

E-Jawi: Digital Learning Tool For Jawi Character Recognition

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Abstract - Preschool education is one of the institutions which functions as a way to improve and further develop the understandings in all aspects of development for children aged 4 to 6 years old. Basic Jawi education is one of the aspects which is included in the Islamic education curriculum, set up by the Malaysian Ministry of Education Curriculum Development Centre. An application of media in teaching will be to diversify the skills of intelligence, which is absolutely necessary to acquire a skill. A proper technique needs to be used to make learning Jawi interesting. Hence, it is important to have suitable learning tools such as digital tools equipped with appropriate interactivity environment and proper interface design to aid children in developing an interest towards learning Jawi. In this work, the project named E-Jawi: Digital Learning Tool for Jawi Character Recognition was developed to help kindergarten students to explore learning jawi subject. The aim for this project is to be an interactive tool for learning how to write Jawi alphabets. In this paper, an approach for Jawi character recognition is proposed. The technique used in this project is grid baselines. The proposed technique is used sqlite database to store the coordinate for each Jawi alphabet and store the sequence of strokes. After reading the Jawi alphabets from user, the coordinates (x,y) of the pixels representing the drawn Jawi alphabets are used for calculating and normalizing slope values of these coordinates. This application has been tested on target users for its design appearance, learnability and capability to learners' writing activities using computer. The results show that learners enjoy using the application for its design appearance. The application has also been proven to have a high learnability rate as users are able to use the application easily. In addition, it is also able to assist learners in mastering the Jawi writing exercise.

Keyword-- Recognition, Jawi, writing

1 INTRODUCTION

Jawi is one of the earliest characters used for writing Malay. Its development is linked with arrival of Islam in Nusantara. Jawi is adapted from Arabic characters, which consists of 29 characters. Arabic is the written language of the Quran, the holy book of Islam. Arabic language originated in Saudi Arabia in pre-Islamic times, and spread rapidly across the Middle East. Jawi has been widely used in Malay Peninsular since the 17th century until the British invented the romanised Malay script when they colonized Malay Peninsular in the 18th century. (Nur Aziela Mansor, 2010)

Jawi subject had been introduced in schools. In 1962, Islamic Education (IE) was introduced in Malaysian educational system. It was known as Islamic Religious Knowledge, and learning Jawi skills (writing and reading Arabic letter) was one of the disciplines in the subject. At the moment, the Islamic Education syllabus for primary school is prepared by a curriculum named Integrated Curriculum for Primary School (Kurikulum Bersepadu Sekolah Rendah [KBSR]) since 1983. Islamic Religious Knowledge is one of the component subjects **offered in the primary schools for Muslim students.**(A Mamat ,2012)

2. PROJECT DESCRIPTION

2.1 Project Background

The project that will be developed is E-Jawi tools web based learning application that specify for learning Jawi from recognizing the Jawi alphabets aspect, how to pronounce the Jawi alphabets and how to read and write in Jawi for student acceptance test whether it is effective or otherwise. This project will be use by the 2 kindergarten students aged between 4 years until 6 years old, teacher who teach this subject and also parents for learning process at home. This is because, the students within that ages, they need non - stop learning process and using a suitable color aspect, font and audio that clearly so that they can remember more and understand better.

Handwriting is a very important fine motor skill learned during the early school years and formal handwriting instruction may begin as early as the kindergarten years. Computers have proven to be beneficial to the field of education. However a computer with an interface based on keyboard and mouse has limited practical use in schools. This is because computers cannot be used when children are involved with handwriting activity. So that, handling the keyboard interferes with the writing process, and if this is the case, then the use of more natural interfaces, such as speech and handwriting recognition device, may be desirable. The availability and affordability of graphic tablets and digital pens, and tablet PCs today, make entering a response to computer via the computer handwriting mode a workable alternative to the keyboard. Pen-based computers have several crucial advantages that can help student with electronic handwriting. (Norizan Mat Diah, 2011)

Facilities provided by the pen-based technology in computer handwriting can help solve the problem of Jawi writing difficulty for children. There is a need to study approaches to create software for processing Jawi characters by storing data (hand writing input via tablets or similar touch screen device) in the form of digital image. (Norizan Mat Diah, 2011). Suitable pattern recognition algorithms will be applied to formulate and then generate feedbacks to the user.

2.2 Methodology

To develop this project, Rapid Application Development (RAD) model has been chosen as part of project development. It consists of four phases, Analysis & Quick Design, Prototype Cycles (Develop, Demonstrate, Refine), Testing and Deployment. The following represents how those phases are applied in this methodology.

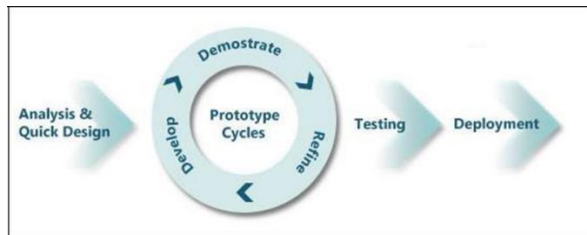


Figure 1: Example of Rapid Application Development model

The reason to use this model in process to develop this project because it starts with understanding and defining the client's business needs, and then moves through the phases of high-level requirements to detailed requirements, to design, to prototyping, to development, and to implementation. Testing should be involved early in the project and throughout the development effort. This RAD model also allow the client to have hands-on contact with the product as soon as possible. Throughout these phases, one must continually review and update the project plan, carefully controlling all change requests along the way. One must assess the risks to the project at the completion of each cycle and review the current understanding of the client's business needs throughout the project. The schedule must be accurately developed and carefully controlled.

In the first phase, the main objective is to research the main problems before deciding to propose the title of the project. A thorough research must be conducted to identify the project details such as goals, scopes, constraints, budget and objectives. Once defined, the requirements gathering takes place by making research on some journals and existing windows application regarding the project title. Those information will be documented in the Software Requirement Specifications (SRS) and the application should be developed

according to the document. Then, after the requirements both functional and non-functional have been specified, a quick design phase will take place where the interfaces, architecture, workflow, test plan and UML diagrams are designed. These will be made as a baseline for the next phase in the methodology which is Prototype Cycles. In second phase, it will take place after the requirements have been confirmed. In order to make the application visible, a workable prototype is being developed where required functions are implemented in the application. Each development of prototype will be demonstrated to the respective project supervisor until it fulfills the specified requirements. It will go through the sub phases in this cycle which are develop, demonstrate and refine over and over again until it is completely developed. The requirements could probably change, thus the development shall adapt with the changes so that the application can meet user's satisfaction. In third phase is done once the application has been completely developed. Test cases will be designed before the test is conducted and a document named Software Test Design (STD) will be produced. Unit Testing, Integration Testing, System Testing and User Acceptance Testing are among the test that need to be gone through by the application. Unit Testing will test each module and functions provided by the application. This is to ensure that there should be no bugs found in the application. Both White Box and Black Box testing will be included in each testing phase as they are testing on the source code as well as the functionalities of application. Integration testing will test the connection between the application and the database in terms of retrieving the data whereas the System testing will test the application as a whole, each function shall deliver according to requirements. Before E-Jawi:Digital Learning Tool for Jawi Character Recognition is delivered to users, it needs to go through the User Acceptance Test where it will be tested by the real users. From here, the level of user's satisfaction in using the application can be measured based on their feedback. After the application satisfied its requirements, it will be made visible to users so that they can start using the application.

2.3 User Acceptance Result

In this stage of testing the user acceptance test, an evaluation form is given out to 15 users consist of UNIKL staffs and students. The user will be asked to rate the system based on a certain category using the like scale system. *Table 2* shows an example from the evaluation form. *Appendix A* for the complete evaluation form.

1) The system is attractive and well designed

1	2	3	4	5
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2) The system is easy to understand

1	2	3	4	5
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3) The system flow is clear

1	2	3	4	5
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4) The system functions perfectly

1	2	3	4	5
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5) The project owner is willing to answer questions related to his/her project

1	2	3	4	5
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6) The project owner has adequate knowledge about his/her project

1	2	3	4	5
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7) Overall, the project is good and gains my satisfaction

1	2	3	4	5
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8) Overall system complexity

1	2	3	4	5
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2.3.1 Usability Testing Result

TABLE 1 : USABILITY TESTING RESULT

Elements	Rating					Average Rating Total (Rate * Participant / Total of Participant)
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
	1	2	3	4	5	
1				3	12	4.8
2				3	12	4.8
3				3	12	4.8
4					15	5
5					15	5
6					15	5
7				1	14	4.93
8				1	14	4.93
	Overall Total					39.26
	Total Average Testing(Average rating / questionnaire elements)					4.9

Based on Table 1 the result of user acceptance testing divided into several of questions. From the observation mostly user agree with the flow of the system, functions and the system interface. For the knowledge of the system and questions about the system, the averages mostly got agree from the actual user. From the test, in conclusion those users can accept the E-Jawi: Digital Learning Tool for Jawi Character Recognition. This E-Jawi: Digital Learning Tool for Jawi Character Recognition has reached the expected standard to be implemented and meet the user needs. To test the component of the E-Jawi: Digital Learning Tool for Jawi Character Recognition is functional testing where each component will be test in order to meets user requirements. The tester only knows the formal inputs and expected outputs, but does not know how the program actually arrives at those outputs. All the testing must be based on functional specifications.

3 CONCLUSION

E-Jawi: Digital Learning Tool for Jawi Character Recognition is developed to help kindergarten students to learn how to write Jawi alphabets. This project are used by kindergartens students. This application allows young children to learn how to write Jawi at an early age. This project was carried out to developed an effective training tool to aid learners in learning how to write Jawi alphabets. This project can attract children to learn to write Jawi and increase their interest and understanding in this Jawi subject. The implementation involves Jawi Character recognition that help the children to write Jawi in a right way. The technique used in this project is grid baselines. The implementation of grid baselines which involves the movement of the finger and hand in this project

has helped the children to practice and improve their writing skills. The proper way of write Jawi letters may help children to perform more complex activities and letter- formation in the future.

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