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AR-JAWI : INTERACTIVE JAWI LEARNING APP USING AR

NORNADIA AISYA BINTI MOHAMAD NASIR



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**FACULTY OF COMPUTING AND META-TECHNOLOGY
UNIVERSITI PENDIDIKAN SULTAN IDRIS**

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AR-JAWI : INTERACTIVE JAWI LEARNING APP USING AR

NORNADIA AISYA BINTI MOHAMAD NASIR

A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE
AWARD OF THE BACHELOR OF SOFTWARE ENGINEERING (EDUCATION
SOFTWARE) WITH HONORS

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UNIVERSITI PENDIDIKAN SULTAN IDRIS

2023



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(Dr. Azniah Binti Ismail)



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ABSTRAK

Tulisan Jawi merupakan salah satu khazanah yang paling berharga bagi bangsa Melayu. Ia berasaskan tulisan Arab dan mengalami proses penambahan huruf untuk diselaraskan dengan sebutan bahasa Melayu. Tulisan Jawi digunakan di banyak tempat, seperti sekolah dan papan tanda. Namun begitu, di sebalik penggunaan tulisan jawi yang banyak, terdapat segelintir orang Melayu yang tidak boleh membaca atau menulis tulisan Jawi kerana kurangnya pendidikan tentang tulisan tersebut. Oleh itu, kajian ini bertujuan untuk membangunkan aplikasi yang dinamakan AR-Jawi yang menyediakan pembelajaran tulisan Jawi secara interaktif. Ciri-ciri AR-Jawi direka bentuk sebagai penambahbaikan terhadap aplikasi pembelajaran Jawi yang telah sedia ada. Pembangunan aplikasi ini adalah berdasarkan kaedah Evolusi Prototaip. Fungsi dan ciri aplikasi telah dibuat menggunakan tinjauan separa kuantitatif ke atas 11 responden (iaitu pengguna berpotensi, termasuk pelajar sekolah dan pelajar universiti) dan sesi temu bual bersama 3 guru bahasa Arab. Aplikasi ini dibina menggunakan AndroidStudio, ARCore, Sceneform dan Firebase. Terdapat 13 fungsi: mendengar sebutan abjad Jawi dan menonton video pembentukan suku kata, menonton video sambungan abjad dan menonton video cara penggunaan, berlatih soalan tentang pembentukan suku kata dan penyambungan abjad, mengambil kuiz suku kata dan perkataan, mendaftar akaun, log masuk dan menyelaraskan kemajuan. Selepas aplikasi ini selesai dibangunkan, ujian kebolegunaan dengan 11 responden dijalankan. Semua responden diberi aplikasi AR-Jawi untuk digunakan sebelum diberikan soal selidik berkaitan fungsi-fungsi dan ciri-cirinya. Hasil daripada soal selidik dianalisis untuk mendapatkan keputusan ujian kebolegunaan iaitu 87.3%. Kesimpulannya, pembangunan aplikasi AR-Jawi telah selesai, dan daripada ujian kebolegunaan, saya membuat kesimpulan bahawa ia memberi manfaat kepada generasi akan datang untuk mempelajari lebih lanjut tentang tulisan jawi, dan diharapkan, pada masa akan datang, ia akan tersedia untuk pengguna IOS.



AR-JAWI : INTERACTIVE JAWI LEARNING APP USING AR

ABSTRACT

Jawi writing is one of the most valuable treasures for the Malay people. It is based on Arabic writing and undergoes a process where letters are added to synchronize with Malay language pronunciation. Jawi writing is used in many places, such as schools and signboards. However, despite the many uses of Jawi writing, there are some Malays who cannot read or write Jawi due to a lack of education about that writing. Therefore, this study aims to develop an application called AR-Jawi that provides interactive learning of Jawi writing. The features of AR-Jawi are designed as an improvement over the Jawi learning app that has been developed before. The app development was based on the Evolutionary Prototyping Methodology. Requirements were elicited using a semi-quantitative survey on 11 respondents (i.e. potential users, including schoolchildren and university students) and interview sessions with 3 Arabic language teachers. The app is built using Android Studio, ARCore, Sceneform, and Firebase. There are 13 functions: listen to Jawi alphabet pronunciation and watch syllable formed, watch alphabet connection and instruction guide videos, practice syllable formed and alphabet connection questions, take syllable and word quizzes, register, login, and sync progress. Following the completion of the development phase, a usability test with 11 respondents is conducted. All respondents were given the AR-Jawi app to use before being given a questionnaire about its features. The response was analysed to get the usability test result, which is 87.3%. In conclusion, the AR-Jawi application development is complete, and from the usability test, I conclude that it is very beneficial for the future generation to learn more about Jawi writing, and hopefully, in the future, it will be available for IOS users.



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LIST OF ABBREVIATIONS

| | |
|------|--|
| AR | Augmented Reality |
| ADV | Architecture Diagram |
| EP | Evolutionary Prototyping |
| VR | Virtual Reality |
| SDD | Software Design Document |
| SDLC | Software Development Life Cycle |
| SRS | Software Requirement and Specification |
| STD | Software Test Design |
| SUS | System Usability Scale |





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CHAPTER 1

INTRODUCTION



Jawi writing has been used since ancient times, even before the arrival of the colonists in Malaya. It can be traced through the discovery of scripting books and rock carvings found throughout Malaya. The understanding of Jawi writing should have been embedded in the Malays because it was the original writing of the Malays before the introduction of Roman writing by the colonists. The arrival of the colonists in Malaya has brought great changes, especially in the writing of scripts such as official letters, newspapers, and magazines. The conversion of Jawi script to Roman script was made to make it easier for the colonists to understand the contents of letters. Over time, the use of Roman writing, which was only used by officials at that time, spread to every part of Malaya. This caused the use of Jawi writing to be less and less until today. The increasing use of Roman writing has made the current generation unable to read and



write using Jawi writing. The use of Jawi writing, which is only limited during the learning process related to Islam, has made a few students reluctant to learn it. It is far worse when more than half of the students who take Jawi subjects as one of their courses are still unable to master them. According to Suhaimi et al. (2020), 56% of students cannot read Jawi writing and do not have the skills to connect Jawi letters to build words. This high percentage is very worrying. If it continues to increase, it may lead to the loss of Jawi writing. To prevent the loss of Jawi writing from happening, this research aims to develop the AR-Jawi application with the aim of introducing Jawi writing to everyone in Malaysia. It also aims to attract the interest of every individual in learning Jawi writing, regardless of their race and age. The AR-Jawi application provides an interactive self-learning tool for beginners to learn Jawi effectively.

1.2 Research Background

The use of Jawi writing in Malaysia is decreasing due to the opposition of a few people to its use. This reduction can also be observed when there are a few individuals questioning the use of Jawi writing during the learning of Islamic education, which is said to be irrelevant. Things like this will cause the extinction of the Jawi language. The Jawi writing, which was originally used in every corner of Malay land, will be lost if it is not maintained and polished in the current generation. Based on the answers to the questionnaire given to some individuals, they think that Jawi is a form of writing that is difficult to understand, and it is also rarely used during daily activities. However, there are also agencies that strive to protect Jawi writing. Among



the efforts that can be seen is the use of Jawi writing on signs throughout Malaysia. In addition, there is a deed issued to guarantee the position of Jawi in act 32 of the national language act 1963/67. It is stated in section "the national language text is the Rumi text provided that it does not prohibit the use of the Malay words, better known as the Jawi character, for the national language". This can be seen as an opportunity for the development of AR-Jawi to be included in protecting and introducing Jawi to society.

1.3 Problem Statement

There are problems arising that prevent people from learning and mastering Jawi writing. A problem-solving system needs to be built to avoid and solve this problem. Exposure to direct learning at school is one of the ways to teach students about Jawi writing. However, there are some students who cannot go through the learning session due to several factors, such as being in a Chinese-stream school, an Indian-stream school, or other schools that do not offer the subject of Jawi writing. In addition, there are also non-Malay students who want to learn Jawi but do not know any teachers who can teach them. If the student learns Jawi writing from their childhood, it can help advance their knowledge of Jawi writing, but some people are responsible for catching the children's interest in learning Jawi writing at an early age. There are also many factors that influence children's interest in learning Jawi, including their upbringing by parents and family (Rahmat et al., 2018), like getting no exposure and lacking an encouraging environment from their early years (Burke and Heller, 2016, as cited in Arifin et al., 2020). The lack of exposure to Jawi writing at an early age can





cause the children's difficulty in learning Jawi. Exposure in the form of books, videos, and songs should be provided from an early age to help children cognitively master the use of Jawi writing. Some children also refuse to learn Jawi writing if there is no encouragement from their parents. Parents can give a lot of motivation to the children to learn Jawi by being with them when the process of learning Jawi writing happens. One of the activities that parents can do with their children is practise Jawi writing. According to Samsudin (2019), as cited in Arifin et al. (2020), the ability to read the Jawi alphabets can be improved if the child practises a lot. Practice activities such as remembering and writing Jawi letters is the first step that can lead to the child's understanding of Jawi writing. In addition, parents can also give books with Jawi writing to children for them to practise reading. Once the children have read a lot of Jawi writing books, they can differentiate between the right and wrong connections between each of the Jawi letters. Other than that, parents can also help expose their children to Jawi writing by introducing them to the interactive Jawi app. There are a lot of interactive elements that a Jawi application can provide, which are through games, quizzes, and other activities that involve both learner and application involvement. Some technology can be used to make an application more interactive, which is by using virtual reality and augmented reality technology. VR technology is already widely used by developers in developing courseware and applications. Meanwhile, augmented reality is the latest technology that can help users experience the real-world experience in a more efficient way. This technology can be used to develop an interactive Jawi learning application. Additionally, an AR application is very appealing to children to learn Jawi (Rahmat et al., 2018). However, to achieve effective learning and practicing, its functions must be well-designed. Every



functionality and feature of an AR application for learning Jawi, especially its content, needs to be designed carefully so that it reflects the current format of Jawi writing.

1.4 Research Objective

Research objectives for the development of the AR-Jawi application are:

- a) To identify the main problem for children in learning Jawi.
- b) To develop a functioning prototype of an interactive Jawi learning application by using Augmented Reality technology.
- c) To test the functionality of the AR-Jawi prototype and to get feedback from the user based on the developed prototype.

1.5 Research Question

Research questions in the development of the AR-Jawi application are based on the research objective. The research questions are stated below:

- a) What is the main problem for children to learn Jawi writing?
- b) How to develop a prototype that can help attract the interest of user to learn Jawi writing?
- c) Does the develop prototype help beginner Jawi learner to learn Jawi?



1.6 Learning Theory

Learning theories are frameworks used widely in the education system, especially in developing students' knowledge and behaviour. The same knowledge can be gained by the students in diverse ways of learning. This learning theory serves as a guide for teachers in selecting instructional tools and methods for presenting subject content. The same goes for the AR-Jawi application. It uses some theories to present the content towards the learner so that they can understand Jawi writing in a more effective way than normal teaching and learning sessions.

The AR-Jawi application focused on applying intrinsic motivation towards the learner.

Intrinsic motivation is the motivation that is nurtured within each individual to achieve the goals set by that individual. This internal motivation can be fostered by attracting the attention of the individual to do things they like. When they feel comfortable and are interested in learning more, they will continue to do it. Setting a goal for learners to achieve in this application is important to encourage learners to push their limits. The result of achieving the goal can give satisfaction to learners' psychological needs when they successfully master themselves in Jawi writing. There are four elements of intrinsic motivation, namely challenge, fantasy, control, and curiosity. (Kawachi, 2003). The elements that were applied in the AR-Jawi application are control and curiosity. Both of these elements are at the basis of the development of the AR-Jawi application. Control elements are embedded in the AR-Jawi application throughout the whole use of it. Learners are able to choose what they want to learn and how much time they want to spend on those particular topics. The AR-Jawi application also embeds a repetition strategy (Vygotsky, 1978) where learners are able to rewind back





to what they already learned. Students who want to test their Jawi writing skills can choose to answer quiz questions where they can choose the level of the quiz. The quizzes provided start with a low level and go up to a difficult level, and to raise each level, students need to answer one level with the correct answer. The next element that is embedded in the AR-Jawi application is the curiosity element. AR-Jawi provides a function that integrates the use of Augmented Technology (AR), which enables the display of a 3D image of an object based on the arranged cards provided to them. This element created a motivation for the learner to find words that can trigger the scan. By doing so, AR-Jawi is able to not only provide the learner with an understanding of Jawi writing, but also to entice them to stay and learn more.

1.7 Research Benefit



In discussing the benefits of AR-Jawi application development, people can gain a lot from this. The benefits of this system are not only seen from the learner perspective but towards all individuals that are involved, such as teachers and parents.

a) Learn Jawi writing at early age.

The benefits that user gain from the project are many, especially in learning Jawi writing. AR-Jawi application helps children at an early age to gain a better understanding of Jawi writing starting from the introduction of Jawi letters until they are able to form a word using the Jawi letters. AR-Jawi application also helps children to improve their skills in connecting each of the letters to form a proper word by providing videos for them to watch.



- b) Assist parents in spending quality time with their while they learn Jawi

AR-Jawi application helps the parents especially if they have less knowledge of Jawi writing, in helping their children to understand Jawi writing. AR-Jawi application provide cards of Jawi letters together with the example of word for the learner to arrange. As a result, parents can spend their free time guiding their children in rearranging Jawi letters.

- c) Help teacher attract students' attention and interest in learning Jawi writing.

AR-Jawi application helps teachers attract students' attention by providing a function that can scan arranged cards of a word to display a 3D image of that word. By showing the model that comes out after they rearrange letters to become a word, they can pick their students' interest. With that, students will be more focused and excited to learn more about Jawi. AR-Jawi also act as a helping tool for teachers in improving their student in reading and writing Jawi.

1.8 Research Scope

Research scope for development of the AR-Jawi application includes target audience, geographical area, content, and function.

- a) Target audience

The target audience of the AR-Jawi application is the beginner Jawi learner.

- b) Geographical area

Since this project started in the middle of the pandemic, there are to target geographical areas, which are Tanjong Malim, Perak and Bachok, Kelantan.

c) Content

The main content of the AR-Jawi app is learning Jawi letters, how to connect each of the letters, and forming words with the combination of the letters.

d) Function

AR-Jawi application provides four (6) main functions, of which the first one is introducing the Jawi letter and its pronunciation. The second and third are watching videos of how to connect each alphabet and syllable. Then, the next two functions were the quiz activity to see how each of the letters and syllables are connected. The last function is the one that involves AR technology, which

allows users to arrange given Jawi letters into a word.

1.9 Operational Definition

Table 1.1 points out the operational definition used in this writing.

Table 1.1 : Operational Definition

| Variable | Operational Definition |
|-------------------|---|
| Jawi writing | Jawi writing is one of Malay's most valuable treasures. Jawi writing is based on Arabic writing but with the addition of letters to match the pronunciation of some words in the Malay language. Jawi writing has 30 letters that have different and unique shapes. The connection of Jawi can form a word where it requires some knowledge to connect each of the letters. |
| Augmented Reality | Augmented reality, or in short, known as AR, is a technology that can help users to experience a real-life experience only by using their devices. |



1.10 Conclusion

This chapter introduces Jawi writing and its uses in society. The problems that occurred within this scope that led to this research were elaborated. This chapter focused on introducing AR-Jawi and its benefits, especially among the beginner Jawi learner. AR-Jawi is aimed not only at younger learners but at all people, regardless of age or race. The AR-Jawi application also helps attract the attention and interest of people to learning Jawi writing by providing fun and interactive functionality and features.

