Interactive Jawi Learning Application on Mobile Device for Primary Students

By

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Dissertation submitted in partial fulfillment of
the requirements for the
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(Business Information System)

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CERTIFICATION OF APPROVAL

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A project dissertation submitted to the

Business Information System Programme

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Approved by,

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(Nazleeni Samiha Bt Haron)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

JAN 2013

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgement, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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(Siti Nuwairani Binti Ismail)

ABSTRACT

Jawi is taught in school as one of the curriculum structure in Malaysia. However, the performance of students in writing and reading Jawi is very poor. Interactive Jawi Learning Application can become a creative medium of learning infused with educational and entertainment contents to encourage students to learn Jawi in enjoyable way. The project will utilize the use of smart phone capabilities combines with the game approach to create an interactive mobile game-based learning which enables the user to learn writing in Jawi that applied for primary school students' level. The objectives of the project are to design and develop a mobile game-based learning application for Jawi to grant mobility for primary students, and investigate the effectiveness of the mobile game-based learning application in facilitating the learning of Jawi. The project begins with data collection and analysis and proceeds to development of the mobile game-based application. The development of the application starts with, planning, and continue with project analysis, design and implementation. The finding on the effectiveness of the mobile game-based application is gathered through user testing and survey. From the result, this project has advantage to be a helpful learning aid in facilitating the learning on writing in Jawi.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Nowadays, smart phones are widely used by the people and have becoming as a trend. The uses of smart phones can range from making a normal call to managing a business online. Smart phones are also being exploited to assist in education, where various types of applications are developed based on different operating systems. Android phone is one of the most popular smart phones running on Android operating system. Many applications are developed on Android phone, including mobile game-based learning application as a tool to educate the students and enhance the efficiency of learning and can become a compliment to traditional way of learning.

Mobile game-based learning is a type of game that deals with mobile applications to achieve learning outcomes. To make learning more exciting, most of the mobile learning applications nowadays combine between the two elements; education and entertainment, to motivate and engaging students to learn. People can become excellent in learning when their motivation is strong and when they enjoy what they are doing (Karden, 2003). Interactive Jawi Learning Application on Mobile Device for Students, using Android operating system combines these two elements to provide Jawi learning by the use of game activities to make the learning more exciting and enjoyable. The mobile game-based learning application emphasize on the need for a student to master in Jawi, a writing style originating from Arabic alphabet used for Malay language. The research of the study is aimed to investigate whether mobile

game-based learning application for Jawi is an effective learning tool for primary students.

1.2 Problem Statement

School students, especially in primary school cannot read or write Jawi proficiently as it is not widely used in writings. Performance of students in Jawi learning is low in three aspects; writing and spelling, multi choice question, and essay writing and Quranic verse (Nik Rosila, 2007). The system of teaching which is not interesting and monotonous makes students uninterested to learn Jawi (N.M. Diah et. al, 2011).

Besides that, the current mobile applications on smart phones did not offer many educational games using Jawi script (Hairul Aysa et al., 2010). Even if there is, the learning is not much focusing in enhancing the students' skills and knowledge in Jawi.

The development of an Interactive Jawi Learning Application on Mobile Device for Students is aimed to improve the Jawi learning process among primary students.

1.3 Objectives of Study

Interactive Jawi Learning Application on Mobile Device for Students is intended to encourage students, especially in primary school to learn Jawi in enjoyable way. The objectives of the project are as follows:

1. To develop a mobile game-based learning application for Jawi.

2. To investigate the effectiveness of the mobile game-based learning application in facilitating the learning of Jawi.

1.4 Scope of Study

The project is targeting the primary schools students at the age of 10 and 11, who have difficulties in learning Jawi. The mobile game-based learning application will be a complement for current educational system. Interactive Jawi Learning Application on Mobile Device for Students will be developed using Malay based language with Jawi script on Android operating system.

The application will focus to improve writing technique using Jawi script among the students.

1.5 Project Relevancy

The project deploys the benefit of using smart phone into a tool that can help students in their learning of writing Jawi. Although the current way of teaching does not promote using smart phone in class, students can use it as a complementary to enhance the learning wherever they are outside the class.

The interface of the mobile game-based learning application is designed with simplicity and easy to navigate between interfaces to encourage the young users to adapt faster to the game environment. This can help them to focus on the learning through the game played.

1.6 Project Feasibility within the Scope and Time Frame

The project research and development is done in two semesters. It involves detailed research and information gathering, and developing the mobile game-based application and testing. The mobile game-based application is developed using MIT App Inventor and run on Android operating system. The testing on the usage of the application is focused on primary students, specifically ranging from 10 to 11 years old.

CHAPTER 2

LITERATURE REVIEW

2.1 M-Learning

M-learning is described as the delivery of learning content to learners by using mobile computing devices (Traxler J. 2007). Usage of mobile device in learning is getting more common. According to Chris-Kuo et al. (2008), there is growing trend in utilizing technologies in education. The use of mobile devices is becoming widespread and changing the attitudes towards using mobile devices in learning. The education systems are willing to acknowledge the use of mobile devices as learning tools (Lorenzo R. D., 2013). After e-learning, m-learning becomes the new way of learning and is based on mobile devices. The increasing number of mobile users becomes an opportunity for m-learning. M-learning complements e-learning since there is rapid development and technological advancements of wireless technologies with growing number of mobile users (R. Benlamri et al., 2006).

In developing an m-learning tool, the successful criteria of m-learning that must be taken into account are its availability, broad community support, group and broadcast discussions, one-on-one communication, capable for heterogeneous devices, and decentralized information sharing (Stieglitz S. et al., 2007). Availability can help the learners to access to the learning anytime, anywhere, and also provides mobility to them. Besides that, m-learning needs also consider the adaptavity of learning (T. T. Goh et al., 2003) and the learning environment context (P. Lonsdale et al., 2003).

In addition, the architecture of m-learning is focused on individual learning experiences, whereby the learners can choose their own time and place to do the lessons. However, mobile learning do not deny that the traditional learning promotes students to work in group and have more impact on the students, compared to individual learning due to network effects (B. W. Wirtz, 2000). Thus, communication can involve when an individual compare the results from the mobile learning or share with others to get greater knowledge gain. Besides that, interactivity and multimedia in m-learning can facilitate student in learning. According to Luciana et al. (2011), the development of m-learning must consider that the meaningful learning is delivered in dynamic and motivating way. The developer needs to include multimedia and interactivity in the m-learning application.

Based on past research done by Passey D. (2010) on mobile learning in school context, he investigate on how effective the mobile learning using PDA as the learning tool. The research is done on students at the age of 12 on the core subjects that are taught in school. He gathered feedback from the teachers after two months and reported that the learning give good impacts on spelling the words since the research focus on spelling.

In the same research, the author also discover the role of teachers, parents and the students to put success on m-learning, despite of the challenges that come with m-learning. Teachers should offering plans to manage the operation of the mobile devices, providing opportunities to develop skills when doing learning activities and share the knowledge with other students. For parents, they need to have awareness on how to maintain and manage the mobile devices that they provide to their kids without restricting them to use the device for learning. Besides that, the student also needs to be responsible to gain technical and operational skills from the learning and gain as much as knowledge and share it with others.

2.2 Game-based Learning

By following the trends of mobile applications, many developers or programmers develop various types of applications to meet with the market requirement. Some of the application built is to anticipate user's demand on mobile application for learning, which is able to produce real world benefits, either for an individual or the society as a whole. Despite of building a dull application for learning, a modification in the way of learning can be varied, by using game approach for learning purposes. It is supported by Augustin et al. (2011) who said that game-based learning utilizes the full potential and attractiveness of modern computer games and great motivational capability for learning purposes as it is an emerging trend in educational technology.

A research was done by Norizan et al. (2010), on Jawi on Mobile Device with Jawi Word Search Game Application to create and interactive mobile game that enables the user to learn spelling in Jawi. The research was done to study on the feasibility of implementing Jawi game on a small mobile device. Based on the research, it is practical to develop a game-based learning application on mobile device, since it can instill the love to learn Jawi through game.

According to Chang (2009), some studies have suggested that proper visual and audio multimedia can attribute to over 94 percent of perceptive abilities, which means that multimedia can facilitate student learning. Through game, its challenging and interesting characteristics can attract users to give their full attention and feel occupied with the game, which effectively draw users' concentrations. Devaraju et al. (2007) also believe that multimedia application can encourage learners when they can control the elements in the multimedia, instead of just paying attention when teachers write on the board and cards. Apart from that, a study conducted by Hafizullah (2007) found that game is very popular and is used as a form of education in Institution of Higher Learning Malaysia. Game can be utilized to provide entertainment and in the same time, promote learning.

Mobile game-based learning application played on mobile device such as smart phone which comprised a game that purposely utilized for learning (Syamsul Bahrin et al., 2009). A research was done to study on the current trend on mobile application and the use of game in learning on the primary students. From the study, it is found out that 40% of the students have Android mobile phone and 60% of them might use other operating system or do not have phone (Chong, J. L. 2012). This indicates that mobile game-based learning has an opportunity and can be applied to utilize the use of mobile phone. Besides that, it is important to ensure that the game can motivate the user and achieve the goal of learning when playing with the game activities. The game is aimed to enhance enthusiasm in order to learn and gain knowledge by effectively transfer the knowledge contents through game or achieve a specific learning outcome (Goodman et al., 2006). Developing a good game for the mobile application is very important to ensure that the objective of the player to learn something from game is accomplish and participate with high interest (Egenfeldt-Nielsen, 2006).

Teachers themselves play an important role to assist in game-based learning, since they know what need to be taught to the students according to current syllabus. Thus, study was done by Wong J. et al. (2009) to give awareness to the teachers about the progression of a learning session by using game-based learning. It stressed on the learning environment, by applying metaphor concept to explore virtual world, and this needs the awareness of the teachers on how far has the students has achieved by doing the activity in the game. It is found that game-based learning gives an interesting environment, in which the teachers need to remain aware on the activity played by the students so that the learning can meet its objectives.

Besides that, the process for game-based learning starts with the learner interacts by playing games. From the interaction between the learner and mobile device, the learner will achieve the learning outcome of playing the game (Pivec et al., 2003). Based on the model of game-based learning by Garris et al. (2002), it describes three main concept in game-based learning; input, process and output. The instructional content and game characteristics becomes the input and being process through four

elements in game cycle; judgments, debriefing, behavior, and system feedback when later is processed to become the output, which is the learning outcomes.

Figure 2.1: Model of Game-Based Learning by Garris et al. (2002)

2.3 Jawi Teaching

In the current education system in Malaysia, Malaysia government initiate an educational program, j-QAF which teaches students in primary students on teaching and learning of the Noble Quran, Arabic and Islamic Sciences. One of the teaching modules in j-QAF is in regards to teaching and learning Jawi language (Nor Aniza et al., 2008). However, the teaching is not effective and students are uninterested to learn Jawi due to lack of motivation (Hairul Aysa et al., 2010). Besides that, according to Nik Yaacob (2007) and Abdullah (2008), the method used to teach Jawi writing is not attractive. To cater on this problem, mobile application with game approach is targeted to teach students, mainly in primary school to learn Jawi.

The Jawi alphabets follow the Arabic characters, with some modification to fit with the local vocal sound. It consists 29 Arabic characters and 6 additional letters devise from the Malay (Yaacob et al., 2001). Writing using Jawi script is much

influenced when Islamic arriving to Malay Archipelago (Amat Juhari, 1996). Malay use phonetic language and has two types of character; roman and Jawi character. Roman character is used in modern Malay while Jawi character is used in traditional Malay (Zaini Arifah et al., 2009). According to Roslan et al. (2009), the new generation of people having weaknesses to write or read Jawi is because it is not widely used as medium in their daily activities. Since the generations nowadays are more inclined towards game, whether it is mobile or not, it can become a creative medium of learning and brings fun. When it is developed on mobile device such as smart phone, or a mobile application, it encourages mobility and flexibility (Norizan et al., 2010). Thus, it can improve the way of learning and is hoped to help students to learn Jawi easily.

There is a study on A Development of Computer Assisted Software (AJaW) that Encourages Jawi Writing for Children by Norizan et al. (2010). The study is carried on to address on the problem that handwriting is slow and difficult for young children to do writing. Children needs some time to master the skill, with instruction and guidance (Palluel-Germain R. et al., 2007). Hence, to master Jawi writing, students need to have knowledge and skills on how to write them, with practice and lesson. The result from the study found that the implementation of motor skills by handwriting has assisted the children to practice and improve their writing skills and at the same time, increased their interest and grasp Jawi subject.

2.4 Learning Theories in Mobile Game-based Learning

Learning theories are descriptive. It describes how learning is occurred. The theories provide a deeper grasp of the effects that result from phenomena (Charles R. 2008). It is important to select a suitable learning theory because it can effectively foster learning process (Nor Azan M. Z. et al, 2009).

The theory of multiple intelligences by Gardner H. (2000) provides nine potential ways to learning. They are:

- Linguistic intelligence – display a facility with words and languages
- Logical mathematical intelligence – logic, abstractions, reasoning, and numbers and critical thinking
- Interpersonal intelligence – interaction with others
- Intrapersonal intelligence - introspective and self-reflective capacities
- Spatial intelligence – deals with spatial judgment and ability to visualize with the mind's eye
- Bodily-kinesthetic intelligence – controls of one's bodily motions and capacity to handle objects skillfully
- Musical intelligence – sensitivity to sounds, rhythms, tones and music
- Naturalist – nurturing and relating information to one's natural surroundings
- Existential – spiritual or religious intelligence

Besides that, behaviorism learning theory (B.F. Skinner, 1971) is the most dominant theory in learning (Schunk, 1991). Behaviorism is the theory that describes learning is due to an observable change in behavior. The learners study the information, apply the information, and receive reinforcement.

In cognitive theory (Piaget, J. 1957), the learner is completely incorporated with the environment within the learning (Inman J., n.d.). This theory emphasized on gaining and maintaining the learner's attention. Once the learner is immersed in the learning, rehearsal and visuals are used to move the information into the memories. Reinforcement is used primarily as feedback (Woolfolk, 2004).

The next theory is constructivism (Bruner, J. 1996) is the theory that describes learning to due to the construction of knowledge (Christie, 2005). The theory focuses

on the understanding the information. A big component of constructivism is socializing. The learners are posed with guiding questions and the learners work together to acquire the new information.

On the other hand, Gagné R. (1985) proposed a series of events which follow a systematic instructional design process that share the behaviorist approach to learning, with a focus on the outcomes or behaviors of instruction or training. It is known as events of instructions. The steps of events of instructions adapted from Gagné, Briggs, and Wager (1992) are as follow:

- Gain attention of the students
- Inform students of the objectives
- Stimulate recall of prior learning
- Present the content
- Provide learning guidance
- Elicit performance (practice)
- Provide feedback
- Assess performance
- Enhance retention and transfer to the job

CHAPTER 3

METHODOLOGY

3.1 Research Methodology

The research methodology will require gathering relevant data from various sources. Data collection will use quantitative and qualitative method.

Quantitative method will consist of surveys from students in primary school. The survey is done to see how mobile game-based learning application can effectively facilitate in the learning of Jawi on mobile device. The selecting of sample is on the students at the age of 10 and 11, which consists of 15 students. The sample needs to know on how to handle mobile device to learn using the mobile game-based learning application. The data collection will be collected from the game scores and also from their observation on the usability of the application.

For qualitative method, a substantial data will be needed to know what is the best way of teaching using game that can enhance the skills and knowledge of students in learning Jawi.

Upon collecting the data, an analysis shall be done to achieve the research objectives and to develop an interactive tool, a mobile application of learning Jawi to grant mobility for students.

In the game design phase, a group of activities are conducted such as storyboarding, game flow design, interface design, and navigation structure design. In the development phase, the mobile game-based learning design resources is integrated using App Inventor and later, the programming steps to enable all functionality of the

application is developed using the Block Editor. The game resources include graphics and text which provide the learning content. Initial testing is done on mobile phone to ensure that the game can be adapted using Android operating system without errors and bugs.

Adjustments are made for any errors occurred during the testing. Lastly, the game is deployed to Android mobile phone for implementation and testing on the effectiveness of the mobile game-based learning application in facilitating the learning of writing in Jawi.

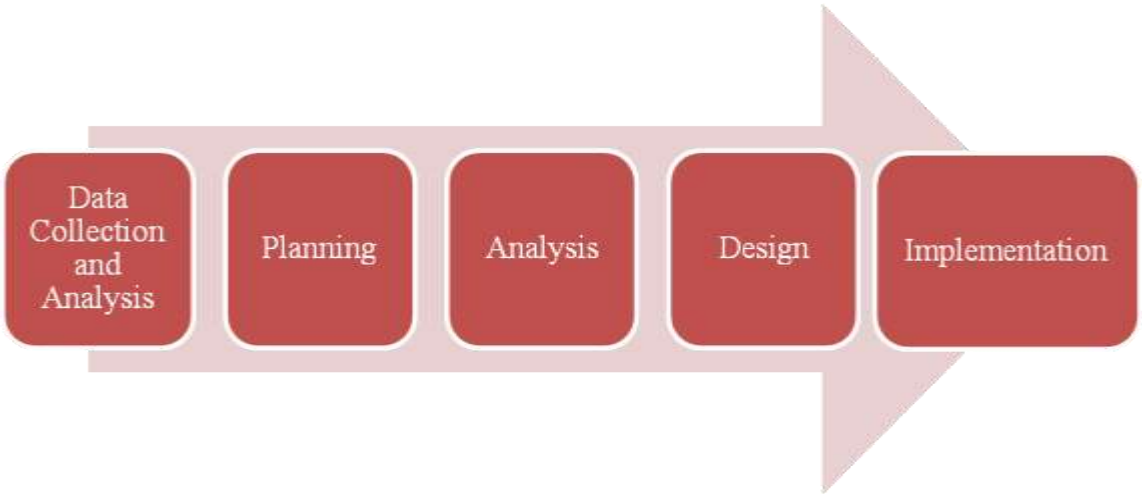

Figure 3.1: Research Methodology

Phase 1: Data collection and analysis

In this phase, data collection is done on the use of mobile learning on mobile device and how it can improve the learning of writing in Jawi especially for students in primary school. Literature review is conducted on the mobile learning, game-based learning, and Jawi teaching.

Phase 2: Planning

In planning phase, it is important to identify the software to be used, analyze user requirements, and prepare gantt chart for the project. Detailed research is conducted for a better understanding on the application that will be developed.

Phase 3: Analysis

During analysis phase, the developer needs to identify the requirement of the mobile game-based learning application structure. The game will consist seven rules of writing in Jawi based on the syllabus by 'Panitia Pendidikan Islam; Modul Jawi Tahap 2'.

Phase 4: Design

The developer needs to design the application based on the results from analysis. The design phase starts with designing the user interface which is easy to use and user friendly suits with the knowledge or skill of the target user. Deciding the design structure and logic flow for the application is important to meet with the user requirement.

Phase 5: Implementation

The last phase is implementation, where coding, testing, installation and support for the application are developed. The complete mobile game-based application is developed and testing will be conducted on the target user, which is school student by the age of 10 to 11. After testing, they will be given survey form to analyze on the usability of the application.

3.2 Project Activities

Before development of the project, research is done on how mobile game-based learning can be adapted into an application that can help students in learning writing in Jawi through critical analysis based previous project that have been done using the same approach in learning. Study on the development of an Android application is needed to understand and know what is the suitable programming language and platform applicable with the mobile game-based application structure that will be developed.

Besides that, the requirements that have been identified for the application is to deliver a mobile game-based learning application for learning Jawi for students that emphasize on seven rules of writing. They are:

a) 'Hukum DARLUNG'

b) 'Hukum KAGA'

c) 'Penggunaan Huruf NGA & GA'

d) 'Penggunaan Huruf TA'

e) 'Penggunaan Huruf HA'

f) 'Penggunaan Huruf Kaf & Qaf'

g) 'Perkataan Tradisi'

Based on the requirements, designing the user interface for the application is done in App Inventor Designer. The application is designed and named 'Celik Jawi'. It will consist of four main menus; 'Permainan' (Play), 'Skor' (Score), 'Arahan' (Instructions), and 'Keluar' (Exit).

The design of the proposed interface is developed. The main interfaces of the mobile game-based learning application are as below:

Figure 3.2: Main menu screen

Figure 3.3: Choose level screen

The main menu consists of three main functions. In the first function, 'Permainan', the user will be directed to play games on Jawi. The next function is 'Skor', which will show the current highest score for each game categor. The last function, 'Arahan' will guide the user on how to play the game.

After the user choose 'Permainan', the user will be directed to choose level screen, which the user needs to select the unlock category and play game in the selected category. The lock category will unlock once the user attain half of the full score in the previous category.

Figure 3.4: First game level

Figure 3.5: Right answer screen

To play the game, the user will need to tap on each button that displays the Jawi character as in Figure 3 to spell the prompted word in Romanized character. If the answer is correct, the application will prompt the whole word in Jawi character before going to the next word and attain one score. If the answer is wrong, the user will directly goes to spell the next word without getting any score.

Figure 3.6: Continue with next word

Figure 3.7: Next level unlocked

Figure 3.8: Second game level

Figure 3.9: Right answer screen

Figure 3.10: Continue with next word

Figure 3.11: Score screen

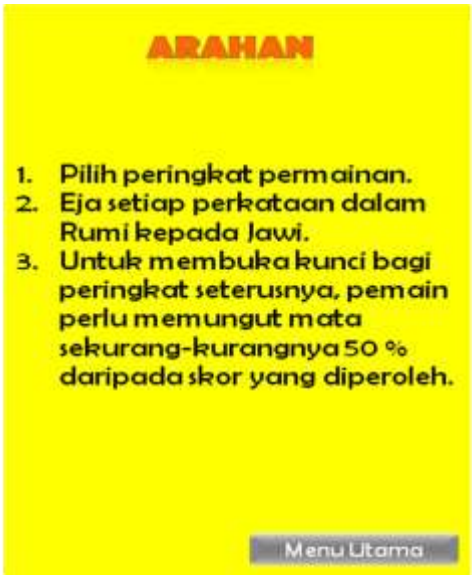

Figure 3.12: Instruction screen

For designing in App Inventor Designer, the program works by adding the components that are available in the left sidebar of the designer onto the screen.

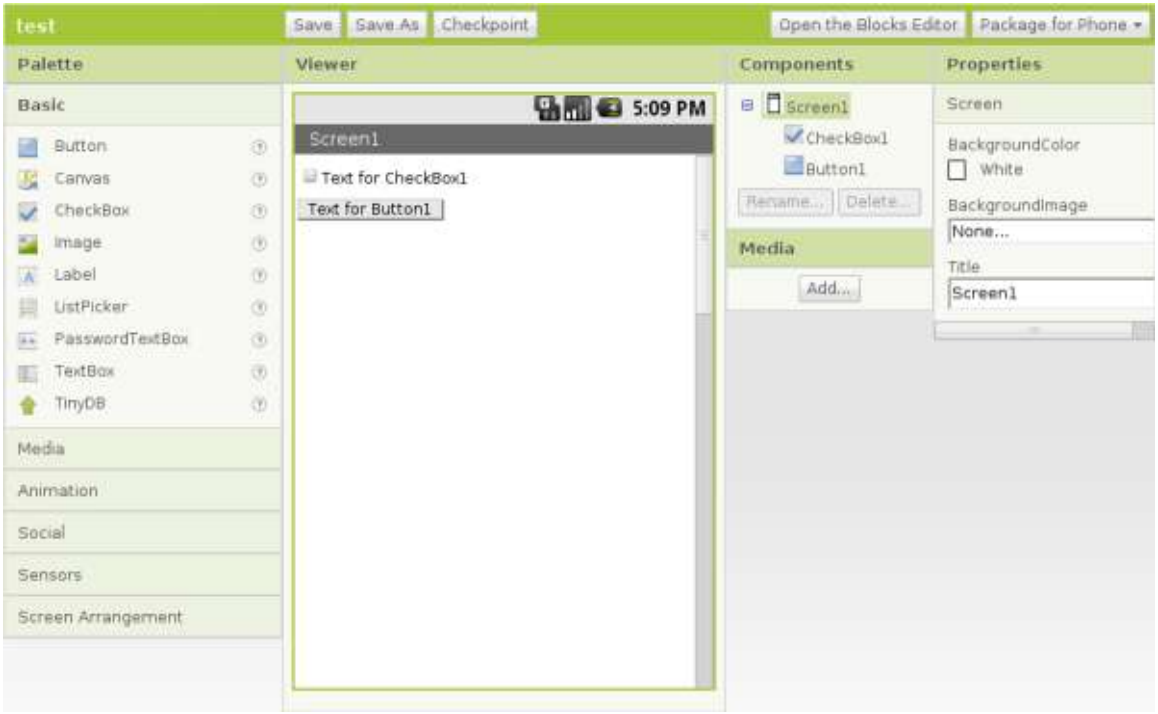

Figure 3.13: App Inventor Designer screen

Click and drag any components under the Palette. After placing the components onto the screen, a list of components that being used are appeared on the right side of the designer. The properties of the components can be manipulated to determine how they will appear on the screen.

Figure 3.14: App Inventor Designer screen (The interface design)

After designing the interface of the application, then proceed to development in App Inventor Blocks Editor. The block editor is functioned as the programming interface to assign behaviors for each component in the App Inventor Designer. Drag and drop blocks and assigned the definition, variable, math or logic to the components. Assemble the position of the blocks to fix with the built-in blocks so that it will translate into the behavior of each component when the user performs some action on the component.

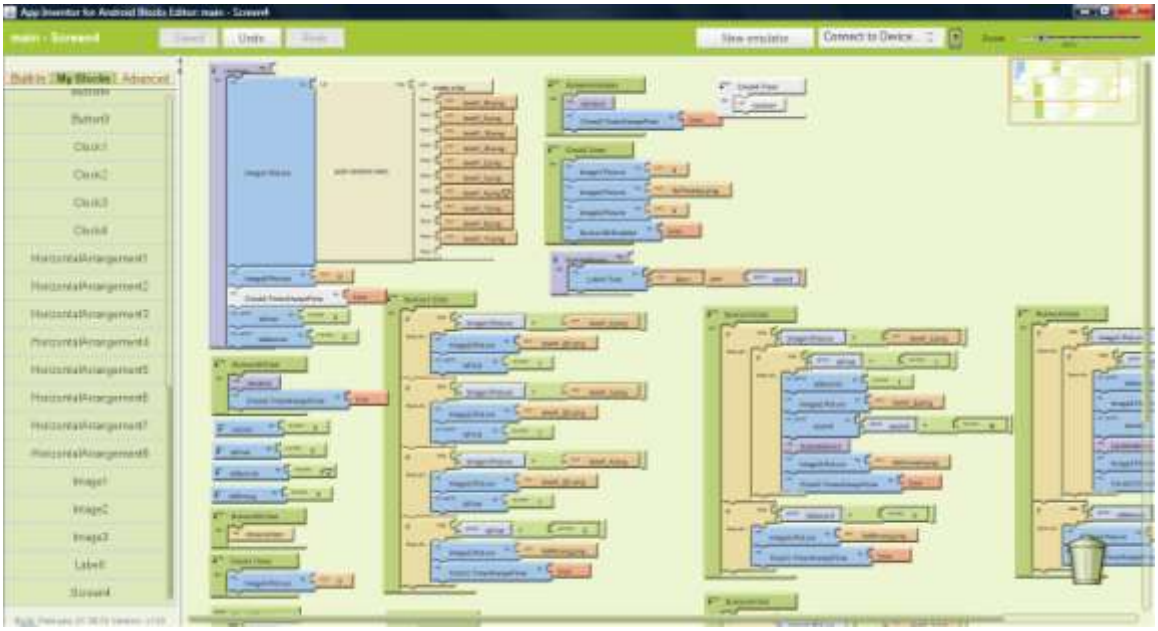

Figure 3.15: Blocks Editor

After assigning task to the blocks, the program can be tested on an emulator or connect to mobile device. The emulator enables viewing of the application with the functions run on the program. The App Inventor servers will store the works in App Inventor Designer and App Inventor Blocks Editor.

Figure 3.16: Android's phone emulator

When development of the mobile game-based application is completed, the application can be stored and installed on the mobile device. Below are the screenshot of the main menu screen and screen on chosen category of the mobile game-based learning application.

Figure 3.17: Interface of the main menu

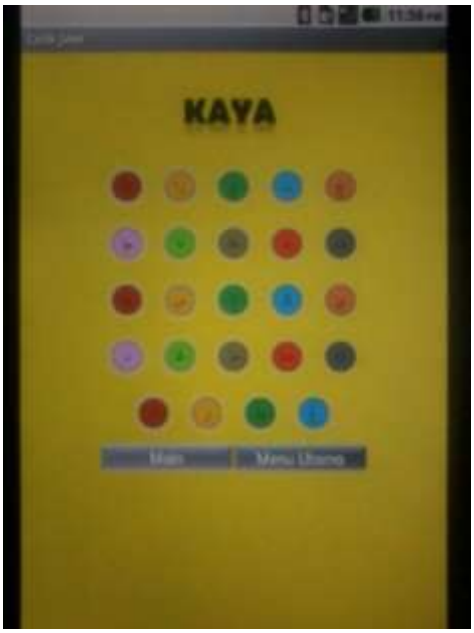

Figure 3.18: Interface of the game from one of the game category

When the application is successfully installed in mobile device, survey analysis is conducted among school students in the age of 10 and 11 years old. They are given the mobile device with the application already installed on it. They are given some times to complete a level in the game. After the game is over, the score is taken for analysis purpose on the performance. Based on the scores attained, the performance of the students can be calculated.

They were also been given a survey form to answer based on five criteria; functionality, usability, design, layout and future usage. For the testing purpose, 15 students with age 10 and 11 participated and gave feedback on each criterion, based on the range:

a) **Functionality** 1) Good 2) Neutral 3) Poor

b) **Usability** 1) Good 2) Neutral 3) Poor

c) **Desig**n 1) Good 2) Neutral 3) Poor

d) **Layout** 1) Good 2) Neutral 3) Poor

e) **Future usage** 1) Good 2) Neutral 3) Poor

Based on the feedback, we can know whether the mobile game-based application meets the user requirement and expected approach of delivering the game in facilitating the user in Jawi learning.

3.3 Tools

Table 3.1 shows the tools required for the development of the project:

Tools / Equipment	Justification of Usage
Android Mobile Device	The project is an Android application and will use mobile device with Android operating system to carry out testing on the Android mobile application
Software Development Kit (SDK) Tools	This project involved the installation of SDK plug-in to allow the creation of mobile application for Android operating system
MIT App Inventor	App Inventor is used as the main platform for the creation of software application for Android mobile game-based application

Table 3.1: Tools Used

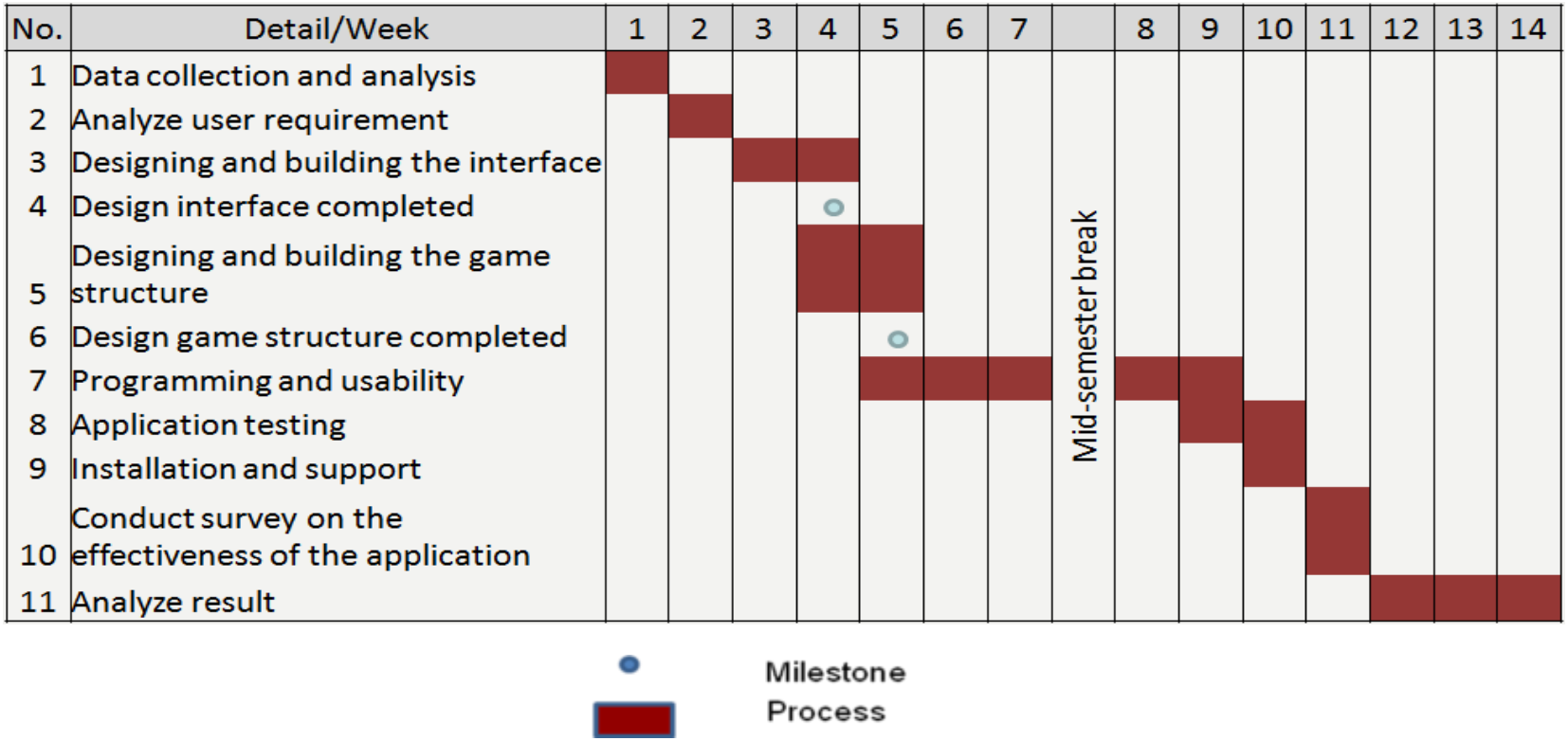

Figure 3.19: Gantt chart

CHAPTER 4

RESULT AND DISCUSSION

4.1 Mobile Game-Based Learning Theory

The most important aspect in the mobile game-based application is the learning content analysis. The requirement that have been identified for the application is to deliver a mobile game-based learning application for learning Jawi for students that emphasize on seven rules of writing which are 'Hukum DARLUNG', 'Hukum KAGA', 'Penggunaan Huruf NGA & GA', 'Penggunaan Huruf TA', 'Penggunaan Huruf HA', 'Penggunaan Huruf Kaf & Qaf', and 'Perkataan Tradisi'.

The learning theories focused in developing the mobile game-based learning application are underlying from three basic concepts; behaviour, cognitive and constructive theories, whereas multiple intelligence and events of instructions are the significance theories used in learning environments.

Learning Theory	Game's Characteristic
Behavior (Schunk, 1991)	The game is divided into each category of rules in writing Jawi to clearly highlight the learning objective in each category. Besides, hint is given through the selection of characters to accomplish the challenge

Cognitive (Inman J, n.d)	The game is designed with simple user interface and navigation to successfully enhance the learning process
Multiple Intelligences (Gardner H. 2000).	The game includes three intelligences; linguistic, intrapersonal, and spatial into the game The use of Malay in game and instruction become the elements in linguistic. Intrapersonal is when the user immerse and communicate with the game environment.
Constructive (Christie, 2005)	The user needs to learn by completing each challenge in spelling one word that will appear in random at a time
Events of instructions Gagné R. (1985)	There are six events of instructions adapted in the game; gain attention, inform learners of objectives, present the content, provide feedback, assess performance, and enhance retention and transfer.

Table 4.1: Learning theory

4.2 Game Play and Flow

The mobile game based learning is aimed at improving the knowledge of the primary students in writing Jawi. In general, the game is generated into one single type of game but each level is focusing on different rules of writing. The player will need to spell a Malay word appears at random by clicking on the interface that acts as a button. A button represents a syllable. The player needs to tap on two buttons to spell the Malay word which has two syllables. The players' skill and knowledge will determine how well they can score and master from the learning. The score will appear as they manage to spell the word correctly. When the times up, the player can choose whether to continue play with the game, choose another game category or exit the game.

4.3 Deliverable Application Interfaces

The learning content of the mobile game-based application is run on mobile device. In this project, the application is installed in two different mobile device; Samsung Galaxy Y phone and ViewPad 7, both are using Android operating system. In this project, mobile device is used for learning program as the delivery of learning content to learners (Traxler J. 2007). As suggested by T. T. Goh et al. (2003), the successful criteria of mobile learning is adaptivity and learning environment. By considering these factors, the project come out with an application that suitable with the age of the target user, which is 10 to 11 and the learning environment that requires the use of mobile device.

Based on the past research on game-based learning application on mobile device, it is practical to develop the application since it can instill passion to learn Jawi through game (Norizan et al., 2010).

The first objective of the project is to design and develop a mobile game-based learning application for Jawi to grant mobility for primary students. The design and development of the application is based on the research during data collection and

analysis. After the development and programming part is completed, the application is installed on the mobile device as below:

Figure 4.1: Interface of the main menu

Based on this menu screen, user can choose between four menus; ‘Permainan’ (Play), ‘Skor’ (Score), ‘Arahan’ (Instructions), and ‘Keluar’ (Exit).

Figure 4.2: Interface of the game category

The different category helps to differentiate the learning objective through the game. This will effectively highlight the learning objective and transfer the knowledge contents through game in each category as this will develop interest of the target user and the objective of learning is accomplish (Egenfeldt-Nielsen, 2006).

When the user chooses to play, they will need to choose which category of games they want to play. Each category indicates each type of rules of writing in Jawi.

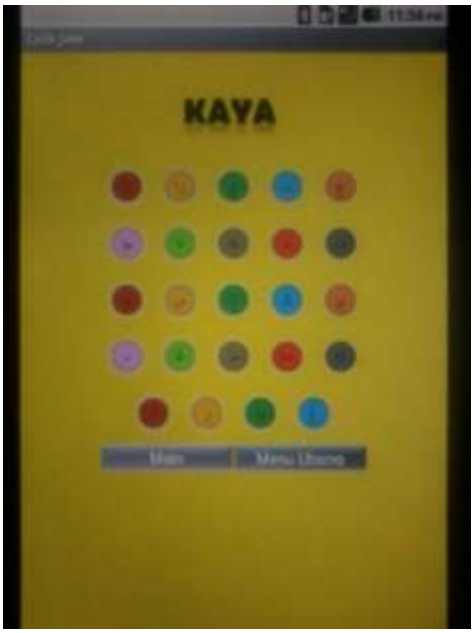

Figure 4.3: Interface of the game from one of the game category

After the user selects a category, it will direct the user to the next page, where the user will play the game. The user will need to tap on the button to spell the Romanized word appear on the screen in Jawi. If the answer is correct, the word 'Betul' (Correct) will appear on the screen.

Figure 4.4: Interface of the game prompted the correct answer

When the user gets the answer correct, the score of the game will also appear on the screen. This characteristic applied the conceptual model of Game-Based Learning by Garris et al. (2002). This model suggested that the game content becomes the input and being processed through one of four elements in the game cycle which is system feedback, and later it is processed to become the output, which is the learning outcome.

Figure 4.5: Interface of the game showing the score

After the game has finished, the user can choose whether to play again, by tapping on the 'Main' (Play) button or go back to the main menu by clicking on the 'Menu Utama' (Main Menu) button.

Figure 4.6: Interface of the game showing game menu

4.4 User Testing Results

For testing on the mobile game-based application, 15 students were involved in the survey. The survey focused on five main aspects; functionality, usability, design, layout, and future usage.

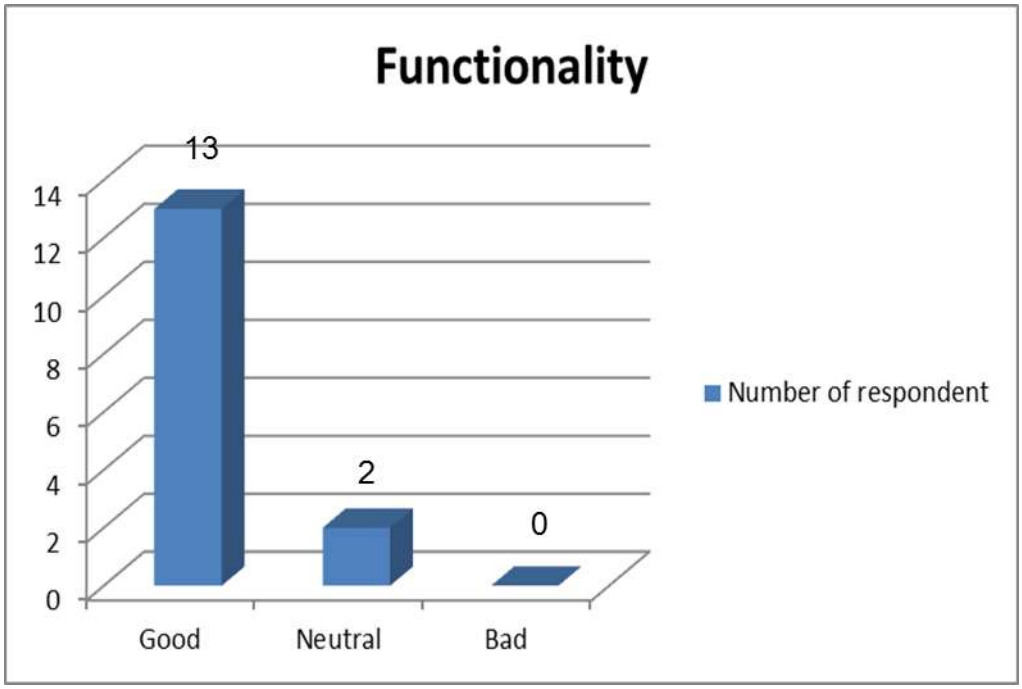

Figure 4.7: Graph result for functionality testing

Functionality testing is done to evaluate the whether the application is compliance with its specified requirements. 13 respondents testify that the function is good and 2 respondents rate as neutral, which indicates that the user has not satisfied with the whole functions of the application. Some of the functions may not meet the functional requirements.

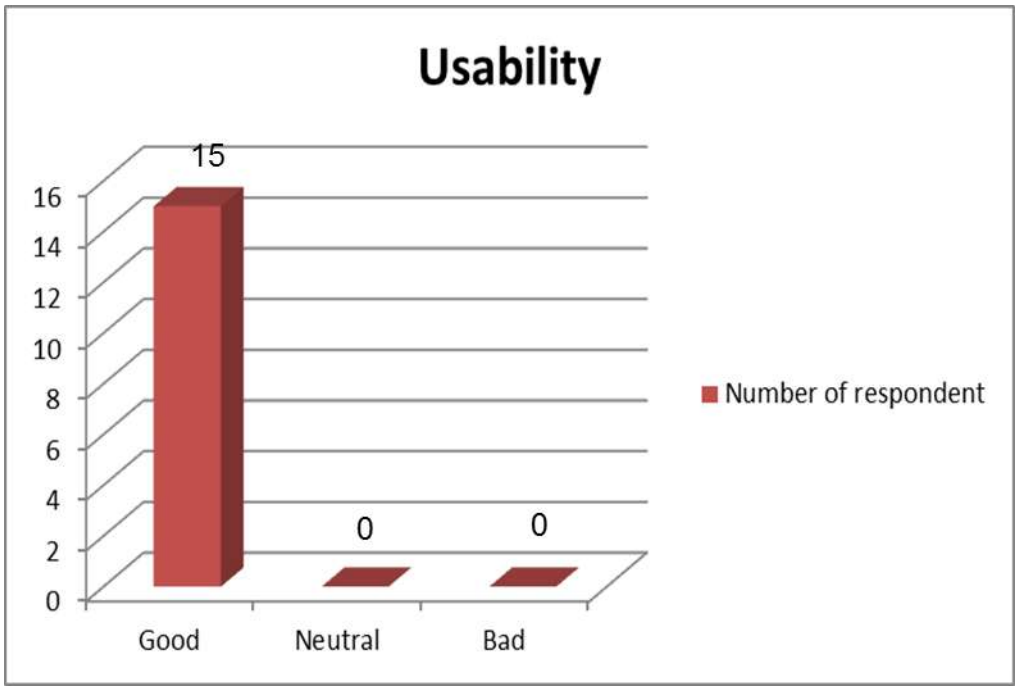

Figure 4.8: Graph result for usability testing

Usability testing is also done to evaluate the user's-ease to use the application. From the result, all of 15 respondents rate as it is good. The results shows that the application is suitable to be used as a mobile game-based learning tool to help them to enhance their learning of writing in Jawi because of simple navigation between screens, uniformity in the format of screen, and learning is easy for the new user.

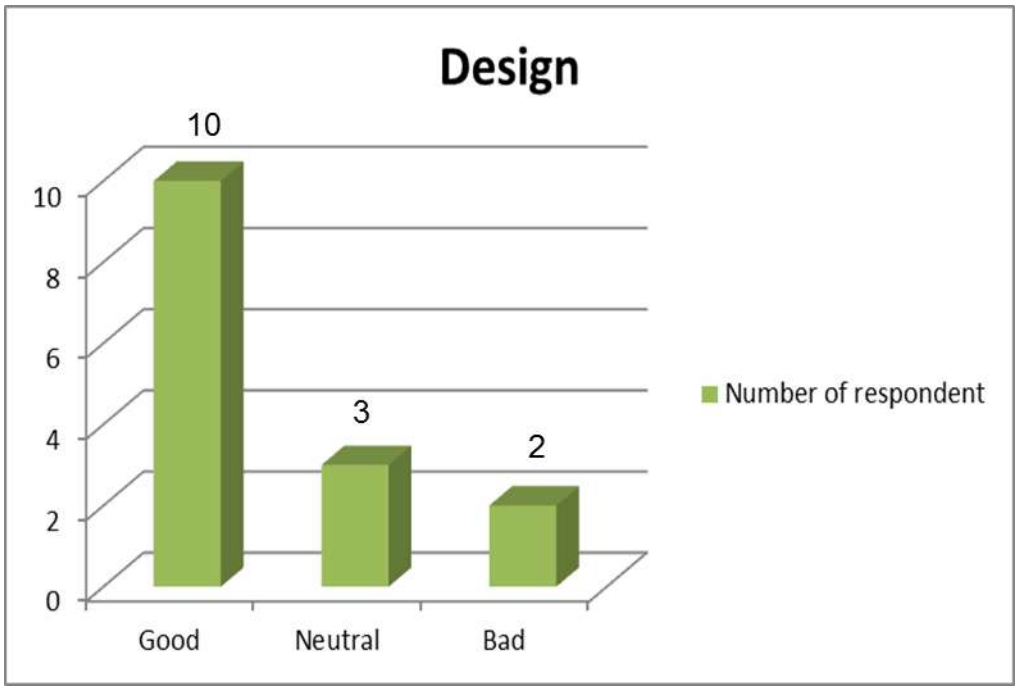

Figure 4.9: Graph result for application design testing

Besides that, design testing is conducted to evaluate user preference on the application interface, design of buttons, screens and colours. 2/3 respondents says that the design of the application is good, while 3 over 15 respondents give rating as neutral and only 2 respondents perceived it as bad. The comments are most on the size of the interface which is quite small to enable them to play the game properly.

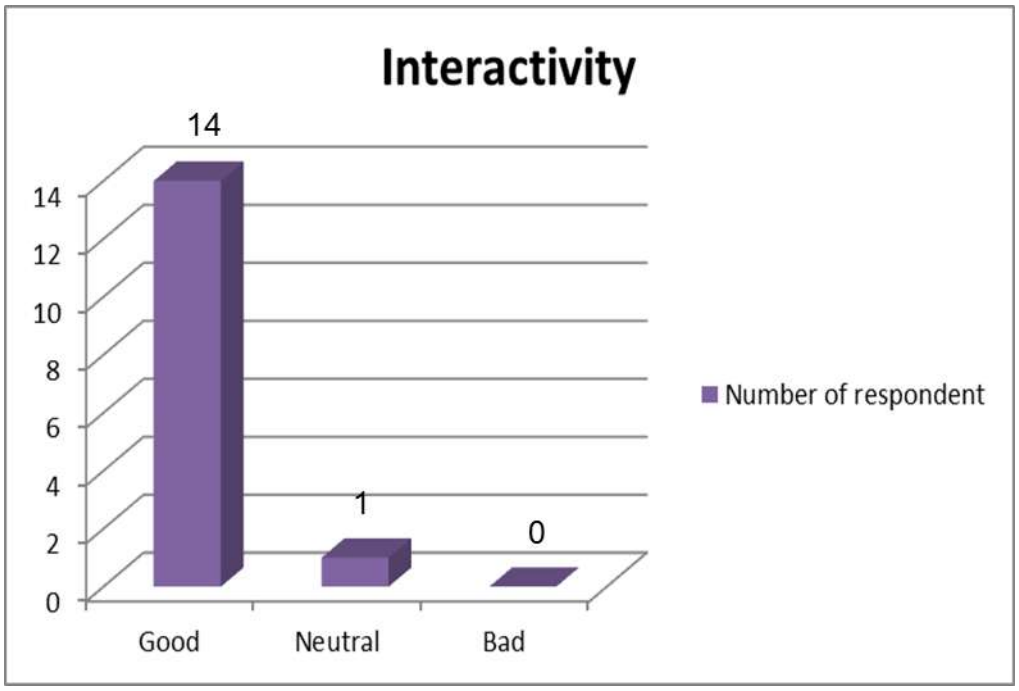

Figure 4.10: Graph result for interactivity on the application testing

The testing on the interactivity of the application is also done to evaluate the degree of user involvement, interaction ease and coordination. 14 respondents say the interactivity of the application is good and only one responds says neutral because the user perceive of less interaction ease.

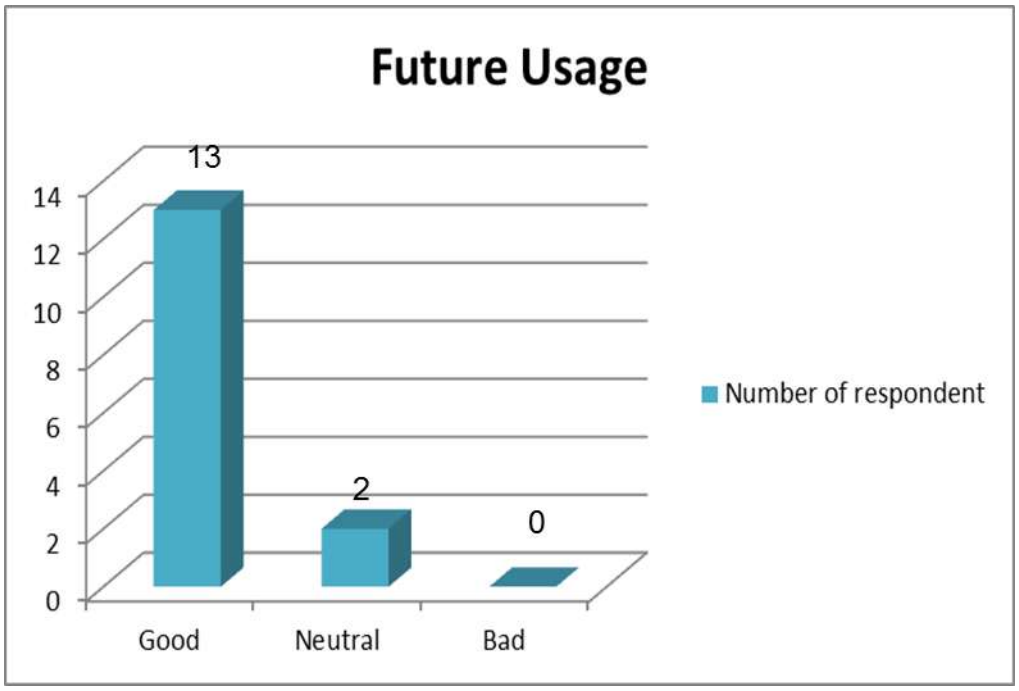

Figure 4.11: Graph result for future usage testing

The testing on the future usage is also conducted to evaluate the potential of the application in becoming an effective learning aid. 13 respondents give a good rating and only two says neutral on the future usage of the mobile game-based application because the mobile device used to run the application (e.g. mobile phone) is not suitable to be used in class. This signifies that the application has potential in becoming effective learning aid for students who want to learn writing in Jawi using game approach.

The respondents' performance in using the game is rated based on the scores they have attained.

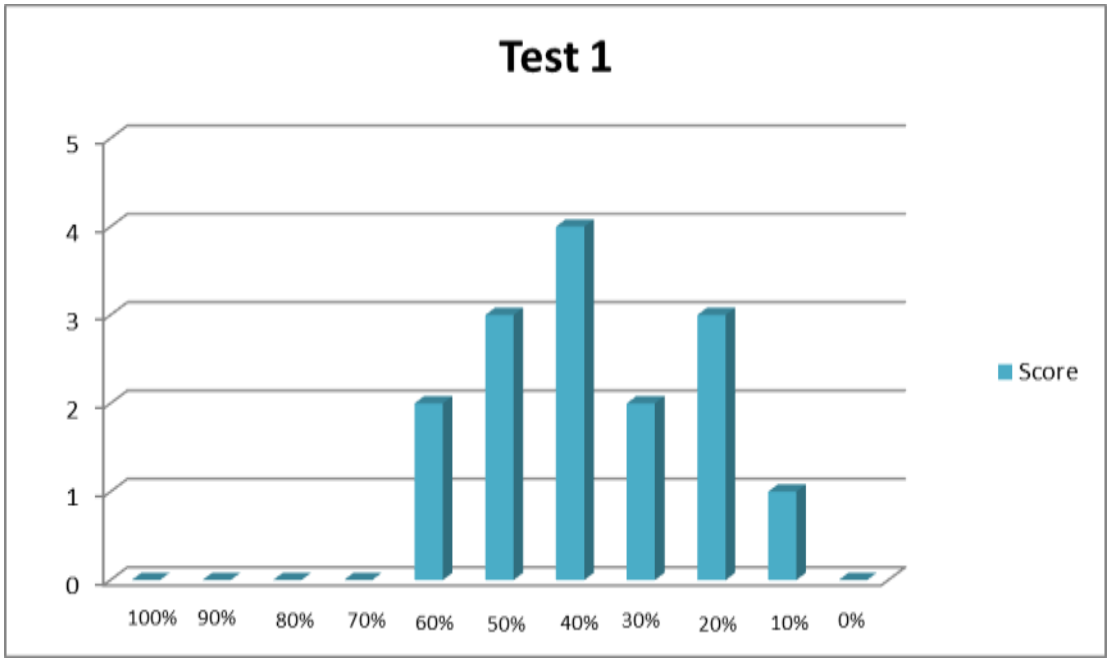

Figure 4.12: Graph result for first application testing

The respondents need to take two tests to analyze on their performance in using the application based on scores. For the first test, the graph shows that the performance is very poor. No student gets full marks and there are only two students get the highest score which is 60%. Three students score half of the game and one student get the lowest score which is 10%. The average score from the 15 respondents are 37.33%. This can happen because they are still not familiar with the interface and function. Besides that, it also indicates about their knowledge of writing itself which is identified in the problem statement, where the performance of students in Jawi learning is low in some aspects, and one of them is writing and spelling (Nik Rosila, 2007).

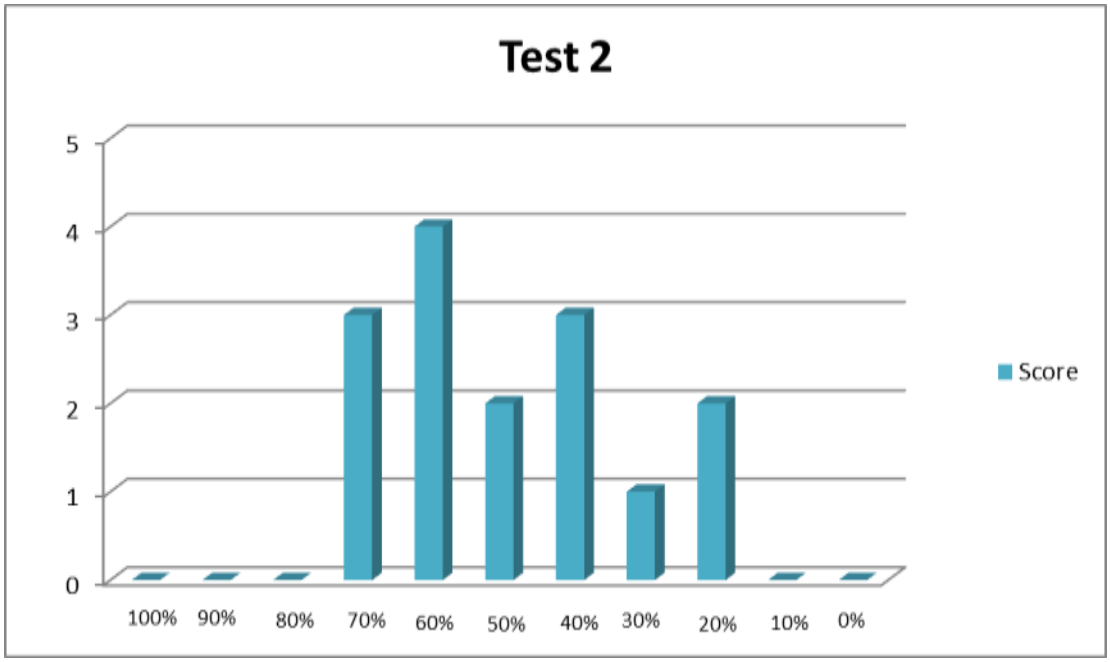

Figure 4.13: Graph result for second application testing

After the respondents are given to do test 2, there is a slight increase in the score. 3 students able to score 70% and no students get the lowest mark of 10% as in the test 1. The average score for the second test is 50.67%, an increase of 13.34%. Although the difference on the performance are small, but this results shows that the mobile game-based learning application is effective in facilitating the learning of Jawi among the students.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 The Relevancy of the Project

The objective of the study is to design and develop a mobile game-based learning application to learn Jawi to grant mobility for students. This application will be focusing on the writing aspects of Jawi; the character formation and spelling with game application.

Based on the analysis on the literature review, students are having problem on how to write the Jawi characters and spelling, thus the second objective of the study is to investigate the effectiveness of the mobile game-based learning application in facilitating the learning of Jawi on these two aspects.

5.2 Suggested future work

The mobile game-based learning application can be proposed to follow the learning of the syllabus in the current education system in Malaysia. This will fully aid the learning and need to be supported by the Ministry of Education in Malaysia, since this requires an integrated syllabus on Jawi teaching in classroom.

Besides that, it can be improved on the functions built in the application itself. As the learning gets wider and challenging, the students not only learn the basic, but they might need to learn on how to use the Jawi characters in writing an essay.

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