, haptic, somato-sensory, and olfactory. An augogram is a computer-generated image used to create an AR. Augmented Reality can be defined as a framework that fulfils three simple features: a mixture of real and virtual environments, real-time interaction, and precise 3D virtual and real object registration. AR appeared in science fiction from 1901, but it was in 1990 that Boeing's Thomas Caudell described the term as technology. It is distinct from virtual reality, which involves the separation of users in virtual worlds. Essentially, the term refers to a pure combination of physical and virtual worlds. 'Augmentation' technology has supplied the real-world picture with additional layers of digital knowledge as an individual subject, recorded on film or camera [2]

B. Unity Application

Unity is a strong, full-featured, commercial multi-platform 3D game development tool made by Unity Technologies. It has a free edition for people to read more, and you can publish your games with it for free, but it has certain features that are disabled. Unity is not just a programming framework, but a sophisticated editing platform. The default screen configuration is a Scene View that helps you to monitor anything at your speed, and a Game View that you can start testing at any time.

C. Vuforia SDK

Vuforia is an SDK developed for Android, iOS, and UWP (Universal Windows Platform) AR applications. It was originally developed by a corporation known as Qualcomm and only text could be recognised in its release edition [5] (Nikitin, 2020). The SDK was purchased by PTC Inc. in 2015. The new owner focuses on Vuforia advertising as an SDK enterprise app,

but is still used for mobile growth. SDK is written using C++ and offers smartphone platform access to its API. New releases of Unity have built-in Vuforia, so developers no longer need to torture themselves by downloading the SDK [5].

D. Related Work

1. *Augmented Reality Map of Barcelona*

Fig. 1: AR Map of Barcelona by Smartech Group

The application was invented for tourist to search for a tourist spot. The application also can help tourist to see the building in 3d perspective. It's a handy application to attract tourist to come and visit the area. The application uses the map of Barcelona to locate any tourist point such as Camp Nou Stadium which very popular all around the world.

2. *The Future of Vehicle and IoT Visualisation*

Fig. 2: AR App by GPSengine

The AR application in Figure 2 was developed to track down car on a map and it will show the location of the car in augmented reality. The location of the car will be shown on a virtual map which equipped inside the augmented reality application. The application was built to track down user car if there is any unnecessary movement or in other words, the car was stolen.

3. *Google Map AR*

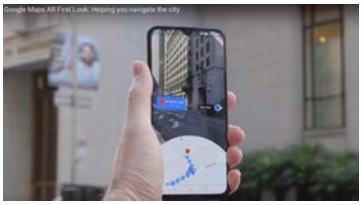

Fig. 3: AR App by Google

Google Maps AR is designed to help you navigate while walking using Augmented Reality. It uses the camera at the rear of the phone to locate where you are, superimposing on the view direction and information, rather than just showing a map to you.

Based on the studies done, it can be concluded that there are none of the AR application in the market that focuses on visualization of historical figures especially those from Malaysia. Review done also suggest that the Google Maps AR is the most suitable reference for this project. Although the content is different but out of the three, Google Maps AR has a very good animation, sound effect and most importantly it is user-friendly. The application is also well design, the arrangement of button and icon are good and that makes the application looks very attractive to user.

III. Methodology

The type of method that will be used on this application is qualitative research. Data will be collect from. the questionnaire, observation and interview.

A. ADDIE Model

ADDIE model is used in the project as it is simple and it is widely used in instructional application , especially for teaching methods, books, educational games and other technologies in education [8].

1) Phases 1: Analysis

Analyzing every aspect of student perspective about History subject. Analyze the design course on the theme, project and idea. Some of the aspect been analyze is the content needed to put inside the application.

2) Phases 2: Design

In design phase, researcher need to make some sketches of all components needed to be put inside the application such as characters, clothes and the flow of the application.

Fig. 4: sample characters design

3) Phases 3: Development

After the completion of the design phase, researcher will start build his project. The development of characters is based on the sketch that researcher have made in Design Phase. The number of characters that will be created is 6 characters which are Dato Bahaman, Dol Said, Tok Janggut, Dato Maharaja Lela, Yamtuan Antah and Haji Abdul Rahman Limbong.

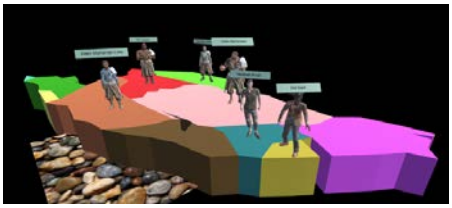

Fig. 5: historical figures and state

4) Phases 4: Implementation

In this phase, researcher need to make sure the final project has been completed based on requirement needed. Researcher need to make sure that the project is fully function and faulty-free. Researcher need to make sure that user will understand the application and start using the application.

5) Phases 5: Evaluation

The project uses questionnaire for data collection. The questionnaire uses a dichotomous style survey, it's a yes no questionnaire. It consists 2 sections A and B, 6 questions in the former which student need to answer first before using the application while another 5 questions are in section B where student will answer after student has used the application.

The location for testing is Sekolah Menengah Kebangsaan Khir Johari in Perak. The school has roughly 770 students. For this project, 10 students are required for the testing. Teachers who teach History subject also involved in the testing to see if the application can be used as a teaching aid.

IV. Results and Discussion

Based on the testing done, Figure 1, shows the result of whether using AR application is the best way to learn History subject. Figures below shows the student respond from the test session, feedback from student and teacher after using the application.

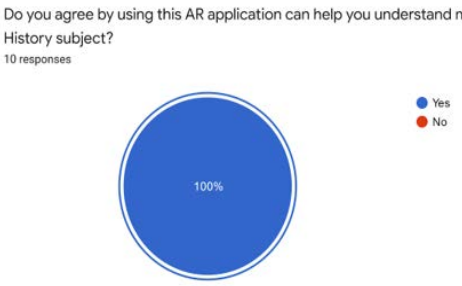

Fig. 5: AR application can help student understand more about History subject chapter 7.

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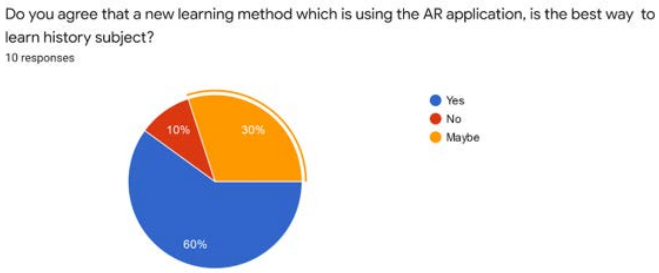

Fig. 6: The AR application is the best way to learn History subject

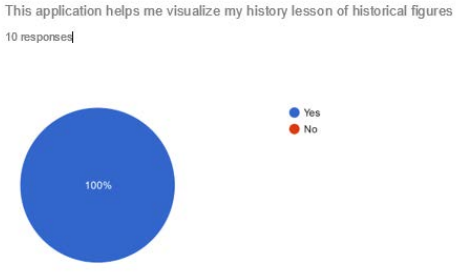

Fig. 7: The AR application helps student visualize lesson effectively

Based on Figure 5, researcher can conclude that all students agree that the AR application can help them learn chapter 7 in History subject. Figure 6 shows that most students agreed that the AR application is the best way of learning History subject. The other 3 students have similar comments that the application could be if there are improvements in the application in the area of voice over, content and also interactivity. As for Figure 7, 100% student agree that the application helps them visualize the lesson.

V. Conclusion and Recommendation

Based on the objective achieve by completing this project, researcher can conclude that the project is a success. The application was well received among students and teachers. The 3D characters of historical figures were likeable however the contents of the application still need improvements.

Future improvements include expanding the knowledge in making the AR application not only for History subject but to also cover the entire History Form 3 textbook. Next, is the plan to make the AR application in dual language which is in Bahasa Melayu and English. By providing dual language inside the AR application, the application can be used by other student from other country who don't understand Bahasa Melayu. It is hope that many more educational AR application will be developed to help the students to learn better and in a more enjoyable way.

References

[1] P. Milgram, and F. Kishino, "A Taxonomy of Mixed Reality Visual Displays," IEICE Trans. Information Systems. vol. E77-D, no. 12.pp,1321-1329, Dec, 1994

[2] Maxwell, K, *macmilan dictionary.* [Online]. Available: https://www.macmillandictionary.com/buzzword/entries/augmented-reality.html [Accessed: 20 March, 2020]

[3] P. Thanpa, "Cross-platform Augmented Reality with Unity," *Viget, July 2019.* [Online]. Available: https://www.viget.com/articles/cross-platform-ar-with-unity/

[4] J. Chen, "Android Operating System" *Investopedia,* February 2020. [Online]. Available: https://www.investopedia.com/terms/a/android-operating-system.asp

[5] N. Nikitin, "How To Choose A Technology For An AR Project. Part 1: Vuforia" ARchy, Jan 2020, (14 January , 2020). [Online]. Available: https://medium.com/@ARchy_Team/how-to-choose-a-technology-for-an-ar-project-part-1-vuforia-65b92d7c7561

[6] J. Muller, Statista, 8 August, 2019. [Online]. Available: https://www.statista.com/statistics/494587/smartphone-users-in-malaysia/

[7] "Dr Mahathir Pushes For Practical Approach To Education," The Malaysian Reverse, edition, Feb 12 2020. [Online]. Available: https://themalaysianreserve.com/2020/02/12/dr-mahathir-pushes-for-practical-approach-to-education/

[8] N. Saidin, N. D. A. Halim, and N. Yahaya, "Designing Mobile Augmented Reality (MAR) for Learning Chemical Bond," International Colloquium Of Art And Design Education Research, 2015. pp. 174-179