# A 2D MOBILE GAME TO LEARN ALPHABETS FOR CHILDREN AGED 5 TO 7

**NUR SYAZWANI BINTI SUKORMO**



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**BORANG PENGESAHAN STATUS TESIS***

JUDUL: A 2D MOBILE GAME TO LEARN ALPHABETS FOR CHILDREN AGED 5 TO 7.

SESI PENGAJIAN: 2015/2016

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Alamat tetap: NO 335 KM 6 KG.JAWA Pn. Tarisa Makina Kintakaningrum

26820 KUALA ROMPIN, PAHANG

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# A 2D MOBILE GAME TO LEARN ALPHABETS FOR CHILDREN AGED 5 TO 7

**NUR SYAZWANI BINTI SUKORMO**



**This report is submitted in partial fulfillment of the requirement for the Bachelor of Information Technology (Game Technology) With Honours**



**FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY**

**UNIVERSITI TEKNIKAL MALAYSIA MELKA**

**2016**

# DECLARATION

I hereby declare that this project report entitled

**A 2D MOBILE GAME TO LEARN ALPHABETS FOR CHILDREN AGED 5 TO 7**

is written by me and is my own effort and that no part has been plagiarized without citations.



STUDENT : _____ Date: 20 August 2016

(NUR SYAZWANI BINTI SUKORMO)

I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of Information Technology (Game Technology) With Honours.

SUPERVISOR : _____ Date: 22 August 2016

(PN.TARISA MAKINA KINTAKANINGRUM)

# DEDICATION

My humble effort I dedicate to my sweet and loving

Father and Mother,

Whose affection, love, encouragement and prays of day and night make me able to get such success and honor,

Along with all hard working and respected

Supervisor

## ACKNOWLEDGEMENT

I would like to gratefully acknowledgement the enthusiastic supervision of Mrs. Tarisa Makina Kintakaningrum during this Final Year Project. Her patience in giving comments, suggestion, and advices are really useful and it supported me. It was a pleasure working with her. I would like to express my gratitude to all my friends from Faculty of Information Technology, Universiti Teknikal Malaysia Melaka who put their faith in me and urged me to do better.

# ABSTRACT

This project is an education game for the android platform to help children in learning process. The objective for this game is to investigate a mobile learning game element appropriate for children aged 5 - 7 to learn alphabet. Second, to design and develop a Finger Touch game as an educational game to learn alphabet using Unity2D and C# Programming Language and third to evaluate player's effectiveness to recognize and know alphabet upon playing the game.

Besides, the purpose of this game is to help children recognize and learn to pronounce the alphabets correctly because recognize alphabets are important for children reading skills.

# ABSTRAK

Projek ini adalah satu permainan pendidikan untuk android platform bagi membantu kanak-kanak dalam proses pembelajaran. Objektif permainan ini adalah untuk mengkaji unsur pembelajaran permainan mudah alih yang sesuai untuk kanak-kanak berumur 5-7 untuk belajar abjad. Kedua, untuk membangunkan dan reka bentuk permainan Finger Touch sebagai permainan pendidikan untuk belajar abjad menggunakan Unity2D dan bahasa C# Programming dan ketiga untuk menilai keberkesanan pemain untuk mengenali dan tahu abjad apabila bermain permainan.

Selain itu, tujuan permain ini adalah untuk membantu kanak-kanak mengenal dan belajar sebuatan abjad dengan betul kerana mengenali abjad sangat penting untuk kanak-kanak dalam kemahiran membaca.

# LIST OF ABBREVIATIONS

| | | |
|---|---|---|
| 2D | - | 2 Dimension |
| .APK | - | Android Application Package |
| GDLC | - | Game Development Life Cycle |
| HUD | - | Head Up Display |
| JDK | - | Java Development Kit |
| JPEG | - | Joint Photographic Experts Group |
| MM3 | - | Lab Multimedia 3 |
| PC | - | Personal Computer |
| PNG | - | Portable Network Graphic |
| SDK | - | Software Development Kit |
| VR | - | Virtual Reality |

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# CHAPTER I

# INTRODUCTION

## 1.1 Project Background

The project named Finger Touch is a serious game which is created for android platform and suitable for children aged 5 to 7 years old. Moreover, the genre of this game is the puzzle game. The purpose of this game is to help children recognize and learn to pronounce the alphabets correctly because recognize alphabets are important for children reading skills. In this game, consist of 10 levels and each level have a different word. The player must complete each level with collecting all the alphabets based on the word given. The level becomes more challenging based on the long of the word given. The player is given 30 lives to complete all levels. The lives will be deducted when player collide with the enemy (snail and caterpillar) or wrong alphabets. Besides, the score will count 2 points for the correct alphabets. If the player cannot complete all the levels with 30 lives, thus the player must restart the game from the first levels.

## 1.2 Problem Statement

Finger Touch is a game based learning. Nowadays, children are increasingly pay less attention and interest in learning. In addition, they are also slow to learn and remember new things. Therefore, Finger Touch is designed to be of interest and help children learn to recognize alphabet and how to pronounce it.

## 1.3 Objectives

i. To investigate a mobile learning game element appropriate for children aged 5 - 7 to learn alphabet.
ii. To design and develop a Finger Touch game as an educational game to learn alphabet using Unity2D and C# Programming Language.
iii. To evaluate player's effectiveness to recognize and know alphabet upon playing the game.



## 1.4 Goals and Genre

The goals for this game are more to the educational part such as the player knows to recognize and learn to pronounce the alphabets correctly. Besides, the genre of this game is the puzzle game because the player needs to complete the game based on the word given.

## 1.5 Game Features

The main target player for this game is the pre-school student but it also can be played by another user. The rules of the game are player must complete the 10 levels based on the word given. Each level has different long of the word. The player is given 30 lives. The lives will be deducted when player collide with the enemy (snail and caterpillar) or wrong alphabets. Besides, the score will count 2 points for the correct alphabets. If the player cannot complete all the levels with 30 lives, thus the player must restart the game from the first levels.

## 1.6 Conclusion

In a conclusion, 2D game-based mobile learning called Finger Touch to allow children learn to recognize and pronounce the alphabets correctly. Besides, I expected that this project will be useful to children (pre-school). The next chapter to be discusses about literature review and project methodology.

# CHAPTER II

# LITERATURE REVIEW AND PROJECT METHODOLOGY

## 2.1 Introduction

The concept and idea of this project are from the existing game. There are many of the existing game for education in a personal computer (PC) or android platform. They also have the different features, gameplay, game engine, and game mechanics when develop the game. In this chapter will review in details about the genre, existing game and comparison of existing game, and also project methodology in develop this education game for children aged five to seven.



## 2.2 Genre

Lindsay Grace (2005) has stated in her article about game genre – Puzzle Game "Games that offer puzzles as the primary attraction to games. These games are most commonly released on low budget via the web. The people who play these games tend be the oldest population of the game playing community. One of the most successful puzzle games is the famed Tetris, Lemmings and Minesweeper". Besides, (Philip Hanna, Queen's University, Belfast, Ireland) has stated the definition of the puzzle game in her

slide “Puzzle game often require the player to solve puzzle or problems and can involve the exercise of logic, memory, pattern matching, and reaction time”.

## 2.3 Serious Game

Generally, serious game designed for a primary purpose other than pure entertainment. Anne Derryberry has stated in her article (Serious Game: Online Games for Learning) that serious game are used in emergency services training, in military training in corporate education, in health care, and in many other sectors of society. Besides, serious games are designed with the intention of improving some specific aspect of learning.

## 2.4 Mobile Game Learning



Mobile game are games designed for mobile devices such as Smartphone, features phone, and tablets PCs and portable media players. (Laura Naismith, Peter Lonsdale, Giasemi Vavoula, Mike Sharples, from University of Birmingham) has stated in their article Literature Review in Mobile Technologies and Learning that “ mobile technologies are becoming more embedded, ubiquitous and networked, with enhanced capabilities for rich social interaction, context awareness and internet connectivity. The challenge will be to discover how to use mobile technologies to transform learning into a seamless part of daily life to the point where it is not recognized as learning at all”.

## 2.5 Existing Game

The existing game nowadays have a similar characteristic, which is they are composed of game based learning. For example, Match n Spell games are an android platform. In this game, the player needs to drag and drop the alphabet to match with the word given. The game engine that they are used is Adobe Flash. In addition, Alphabet Slider Puzzle game is play for personal computer (PC) platform also has the same concept and idea also same game engine which is Adobe Flash.

### 2.3.1 Comparison of Existing Game

**Table 1: Comparison of Existing Game**

| | Alphabet Slider Puzzle (Website Game) | Match n Spell |
|---|---|---|
| **Gameplay** | Alphabet Slider Puzzle is an activity for early elementary age children. Students click and drag the puzzle pieces to complete the alphabet pictures. When a picture is complete the letter is pronounced and associated with a word and picture. This activity requires audio and works well on the classroom interactive whiteboard. | This game has three different game modes that will help your child learn to spell. The game modes increase in difficulty depending on your child's age, so there is always a fun spelling game for your child of any age. |

| | | |
|---|---|---|
| **Game Features** | - Kids learn the letters of the Alphabets | - Animation of each word when your Kid correctly completes the word.<br>- Voiceovers to help your Kid to learn how to say each Letter and Word<br>- Kids learn how to pronounce the letters of the alphabet and the words |
| **Game Mechanics** | - Drag and arrange the piece of image about the word to the correct position. | - Dragging the big and colorful letters into their correct slots. |
| **Game Engine** | Adobe Flash Player | Adobe Flash Player |
| **Platform** | Website supports iOS and Android mobile devices. | Android |
| **Level Design** | This game has level based on the letter of alphabets from A to Z. | This game has three different game modes and the game modes increase in difficulty. |
| **Goals** | To improve child's memory and how to pronounce the letter of alphabets. | To help improve your child's spelling and letter recognition whilst also enjoying the fun narration and images. |

## 2.4 Project Methodology

The Finger Touch game will be developed by using Unity2D game engine and build to android platform. The game will be carried out with the touch screen and move to collect the alphabet that matches with the word given. So, the kind of project methodology that I am use is Game Development Life Cycle (GDLC) as illustrated in figure 1. Rido Ramadan and Yani Widyani(2013) has stated in their conference paper about GDLC " Game Development Life Cycle (GDLC) is a guideline which encompasses the game development process. Several GDLC have been proposed by different organization, but none of them properly address how to ensure the qualities and successfully deliver good quality games. There are four GDLCs which become the consideration in developing a new GDLC guidelines".

However, for this project I am choose one type of GDLC which is Heather Chandler's GDLC. There have three stage in game development process. Firstly, at Inception and Prioritising Stage (Pre - Production), we must identify the problem statement and analysis with make some research to collecting information and data. Next, the best idea to develop the game can forming based on the research. So, the appointment with project supervisor is made to propose the ideas.

For the second stage which is Design Stage (Production), the proposal of the game is made and sent. Besides, for the project planning phase, we design the gameplay of the game and it must be suitable for the target user. In addition, project planning followed by Gantt chart and milestone to design the gameplay and asset, game mechanic and flowboard of the game. Example of asset that need to design is the game world, user interface, character and head up diasplay (HUD). Next, find some sound effect to make the game more interesting when player playing the game. Playtesting the game will make to identify the bug and review that the objective is archive or not.

Last but not least, in Project Approval and Evaluate Stage (Post – Production) will solve the problem of the game by doing some research on the existing error and improve the gameplay and game mechanic. Next, we can play testing the game again before demo the game.

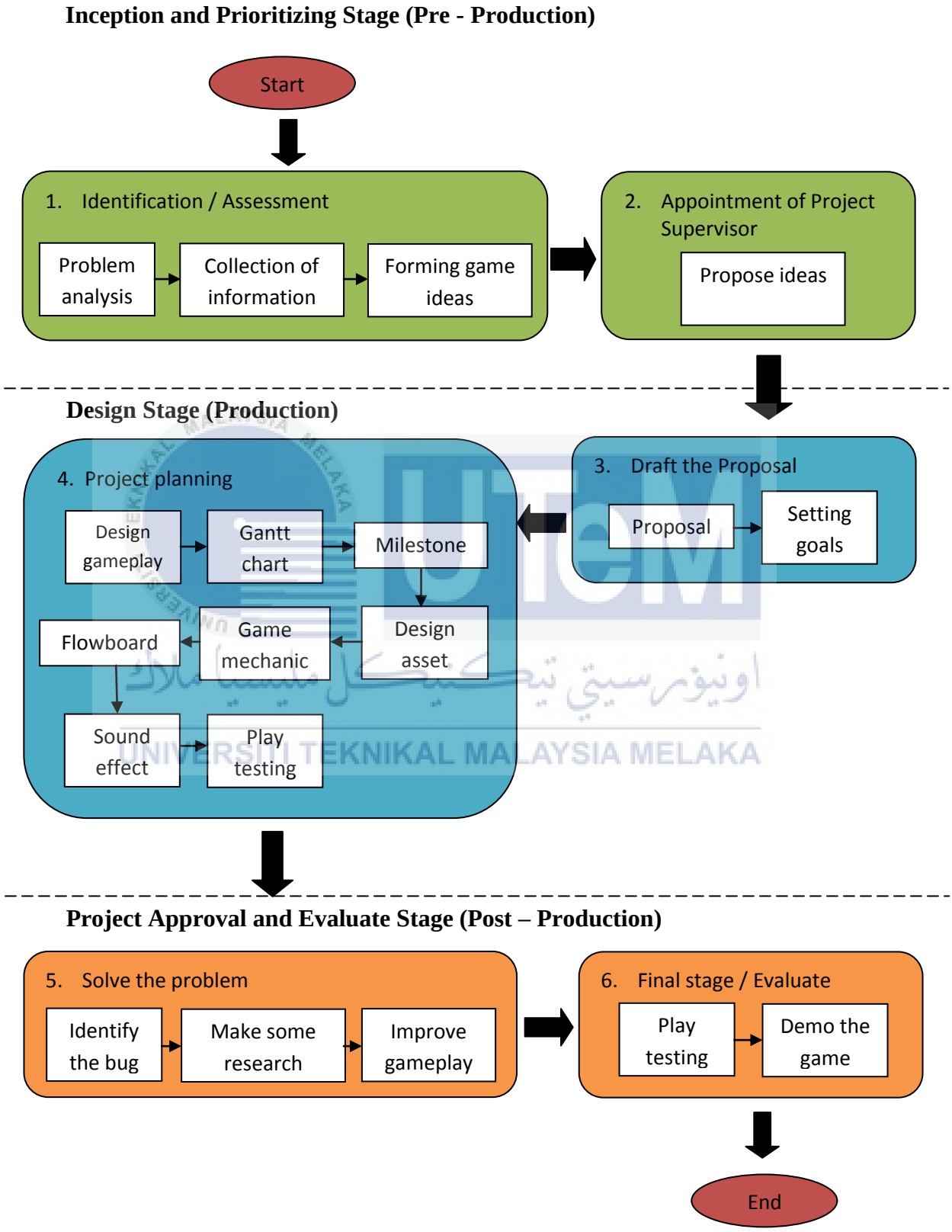



Figure 1: Heather Chandler's GDLC.

## 2.5 Conclusion

In a conclusion, there are many difference genre and platform between the existing games. Besides, we get the review what the comparison between the existing games. The methodologies that are used for this project is Heather Chandler's GDLC that have 3 stage to develop this game. For the next chapter, we will discuss the analysis or summaries in the current scenario and also the project, software and hardware requirement analysis.

# CHAPTER III

# ANALYSIS

## 3.1 Requirement Analysis

### 3.1.1 Project Requirement

Project requirement for this project consist of software and hardware requirement that support the development of this project. Besides, table 2 below shows the comparison of the Finger Touch game with the existing game.



**Table 2: Comparison of Existing Game**

| | Alphabet Slider Puzzle (Website Game) | Match n Spell | Finger Touch |
|---|---|---|---|
| **Gameplay** | Alphabet Slider Puzzle is an activity for early elementary age children. Students click and drag the puzzle | This game has three different game modes that will help your child learn to spell. The game modes increase in difficulty depending on | In this game, consist of 10 levels and each level have a different word. The player must complete each level with collecting all the |

| | | | |
|---|---|---|---|
| | pieces to complete the alphabet pictures. When a picture is complete the letter is pronounced and associated with a word and picture. This activity requires audio and works well on the classroom interactive whiteboard. | your child's age, so there is always a fun spelling game for your child of any age. | alphabets based on the word given. The level becomes more challenging based on the long of the word given. The player is given 30 lives to complete all levels. The lives will be deducted when player collide with the enemy (snail and caterpillar) or wrong alphabets. Besides, the score will count 2 points for the correct alphabets. If the player cannot complete all the levels with 30 lives, thus the player must restart the game from the first levels. |
| **Game Features** | - Kids learn the letters of the Alphabets | - Animation of each word when your Kid correctly completes the word.<br>- Voiceovers to help your Kid to learn | - Finger Touch game more interesting based on the features live, score and display the current score. |

| | | | |
|---|---|---|---|
| | | - how to say each Letter and Word<br>- Kids learn how to pronounce the letters of the alphabet and the words | |
| **Game Mechanics** | - Drag and arrange the piece of image about the word to the correct position. | - Dragging the big and colorful letters into their correct slots. | - Player move forward and jump to collect the balloon and avoid from the enemy. |
| **Game Engine** | Adobe Flash Player | Adobe Flash Player | Unity2D |
| **Platform** | Website supports iOS and Android mobile devices. | Android | Android |
| **Level Design** | This game has level based on the letter of alphabets from A to Z. | This game has three different game modes and the game modes increase in difficulty. | This games has 10 levels with different of word and the long of word. |
| **Goals** | To improve child's memory and how to pronounce the letter of alphabets. | To help improve your child's spelling and letter recognition whilst also enjoying the fun narration and images. | To improve children recognition and pronunciation of alphabets. |

### 3.1.2 Technical Requirement

This project was developed using Unity2D game engine and CSharp languages.

#### 3.1.2.1 Software Requirement

**Table 3: Software Requirement**

| Software | Purpose |
|---|---|
| **Adobe Illustrator CS6** | Adobe Illustrator software offers the comprehensive tools for design 2D character. For this project, I am using the Adobe Illustrator software to design the player character, the enemy, the balloon and alphabets, and the game world. |
| **Adobe Photoshop CS6** | Adobe Photoshop software offers the comprehensive tools for design the interface, button, and text. For this project, I am using the software to design the button move, jump, start, replay, and menu. Besides, the title of game also was design using the Adobe Photoshop. |
| **Unity2D** | Unity2D software is the engine of game to develop the project. For this project, I am using Unity2D as engine to develop the Finger Touch game. |

| | |
|---|---|
| **Visual Studio 2013** | Visual Studio software is used to coding the game. For this project, I am using the Visual Studio to code the game using the CSharp language. |
| **Microsoft Office** | This software is used to conduct documentations need such as the proposal, report, log book, and the slide presentation. |

### 3.1.2.2 Hardware Requirement

**Table 4: Hardware Requirement**

| Hardware | Purpose |
|---|---|
| **Personal Computer (PC) and Laptop** | For this project, I am using the laptop and personal computer (PC) that consist the software such as Unity2D, Adobe Photoshop, Adobe Illustrator, Visual Studio, and Microsoft Office to develop the game. |
| **Mobile Phone** | For this project, I am using the mobile phone to play testing the game for android. |



### 3.1.2.3 Other Requirement

The other requirement for this project is lab. I was booking the Multimedia Lab 3 (MM3) and Virtual Reality Lab (VR Lab) for the 5 month to complete the game.

## 3.2 Project Schedule and Milestones

**Table 5: Project Schedule**

| No. | Task | Duration (Weeks) | Weeks | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| | **Pre-Production Stage** | | | | | | | | | | | | | | | | |
| 1 | Forming and propose idea | 2 weeks | | | | | | | | | | | | | | | |
| 2 | Research how to develop the game | 3 weeks | | | | | | | | | | | | | | | |
| | **Production Stage** | | | | | | | | | | | | | | | | |
| 3 | Design asset for the game | 2 weeks | | | | | | | | | | | | | | | |
| 4 | Interface design | 3 weeks | | | | | | | | | | | | | | | |
| 5 | Start develop the game | 15 weeks | | | | | | | | | | | | | | | |
| 6 | Progress report 1 | 2 weeks | | | | | | | | | | | | | | | |
| 7 | Progress report 2 | 2 weeks | | | | | | | | | | | | | | | |
| 8 | Recheck the gameplay | 2 weeks | | | | | | | | | | | | | | | |
| 9 | Continue the progress | 9 weeks | | | | | | | | | | | | | | | |
| 10 | Find sound effect | 6 weeks | | | | | | | | | | | | | | | |
| 11 | Play testing part 1 | 3 weeks | | | | | | | | | | | | | | | |
| | **Post-Production Stage** | | | | | | | | | | | | | | | | |
| 12 | Resolve the bug | 3 weeks | | | | | | | | | | | | | | | |
| 13 | Play testing part 2 | 3 weeks | | | | | | | | | | | | | | | |
| 14 | Demo the game | 1 week | | | | | | | | | | | | | | | |

**Table 6: Project Milestones**

| No. | Key Milestones | Start Date | End Date |
|---|---|---|---|
| 1 | Start the game | 22-Feb-2016 | 3-Jun-2016 |
| 2 | Show progress | 22-Feb-2016 | 3-Jun-2016 |
| 3 | Progress report 1 | 7-Mac-2016 | 18-Mac-2016 |
| 4 | Progress report 2 | 28-Mac-2016 | 4-Apr-2016 |
| 5 | Play testing 1 | 18-Apr-2016 | 2-May-2016 |
| 6 | Play testing 2 | 16-May-2016 | 3-Jun-2016 |
| 7 | Demo the game | 30-May-2016 | 3-Jun-2016 |

## 3.3 Conclusion

In a conclusion, we get the analysis and the comparison from the existing game. Besides, the process of analysis is important in order to defining what the game will be when it is done. For the next activities are about the design and development user interface and assets of the Finger Touch game.

# CHAPTER IV

# DESIGN

## 4.1 Introduction

In this chapter, I have implemented the design for the Finger Touch Game. For this game, I have made some research to choose the suitable interface, fonts and graphics for the target user. Besides, we will discuss about game architecture, game design and also game art.



## 4.2 Game Architecture

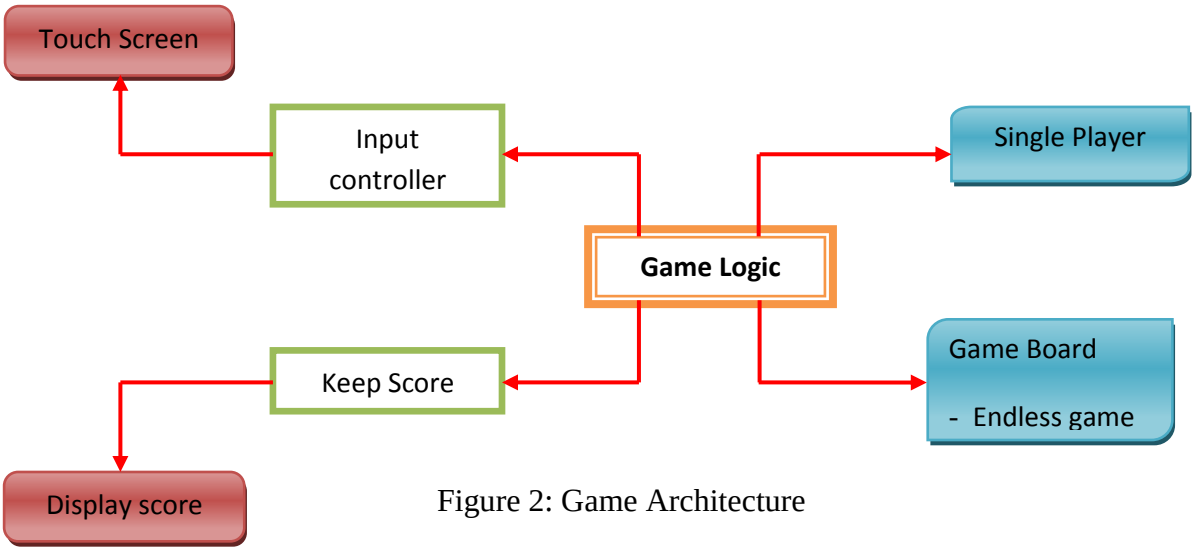



Figure 2: Game Architecture

## 4.3 Game Design

### 4.3.1 Gameplay

In this game, consist of 10 levels and each level have a different word. The player must complete each level with collecting all the alphabets based on the word given. The level becomes more challenging based on the long of the word given. The player is given 30 lives to complete all levels. The lives will be deducted when player collide with the enemy (snail and caterpillar) or wrong alphabets. Besides, the score will count 2 points for the correct alphabets. If the player cannot complete all the levels with 30 lives, thus the player must restart the game from the first levels.

Game Rules:

- Each correct balloon of alphabet is equal 2 point.
- For the 10 levels, player is given only 30 lives to complete the game.
- 1 lives will be deducted if collide with enemy (snail and caterpillar) or wrong balloon of alphabets.
- Player must restart the game from the first level if lives are equal to 0.

Player Roles:

- Player needs to move forward to collect all the balloon of alphabets.
- Player can single and double jump to avoid from enemy (snail and caterpillar) or the wrong balloon of alphabets.

### 4.3.2 Hierarchy of Challenges

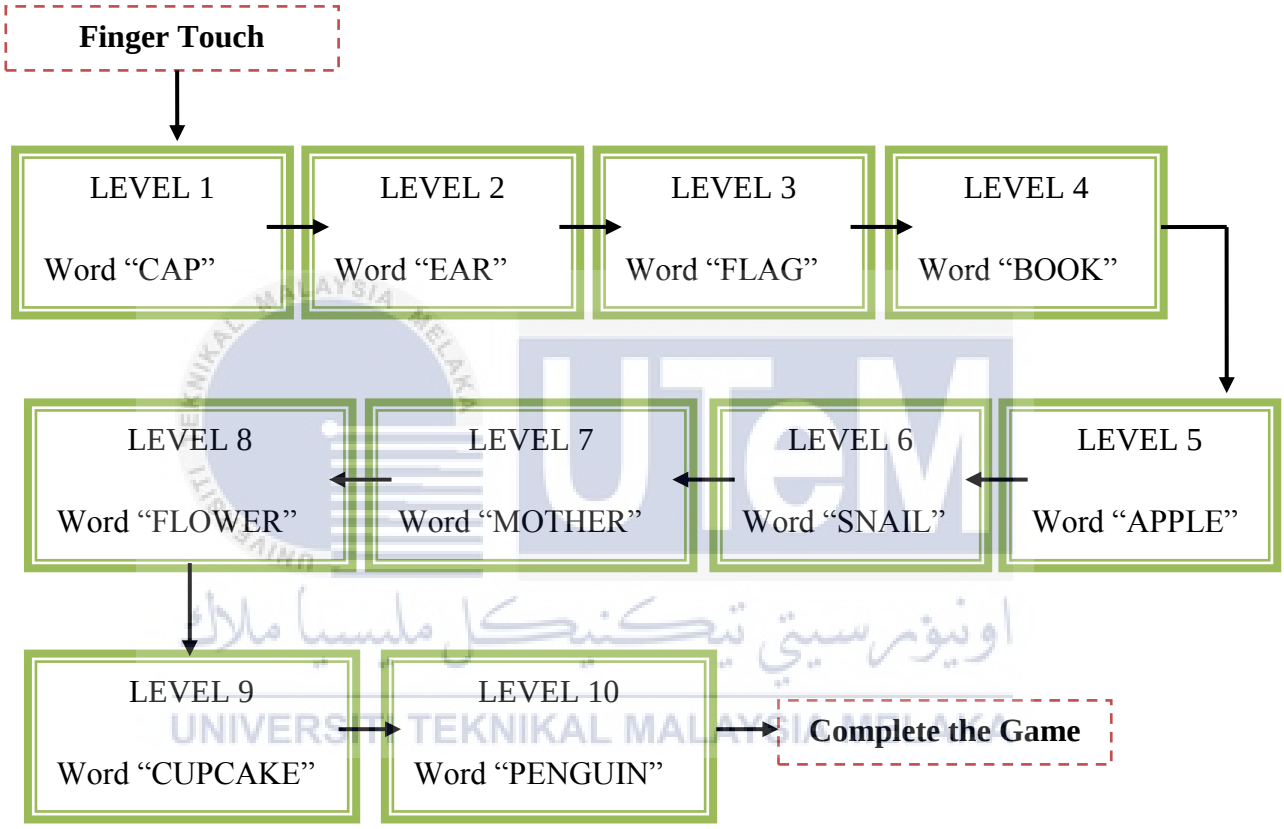



Figure 3: Hierarchy of Challenges

### 4.3.3 Core Mechanics

In this game, 30 lives are given to complete the 10 levels. Besides, player need collect all the right balloon of alphabets follow by the word given. The score will increase and count 2 points for the each correct of alphabets. The lives will be deducted if player collide with enemy (snail and caterpillar) or wrong balloon of alphabets.

### 4.3.4 Flowboard

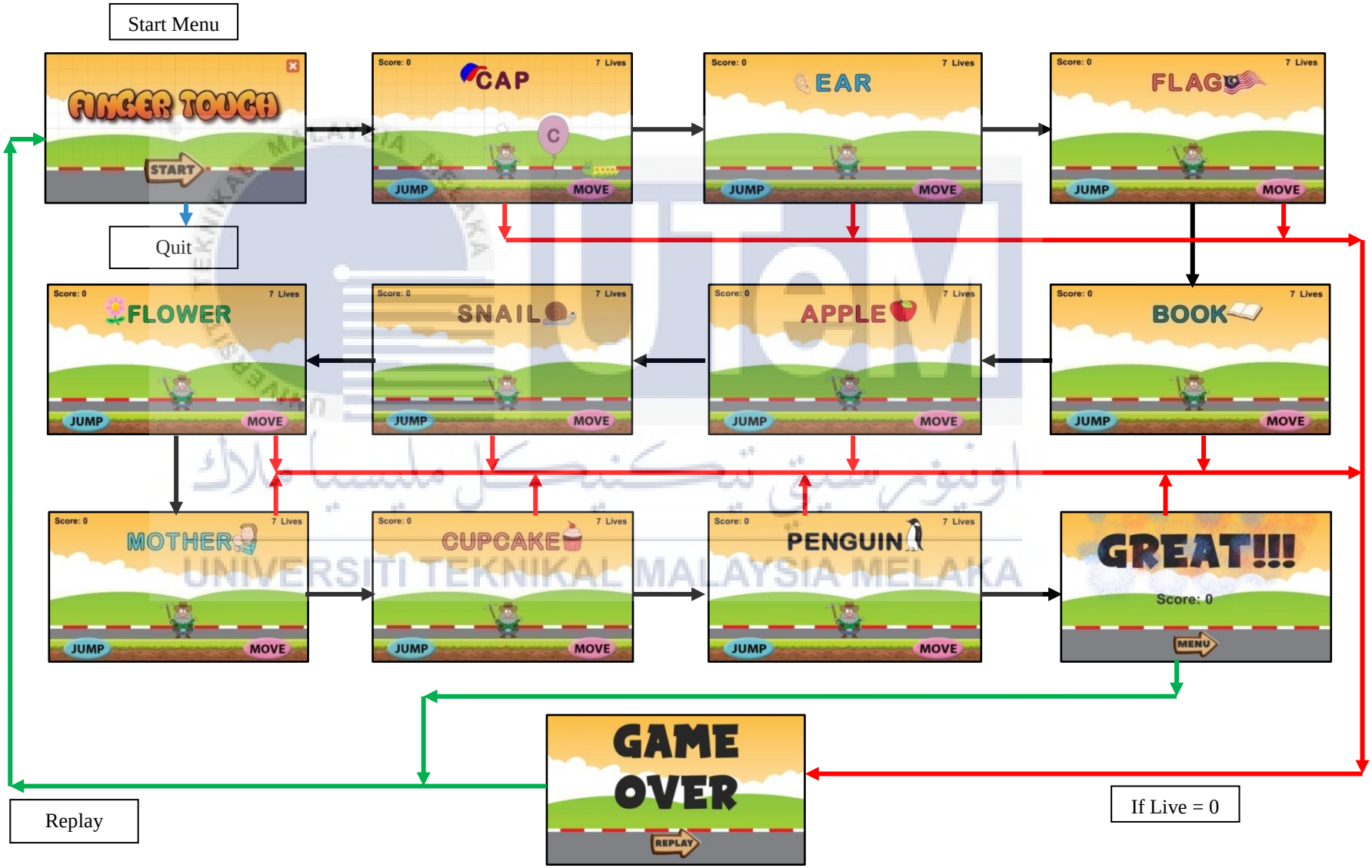



Figure 4: Flowboard

### 4.3.5 Level Progression

Level progression is divided into 4 section which is the first section is the main menu where the player has two buttons to choose. Next, the second section is about the levels. In this game consist, 10 levels and each level differentiated by the word given and the difficulties are increase based on long of the word. For the third section is game over menu. It is the loss interface when player loss during playing the game and the fourth section is the win interface. It is the reward when the player passes all the level and wins the game. Besides, each level also has the reward which is when player collect the correct balloon will get 2 points.

### 4.3.6 User Interfaces

User interfaces for this game was design using the metaphor such as arrow right button, alphabets on a balloon, caterpillar and snail move on the road, and the balloon static on the road.




**Figure 5: Main Menu Interface**

Figure 5 showed the main menu interface for this game. In main menu interface, player can choose the button start to start playing the game or “X” button to exit from this game.


**Figure 6: Gameplay Interface**

Figure 6 shows the gameplay interface that was applied for the next 10 levels. In this interface that has two buttons to click this is button jump and move. Besides, the word cap will change to another word for the next level.


**Figure 7: Game Over Interface**

Figure 7 shows the game over menu. For this interface there have only one button replay for player replay the game or back to the main menu and start the game.

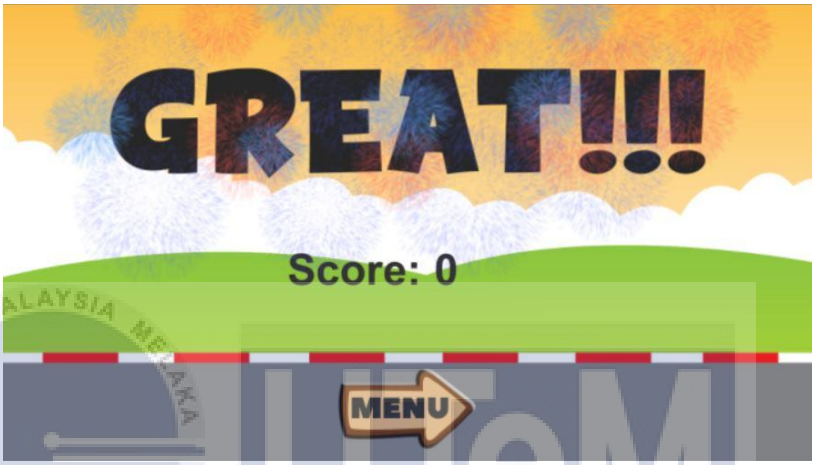



**Figure 8: Win Interface**

Figure 8 shows the win interface. In this interface, only have one button menu to player back to the main menu. Besides, the interface will appear when player pass all the 10 levels.



### 4.3.7 Interaction Model

Interaction model that I used in this game is touch screen because it was develop for android. So, every interface was connected using the clickable button touch screen. To play this game, player need to click the start button to play the game, jump button to make player jump, and move button to move forward the player.


**Figure 9: Main Menu**


**Figure 10: Gameplay**

## 4.4 Game Art

Table 7 below shows the game art that was taken to develop the game. For the character design, it takes 5 days to design and trace the character using Adobe Illustrator cs6. Besides, for the level design take 1 week to finish. Level design was develop based on the difficulty of game. Next, for the animation of the character and also adding effect to the scene take 2 to 3 days to finish.

Table 7: Game Art

| |
|---|
| Character Design (5 Days) |
| Level Design (1 Weeks) |
| Animation (2 Days) |
| Effect (3 Days) |



### 4.4.1 Game World

Figure 11 below shows the game world of the game. In this game, I using area road of a park as a theme for the game world.

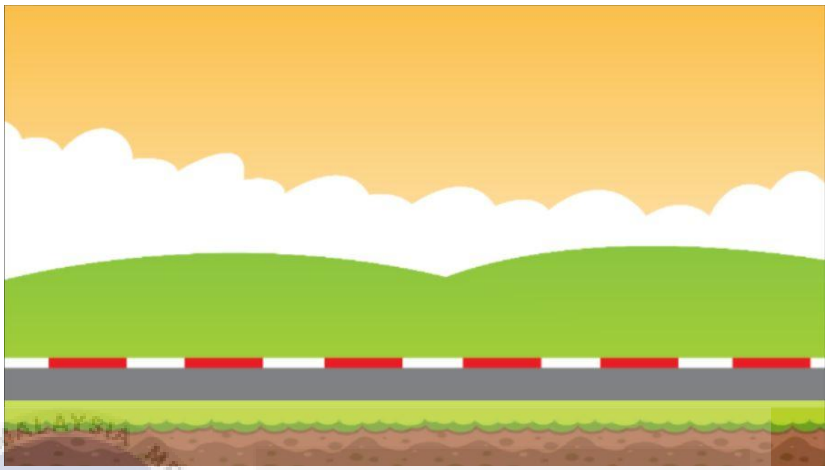
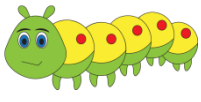


**Figure 11: Game World**

### 4.4.2 Character Design

**Table 8: Character Design**

| | |
|---|---|
|  | Player character |
|   | Button move to move the player character forward. Button jump to jump the player character. |
|   | The snail and caterpillar as an enemy to disturb the player character movement. |

| | |
|---|---|
|  | Button start is used to player start the game<br>Button replay is used to player play again the game. |
|  | The balloon has the letter of alphabets that player character needs to collect based on the word given. |



### 4.4.3 Camera Model

In this game project, camera model that I used is Side scrolling. A side scrolling is viewed from a side view camera angle and onscreen character that move from the left side of screen to the right to archive the goals of game. The screen of this game follows the player character and tries to keep it near the center of the screen. Besides, the camera will adjust with the player character movement, jumping and showing more space in front of the character than behind.

### 4.4.4 Audio and Sound Effect

This project has audio and sound effects there are used as background music and hint to make player fell when playing the game.

i. Background music - Kevin MacLeod – Cipher there are download from YouTube.
ii. Score point - Correct – Answer sound there is downloading from YouTube.
iii. Lives lost - Buzzer Wrong Answer sound there is downloading from YouTube.
iv. Games Over - Wrong – sound there are downloading from YouTube.
v. Win Game - 3d-fireworks and Cartoon – Winning sound there are downloading from YouTube.

## 4.5 Conclusion

In a conclusion, we got to know what the proper design to be implemented in a game and the suitable design based on the target user. For the next chapter, we will discuss about the implementation such as creation of game art, and integration of game component.

# CHAPTER V

# IMPLEMENTATION

## 5.1 Introduction

In this chapter, the implementation phase will describe the production of graphics, audio and video, and all the things that comprise the prototype into the production of the end product. Besides, the activity involved in the implementation phase will focuses on conversion and integration of the game art. At the end of the implementation phase, the product will achieve the goals.



## 5.2 Creation of Game Art

The creation of game art that was used is 2D art pipeline and the purpose of sequence of operation required to move art asset from concept to the finished product. The 2D art pipeline has three steps namely concept, creation and conversion. Figure 12 below shows the 2D art pipeline that are use to finish the product.

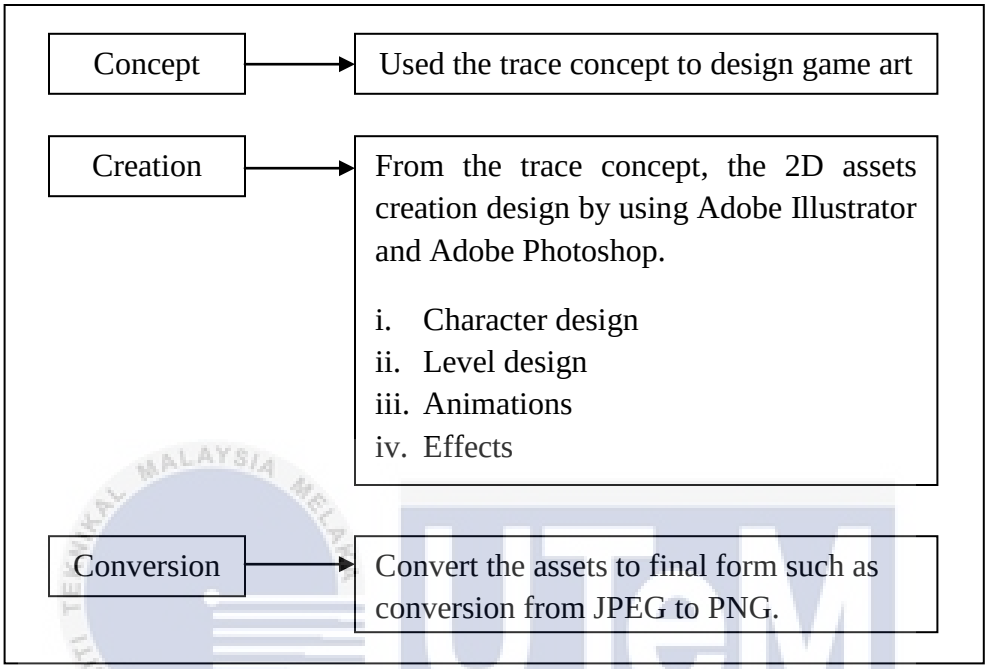



**Figure 12: 2D Art Pipeline**



### 5.2.1 Production of Graphics

Production of graphics is where the design and editing for the game assets such as game world, character and button. All the image of game asset used is search and downloading from internet and redrawn or traces using Adobe Illustrator. Besides, the redrawn image has been saved in a portable network graphics (PNG) format and joint photographic experts group (JPEG). Figure 13 below shows the step by step that has done to complete the production of graphic.

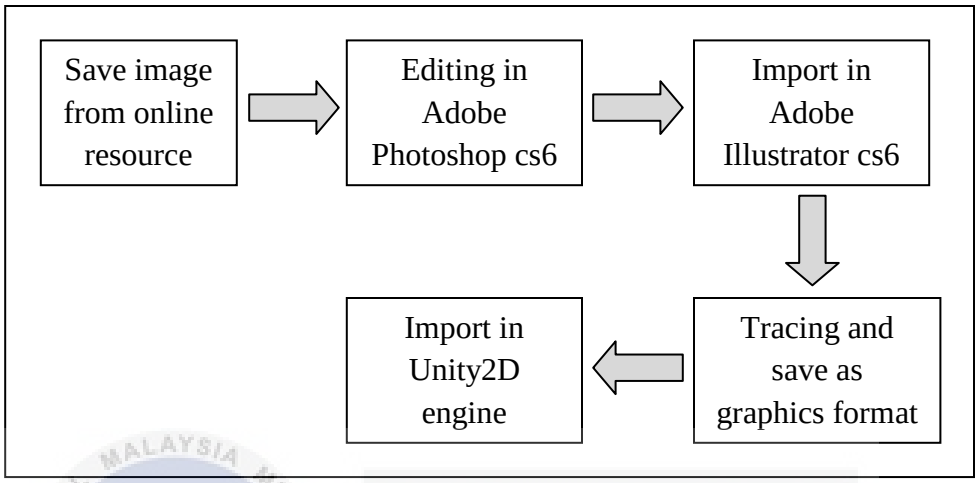



**Figure 13: Flow of Production Graphics**

### 5.2.2 Production of Audio

Production of audio is important because it is able to attract the attention of children to play this game. For example, by adding the pronunciation audio in this game, children will get better understanding and good pronunciation in learning alphabets. Moreover, it gives the learning process more fun. All the audio used is downloading from internet and saved in .mp3 format. Besides, movie maker software and online converter is used for audio editing. For example, cut and compress the audio of pronunciation alphabets. Table 9 below shows the name of audio that are used to complete the production of audio.

**Table 9: Production of Audio**

| Type of Audio | Production |
|---|---|
| Background music | Kevin MacLeod – Cipher there are download from YouTube. |
| Pronunciation Alphabets | Talking ABC Animal from A to Z for kids _ Animal Alphabet there are download from YouTube and editing by using movie maker software. |
| Sound Effects | When player collide with the enemy and wrong alphabets. |

### 5.2.3 Production of Animation

Production of animation is important to attract the attention of children to play this game. For example, by adding the animation of character in this game, it gives the learning process more fun for children. All the character animation used is tracing using Adobe Illustrator and editing the sprite of character by using Adobe Photoshop and the animation was set using unity engine. Figure below shows that the character that are used to animate and the animation timeline.

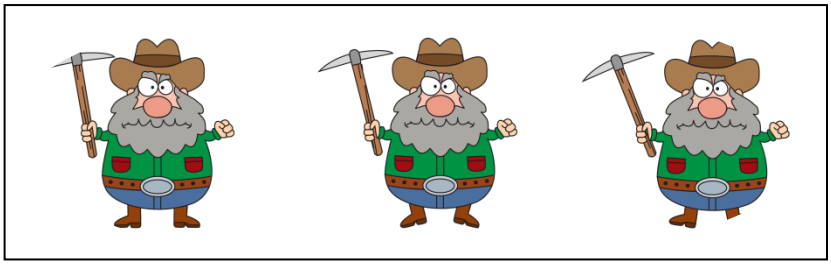


**Figure 14: Character Sprite**

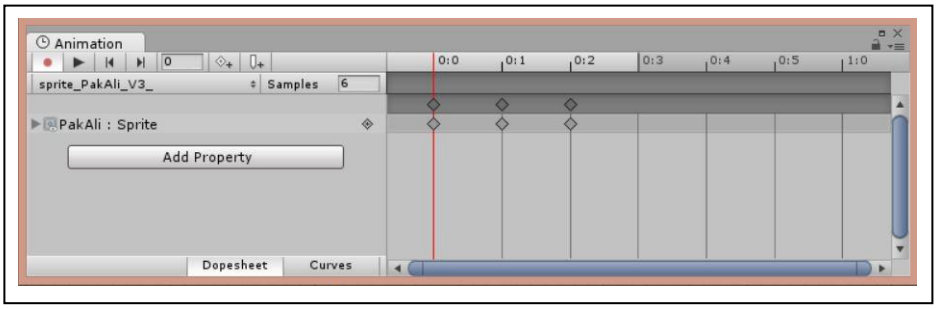



**Figure 15: Character Animation Timeline**

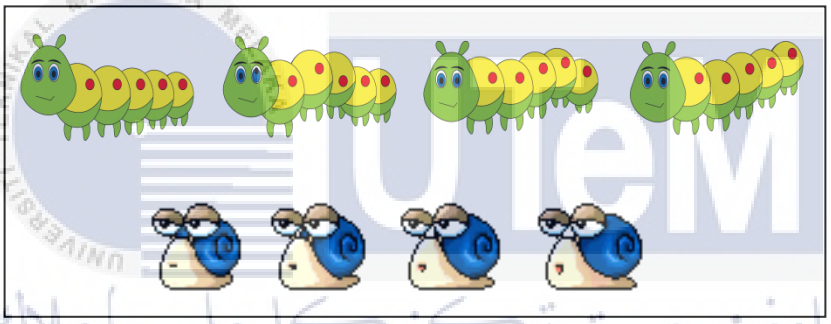


**Figure 16: Enemy Sprite**



## 5.3 Integration of Game Component

Integration of game component is process of integrating the art component with the technical aspect of game development based on the game engine that used. For example, the main character “PakAli” was integrating using source code.

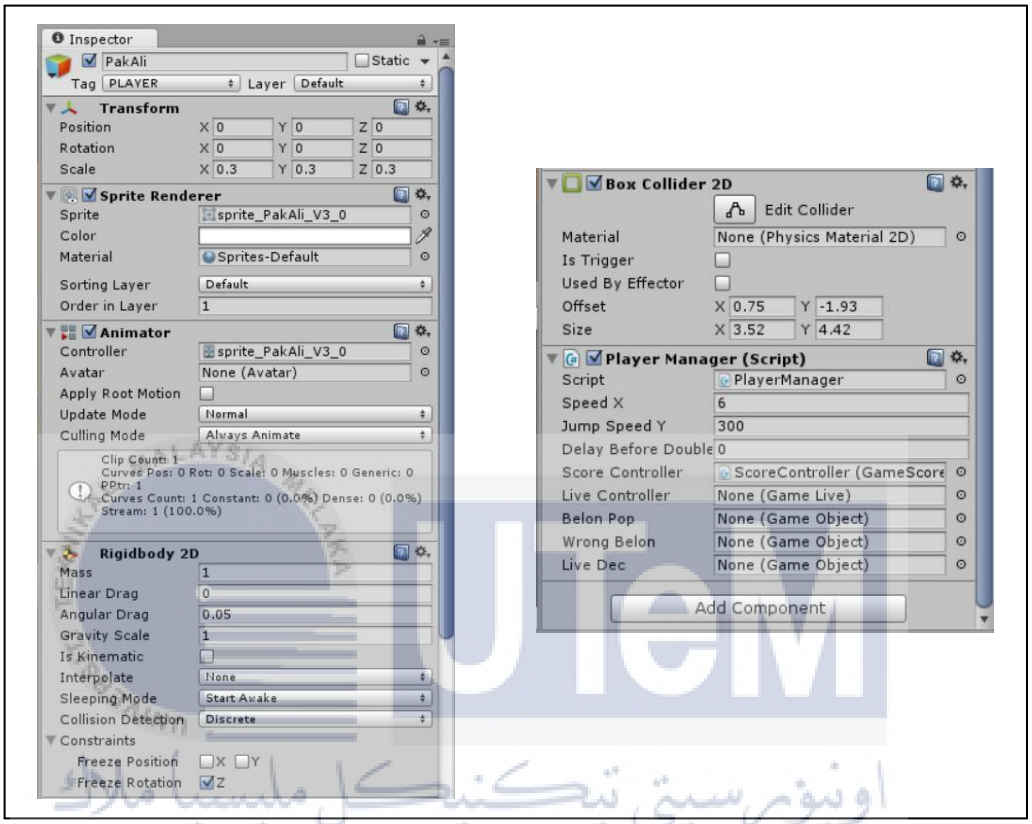



**Figure 17: Character Integration Component**



The figure 17 above shows the component of character that are used to integrating the character. For example, character “PakAli” was added component Rigidbody2D to avoid character from floating and Box Collider 2D component to detect when character collides with enemy or alphabets.

```
    //move forward
    public void WalkRight()
    {
        speed = speedX;
    }

    //stopmove
    public void StopMoving()
    {
        speed = 0;
    }

    //jumping
    public void Jump()
    {
        //single jump
        if (isGrounded)
        {
            isGrounded = false;
            rb.AddForce(new Vector2(rb.velocity.x, jumpSpeedY));
            Invoke("EnableDoubleJump", delayBeforeDoubleJump);
        }

        //double jump
        if (canDoubleJump)
        {
            canDoubleJump = false;
            rb.AddForce(new Vector2(rb.velocity.x, jumpSpeedY));
        }
    }

    void EnableDoubleJump()
    {
        canDoubleJump = true;
    }
```



**Figure 18: Character Integration Component Code**

The figure 18 above shows the source code that is used to set the movement and jump of the character.

Besides, the other characters also integrating by using source code. Table 10 below shows the code name that is used to integrate the character assets. For example, the enemy character was integrating in SnailMove.cs code and Snail.cs code to set the character move and detect with player when collide.

**Table 10: Source Code Name for Integrating**

| Assets | Source Code Name |
|---|---|
| Character "PakAli" | PlayerManager.cs<br>Moveleft.cs |
| Enemy Character:<br>- Snail<br>- Caterpillar | <br>SnailMove.cs<br>Snail.cs |
| Balloon of Alphabets | CameraController.cs |

## 5.4 Game Configuration Management

Game configuration management is about how the game will be published as a viable product. Firstly, before start develops the game, the Unity game engine must be set as an android platform. Next, external tools in Unity Preferences need to be set such as Software Development Kit (SDK) and Java Development Kit (JDK) that allows the creation of application for a certain software package. Besides, in the editor setting, the Unity remote device must allow any android device to use.

### 5.4.1 Configuration Setup

Configuration setup is about how the game will be published include the installation of game. Figures below shows the flow that needs to do to setup the game before and after develop.

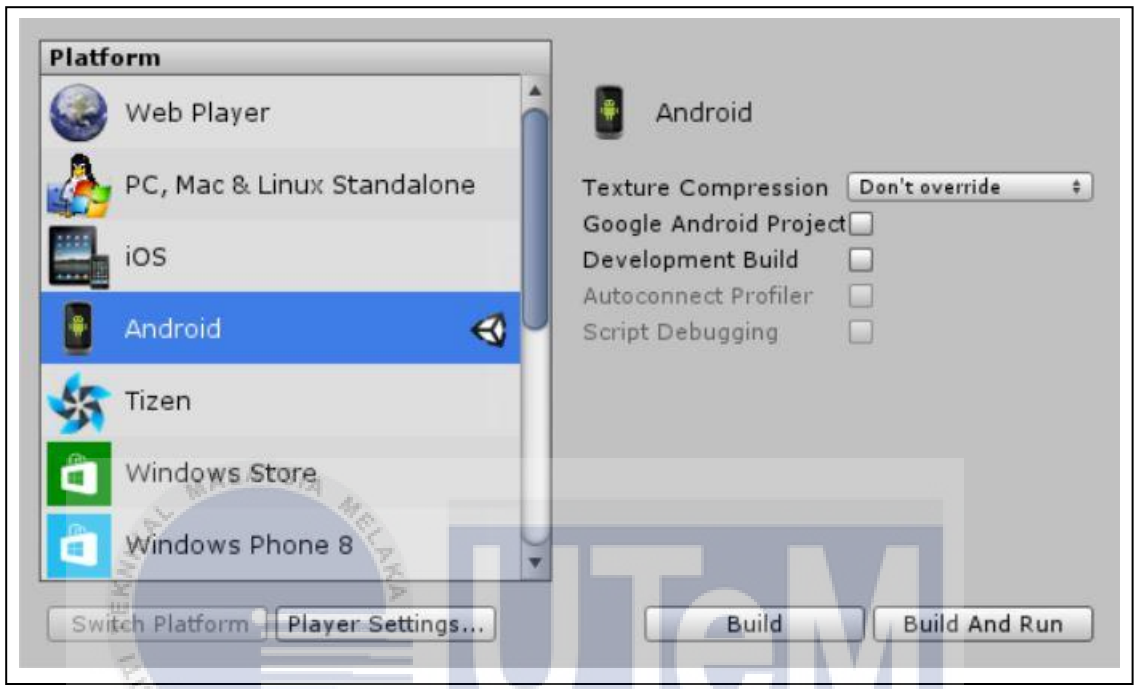



**Figure 19: Android Platform Setting**



The figure 19 above shows that the Unity engine must be set to android platform first before starting the development game. Besides, after complete the development, button build is click to execute file into .apk format.

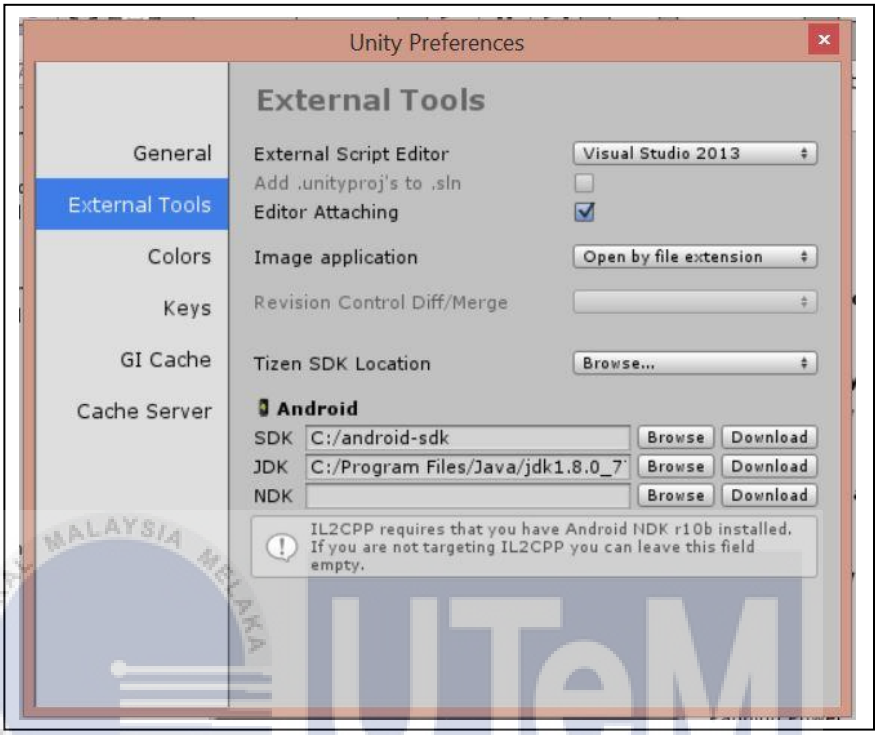



**Figure 20: Unity Preferences Setting**



The figure 20 above shows that external tools in Unity preferences need to install Software Development Kit (SDK) and Java Development Kit (JDK) that allows the creation of application for a certain software package.


**Figure 21: Unity Editor Setting**

The figure 21 above shows the editor setting where the game need allow any android device detected as unity remote.

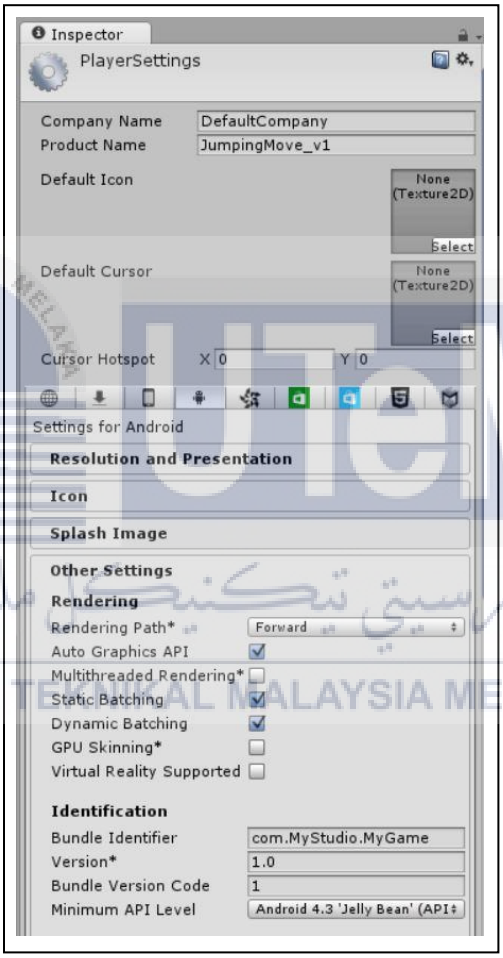



**Figure 22: Unity Player Setting**

The figure 22 above shows the player setting before build the game to execute file, .apk format.

### 5.4.2 Version Control Procedure

In this product, version control procedure is about procedure and control in managing the game version. In this game, at the beginning until the end of the product, has 14 versions and each version is different by the improvement of game. Every improvement was made based on the feedback that gets from the other student who has been playing the game. Besides, the game also has been tried over to junior of game student and they were giving the best feedback to improve the game.

## 5.5 Implementation Status

Implementation status is about the progress development of product for each task based on project schedule. Table below show the implementation status for complete the game.



**Table 11: Implementation Status**

| Task | Description | Duration to complete | Status |
|---|---|---|---|
| Pre-Production | Design the game world and asset of game development. | 1 month | Complete |
| Production | Design the game flow and the gameplay | 2 month | Complete |
| Post-Production | Search the suitable of sound and editing the music | 2 month | Complete |

## 5.6 Conclusion

In this chapter explains in details about the implementation such as creation of game art, integration of game component, game configuration management, and implementation status. In creation of game art included the production of graphics, production of audio and production of animation. The game configuration management included configuration setup and version control procedure. For the next chapter, we will discuss about the testing and evaluation process of game.

# CHAPTER VI

# TESTING AND EVALUATION

## 6.1 Introduction

In this chapter, we will describe briefly about the testing for this product. There are several ways to conducting the testing and evaluation process. For this product, the testing process has done by distributing questionnaire and observation to kindergarten aged five to seven. The testing process has done for pre-testing and post-testing to get the result and feedback.



## 6.2 Test Plan

Test plan is important component of a game test to make sure the product can run smoothly without any bug. For the purpose of test plan is about the content of product. The content testing was involved to evaluate player's effectiveness to recognize and know alphabet upon playing the game.

For the phase process, the product was testing for pre-testing and post-testing. The target group to test playing this game is children at kindergarten aged five to seven.

For the proposed testing method is questionnaire and observation to kindergarten children based on their understanding to play the game.

Besides, questionnaires were also given to teachers to get feedback about the effectiveness of the game whether it is appropriate to use as an educational platform for children in kindergarten. To evaluate the effectiveness to recognize and know alphabets upon playing the game, the game was test to 10 students aged five to seven.

## 6.3 Test Implementation

In this section, test implementation is about how the testing and evaluation is conducted. For this product, the pre-production testing is focus group which is children aged five to seven at kindergarten. In production testing, bug hunting test was use to know the bug of product and trying to fix it. Besides, to get the test data, questionnaires and observation testing was used. Table 12 below shows the example of questionnaires that are used to get the feedback from teachers and figure 23 below shows the example of questionnaires that are used for children to observe their understanding in learn alphabets.

**Table 12: Questionnaires Form for User Testing**

1. **Strongly Disagree**
2. **Disagree**
3. **Uncertain**
4. **Agree**
5. **Strongly Agree**

| No | Question | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1. | **Goal Clarity**<br>Overall game goals were presented clearly | | | | | |
| 2. | Intermediate goals were presented clearly | | | | | |
| 3. | I understand the learning goals through the game | | | | | |
| 4. | **Challenge**<br>I enjoy the game without feeling bored or anxious | | | | | |
| 5. | The game provides hints in text that help me overcome the challenge | | | | | |
| 6. | The game provides online support help me overcome the challenge | | | | | |
| 7. | **Knowledge Improvement**<br>The game increases my knowledge | | | | | |
| 8. | I catch the basic ideas of the knowledge taught | | | | | |
| 9. | I try to apply the knowledge in the game | | | | | |
| 10. | The game motivates the player to integrate the knowledge taught | | | | | |


**Figure 23: Testing Observation Question**

## 6.4 Test Result and Analysis

In this section, the purpose of testing and evaluation is to analyze the result obtained from questionnaires and observation.

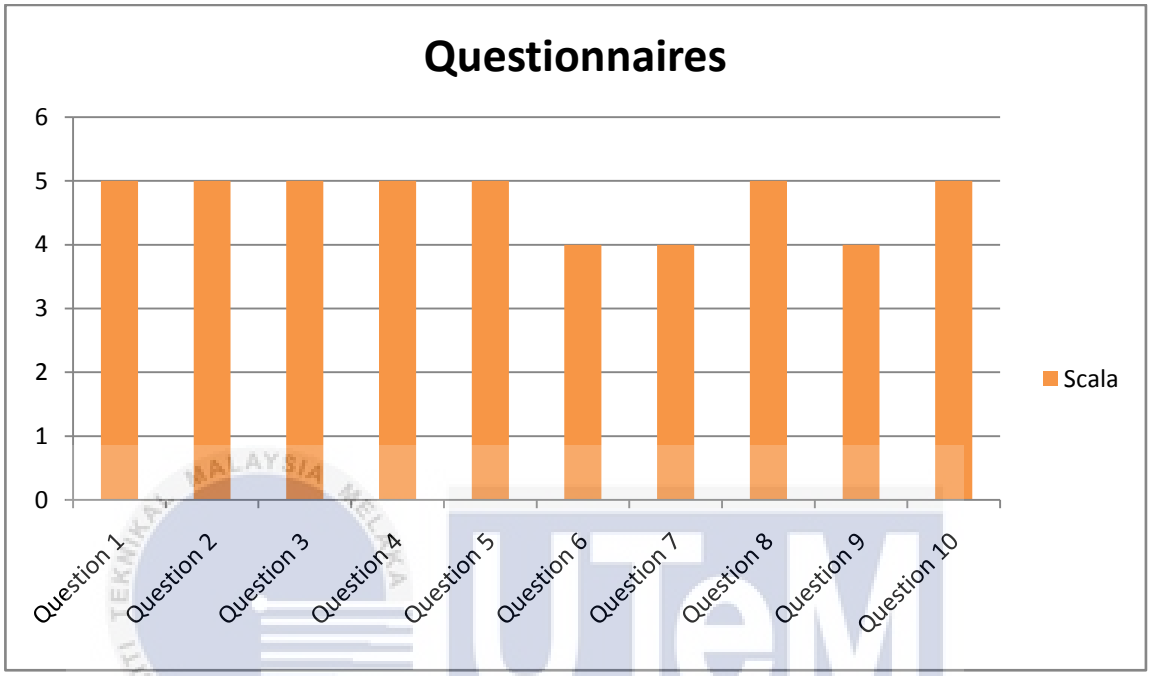



**Figure 24: Bar Chart of Questionnaires Result**



The figure 24 above shows the result of questionnaires test. The question was give to 1 respondent. The question was divided to three part based on goal clarity, challenge and knowledge improvement. Besides, to answer the question is based on the scalar which is 1 means strongly disagree, 2 means disagree, 3 means uncertain, 4 means agree and 5 means strongly agree. For the question 1 to 5, the teacher was choose strongly agree with the question. Besides, question 6, 7 and 9 was choose agree. It is because at the kindergarten, they are more emphasizing students with lowercase cause it is easier to teach and more widely used in all the articles versus uppercase that only used in the initial word.

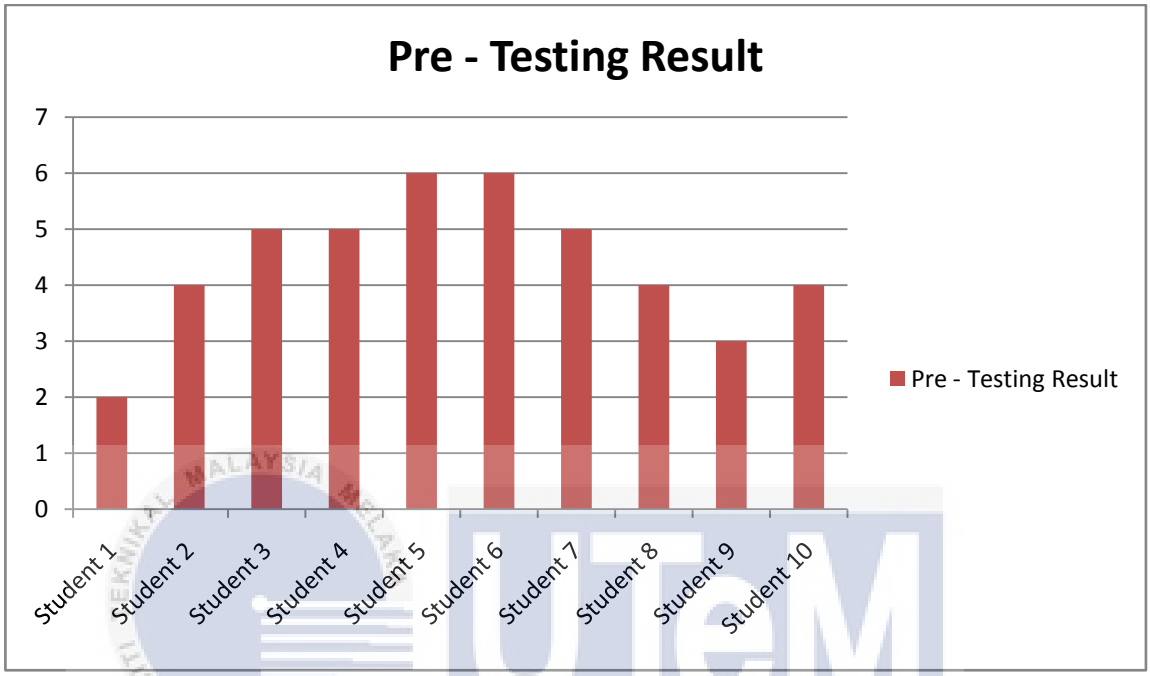



**Figure 25: Bar Chart of Pre-Testing Result**



The figure 25 above shows the result of pre-testing test. Based on the observation, the 10 respondents was lack of knowledge about how to write the alphabets before playing the game. It is because each respondents lack of exposure about the uppercase and they only know the shape of alphabets without writing it. Besides, the teacher at the kindergarten also said that they are more emphasizing students with lowercase. It is because the lowercase is easier to teach and more widely used in all the articles versus uppercase that only used in the initial word.

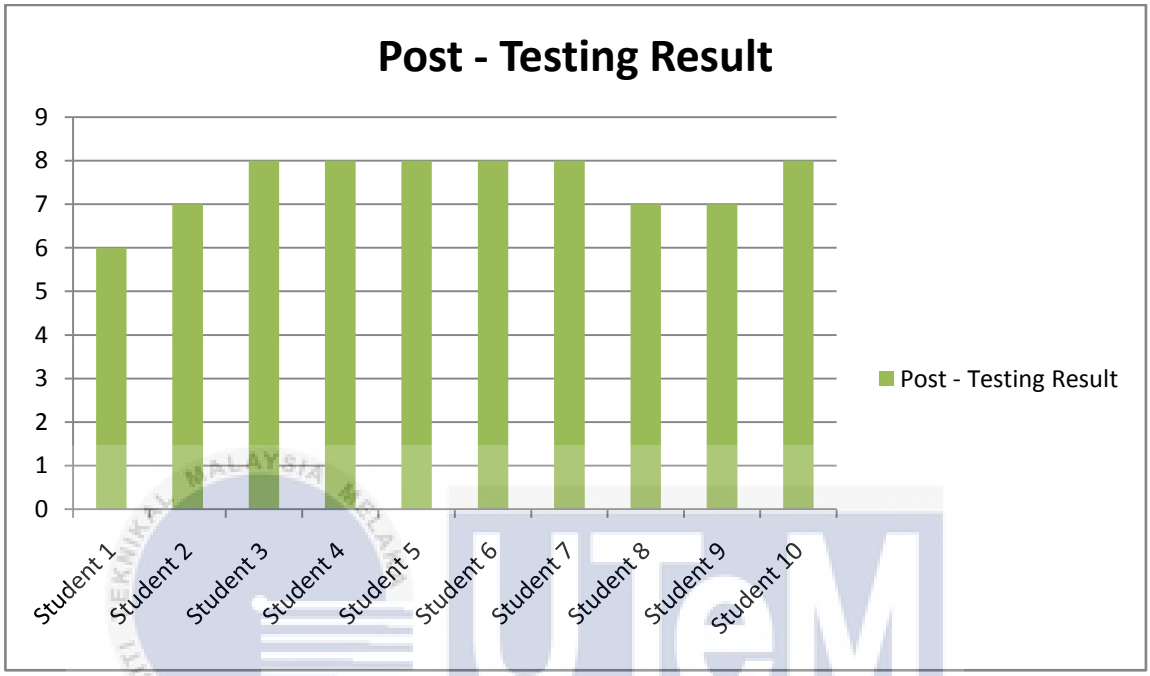



**Figure 26: Bar Chart of Post-Testing Result**



The figure 26 above shows the result of post-testing test. Based on the observation, after playing the game, the 10 respondents get know how to write the alphabets. So, the graph is increase compare the pre-testing test. It is because the respondents already know the alphabets and the shape but they did not know how to write it. Besides, after playing the game, their writing is better and they are fun while playing the game.

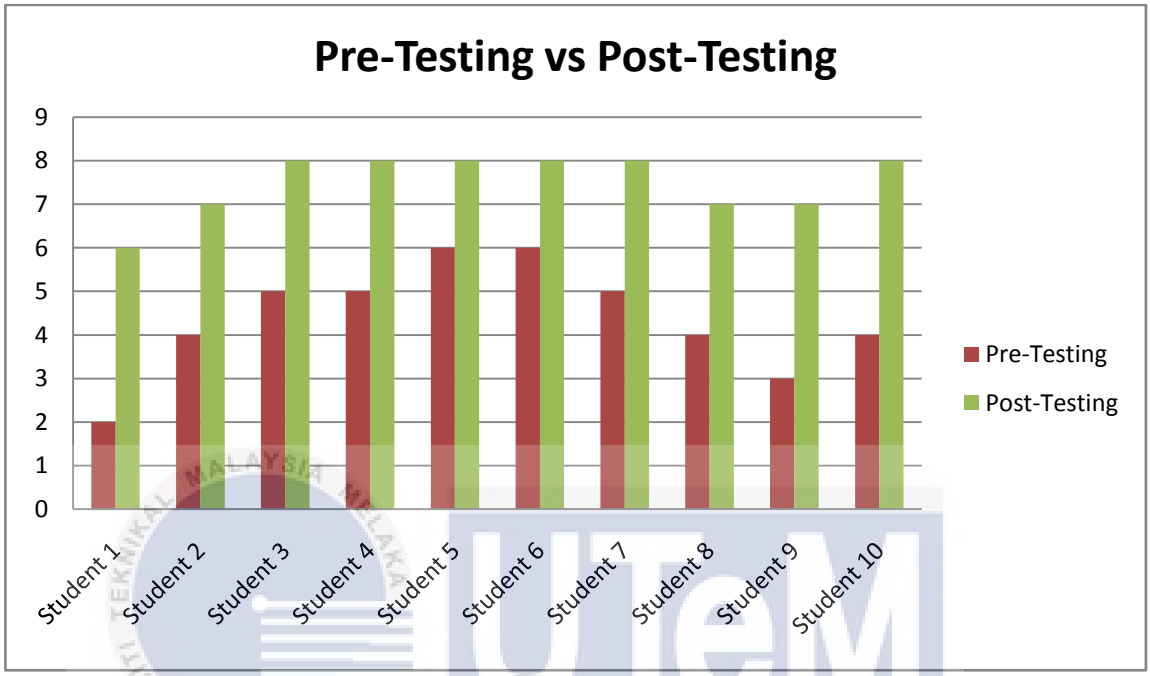



**Figure 27: Bar Chart of Pre-Testing vs. Post-Testing Result**



The figure 27 above shows that the differences between pre-testing and post-testing of 10 respondents. Based on the bar chart, the observation that can be concluded is to evaluate player effectiveness to recognize and know alphabet upon playing the game was achieved.

## 6.5 Conclusion

At the end of this chapter, the final stages of testing have a lot of differences between pre-testing and post-testing. So, the objective to evaluate player's effectiveness to recognize and know alphabet upon playing the game is achieved. For the next chapter is about the project conclusion to conclude the observation of strength and weeknesses, proposition for improvement and contribution.

# CHAPTER VII

# PROJECT CONCLUSION

## 7.1 Observation of Strength and Weaknesses

After the testing and evaluation phase, it can be seen based on the observation that this project has its own strength and weaknesses. Therefore, based on the strength and weaknesses that has been identified, the project will be more succeeding if the improvement of product is made. So, to ensure a quality product is produced, the strength and weaknesses is important.



Project Strength:

1. The game was developed for android and easier to install.
2. All the assets were design and trace by my own using Adobe Illustrator cs6.
3. The game was developed using the Unity2D game engine that is good software.
4. The game was developed for 2D mobile game to children aged 5 to 7 learn alphabets.

Project Weaknesses:

1. The character only moves to the right side.
2. The button jump and move too small to be pressed.
3. The level does not mention to go the next level after player passes the game.
4. The exit button only had at the start menu, so to exit the game player need complete the game or make live to zero.

## 7.2 Proposition for Improvement

The proposition for improvement is too important to overcome the whole weaknesses and disadvantages of this project. So, in this section will tell the improvement that need to do to get the better product. There are several things can do to improve the product.



Suggestion for Improvement:

1. Divide the level to easy, medium and hard.
2. Adding the home, exit and pause button at the proper scene to help player easy to play.
3. Adding the sound pronunciation word after player complete the level.
4. Give some reward if player can complete one level or display the final and higher score.
5. Create the flexible movement of character to help player control character movement.

## 7.3 Contribution

At the end of this project, there are lots of contributions that have been given to children for learning process. Besides, the element that is used such as image, audio, text and animation can help to attract children to play the game and it makes the game more interesting. Moreover, the other element such as gameplay, game features, game mechanics, level design and goal are also important during the developing process. It is because designing gameplay need to do first to guide developer designing the game. Same goes to level design and goal. Each game that was developed must have a goal to achieve and level design is step how to achieve the goal while game mechanics used to tell the player how the game controls. Therefore, teachers and parents can use this product as a learning tool to help children recognize the alphabets faster.

## 7.4 Conclusion



In a conclusion, overall of this project has achieved the objective. For the first objective is to investigate a mobile learning game element appropriate for children aged 5 - 7 to learn alphabet. Second, to design and develop a Finger Touch game as an educational game to learn alphabet using Unity2D and C# Programming Language. Third, evaluate player's effectiveness to recognize and know alphabet upon playing the game.

Besides, 2D game-based mobile learning called Finger Touch to allow children learn to recognize and pronounce the alphabets correctly. Besides, I expected that this project will be useful to children (pre-school). So, there are many difference genre and platform between the existing games. Besides, we get the review what the comparison between the existing games. The methodologies that are used for this project is Heather Chandler's GDLC that have 3 stage to develop this game.

After do the research, we get the analysis and the comparison from the existing game. Besides, the process of analysis is important in order to defining what the game will be when it is done. Next, is about the design and development user interface and assets of the Finger Touch game. Based on the research, we got to know what the proper design to be implemented in a game and the suitable design based on the target user.

At the end of this chapter, the final stages of testing have a lot of differences between pre-testing and post-testing. So, the objective to evaluate player's effectiveness to recognize and know alphabet upon playing the game is achieved.

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# APPENDICES

Appendix A: Player Manager.cs

This code is used to set the player move, jump and lose live.

```
using UnityEngine;
using System.Collections;

public class PlayerManager : MonoBehaviour
{
    public float speedX;
    public float jumpSpeedY;
    public float delayBeforeDoubleJump;
    public GameScore scoreController;
    public GameLive liveController;
    public GameObject BelonPop;
    public GameObject WrongBelon;
    public GameObject LiveDec;

    bool isGrounded, canDoubleJump;
    float speed;

    Rigidbody2D rb;

       // Use this for initialization
       void Start ()
    {
        rb = GetComponent<Rigidbody2D>();
        BelonPop = GameObject.Find("BelonPop");
        WrongBelon = GameObject.Find("WrongBelon");
        LiveDec = GameObject.Find("LiveDec");
        liveController.Lives = PlayerPrefs.GetInt("PlayerCurrentLives");
        scoreController.Score = PlayerPrefs.GetInt("PlayerCurrentScore");
       }

       // Update is called once per frame
       void Update ()
    {
        //player movement
        MovePlayer(speed);
       }
```

```
    void MovePlayer(float playerSpeed)
    {
        //code for player movement
        rb.velocity = new Vector3(speed, rb.velocity.y, 0);
    }

    void OnCollisionEnter2D(Collision2D other)
    {
        if(other.gameObject.tag == "GROUND")
        {
            isGrounded = true;
            canDoubleJump = false;
        }

        if (other.gameObject.tag == "Belon")
        {
            //BelonPop.GetComponent<AudioSource>().Play();
            Destroy(other.gameObject);
            BelonPop.GetComponent<AudioSource>().Play();
            scoreController.Score += 2;
            PlayerPrefs.SetInt("PlayerCurrentScore", scoreController.Score);
            //BelonPop.GetComponent<AudioSource>().Play();
        }
    }

    void OnTriggerEnter2D(Collider2D other)
    {
        if ((other.gameObject.tag == "Wrong") || (other.gameObject.tag ==
"Enemy"))
        {
            WrongBelon.GetComponent<AudioSource>().Play();
            liveController.Lives--;
            PlayerPrefs.SetInt("PlayerCurrentLives", liveController.Lives);
            //Destroy(other.gameObject);
        }

        if (liveController.Lives == 0)
        {
           // Destroy(collisionObject.gameObject);
            Application.LoadLevel("GameOver");
        }
    }

    //move forward
    public void WalkRight()
    {
        speed = speedX;
    }

    //stopmove
    public void StopMoving()
    {
        speed = 0;
    }
```

```
    //jumping
    public void Jump()
    {
        //single jump
        if(isGrounded)
        {
            isGrounded = false;
            rb.AddForce(new Vector2(rb.velocity.x, jumpSpeedY));
            Invoke("EnableDoubleJump", delayBeforeDoubleJump);
        }

        //double jump
        if(canDoubleJump)
        {
            canDoubleJump = false;
            rb.AddForce(new Vector2(rb.velocity.x, jumpSpeedY));
        }
    }

    void EnableDoubleJump()
    {
        canDoubleJump = true;
    }
}
```

Enemy.cs

This code is used to set the enemy move, and collide with player.

```
using UnityEngine;
using System.Collections;

public class SnailMove : MonoBehaviour
{
    public float moveSpeed;
    public bool moveRight;

     // Use this for initialization
    void Start()
    {

    }

    // Update is called once per frame
    void Update()
```

```
    {
        if (moveRight)
        {
            GetComponent<Rigidbody2D>().velocity = new Vector2(moveSpeed,
GetComponent<Rigidbody2D>().velocity.y);
        }

        else
        {
            GetComponent<Rigidbody2D>().velocity = new Vector2(-moveSpeed,
GetComponent<Rigidbody2D>().velocity.y);
        }
    }
}
```

Appendix B: Questionnaires

**FINAL YEAR PROJECT 2**

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**Questionnaire: To evaluate player's effectiveness to recognise and know alphabet upon playing the game.**

***Please tick (√) that represents how you feel about the game.**

**Age:** 34

**Gender:** Female / Male

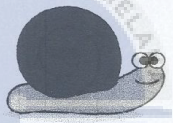
| No | Question | 1 Strongly Disagree | 2 Disagree | 3 Uncertain | 4 Agree | 5 Strogly Agree |
|---|---|---|---|---|---|---|
| | **Goal Clarity** | | | | | |
| 1. | Overall game goals were presented clearly | | | | | ✓ |
| 2. | Intermediate goals were presented clearly | | | | | ✓ |
| 3. | I understand the learning goals through the game | | | | | ✓ |
| | **Challenge** | | | | | |
| 4. | I enjoy the game without feeling bored or anxious | | | | | ✓ |
| 5. | The game provides hints in text that help me overcome the challenge | | | | | ✓ |
| 6. | The game provides online support help me overcome the challenge | | | | ✓ | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7. | **Knowledge Improvement** The game increases my knowledge | | | | / | |
| 8. | I catch the basic ideas of the knowledge taught | | | | | / |
| 9. | I try to apply the knowledge in the game | | | | / | |
| 10. | The game motivates the player to integrate the knowledge taught | | | | | / |

Isikan ruangan kosong di bawah dengan huruf yang betul.

C_O P

_B_ OOK



S_N_A_L_L

_F_LOW_E_R

_C_UPCA_C_E

Appendix C: Respondents