Mengenali Jawi: The Effectiveness of Augmented Reality Application for Jawi Learning

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Abstract*— Jawi script was a writing system that used for composing the Malay language. It was created from the approach of Islam in "Tanah Melayu" which present known as Malaysia. Since British education system supplanted our Jawi with Romanized content, our new age scarcely knew and utilized Jawi content. Our young generation mostly used roman writing as their main communication through writing. The aim of this study is to create an intelligent learning strategy based on Augmented Reality (AR) on the preservation of Jawi in order to communicate knowledge in a more efficient, simple, and convincing manner. The ADDIE Model will be used in this study to ensure that the knowledge is communicated effectively. In this vein, this study will draw attention to Malaysian efforts to save the Jawi script from extinction. The app was put through its paces with 27 users participating in a beta test. Users were issued a post-action survey to gauge their interest in the activity. Users must also adapt to the new developments in their learning environment, according to the results. As shown by the favourable user feedback, the overall behaviour has a positive effect on users.

Keywords: Jawi, Jawi Preservation, Augmented Reality (AR), Mobile Apps, Learning

I. INTRODUCTION

Jawi is the writing system that has been utilized by the Malays since the 12th century. The characters were taken by the Arabic letters in order and a couple of new characters have been added to oblige Malay vocal sounds. It contains 29 one of a kind Arabic characters and 8 new characters that addressed sounds in Malay language. The main Jawi script has been found on a stone tablet named Batu Bersurat Terengganu in Terengganu [1]. Furthermore, the Jawi script likewise has been found in numerous significant archives, for example, for true correspondence during the Malacca Sultanate until Malaysia acquired its autonomy in 1957. Jawi was once perceive as the authority composing for Malaysia [2]. It was once generally utilized in the Malay courts and was the predominant writing in the Malay world. The main issue is, the usage of Jawi script in Malaysia has been reduced, which brought about by the British colonization towards Malay Peninsular in the 18th century. Hence, Jawi script has been gradually forgotten particularly among the new age. Subsequently, this research has been meant to safeguard the Jawi script through the execution of complex innovation called Augmented Reality (AR). By utilizing AR, it has been discovered that Jawi content can be safeguarded and can be utilized as another medium in instructing and learning this content to the youthful age in really fascinating and fun manner.

The following is a breakdown of the paper's structure: In Section 2, we will discuss the definition of AR, as well as its history and benefits. The approach that had been employed throughout the investigation was then discussed in Section 3. The data and findings that were gathered during the research's evaluation phase are then presented in section 4. Finally, the conclusion and future recommendations for research enhancement.

II. RELATED WORKS

Augmented reality (AR) is another advancement that has ascended with potential for application in education. Augmented reality (AR) is a technologically augmented version of the real world that is created through the use of digital visual elements, music, or other sensory stimulation. It is a developing trend among businesses that deal with mobile computing and commercial apps. As stated by [3] Augmented Reality (AR) is a variation of Virtual Environments (VE), or Virtual Reality as it is more commonly called. VE technologies completely immerse a user inside a synthetic environment. While immersed, the user cannot see the real world around him. In contrast, AR allows the user to see the real world, with virtual objects superimposed upon or composited with the real world. Therefore, AR supplements reality, rather than completely replacing it. Ideally, it would appear to the user that the virtual and real objects coexisted in the same space. Another category of Augmented Reality applications is the assembly, maintenance, and repair of complex machinery. Instructions might be easier to understand if they were available, not as

manuals with text and pictures, but rather as 3-D drawings superimposed upon the actual equipment, showing step-by-step the tasks that need to be done and how to do them. These superimposed 3-D drawings can be animated, making the directions even more explicit.

A. The advantages of AR in education.

In education, augmented reality (AR) includes elements that improve problem-solving, teamwork, and development skills in order to better prepare students for the future. It is also useful for traditional pedagogy that emphasises technical knowledge and skills. A hundred percent of the selected studies reported some kind of advantage when using AR systems in education [4]. It is important to clarify that these are only some of the advantages more commonly reported in the studies. Like-wise, most studies reported more than one advantage. Learning gain is the most common reported advantage. Studies stated that, when using AR systems, students improve their academic performance. This improvement was reported not only by data, but also for different teachers and the students themselves. Among others, [5] mentioned an academic activity held in South Korea, which focused on the integration of AR to assist students learning of socio-scientific issues. They demonstrated that students guided through AR obtained better scores than those who were guided through traditional approaches [6]. Studies mentioned that AR is ideal to explain things that cannot be observed. [7] presented the results of a study in which they compared an AR-based application with its equivalent web-based application to learn the basic concepts of electromagnetism. They obtained consistent evidence that suggests that AR-based applications contribute to increase academic achievement in a more efficient way compared to traditional web applications. When paired with collaboration tasks, AR provides new ways for students to learn how to connect and interact with one another [8]. It is also possible that they will use the same technologies in the workplace later on. There is also no need for a full curriculum redesign when using AR: by simply incorporating more contextual interactions, it can be even more successful in supplementing current pedagogical materials. It can be used to simply spark curiosity and debate in various subject areas, as well as serve as the foundation for class activities.

B. Case Study

This study established existing mobile applications that are currently available in the market before beginning the development process. This paper discovered three applications for teaching and learning about Jawi material based on the study. (1) *Belajar Mengeja Jawi*, (2) *Mari Belajar Jawi*, and (3) *Mari Membaca Jawi* are the three of them.

1. Belajar Mengeja Jawi

Belajar Mengeja Jawi is a mobile game that guides users through learning Jawi content. The app includes a variety of exercises that can help users learn how to spell and learn about Jawi material. It also makes use of high-resolution images and audios. The app allows users to learn more about Jawi content by presenting them with a variety of exercises for spelling Jawi words. This app, however, does not make use of augmented reality. This app got a 4.5-star rating based on user feedback.

2. Mari Belajar Jawi

While this mobile application is a paid version, it allows users to test out some of the features for free. This method of delivering Jawi's content is more straightforward and straightforward. In terms of content, it is very nice. The app includes immersive games as well as photo flash cards. This game, however, does not make use of augmented reality. This app got a 4.4 star rating based on user reviews.

3. Mari Belajar Jawi

This mobile app is less appealing and lacks interactivity as compared to other applications. There is just one page in the application, which is the main page. This app only teaches users how to spell in Jawi without teaching them the basics of the language, such as the alphabet and syllables. Furthermore, the user interface of this app lacks imagination, which can deter users from using it. It is critical to show off enough content that's jam-packed with useful knowledge.

TABLE I. TABLE OF COMPARISON

	Belajar Mengeja Jawi	***Mari Belajar Jawi***	***Mari Membaca Jawi***	***Mengenali Jawi***
a	Background music, Background Image, 2D Animation, Sound fx	Background music, Background Image, 2D Animation, Sound fx	Sound fx, Background Image	Background Music, Sound fx, Background Image, 2D Animation, 3D Modeling
b	Average level ofcreativity (No apps instruction provided)	Average level of creativity (No apps instruction provided)	Low level of creativity (No apps instruction provided)	High level of creativity (Apps instruction provided)
c	Low level of interactivity (Simple navigation and audio button)	Low level of interactivity (Simple navigation button)	Low level of interactivity (Simple navigation button)	High level of interactivity (Drag and drop button, Scale up & down button, Rotate button, Color picker, Virtual Audio Button)
d	Mobile Apps	Mobile Apps	Mobile Apps	AR Mobile Apps

a: Multimedia elements
b: User Interface
c: Interactivity
d: Platform

III. METHODOLOGY

ADDIE Model has been used as the guideline for the development of this project. It consists five main stages which is Analysis, Design, Development, Implementation and Evaluation. This section will discuss in details for each phases involved in the development of *Mengenali Jawi*.

A. Analysis Phase

In this phase developer conduct an analysis of user, focusing on user groups, their teaching references and their requirements. The developer analyzed rigorously the existing literature review in terms of the design of AR Jawi in various databases such as IEEE Xplore, Science Direct and Google Scholar. The researcher also analyzed the existing products available that related to Jawi in Play Store and in the search engine. Afterwards, The developer chose to build up the learning jawi character apps set for society that encourages them to get familiar with the new development that were more fruitful to them and at the same time, they will sort out some way to learn and articulate the Jawi character all together.

B. Design Phase

The design stage is where the developer of the project and the objectives identified at the analysis phase will begin. It also does provide crucial points that improve the development of the project [9]. The design phase seems more like the manufacturing of a guideline, a development structure that helps us to lead us to the planned result. In this phase, developer start to design the storyboard, the flow chart and other virtual object to be used in AR application. This project contains few section, *Jom Mengeja*, *Suku Kata* and *Latihan*. Morever, the developer sketch the 2D and 3D characters that were used in the development of AR *Jawi* application. Identifying multimedia element that were used in the next development project is crucial in this phase.

Fig 1. An example of the user interface

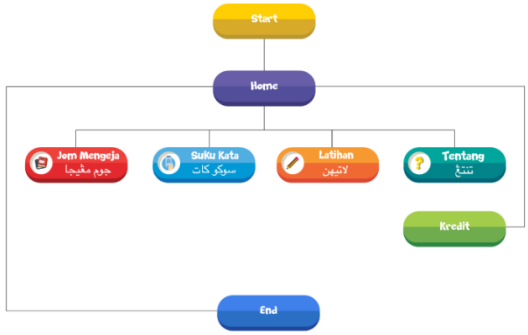

Fig 2. The Flowchart

Fig 3. A few example of the activity in AR Jawi

Fig 4. Other activities

C. Development Phase

This phases involved the main development process of *Mengenali Jawi*. The developer needs to finish in any event 80% complete model to guarantee the task are involving in during the time frame. This AR mobile applciation used Vuforia for developing Augmented Reality and Unity as the game engine. For scripting, C# has been utilize as the main scripting language. All the animation has been done in Unity. For 3D modeling, 3Ds Max and Autodesk Maya were utilized for create 3D model for all aspects of apps content that were needed. The main attraction of this application is the AR features which can attract users for learning *Jawi* in a new way. The AR features allows user to learn Jawi and

users can interact with AR world simultaneously. In order to ensure that users will learn on *Jawi* language, *Mengenali Jawi* implemented a spelling game whereas users need to complete the spelling game which consist of 10 questions.

Fig 5. Development on Unity3D

D. Implementation Phase

During the implementation process, an alpha test was conducted to validate the model before moving on to beta testing and production with the supervisor. The technique should be followed to ensure there there are no errors when introducing the object. The learning outcomes, goal, cause, methodology, strategy conveyance, and testing should all be covered at this level. The developer should put in a lot of effort, last extend, and depend on the requirements. Consider and double-check the mission in terms of its organisation, preparation, topics, and content.

E. Evaluation Phase

Two experts conducted the initial assessment. First, Sharifah Nor Asiah from SRA Desa Putra, a Subject Matter Expert in Jawi script and a teacher with 15 years of expertise, noted that the application was good for teaching Jawi script to students. The apps' interaction is accessible to people of all ages. Second, Wan Shazlina from UniKL MIIT, a senior lecturer in Multimedia field, Based on their comments, this project has been upgraded accoordingly. Finally, an evaluation has been carried out in order to investigate the effectiveness of this AR application. In this study, it involved 27 respondents. Each of the respondents responded really well in evaluating this AR mobile apps. Due to the pandemic, the assessment was unable to meet with the content specialist and target consumers in order to complete the actual evaluation process.

IV. RESULTS AND DISCUSSION

At this phase, research is conducted online, with a series of questionnaires distributed to 27 targeted respondents who tested the apps individually while being closely monitored. Twenty questions about the process were asked of the 27 targeted respondents who took part in the testing. Table II shows that 22 (81.5%) of the 27 respondents strongly agreed that the apps make it easier to learn Jawi because of the quality of the software and the usefulness of the AR technology used in this project. As a consequence of these results, it is clear that Augmented Reality played a significant role in the learning system used in education. Users can learn and connect in a fun way with AR. Finally, as this application was used, the majority of users strongly accepted that Jawi Language had improved.

TABLE II. RESULTS AND FINDINGS

Item	**R**	**%**
This application makes it easier to learn Jawi.	22	81.5
This application would improve my Jawi knowledge.	20	74.1
The interaction between me and the application is clear and understandable.	18	66.7
The Augmented Reality (AR) features makes me more eager to learn Jawi.	19	70.4
It is easy to understand and to operate the Augmented Reality (3D model) in this application.	20	74.1

R : Respondents out of 27

V. RECOMMENDATION AND CONCLUSION

There are a few things about the Jawi project that could be improved. A few recommendations have been made for the future such as future developers working on this project will continue to improve the framework by adding new features and functions. Also, The developer would also need to include an iOS version as well as versions for other platforms. Next, The developer will have to include an iOS version as well as a version for other platforms. Aside from that, the developer could increase the difficulty of the activity page by using more levels and difficult words. The developer could improvise audio commentary for completely submerged users. Finally, the developer should think about developing more Augmented Reality projects, which will support Malaysia's educational system by encouraging the next generation to use AR in a variety of fields.

VI. REFERENCES

[1] Shakila Ahmad, Othman Hussain, Rafiuddin Afkari, Mikdar Rusdi, Mohd Hisyam. (2011). Tulisan Jawi Sebagai Warisan Peradaban Bangsa: Analisa Dari Aspek Cabaran Semasa. World Congress For Islamic History and Civilization, At Academy of Islamic Studies, University of Malaya (p. 2)

[2] Maskhuri Yaacob, Zainab A.N. Nor Edzan Che Nasir, Rohana Mahmud. (2001). Digitisation of an endangered written language: the case of the Jawi script. International Symposium on Languages in Cyberspace (pp. 1-3).

[3] Azuma R (1997) A survey of augmented reality. Presence Tel- eoper Virtual Environ 6(4):355–385.

[4] Nor Farhah Saidin, Noor Dayana Abd Halim, Noraffandy Yahaya. (2015). A Review of Research on Augmented Reality in Education: Advantages and Applications. International Education Studies; Vol. 8, No. 13.

[5] Chen P, Liu X, Cheng W, Huang R (2017) A review of using aug- mented reality in education from 2011 to 2016. Innov Smart Learn.

[6] Garzón, J., Pavón, J. and Baldiris, S., 2019. Systematic review and meta-analysis of augmented reality in educational settings. *Virtual Reality*, 23(4), pp.447-459.

[7] Ibanez MB, Di Serio A, Villaran D, Delgado Kloos C (2016) Support for augmented reality simulation systems: the effects of scaffold- ing on learning outcomes and behavior patterns. IEEE Trans Learn Technol 9(1):46–56.

[8] Mehmet Kesim, Yasin Ozarslan. (2012). Augmented reality in education: current technologies and the potential for education . Social and Behavioral Sciences 47

[9] McGriff, S. J. (2000). Instructional System Design (ISD): Using the ADDIE Model. Instructional Systems, College of Education, Penn State University.