

**DEVELOPMENT OF JAWI GAME-BASED LEARNING TOOL FOR PRIMARY
SCHOOLS STUDENT/CHILDREN**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF JAWI GAME-BASED LEARNING TOOL FOR PRIMARY
SCHOOLS STUDENT/CHILDREN**



This report is submitted in partial fulfillment of the requirements for the
Bachelor of Computer Science (Interactive Media)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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DEDICATION

This final project is dedicated to my beloved parents for their endless support and helps when I need it, always pray the best for me and give me lots of useful advices in process of develop this project.

To my supervisor who has guided, give me lot of supports and always be patient with me while making the progress for this project,

Dr. Ahmad Naim Bin Che Hanapi (UTeM).
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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

To my evaluator who gives a good advices and feedback on this project,

Miss Syariffanor Binti Hisham (UTeM).

Last but not least, to all my beloved friends who always help me

from the beginning of this project until the end of it.

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I would like to ask sincere thanks to my parents and my siblings for always support and pray the best for me.

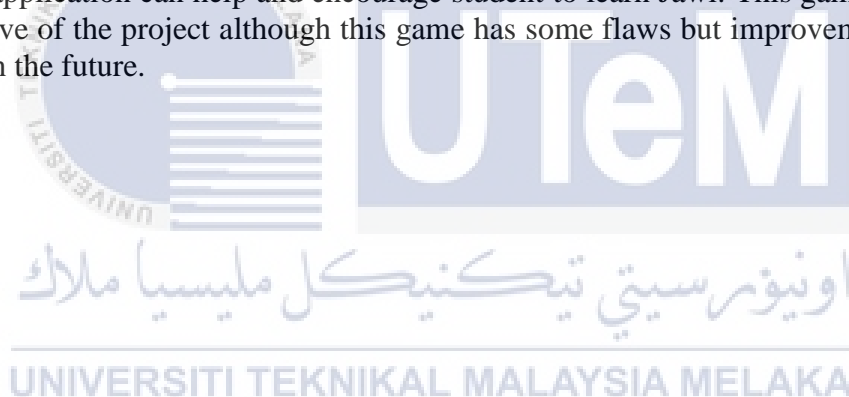
I would like to express my special gratitude and thanks to all my friends, from scratch until this project has been complete. Thanks to my colleague who willingly helped me out with all their abilities and times.

Thank you to faculty too as this project really teach me a lot and test my skills and knowledge about what I have learned since my first year until last year.

Thank you.

ABSTRACT

The usage of Jawi language nowadays is too limited. New generation play a very important role to ensure Jawi language are still preserved. The purpose of this study is to investigate the learnability of Jawi learning through game, to develop Jawi game-based learning tool for primary school or children, and to evaluate the usability of the proposed Jawi learning tool. This project is carried out by doing observation and comparing the existed system. This game also included all of the basic multimedia element such as text, graphic, audio, and animation. A total of 12 Interactive Media students from UTeM were involved in this study as subject matter expert to help the developer discover the bugs and errors. A set of questionnaire was used as an instrument in this project that consists of three sections which are visual clarity, navigation, and functionality that contains 12 questions using a Likert scale measurement. Among the three sections, the results of the study have shown that learnability which is in Part C have the highest scale while the lowest scale is about usability in Part B. Overall, the study found that this game application can help and encourage student to learn Jawi. This game has meets the objective of the project although this game has some flaws but improvement still can be done in the future.



ABSTRAK

Penggunaan bahasa Jawi pada masa kini semakin terhad. Generasi baru memainkan peranan yang amat penting untuk memastikan bahasa Jawi masih terpelihara. Tujuan kajian ini dijalankan adalah untuk mengenalpasti kebolehan pembelajaran dalam Jawi melalui bentuk permainan, untuk membangunkan permainan alat pelajaran berunsurkan Jawi bagi pelajar sekolah atau kanak-kanak, dan untuk menilai kebolehgunaan alat pembelajaran Jawi yang dicadangkan. Projek ini dijalankan dengan melakukan pemerhatian dan membandingkan sistem yang telah wujud. Permainan ini juga merangkumi unsur-unsur multimedia asas seperti teks, grafik, audio, dan animasi. Seramai 12 orang pelajar Media Interaktif dari UTeM telah terlibat dalam kajian ini sebagai responden untuk membantu mengenalpasti kesilapan yang terdapat dalam projek ini. Satu set soal selidik telah digunakan sebagai instrument dalam projek ini yang terdiri daripada tiga bahagian iaitu kejelasan visual, pandu arah dan fungsi yang mengandungi 12 soalan menggunakan ukuran skala Likert. Antara ketiga-tiga bahagian ini, hasil keputusan menunjukkan bahawa kebolehan pembelajaran dalam bahagian C mempunyai skala yang paling tinggi manakala skala yang paling rendah adalah tentang kebolehgunaan dalam bahagian B. Secara keseluruhan, kajian ini mendapati bahawa aplikasi permainan ini boleh membantu dan menggalakkan pelajar untuk belajar Jawi. Projek ini telah mencapai objektif walaupun masih mempunyai beberapa kelemahan tetapi masih boleh diperbaiki pada masa yang akan datang.

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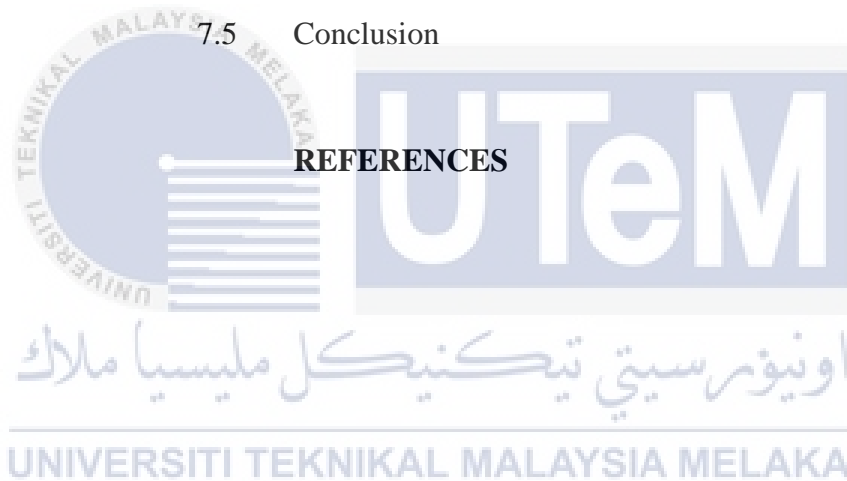
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CHAPTER I

INTRODUCTION

1.1 Introduction

In Malaysia, most of the writing in the social media or newspaper is no longer use of Jawi writing and this can cause the usage of Jawi writing will degenerate. Everyone needs to change their perception that Jawi is not only for students in Islamic field. Jawi script is too limited because in government departments, only Islamic Religious Department are using the Jawi script as in the letter list of marriage and use in the text in khutbah Friday. At school, only in subject of Pendidikan Islam that use Jawi. Jawi script is unique because it has beautiful calligraphy and enrich the Malay intellectual. The glory of Jawi script must be reinstated as it still survive and remain until this day. Jawi script also can move forward like others script and impressive as before.

As the generation of this age, we should feel responsible for rebuild the usage of Jawi in many ways especially using facility of the technology. Jawi became less prominent after the Malaysian Government officially adopted the use of the romanized writing system or Rumi as the medium to write the Malay language. According to Ahmad Zaki Abu Bakar (1986), Jawi became more confined to Islamic

matters and is used in the Islamic courts, mosques, religious offices and religious schools.

With the popularity of Rumi due to its wide usage in education and official correspondence, less Malaysians were able to read the Jawi. So, we must encourage youngster to learn Jawi. This game play developed for primary school students. Through this game play hope they can enjoy while learning on how to spell in Jawi. This game is not for fun only but to improve their spelling in Jawi on each questions. The motivation towards the development of this project is driven due to lack of Jawi knowledge especially in new generation.

Eventhough the pronunciation when we read Jawi script are the same compared to modern Malay, its characters are based on Arabic writing system, thus it requires additional efforts to be familiarized with the system. Another issue that motivates me to develop the system is to support the uses of Jawi Script which are not widely used nowadays. The use of ICT educational tool provides an alternative to the traditional teaching and learning method in order to build interest among students to learn Jawi in a more attractive way. Through this game play they can learning and play the game simultaneously.

1.2 Problem Statement

- Young people nowadays less exposure to Jawi script.
- Limited using of Jawi for games or mobile related application.
- The education system less emphasis on Jawi language.

1.3 Objective

- To investigate the learnability of Jawi learning through game.
- To develop Jawi game-based learning tool for primary schools student.
- To evaluate the usability of the proposed Jawi learning tool.

1.4 Scope

The project scope focused for primary school students or children to investigate whether they can learning Jawi and play the game simultaneously.

1.4.1 Specified User

The major target is for primary school students especially for Year 2. The content of this game will be included in interactive way. This game will provide Jawi spelling and at the same time they also play the game.

1.4.2 Content of Gameplay

Creating a game is more than having good interface and graphics but every game should contain its own unique challenges. Every challenges in game should motivate the player to keep playing the game. Educational games should be done by setting nice, short-term goals and each challenge should satisfy some kind of learning objective.

In this game, the challenges that need to be faced by player is they must choose the right spelling in Jawi language within the specified time. The next level will decrease

the time given but the spelling become more challenging because the syllable more difficult. Another challenge is the life given only three and will be deducted if the player chooses the wrong answer. Therefore, the player must start again at the level where they lose.

Table 1.1: Content of Gameplay

No	Learning Object	Description
1	Start Game	Enable users to start the game.
2	Options	Enable users the instructions of the game (“How To Play”)and to adjust the sound whether to mute or not.
3	Credit	Enable users to see who being apart of the actual creation of the game.

1.5 Project Significance

Children nowadays prefer to use gadgets than spend time with reading materials especially reading in Jawi writing since the use of Jawi is declining. Thus, the gameplay that include Jawi might attract them to learn indirectly.

Thus, through this game students can learn new thing that they don't know before. It provide them to learn and gain new knowledge and read Jawi. Furthermore, this game will be use a variety of multimedia elements such as the combination of text, audio, animation, graphic and many more.

This will help to promote the use of Jawi especially for young kids to improve their Jawi skills since a young age. Simple natural language and graphics used only when it makes sense and make visually user friendly design. This will help them to remember easily.

1.6 Expected Output

- **Commercial value product**

To develop a game that have education value especially to be use by primary school students who want to learn Jawi through a game.

1.7 Conclusion

In this chapter, we get review and understanding the project. Besides that, it will be developed based on the objective and includes the contents of the project and the project significances. By develop the game will absorb information and increase the knowledge of Jawi writing. Besides that, it more helpful to the primary school student to remember how to spell and read in Jawi.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss more about the literature review related to the development of Jawi Proficiency Through Gameplay using on laptop devices. The analysis on the existing projects will be discussed in this chapter.

A literature review is some kind of academic paper based on our knowledge or our findings through journal, internet, newspaper, magazine, blogs, articles and others. Literature reviews are not copying the original report. It is a part of graduate and post-graduate task for their preparation of a thesis or a journal article. Before student start their thesis, the document or proposal must be approved before begin their project. Besides that, it is information gathered and used as a resource to improve the deficiencies of the project before it is developed.

In this game, it is the perfect way to build the skills to familiar with Jawi since Jawi is quite unfamiliar among kids nowadays. This kind of education game will give them learning outcomes when play especially students that learn faster and better with games. Some student feel not interested in learning Jawi even though parents and

teachers are putting a lot of efforts in improving their Jawi. This game is just not for fun but it designed with educational purposes which focus for kindergarten or primary school. It will teach them how to sort into a single word. At least they will recognize some of the words.

For this project, an educational game will be developed to ease student learn Jawi through game play. To make the game more interesting, some kind of multimedia elements will be include such as audio, video, graphic, animation, text and embedded in it. With the help of this elements, hope it will help user to learn Jawi more deeply in fun way.

2.2 Domain

The aim of this project is to develop Jawi Proficiency Through Gameplay especially for primary school students that already know some basics in Jawi. However, this game just to improve their knowledge in Jawi and to attract student to learn Jawi. This is the new way to learn Jawi since before this we only have courseware. This is because kids nowadays more prefer to play a game than others.

2.2.1 Game as a platform for Education

In Malaysia, most of the writing in the social media or newspaper is no longer use of Jawi writing and this can cause the usage of Jawi writing will degenerate. Through this gameplay they will learning on how to spell in Jawi but at the same time they have to complete the task within a time provided. Gameplay is the best platform to use for kids because majority of parents nowadays are affordable for having a technology devices. Through this gameplay they can learning and play the game simultaneously.



2.3 Existing System

Nowadays, most of the writing in the social media or newspaper is no longer use of Jawi writing and this will cause the usage of Jawi will degenerate. Jawi writing is become limited because it only teach in school but not too important in daily life. This perception needs to change because we must pretend this unique writing that has beautiful calligraphy and enrich the Malay intellectual since our (*nenek moyang*).

Example 1:

2.3.1 A Development of a Computer-Assisted Software (AJaW) That Encouraged Jawi Writing for Children

This software development issues for children between the ages of 4 to 6 years old in learning to write the Jawi characters by focusing on the motor skills development in the writing process. Software was developed by researchers using Hannafin and Peck's Instructional Model. The design focuses on the hand movements includes the demonstration on proper pencil-holding techniques, the pre-writing activity, exercise and evaluation. Researchers believe that software which enforce on fine motor skills would improve children's writing skills especially on Jawi scripts. They also hope that Jawi scripts will be preserved and accepted by many. Motor skills is further developed through writing exercises using the graphic tablet. This skill is observed through testing phase. The cognitive element is observed when the learner can recognize the Jawi character and the motor movement.



Figure 2.3: Pen demonstration module Screen



Figure 2.4: Example of Coloring Activities

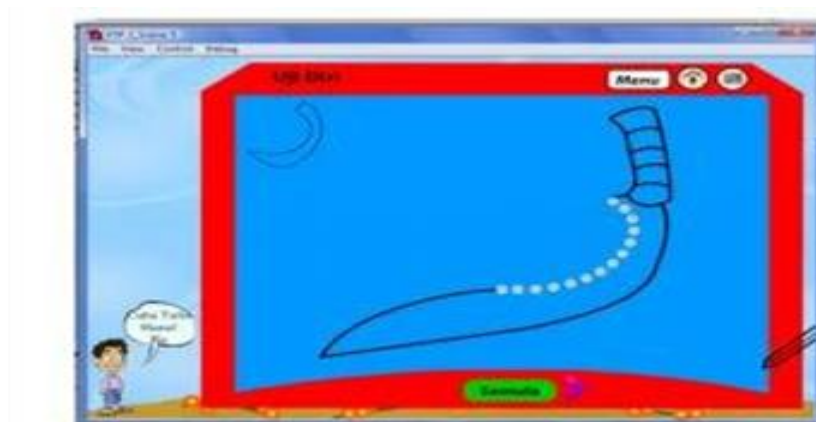


Figure 2.5: Jawi Practice Writing

2.3.1.1 Characteristics

In this software development, the motor skills are applied in writing Jawi when the learner is required to color the letter within the boundary and also when tracing the Jawi character within the boundary. The repetitive exercises allow the movements to be remembered, and the user will soon be able to write Jawi characters independently. The activity created able to hold the learner's attention to focus on the letter and the hand movement during the writing process.

Example 2:

2.3.2 E-learning (SMK Taman Selesa Jaya 2)

This module from a school website is same like a textbook module. It contains many subjects and the writer transfer the information from the textbook into the website. The module provide a module for each form in that school. If the user want to use the module, they must download first and the notes is using Flash.



Figure 2.6: Interface of the website

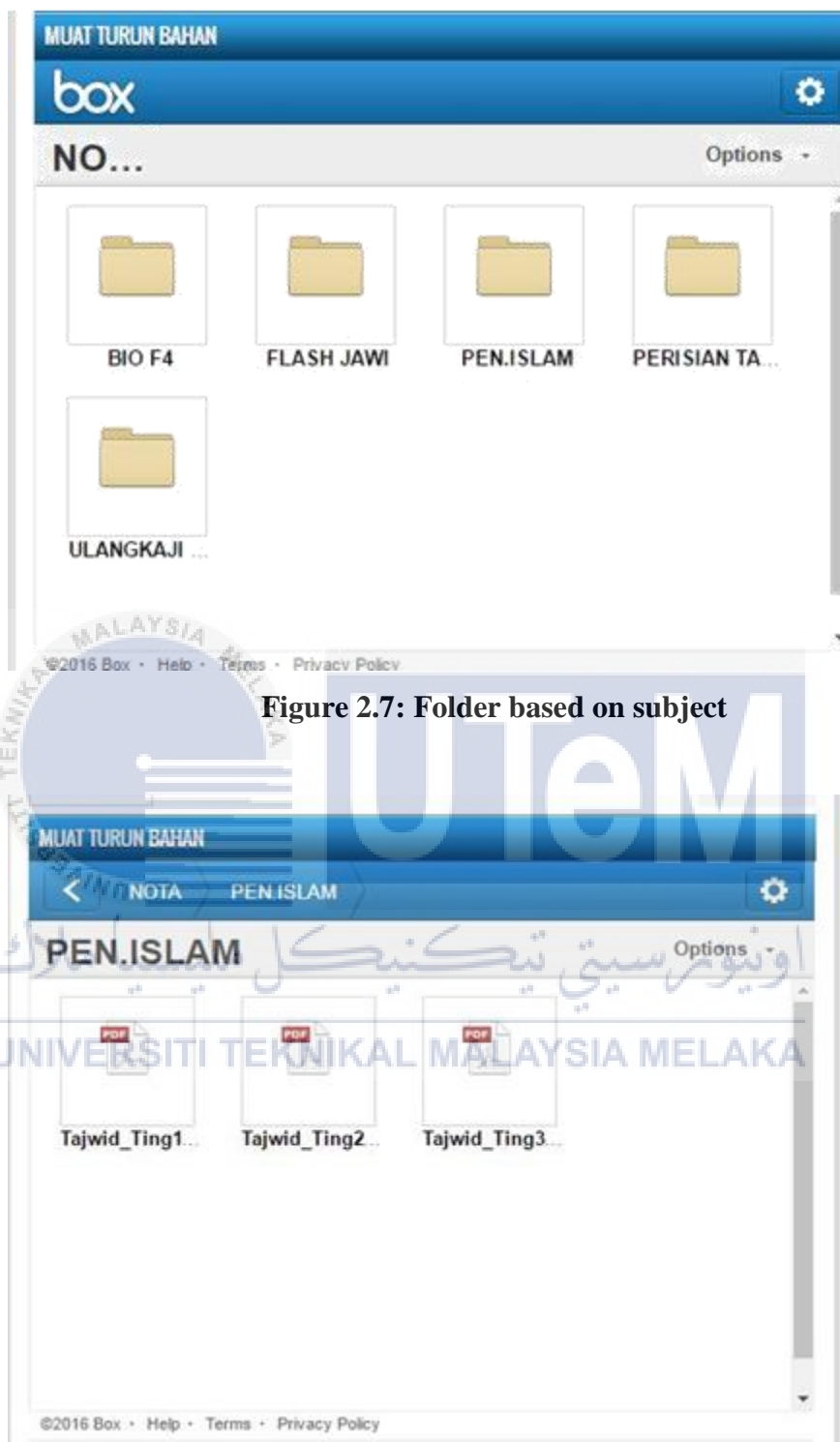


Figure 2.7: Folder based on subject

Figure 2.8: Notes in file

2.3.2.1 Characteristics

In this website, every module of subjects is provided for each form from form one until five. This website can be used by anyone because the module exactly same with the original textbook. Besides the notes, it also have revision module. In this module, no interactive element is provide.

Example 3:

2.3.3 Transcript of Easy Jawi Courseware (e-Jaco)

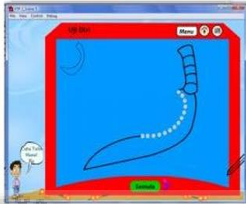


This courseware developed for learning Jawi that focused on dyslexia children. The researchers said that there are many interactive courseware for dyslexia children in Malay, English, and Mathematics. But for Jawi script, the existing courseware did not exactly focusing the method of how dyslexia children learn. With this courseware, they want to recognize whether dyslexia children having problem to use it or not. Researcher had been conducted a pre-test and post-test to identify student acceptance toward courseware at SK Desa Cempaka, Nilai, SK Presint 16(2) Putrajaya and SK Bukit Cherakah, Selangor.

2.3.3.1 Characteristics

This is an innovation of interactive Jawi e-learning courseware for dyslexia. It follow dyslexic learning method and provided audio guided for users. This courseware use appropriate design and colours. These applications assist teacher and parent in the process of teaching and learning with students especially dyslexia's children and can be used by public for learning Jawi basic. Their future planning is to update the modules and upgrade in Android and iOS version.

2.3.4 Comparison of Existing Systems

Table 2.1: Comparison Existing Systems

Existing Module	Computer Assisted Software (AJaW)	Website(e-Learning for school)	Courseware for Dyslexia (e-Jaco)
Interface Design			
Test	Yes	Yes	Yes
Audio	Yes	No	Yes
Video	No	No	No
Animation	Yes	No	No
Image	Yes	Yes	Yes
Interactive	Yes	No	Yes
Graphic Appearance	<ul style="list-style-type: none"> o Interesting because using graphic tablet. 	<ul style="list-style-type: none"> o Quite boring because too much repetition of text. 	<ul style="list-style-type: none"> o Very nice because have a contrast to emphasize key elements.
Interface Design	<ul style="list-style-type: none"> o The balance provides stability. o The alignment allows user to create a visual connection. 	<ul style="list-style-type: none"> o The space is not used properly. o The repetition of text can lead to boredom. 	<ul style="list-style-type: none"> o The proximity creates relationship between elements.

Multimedia Elements	<ul style="list-style-type: none"> ○ Use multimedia elements such as text, audio, graphic and animation. 	<ul style="list-style-type: none"> ○ Limited use of multimedia elements. 	<ul style="list-style-type: none"> ○ Has an element of multimedia such as text, images and audio.
Level of Interaction	High	No interactivity	Moderate

2.4 Project Methodology

The kind of methodology must be determined before setting up a project. It is important because a methodology provides direction, monitors time, cost and performance. It also increases productivity and improves the quality of our product or services. To choose a good development methodology, a few research have been done.

By comparing and observing existing systems in the internet, the most suitable methodologies for game development is Multimedia Production Process which consists of Pre-Production, Production and Post-Production. All of this process will be utilized as a part of this game development.

2.4.1 Content of Production Process

The production process is concerned with transforming a range of inputs into those outputs, This involves two main sets of resources whether the transforming resources and the transformed resources which required to complete a media product from the idea until the final master copy.

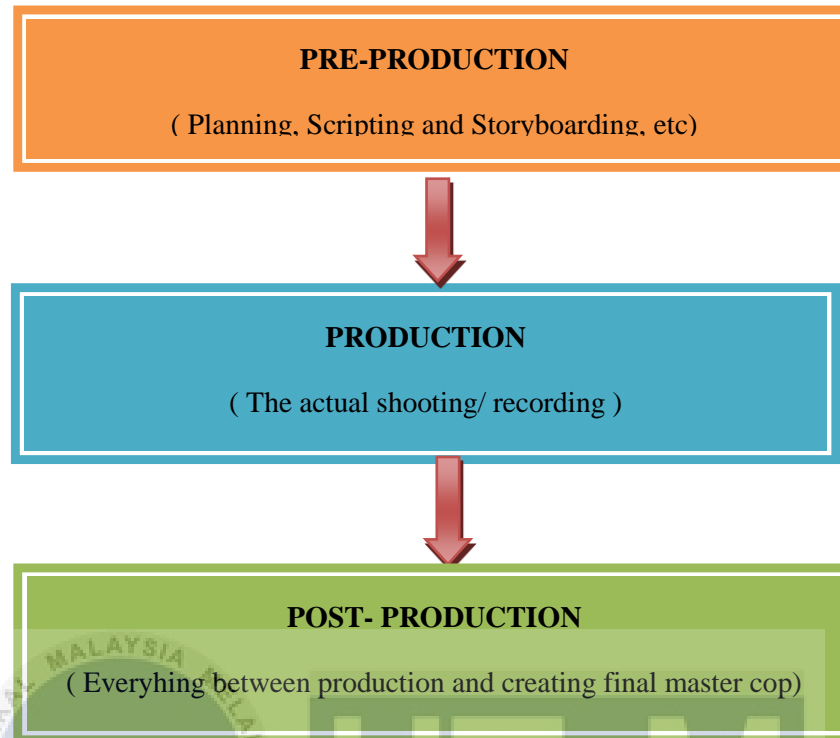


Figure 2.9: Content of MM Production Process

2.4.2 Pre-Production

This process is the first step developer must make which refers to the task undertaken before production stage begins in Content Production Process. Usually the content in this stage depends on the situation of the project. In this stage, developer can use Work Breakdown Structure (WBS) to make projects more manageable. To start out, determine the main deliverables for the project. Once it is completed, start decomposing the deliverables that already identified, breaking them down to successively smaller chunks of work.

2.4.3 Production

After done the pre-production phase, the next step is Production. Once the project management team or developer has designed the entire project, they can begin executing the production phase. This means they must prepare the material and will be designing the product. For game development, production phase is the main stage where assets and source code for the game are produced. The design will continue by the developer throughout production. Many type of product must be develop such as tracing the character in game, background, tools and find the suitable audio for background music.

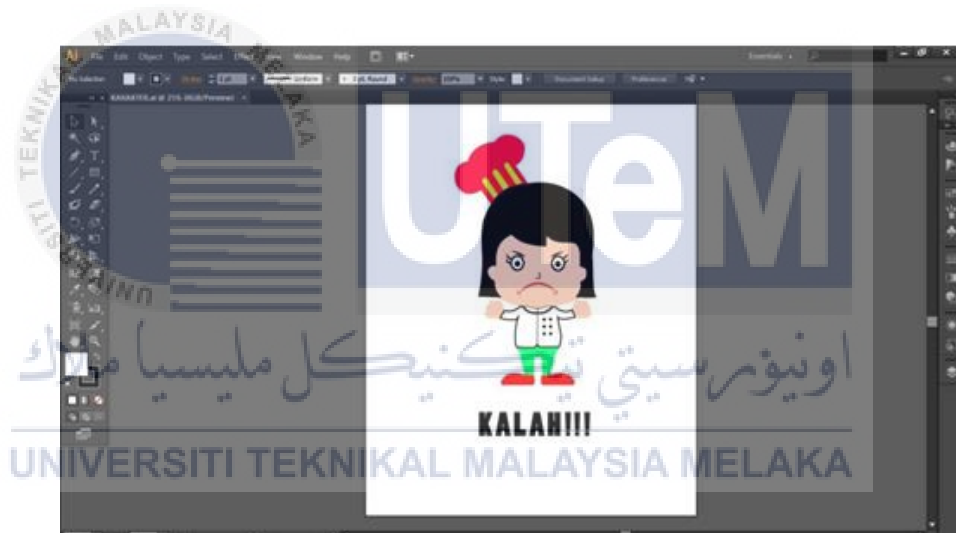


Figure 2.10: Tracing character using Adobe Illustrator (Ai)

2.4.4 Post-production

The post-production phase begins after the game is completed . This phase we can put sound effects, color correction, creating a logo and special effects in this stage . Post-production is like putting the last touch of editing. During testing, play the game repeatedly to find all the mistakes or “bugs”.

2.5 Instructional Design

In this process will include the educational goal, flowchart, detail course content, text question and metaphor.

2.5.1 Educational Goals

The goals of Development of Jawi Game-based learning for primary schools students are such as shown below:

- i) Attract the student to play the educational game.
- ii) To make user feel more easy to understand the Jawi language.
- iii) Understand how to spell Jawi language properly with the help of interactive media elements.

2.6 Project Requirement

Project requirement will explains more regarding the uses of software and hardware requirements that will be used to develop this game.

2.6.1 Software Requirement

Below are the software development tools that will be used in the process of developing content development:

- Adobe Illustrator CS6
- Adobe Photoshop CS6
- Unity 5.3.3f1 (64-bit)

- Microsoft Word 2010
- Microsoft PowerPoint 2010
- Web Browser (Google Chrome)

2.6.2 Hardware Requirement

Table 2.2 : Hardware and Specification

Hardware	Specification
Printer	Print the documentation results and reports
Processor	Intel® Celeron® CPU B815 @ 1.60 GHz 1.60 GHz
Type of System	64-bit Operating system
Pendrive	Medium for storing data or information.

2.6.3 Project Schedule and Milestones

This project has to be done within one semester which is consisting of 14 weeks. To ensure that the project runs smoothly, everything that has been planned from early must be followed starting from analysis process until the maintenance process.

Table 2.3: Milestone of the project

Activity	Start Date	Finish Date
Proposal Submission	12/12/2015	12/31/2015
Proposal Correction	12/30/2015	12/31/2015
Analysis	2/22/2016	3/2/2016
Accumulate requirement	2/22/2016	2/24/2016
Analyze project objectives	2/25/2016	2/27/2016
Select target platform	2/28/2016	3/2/2016
Design	3/3/2016	3/22/2016
Design project architecture	3/3/2016	3/5/2016
Design project content	3/6/2016	3/15/2016
Design graphic	3/6/2016	3/22/2016

Development	3/23/2016	4/11/2016
Configuration of project tools	3/23/2016	4/11/2016
Evaluating & testing	4/24/2016	5/4/2016
Test the application	4/24/2016	4/27/2016
Refine the application	5/1/2016	5/4/2016
Project demo & PSM report	4/4/2016	5/27/2016
Final presentation	30/5/2016	6/3/2016
Project Submission	6/6/2016	6/10/2016

2.7 Conclusion

The literature review is important as well as helping us to write a good report because it make us more understanding for such work especially doing a project in certain period. It also will remind us that you're on-track. In general terms, the literature review helps to provide a context for the research, justify the research, ensure the research hasn't been done, enable the researcher to learn from previous thesis and etc. By doing the literature review, it will help researcher to avoid duplication, identify the gaps in other studies and many more. The next chapter will be discussing about the analysis made before developing the content development.

CHAPTER III

ANALYSIS

3.1 Introduction

This chapter will explain and discuss about how the process applied. This chapter also one of the important things that need to be highlight in developing product. The requirement analysis more focus on the requirements of the project such as user requirements and system requirements. Problem analysis also important in this topic which will discuss the findings and facts of the project. This can be carried out through the observing existing and current system scenario or situation nowadays. The purpose of having this phase is because to make it clearly for developer to understand the situation and decide which function should do and how to perform the function smoothly. Besides that, these activities give us better information and more understanding to complete the development of the product.

3.2 Current Scenario Analysis

This part will list out and describe the current situation and possible outcomes

by study and comparing the existed system. By doing observation, it will help us to generate idea that might affect the outcome of the project. When the data has been assembled, the most and useful information will be integrated into the new proposed project. At once, we also can identify the weaknesses and provide the way to overcome those problem. The quality of project also will increase at the same time. However, there is still no keen completion among people in Malaysia.

3.3 Requirement Analysis

Requirement analysis is the process of determining user expectations for a new or modified product. This process is very important because to ensure that the project objectives are achieved. Moreover, users consists various ages. Therefore, developer must ensure that the needs of users in line with the product to be produced. Besides that, it also help us to understand the lack of need in the project. The requirements analysis should be documented, measurable, testable, traceable, and more to make it clearly and easy to understand.

3.3.1 Learning Analysis

3.3.1.1 Need Analysis

Need analysis is the process of identifying and evaluating needs in a community or people in certain scenario. It also help us to collect as much information as possible in order to build comprehensive understanding of the needs and issues.

3.3.1.2 User Analysis

The most important thing in user analysis phase are deciding the multimedia elements that need and must avoid in this gameplay because it must appropriate with their age which is still in primary school. In this phase, developer must know the characteristics of their users which will influence the development of gameplay.

So, we can provide an interactive way to attract the youngest user to play the game and they do not stop learning the basic Jawi only. Parents nowadays also not focus of their children understanding towards Jawi instead focus on academic results only. The information inserted also very simple and suitable with their age and hopefully the game is effective by using all the multimedia elements.

3.3.1.3 Technical Analysis

The development platform of a digital game is frequently defined before any game design document. The main objectives of technical analysis are to find out the cost, efforts and implication for the content development. The reasons of this game is to ease user to play the game on their own at anywhere and also can be use by parents or teacher to teach their kids. This game can be play by using PCs or personal laptop. The interactive elements involve are audio, animation and image to avoid user feeling bored during play the game. The languages used are C# and Unity as a platform to develop the game.

3.3.1.4 Resource Analysis

The content of this gameplay will provide three levels and the user must







Figure 3.3: Unity 5

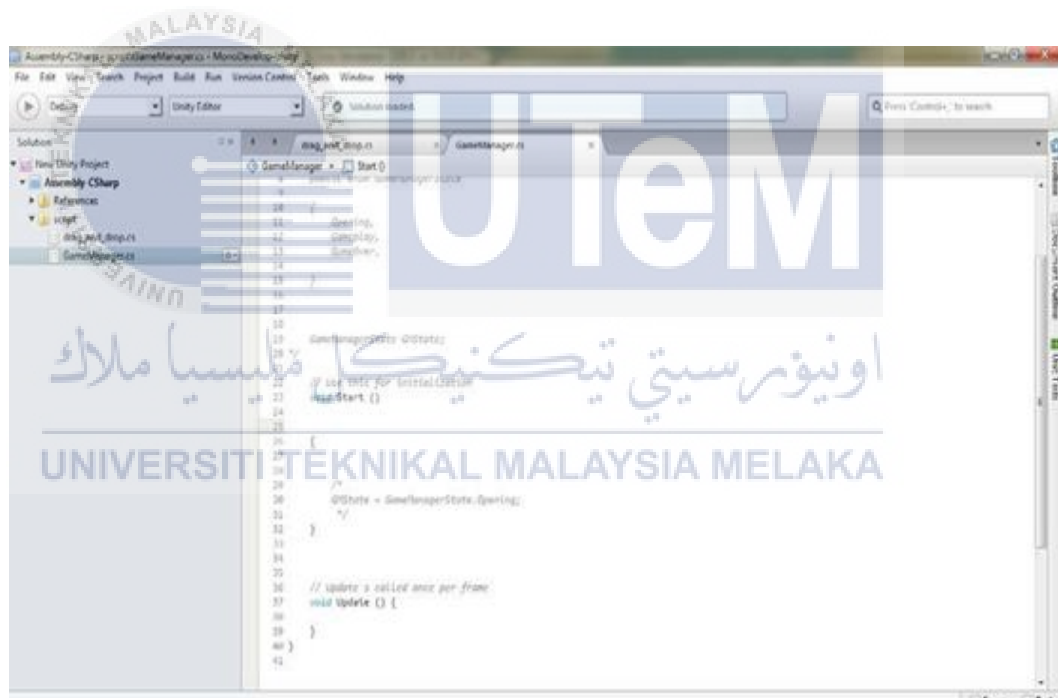


Figure 3.4: Mono Develop Unity

3.5 Conclusion

Through this chapter, all information has been detailed including the user requirements until the software requirements. In this way, it can help to fixing and improve the weaknesses to produce a better product. Besides that, software requirement are played as an important role because it is the main requirement to develop a quality game. A good analysis phase will help to produce better product than the existing product. In this chapter, it also defines how these requirements will be accomplished. Later, , in the next chapter will explain about the design of this project such as user interface design and system architecture.



CHAPTER IV

DESIGN

4.1 Introduction

This chapter describe more about the design phase and the information requirement was gathered from the previous chapter. Each project requires design phase even if the project was small and the requirements were simple, there is still a mental design process that occurs in between understanding the requirements and starting to construct. Design is defined as a process developing a plan for a new product. All the process will include the architectures and interfaces of the product.

4.2 Design Architecture

System architecture was identified and design in this phase. A system architecture is the conceptual model that defines the structure, behavior, and more views of a system. It is representation of a system, organized in a way that supports reasoning about the structures. Design architecture also showed the basic flow for gameplay and how it will work after complete. Once completed, the entire learning

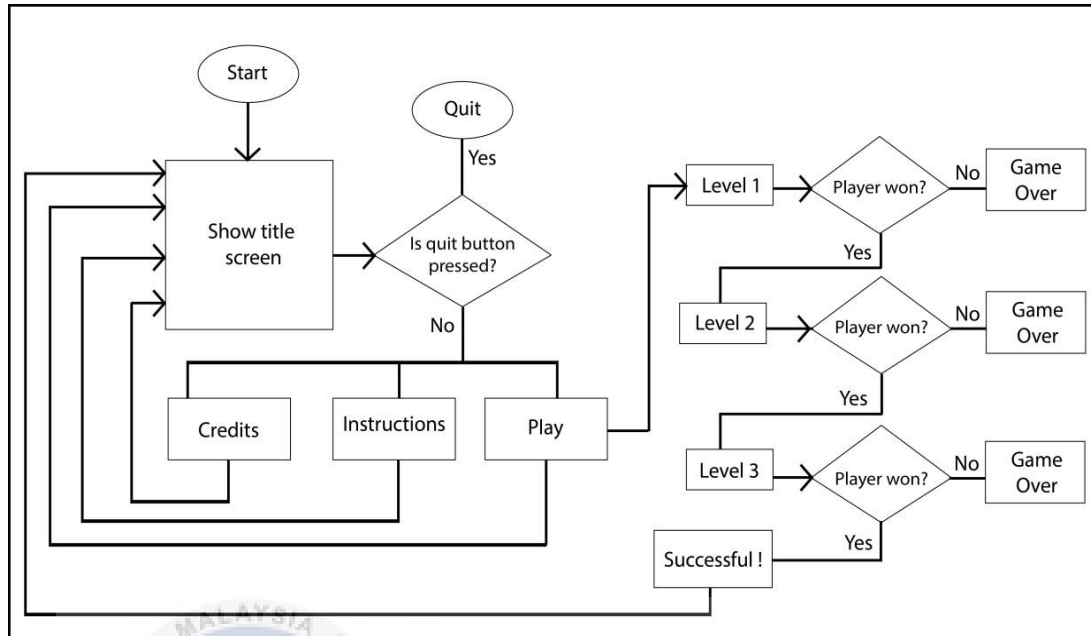


Figure 4.1: Flowchart of system

4.3 Preliminary Design

Preliminary design is a stage where general design concept were determined. It is also known as conceptual design which during this stage, the higher level design concept will be implemented. This process is conducted to achieve confidence that the design fulfill the functional and non-functional requirements. In this project development, the preliminary design is stated into few parts which is core content, concept design, color design and storyboard.

4.3.1 Concept Design

The main reason of this project is to create an interactive gameplay that can

attract and ease user to improve learning skills in Jawi Proficiency Through Gameplay. After making comparison and evaluation among the existing systems, the Unity is chosen as a best tool and platform to use in this project development because it is a simple tool that can help developer to create an interactive gameplay.

The first step made to carried out is find the best concept design by doing drafting on paper and sketching. Before developing the game, draft a work breakdown structure to list out the important details needed by this game. Every information must be details such as list of button that must use, type of animation and many more.

After this step, the next process is make several sketches and lastly decide the best idea and design to be use because to get the best idea, doing one sketch is not enough. After completed all the sketches, create the design and produce the real or final graphic by using Adobe Illustrator CS6 before executing into the Unity. Diagram below show the example of rough work breakdown structure.

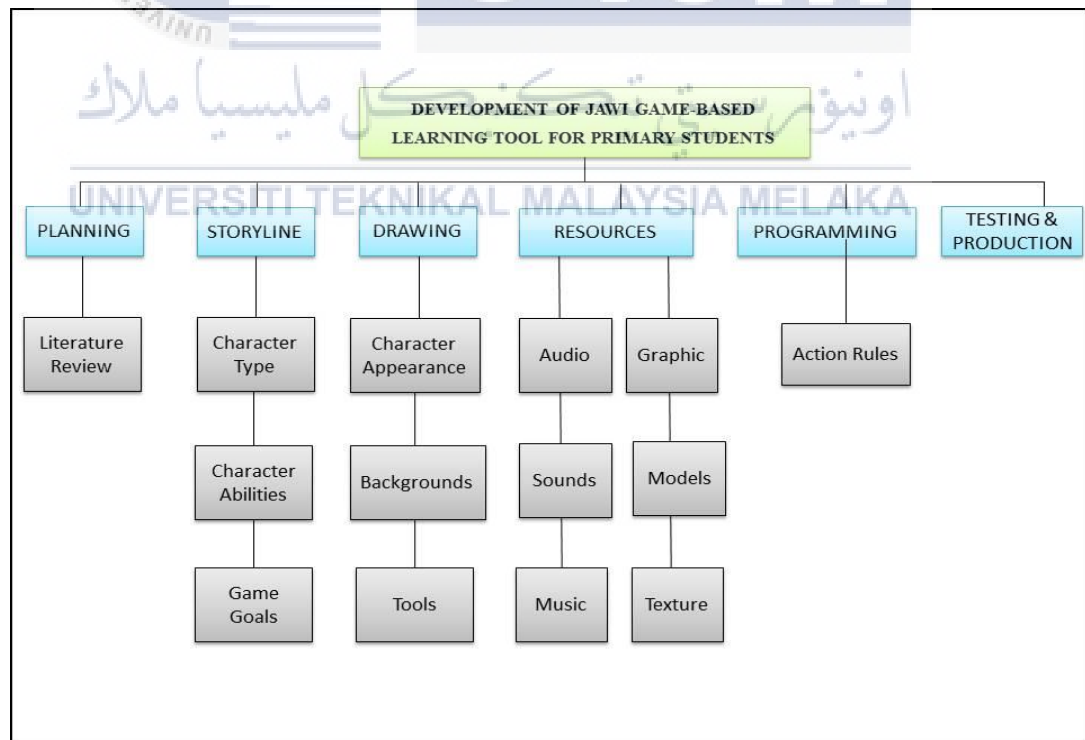
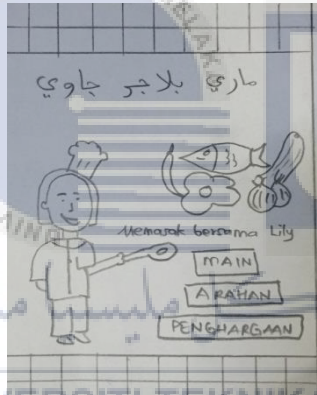



Figure 4.2: Work breakdown structure

4.3.2 Storyboard Design

Storyboard is a great way to visually represent an experience or an interaction among people or people and objects. By creating a storyboard, the experience or interaction can be break down into all of its more specific components over time, which allows us to analyze more closely. During this development, the storyboard design is sketched on paper before implementing into Adobe Illustrator and Unity. Images below show the sketch and the final design that have been select .

Table 4.1 : Storyboard explanations

Image	Explanation
	<p>This is the interface in sketch form how the start page of the game will be. It consists of three buttons which are play, instruction and credit. The animation in this page is the character of chef.</p>
	<p>Before starting the game, a map will appear on the screen to show where you are. It consists of three level.</p>



4.3.3 Color Design

The images, text, and animation used in this game are colorful. User easily attracted to vibrant color rather than dull color especially kids. They also attracted when the character of the game is cute. Besides that, the color design part is an important part in this content development. User will have some fun when surrounded with colorful images and text and will be more engaged in their learning process.

The text color used in this game is colorful because kids love colorful things rather than using only one color. The main color for background in this game is white because it can be customized with various colors. Besides that, the white color also looks simple and neat when combined with images and text in one page. Understanding color psychology will help to make the best choice of colors in the creation of a better game development to capture the attention of your user.

4.3.4 Interface layout

Starting from the first page, it will use the same design and same character to make user easily recognize while using this gameplay but how the image will arranged are slightly different.

4.3.5 Media Creation and Integration

The graphics were edited in Adobe Illustrator and Adobe Photoshop while the audio were downloaded from Internet and some are recorded using phone. The sound effect and background music were downloaded at www.soundjay.com.

Without using audio and sound effects, a gameplay will not be interesting. While audio has always been a major component in game design.

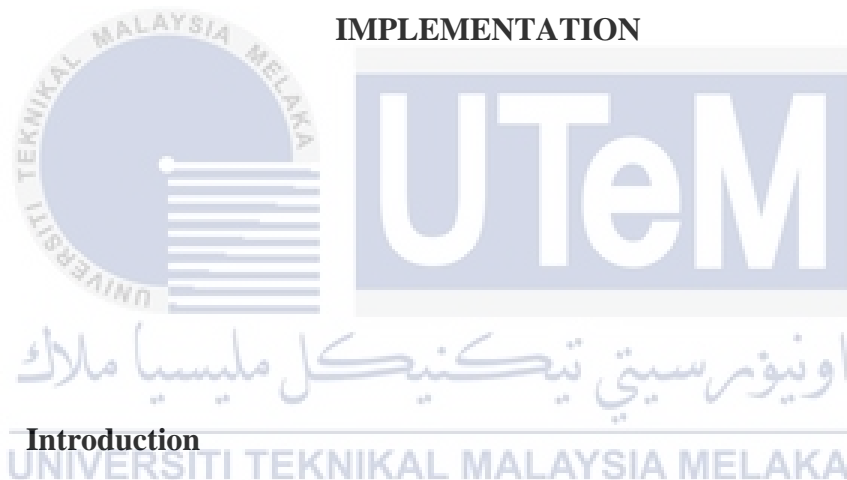
4.4 Summary

This chapter allowed developer to explore and explain more details in innovative ways of delivering the content for making user more understand. System architecture was defined to understand the way of system works.

Flowchart and work breakdown structure also built to recognize flow of this system. Storyboard was done to illustrate project design and the outcome in sketching form as a sample of interface design. Design phase is beneficial and this phase make easy for the implement phase because all the design already created and ready for implement.

In the next chapter, the implementation phase will be explained. This phase will have more detailed information about how the product and what are problems that occurred during the development phase.

CHAPTER V



5.1 Introduction

This chapter will explain about the process for developing this project. During this phase, the design is being modified in order to meet specialized needs and to achieve the objectives. In this chapter, it covers the process that involved in getting the project operating to run smoothly in the environment, also installation, configuration, and many more. This project also included all of the basic multimedia element and describe about Media Creation, Media Integration, Product Configuration Management and Implementation Status. All this phase was done according to the flow. This phase should be carried out more carefully to make sure it is compatible according to our target user.

5.2 Media Creation

Media creation phase include the multimedia elements such as text, graphic, audio, video and animation. These multimedia elements were used to give user appealing environments when using the last product. Any treatment and process that the elements needed to undergo must be done precisely and clearly. All of these elements then put together to produce the final product.

5.2.1 Production of Text

During the development of this game, various type of text was tried to be used to make the last product became attractive. Since the target user is consist of children among primary schools, the text that being applied must meet the characteristics of their interest. Production of text is one of the elements that play an important role according to ages.

To make this game look interesting, the font used must be consistent but colorful because toddlers are easily get bored. The font that being chosen was Maiandra GD which look more suitable in this game. Besides that, it also combine with Jawi scripting so that user know this game must be related to Jawi. However, each of scene in this game used different size of fonts among 16 to 80pt according to suitability. The Jawi scripting and font was drawn using Ai.

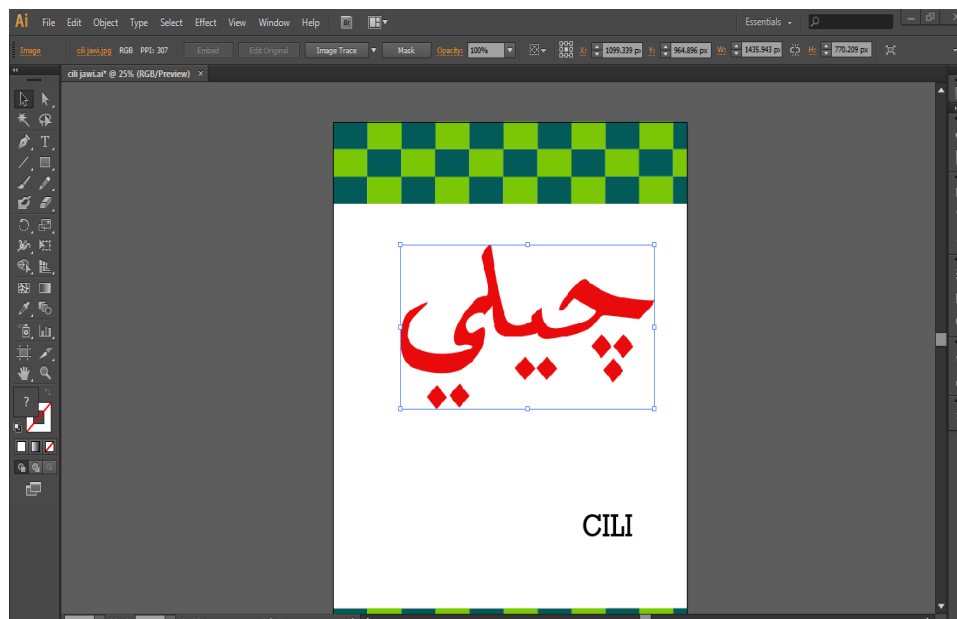


Figure 5.1: Drawn Jawi scripting using Adobe Illustrator (Ai)

5.2.2 Production of Graphic

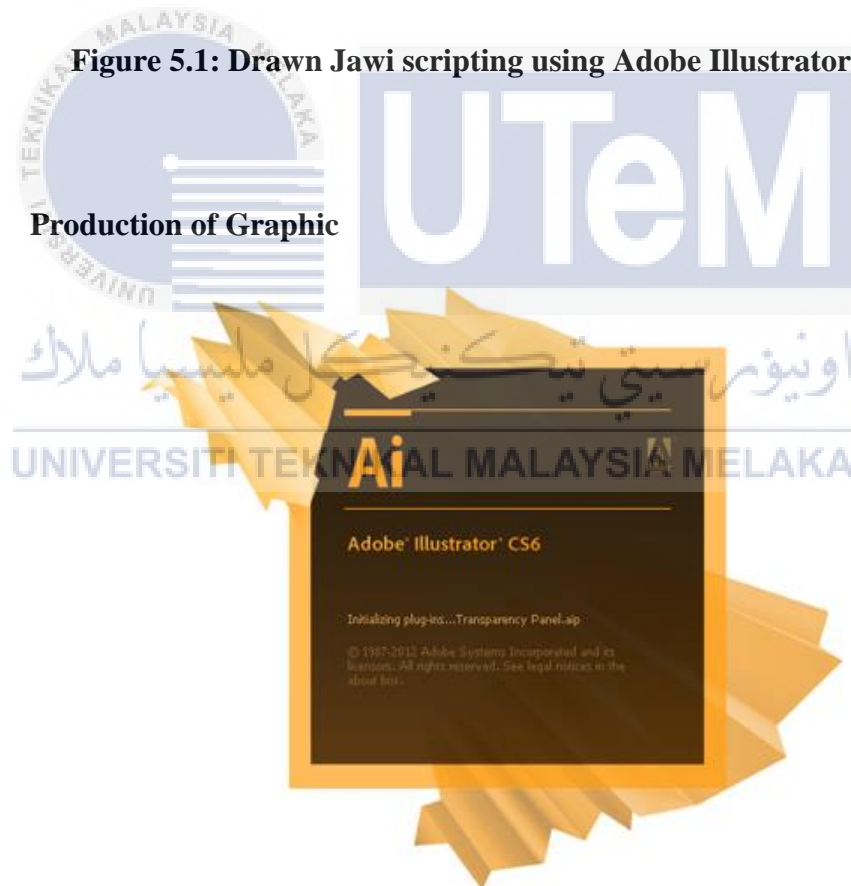


Figure 5.2: Adobe Illustrator

The use of graphics is very important especially in work that involves multimedia elements. Game also can't be separated from the of graphics. It is important to make the game more attractive and understandable. Early stage during this production is taking the original photos form the Internet or developer's collection. Then, edit the original photos using Adobe Photoshop and Adobe Illustrator.

During this stage, the color and graphic style can be change according to the suitability in this game. Next step is the graphic was saved as .png file format and .jpeg format to easily import in Unity5. Lastly, the graphics were applied into the game using Unity5. In this project, the main characters, background, and every single tools in this game are designed and drawn by using Adobe Illustrator CS6. The image below showed the designed that used in Adobe Illustrator.

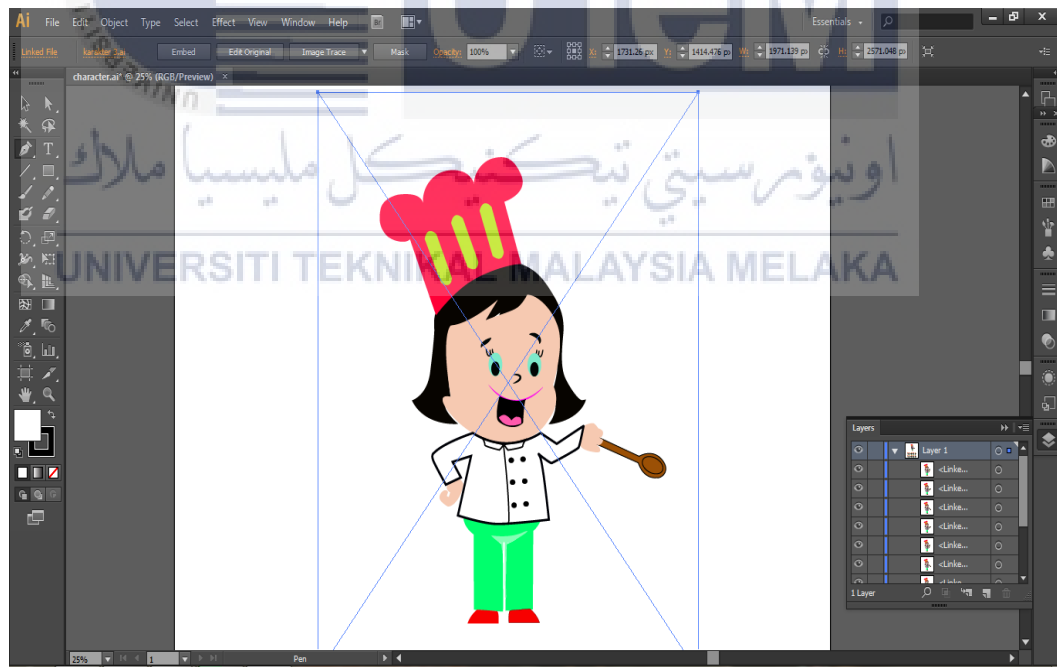


Figure 5.3: Main character design using Adobe Illustrator

5.2.3 Production of Animation

An animation also play as an important role in this project because if all elements is just static image, the game will look quite boring. This game should be fun because the user is among children and their expectation about this game probably high. The animation parts that are used in this game are produced using two software which are Adobe Illustrator to draw the graphic and Unity to animate the graphics. The features inside the Unity is very helpful because it can animate a graphic. The figures below showed the steps during animate the graphic.

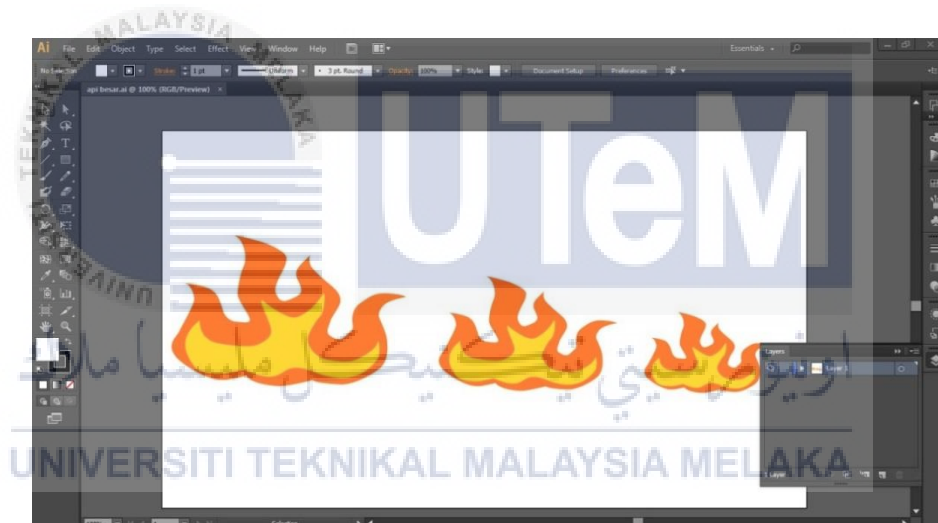


Figure 5.4: Drawn the fire using Adobe Illustrator

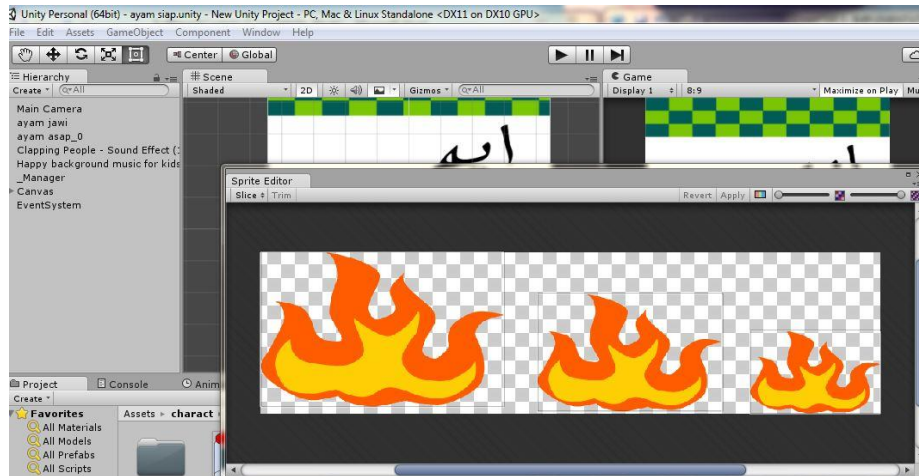
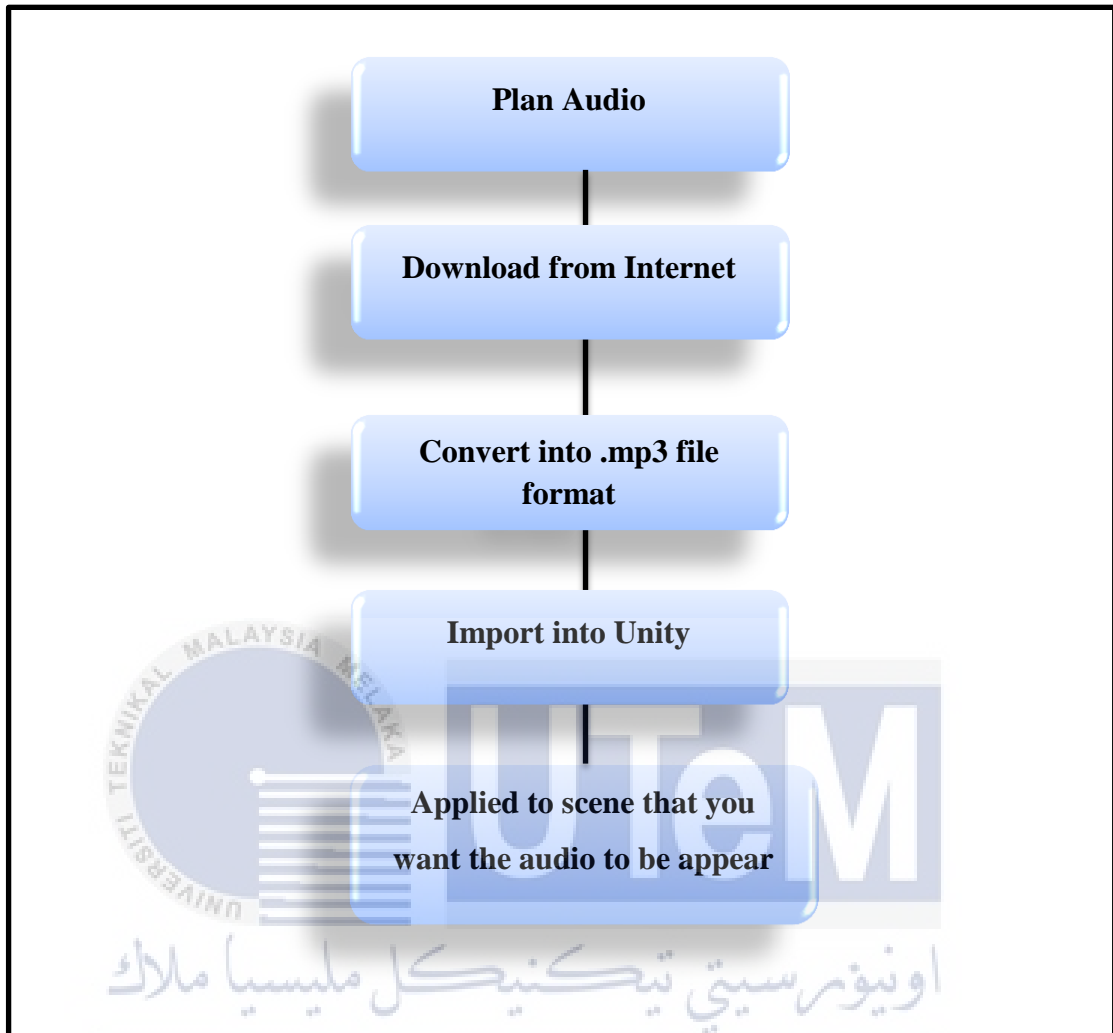


Figure 5.5 : Animate the fire using sprite in Unity

5.2.4 Production of Audio

Audio also included in this project as a background music because it is also important element that should be used in any game development. All the audio that used in this game were downloaded from Internet and were saved as .mp3 file format. Music background was used in this games to make the user realized that something is happening and also as a spirit for them during playing the game. Music can change someone's mood while playing but must be appropriate according to the genre of game and who is the target user. Any game is not complete without sound because it would look very bored from user's view.



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Figure 5.6: Process flow in production of Audio

5.3 Media Integration

The integration of module is made in several software such as for drawn graphics using Adobe Illustrator and the entire multimedia elements will be import in Unity to be its content. The integration process is done in Unity. The language that used during developing this game is C# coding. The movement for the game are done manually by typing the code in MonoDevelop (built-in). Then, the script will be saved as .cs. The file format for final product is .exe. Figure 5.6 below shows external tools for script editor.

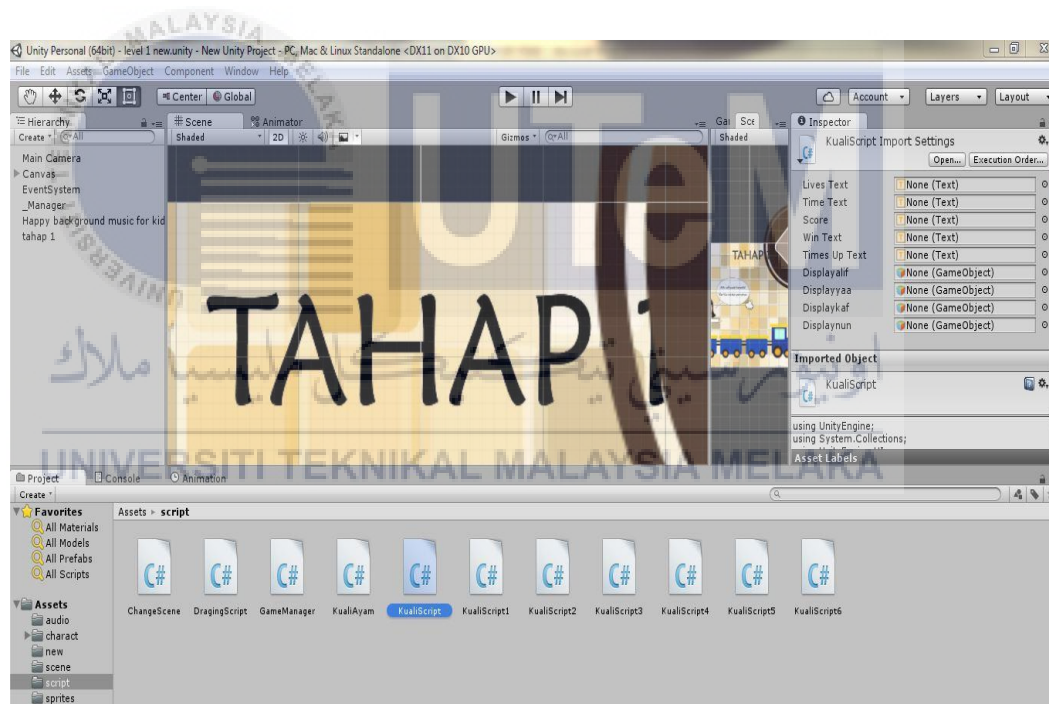


Figure 5.7: Interface in Unity

Figure 5.7 above shows the interface during using Unity. It have hierarchy to show the main camera or the canvas to ease user to use it. It also have assets below that can create folder inside it. User can import any document from desktop and put it in the assets.







Figure 5.10: Process flow in integration

5.4 Product Configuration Management

Unity is a cross-platform to develop a game whether 2D or 3D. Unity's integrated services that can speed up the development process, optimize game, connect with an audience and achieve success also. This phase is a process where the configuration needed to be done to the product to achieve desired outcome.

5.5 Conclusion

This chapter already explained in details the most important things done during the implementation phase while developing a 2D game. This phase very important because it explain about how the process involve when developing the 2D game using Unity5. The next chapter will explain more about the testing phase of the end product.

CHAPTER VI



6.1 Introduction

This chapter will discuss about testing part to discover the bugs and errors which can cause the malfunction of the application. Thus, the result from the testing is evaluated. The purpose of testing is to help the developer to understand how the system works and to ensure the final product meets all the requirements and fulfill the project objective.

Testing process can improve planning and design because it helps the developer to identify the flaws. Besides that, the target user during the testing phase also give

some comment about the system which very helpful to developer. All the result will be compiled and analyses in this chapter to see whether it achieved the target or not.

6.2 Test Plan

Test plan is very important to set up the testing phase in the early stage and to ensure that the testing process runs smoothly. This project will be tested by using alpha testing. This process consists of test organization, test environment and test schedule. In game development, it is necessary to ensure that all of the main parts of the game are tested and checked.

6.2.1 Test User

Alpha testing of this project is conducted with 12 course mates who have knowledge of IT field which can help to find out the flaws and the error of the project. The testers need to launch and use the game according to test the application. The scale will be given for each module.

For the alpha testing, 12 user expert are chosen to test the game. Scale will also be given from these tester based on their performance when playing the game. Those tester who have been selected are chosen from BITM student. The table below describe about the test user in this project.

Table 6.1: Test Organization

Criteria	Alpha Testing
Testing	Functionality testing
Profession	BITM students
Description	To test the functionality of the game which is the interface design, navigation and interactivity, content and its functionality.
Age	20 and above years old
Number of participants	10

6.2.2 Test Environment

Test environment describe the location and environment where the testing was conducted. It also a setup of software and hardware on which the developer is going to perform the testing for the final product. The testing environment should be feasible and safe for the testing to carry out. During the testing, developer must observe the reaction and body language from the respondent while playing the game whether the respondent interested or not with the game. Table below detailed out the test environment.

Table 6.2: Test environment

Criteria	Alpha Testing
Testing	Functionality testing
Profession	BITM students
Location	UTeM, Melaka
Environment	FTMK lab with sufficient lighting and internet connection.
Software	Unity 5.3.3f1 (64-bit)
Hardware	Laptop

When conducting the testing, a digital camera is used to record the important activities during the testing. Figure below shows the environment layout to conduct the testing.

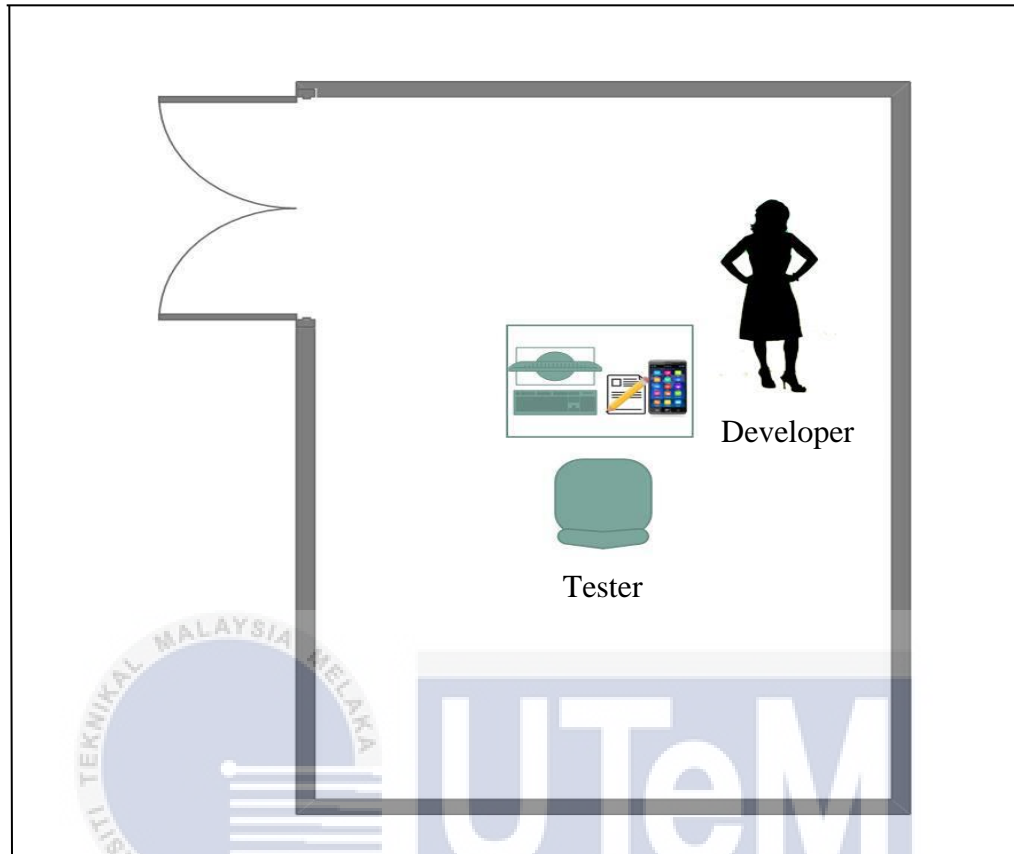


Figure 6.1: Layout when conduct testing

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6.2.3 Test Schedule

Test schedule is a guideline for the testing and evaluation phase to make sure the testing process is running smoothly according to plan. The aim is to control and manage the timing and duration of the testing. Table below shows the test schedule of this project.

Table 6.3: Test Schedule for alpha version

Criteria	Alpha Testing
Testing	Functionality testing
Profession	BITM students
Total of participants	10
Date	25 July 2016
Duration per session (minute)	15 minutes
Number of participants / session	1 person/session
Overall duration	15 minutes

6.3 Test Strategy

Test strategy is how the testing process approached done in the project development cycle. The testing strategy used in the project is black-box testing. Black-box testing is used in alpha testing which is a method where the internal structures of the system are not known to the tester. The user expert helps to discover the requirements that may have been left out by developer.

The tester will provide with a questionnaire. The strategy for evaluating multimedia products is to allow respondents to test and trial the game to the final release. Sometimes the developer does not realize the weakness in project but the end user testing often exposes problems or issues. This is because their understanding is different from the developers. For each testing, there will be scales given to each part of testing. The rates are given based on the table below:

Table 6.4: Rates for questionnaires

Description	Rates
Very disagree	1
Disagree	2
Not sure	3
Agree	4
Very Agree	5

6.4 Test Implementation

Test implementations contain a text description of how the test is complete and the test data, the collections of data obtained from the test result. Besides that, the suitable questions will be created and the testing strategy can identify the contents of the module is interesting or is too complicated to user understand.

6.4.1 Test Description

Testing process will be carried out using a laptop that used by tester to test the final product. Development of Jawi Game-based Learning Tool for Primary Schools Student can be open using any type of laptop. For the first step, the tester must play the game. Then, the tester must answer the Part A, Part B and Part C in questionnaire provided. The questionnaire cover about the learnability, usability, and user interface design.

6.5 Test Results and Analysis

In this section, all the graph analysis from the questionnaire testing that has been conducted is presented. Test result and analysis overview the outcome of the evaluation testing that have been made. The outcome can be concludes either the game is accepted and preferred by those tester or not.

6.5.1 Question Analysis

The questions have three parts which are about the visual clarity, navigation and functionality. The questions are divided into three parts so that the tester can differentiate the questions based on the categories. Besides that, they can answer with greater clarity. The aim for visual clarity part is to obtain the answer from the tester

about the game interface. The navigation and interactivity part is to achieve whether the tester can use the button properly within durable time or not. The last part which is functionality and content is to test the performance of the game.

6.5.1.1 Questionnaire for Alpha Testing

No.	Aspect / Module	1	2	3	4	5
PART A : VISUAL CLARITY						
1.	Neat and tidy layout.					
2.	Legibility of wording.					
3.	The validity of color used.					
4.	The graphic metaphors represent correct relation.					
PART B: NAVIGATION AND INTERACTIVITY						
1.	Simple and correct navigation.					
2.	Button response within durable time.					
3.	Button return anticipated response.					
PART C: FUNCTIONALITY AND CONTENT						
1.	The performance of the game is within the durable time.					
2.	The content of this game is easy to understood.					
3.	The game provides no inconsistencies when use it.					
4.	The instruction in how to play is clear.					
5.	The game can instruct the children to improve their knowledge in Jawi.					

6.5.1.2 Functional Testing

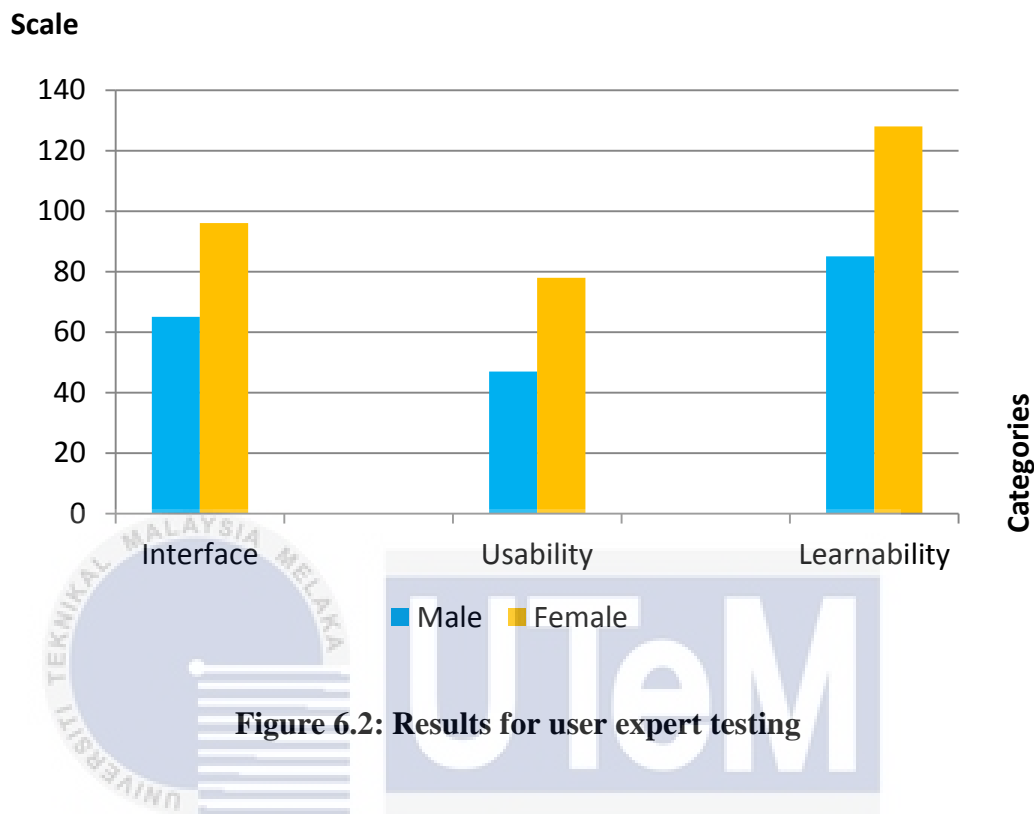


Figure 6.2: Results for user expert testing

Figure above shows the category that related to game application which are user interface design, usability and learnability. Part A is about the visual clarity which is under interface category. Part B is about navigation and interactivity which is ask the user about the usability of the game application while Part C is about functionality and content which question about the learnability.

Among the three categories, learnability is the highest scale which achieve the results 80 and above. It shows that user agreed with the performance of the game is within the durable time. Besides that, the user can easily understand about the content of this game. Most of the user agreed that the game can instruct the children to improve their knowledge in Jawi through this game application.

However, the lowest category is usability which is question about the navigation and interactivity. It shows that there is a lack of response between user and the application. For example, the button does not response within durable time or the

button does not return anticipated. Meanwhile, the results for interface is modest. Most of the user agreed that the visual clarity for the game is neat and have tidy layout. Besides that, there is no problem with the legibility of wording, the validity of color used and the graphic metaphors represent correct relation.

6.6 Conclusion

This chapter describe all the testing part and all the testing analysis that has been done. After all the testing completed, it is proved that the educational game can attract student to learn more about Jawi language compared to the conventional methods that used nowadays.

This testing phase is very good for developer to identify the weakness and strength of the product. However, the testing and improvement process still need to be done in the future even though the project is successfully reach and meets the requirements. This is to ensure the functionality and quality of the product.

CHAPTER VII

CONCLUSION

7.1 Introduction

In this section, we will discuss about the result of the test and everything that we have done so far. This chapter also summarize all the weaknesses and strengths of the product that has been developed for the target users, the feedback from the experience of users in using and testing the product, and the further contribution of the product towards the community.

7.2 Observation on Weaknesses and Strength

Upon completion of the analysis and testing phase, there are also some advantages and disadvantages of this product. Development of Jawi Game-based Learning Tool for Primary Schools Students has been developed for Projek Sarjana

Muda I and II. Observation on the project was done to detect the game strengths and weaknesses based on analysis and testing process.

7.2.1 Product Advantages

The main strengths of this project is the interactive elements especially the user must drag the right jar that contain Jawi alphabets into the pan where the user can experience on dragging the jar like cooking in the real world but at the same time the users know how to spell the right Jawi alphabet. Then, the user able to know is the jars are the right matches or not. The game differ from other game because the game is not only can give the users experience in cooking but in this game its included the interactivity elements where the user can enjoy to cook while gain the knowledge about Jawi. Furthermore, using the animation and interesting images will also help to make the game more fun and able to catch attention from the student.

7.2.2 Product Disadvantages

Some weakness of this product is the score element which does not collect the score from the earlier stage until the last stage. Its only collects the current score for each stage. This will decrease the student motivation to continue playing the game. Besides that, there are no audio provided from the character but the developer still provide the background music to make the game fun and enjoyable. The language used is only in Malay and Jawi. Therefore, the game only suitable and understandable by people that knows Malay words and have some basic in Jawi. Nevertheless, the game still can play very well for those who are willing to improve Jawi.

7.3 Propositions for Improvement

Development of Jawi Game-based Learning Tool for Primary Schools Students has accomplished the objective of the project. However, there still has space for improvements to make this game more better. Improvement that can be done is change the game to 3D model which look more realistic. Modeling a 3D model animation require a lots of times and skills. But, if the 3D animation successfully created, the animation will give a greater impact to the users of the game.

The score elements also can be improved and be more details, such as if the user achieve certain score the user will get some rewards or some trophy. More research need to be conduct to make the game more fun and realistic. In addition, hope this game can be improved in terms of graphic, interface, gameplay and audio.

7.4 Project Contribution

With this game, users can learn and improve their Jawi skills without looking at the textbook of Pendidikan Islam or any others notes. Thus, this game can help users better to understand about Jawi spelling because the concept that was presented is very simple and easy for users to understand. Game can be used as quick reference and can be learn about Jawi anywhere. Hopefully with the interactivity elements, this game is able to attract Y-Gen to learn and know more about Jawi. Then, practice the knowledge in this generation daily life.

7.5 Conclusion

Development of Jawi Game-based Learning Tool for Primary Schools Students has meets the objective of the project. Wrapping up, there were more advantages than disadvantages in this project. Although this project has some flaws, but the little improvement can be done to this product. Students also will enjoy the time to learn Jawi rather than reading a book. Besides that, users will easy to understand the concept of this game. The game can be used to attract student who wants to learn more about Jawi or does not have any interest to learn Jawi before. The feature in this game which is cooking and learning at the same time makes this game unique and different from the other games.



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LIST OF APPENDICES

APPENDIX	TITLE
A	TESTING SESSION
B	QUESTIONNAIRE
C	GANT CHART

APPENDIX A

TESTING SESSION



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APPENDIX B

No.	Aspect / Module	1	2	3	4	5
PART A : VISUAL CLARITY						
1.	Neat and tidy layout.					
2.	Legibility of wording.					
3.	The validity of color used.					
4.	The graphic metaphors represent correct relation.					
PART B: NAVIGATION AND INTERACTIVITY						
1.	Simple and correct navigation.					
2.	Button response within durable time.					
3.	Button return anticipated response.					
PART C: FUNCTIONALITY AND CONTENT						
1.	The performance of the game is within the durable time.					
2.	The content of this game is easy to understood.					
3.	The game provides no inconsistencies when use it.					
4.	The instruction in how to play is clear.					
5.	The game can instruct the children to improve their knowledge in Jawi.					

APPENDIX C

GANT CHART

