A 2D PC GAME FOR RECOGNIZE TYPE OF WASTE AND HOW TO RECYCLE IT

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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JUDUL: A 2D PC GAME FOR RECOGNIZE TYPE OF WASTE AND HOW TO RECYCLE IT.

SESI PENGAJIAN: 2015/2016

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RAIDAH BINTI YAZID

This report is submitted in partial fulfillment of the requirements for Bachelor of Information Technology (Game Technology)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2016

DECLARATION

I hereby declare that this project report entitled

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STUDENT :_____ Date: 21 August 2016

RAIDAH BINTI YAZID

SUPERVISOR :_____ Date: 22 August 2016

TARISA MAKINA KINTAKANINGRUM

DEDICATION

To my supervisor,

for all the time you give me unlimitedy,

To my parent,

for all love you give me uniquivocally

To my family

for your full encouragement

To my friend,

for your help and fully support

ACKNOWLEDGEMENTS

In the name of Allah, the Most Gracious and the Most Merciful Alhamdulillah, all praises to Allah for the strengths and His blessing in completing my Final Year Project (FYP).

Special appreciation goes to my supervisor, Mdm Tarisa Makina, for her patients in giving advices, comment and suggestion are really useful and it supported me through the whole period of FYP 1 and 2.

I also would like to express my appreciation to coordinator FYP for BITE , Miss Syariffanor Binti Hisham, for her guide, motivation and words of spirit much help me and classmate during process of completing the project.

Sincere thanks to all my friend especially Nur Syazwani, Fatin Aqidah, and others for their kindness and moral support during my study. Thanks for the friendship and memories.

Last but not least, my deepest gratitude goes to my parent for their endless love, prayers and encouragement.

ABSTRACT

This project is about a 2D game ,the title of game Lets Recycle It. The purpose of the game is to teach or train children to recognize waste into correct recycle bin and improve the awareness towards recycling. Besides, the objective of this project is to investigate the game mechanic of action puzzle game ,to develop a "Let's Recycle It" game using Unity2d for children age between 7 until 12 years and to evaluate player's effectiveness to recognize types of waste and their corresponding recycle bin.

ABSTRAK

Projek ini adalah tentang permainan 2D, tajuk permainan Lets Recycle It. Tujuan dari permainan ini adalah untuk mengajar atau melatih kanak-kanak untuk mengenali sisa ke dalam tong kitar semula yang betul dan meningkatkan kesedaran terhadap kitar semula. Objektif projek ini adalah untuk menyiasat permainan mekanik tindakan permainan teka-teki, untuk membangunkan " Let'sRecycle It" permainan menggunakan Unity2d untuk kanak-kanak berumur antara 7 hingga 12 tahun dan untuk menilai keberkesanan pemain untuk mengenali jenis sisa dan kitar semula bin sama mereka .

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CHAPTER I

INTRODUCTION

1.1 Project Background

This project is to develop a serious 2D game. The title of the game is " Let's Recycle It" . The purpose of the game is to teach or train children to recognize waste into correct recycle bin and improve the awareness towards recycling. Besides, Genre for this game is action puzzle. This game consists two mode which is training and challenge. In training mode, player has 3 lives. Then player needs to score 30 points to pass in this mode. The score will increase when player drag and drop the waste into the correct recycle bin and live will drop when player gets wrong. Then, for the challenge mode, player need drag and drop the waste into correct recycle bin within the time limit. The time limit is based on the sunset, for example, player need to drag and drop the waste into correct recycle bin before the sunset. The challenge becomes tricky when the placement of recycle bin is random. Player need to find the correct recycle bin before drag and drop the waste. The score will increase when player drag and drop the waste into the correct recycle bin and the score will decrease when player drag and drop the waste to the wrong recycle bin. The target audience for this game is for children ages 7 until 12 years old.

1.2 Problem statement

Nowadays, the total amount of waste is increased. Some can be easily decomposed by the earth and some takes more than 100 years. Recycle is an excellent way to help conserving the earth. People must aware about types of waste in order to use the recycle bin effectively. Game “Let’s Recycle It” is developed based on this problem to give knowledge about waste types, recycle bin types as well as an entertainment.

1.3 Objective

1. To investigate the game mechanic of action puzzle game.
2. To develop a “Let’s Recycle It” game using Unity2d for children age between 7 until 12 years.
3. To evaluate players' effectiveness to recognize types of waste and their corresponding recycle bin.

1.4 Goals and genre

Let's Recycle It" is an educational game. This game is to train children recognize type of waste and their corresponding recycle bin. Beside this game is educate children know the type of waste and function of each type of recycle bin. Genre of the game is action puzzle game.

1.5 Game Feature

Target player for this games is children age between 7 until 12. The chosen of the focus group is suitable to expose children about recycling waste. Besides, the game also available for an adult to play, because it has the challenge mode.

The rules of " Let's Recycle It Game " is player need to drag and drop the waste into correct recycle bin, in another word, player should recognize the type of waste and their corresponding recycle bin. In training mode, player is given 3 live. The live will drop when player drag and drop waste into wrong recycle bin. Then, in challenge mode, player need drag and drop the waste before the sunset .The sunset is calculated as a time limit. The score will increase when player drag and drop waste into correct recycle bin and will decrease when player drag and drop waste into wrong recycle bin.

1.6 Conclusion

This chapter discuss in details about the problem or recycle. Develop Lets Recycle It game is one of the solution to solve the problem. This game output is focused on the children to recognize waste into corresponding recycle bin and increase awareness toward recycle . Next chapter will discuss further about the literature review and project methodology.

CHAPTER II

LITERATURE RIVIEW AND PROJECT METHODOLOGY

2.1 Introduction

Lets Recycle It game project focusing on recognize type of waste and how to recycle it. This project is one of the serious game to teach or train children on how to recycle recycling waste. The output from researching of the similar game, there are few element that can be compared for example the gameplay, genre, game feature, game mechanic, and design of game.

2.2 Genre

Puzzlemaster Scott Kim (2011) has stated definition of puzzle game : "A puzzle is fun, and has one right answer". The classification of puzzle game are divide into 5 type. which is mathematics, physic, visual field, language and common sense and situation. There are 3 classification of puzzle game in term of design, procedural puzzle games, heterogeneous puzzle games and combinatorial puzzle games. Procedural puzzle games, the designer can control the difficulty by limiting the element that computer may use and by scaling the puzzle(making it bigger or faster). There is no level design in these games. Next is heterogeneous puzzle games, the designer can increase the

difficulty by making the solution to the puzzle more obscure , or stringing into more complicated goal-subgoal system. Then, combinatorial puzzle games, the levels are carefully designed, and not created procedurally. The difficulty increase when designer introduce more mechanics. (Herman, Tulleken,2011). Besides action puzzle is sub genre of puzzle game. Action puzzle game requires player manipulate game pieces in real time, often in a single screen and have a time limit.

2.3 Game Mechanic

Games of progression offer many predesigned challenges that the designer has order sequentially, usually through sophisticate level design. Progression relies on tightly controlled sequence of events. A game designer dictates the challenges that a player must encounter these event in particular sequences . Games of emergence is an approach that allow designer to create games in which the freedom of the player is balanced with the control of designer. ("The Open and the closed" : Games of emergence and Games of Progression)

2.4 Existing Games

The current existing game was share the similar element ,which is recycling waste. For this part, there are two existing game to be discussed. There are Junk Monster game and Recycle game.

2.4.1 Junk Monster Game

This existing game names is Junk Monster game. This game is about recycling waste. This game use the PC as a platform. Besides, the software use to develop this

game is Adobe Flash. The genre for this game is action puzzle game. In this game, player need to click piece of junk to the correct recycle bin and clean all the junk before time runs out.

Figure 1 : Main Interface of Junk Monster Game

2.4.2 Recycle game

This existing game names is Recycle game. This game is about recycling waste. This game use the PC as a platform. Besides, the software use to develop this game is Adobe Flash. The genre for this game is puzzle game. In this game, Player need to sort the waste into the right bins and try to earn as many points as player can.

Figure 2: Main Interface of Recycle Game

2.4.3 Comparison of Existing Games

Table 1: Comparison of Existing Game with Let Recycle it game

	Junk Monster	Recycle	Let's Recycle It
Game play	In Junk Monster, player need to click a piece of junk to the correct recycle bin and the bottom of the screen. Then, player need to clean all the junk before time runs out.	In Recycle ,player need to sort the waste into the right bins and try to earn as many points as player can.	In Let Recycle It, consists of two mode, which is training mode and challenge mode. In training mode, player have 3 live. Then player needs to get score 30 point to pass in this mode. The score will increase when player drag and drop the waste into the correct recycle bin and live will drop when player gets wrong. In challenge mode, player need drag and drop the waste into correct recycle bin within the time limit.(time limit based on

			sunset)
Genre	Puzzle	Puzzle	Action Puzzle
Game feature	Score Time	Score	Score Live Time limit
Game Mechanics	Player need to clean all the junk before the time run out	Player need to sort the waste and score as many	In training mode, player have 3 live. Then player needs to get score 30 point to pass in this mode. In challenge mode, player need drag and drop the waste into correct recycle bin within the time limit.(time limit based on sunset)
Level Design	One Level	One Level	Two Level : Training/ Challenge
Software use	Adobe flash	Adobe flash	Unity version 5.2
Music/Sound effect	Only sound effect	Only sound effect	Has background music and sound effect

2.5 Project Methodology

The methodology that uses for this project is Game Development Lifecycle model (GDLC). GDLC is one of the example model and guidelines to successfully deliver a good quality game. For development game, based on Heather Chandler GDLC, it consists of 4 phases, started from pre-production, production, testing, and post-production.

Pre-production phases define the game design and project planning. These phases are started with research an article and find the existing of the game that related to recycling waste. Besides, make the comparison of game mechanic, game play with the existing game. Others, design and define the gameplay, target audience, the asset ,art and choose the suitable game engine to develop the game.

Production phases are related to the creation of technical part and artistic aspect. The phase started with created the asset, for example, the game world ,the character, user interface and head up display. The game asset will design by using Adobe illustrator and edit by using Adobe Photoshop. Others, start to develop the game with code by using C# programming language in Unity 2D.

Testing phases are to test the game and improve the product quality. For this project, the play testing is made to improve the quality of the game in term of gameplay, game design.

Post-production phases consist of post-mortem activities. For this project, the Game will be implemented on Pc and played by children. Two sessions will be held for children to play the game. At the first session, just explain how to play the game while at the second session player will explain further about the game, for example, player need

to thrown the waste into the correct recycle bin. Use the Questionnaire as a research method to compare the result before and after player play.

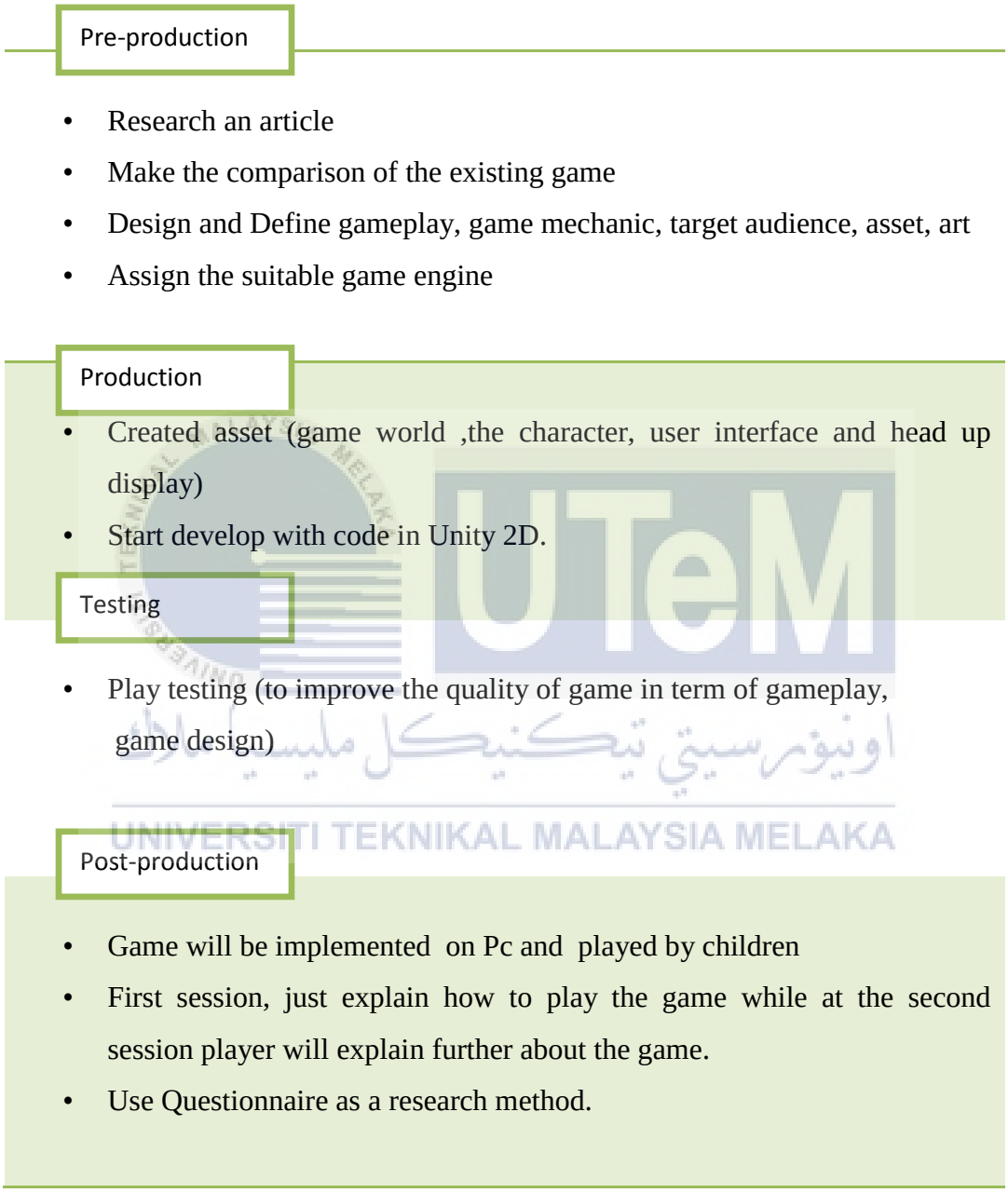


Figure 3 : Game Development Life Cycle

2.6 Conclusion

In this chapter, the comparison are made between the existing game and Let Recycle it game. There are differences between the existing and Let Recycle it game. Others, use the Game Development Life Cycle as a guide for developing a game. Next chapter, is about Analysis , including of requirement analysis, technical requirement and project milestone.

CHAPTER III

ANALYSIS

3.1 Requirement Analysis

3.1.1 Project Requirement

Project Requirement consists of hardware and software that support development of the game. Others, the game need to have the good game play , add the feature and have a level design.

3.1.2 Technical Requirement

This project use the game engine and development tool.

3.1.2.1 Software Requirement

Software requirement is divided by 2 section. One software is to develop the game and other is to create an asset.

Table 2: Software Requirement

Software	Explanation
Unity 2D version 5.2.1.	Use the game engine for code and develop the game. For code, use the C# programming language
Adobe Illustrator, Adobe Photoshop	Use to create, design and editing all the asset for games.

3.1.2.2 Hardware Requirement

Laptop or Personal Computer (PC) : Use for develop the game

3.1.2.3 Other Requirement

Lab Virtual Reality .

3.2 Project Milestone

Table 3: Project Milestone

No	Game Development Life Cycle	Task	Duration (week)	Week														
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Pre-production	Brainstorm Idea	1															
2		Choose the game title and preparation for development	1															
3	Production	Design mode 1 : Training mode	3															
5		Design mode 2 : Challenge mode	3															
6		Design Game Asset	2															
7		Design Game World	2															
8		Develop Game	5															
9	Testing	Play Test Game	2															
10	Post-production	Implementation	1															

3.2.1 Milestone and Date

Table 4.0 : Milestone and Date

Key milestone	Start Date	End Date
Pre-production	22 Feb 2016	29 Feb 2016
Production	29 Feb 2016	02 Apr 2016
Testing	02 Apr 2016	30 Mei 2016
Post-Production	30 Mei 2016	03 June 2016

3.3 Conclusion

This chapter is analysis the requirement that needs to develop the game. How long time taken to develop the game, the process needed to develop the game, software and hardware to develop the game. Next chapter is about Design the game. The chapter consists of game play, game architecture, core mechanic , flow board and level progression.

CHAPTER IV

DESIGN

4.1 Introduction

In this chapter, the discussion further about design the game. Design is the most important to produce the quality game .Design is not focusing on graphic only but how the game play and the fun element in the game The design consists of game architecture, game design and game art. In game design consists of game play ,hierarchy of challenge, core mechanic, flowboard, level progression and interaction model.

4.2 Game Architecture

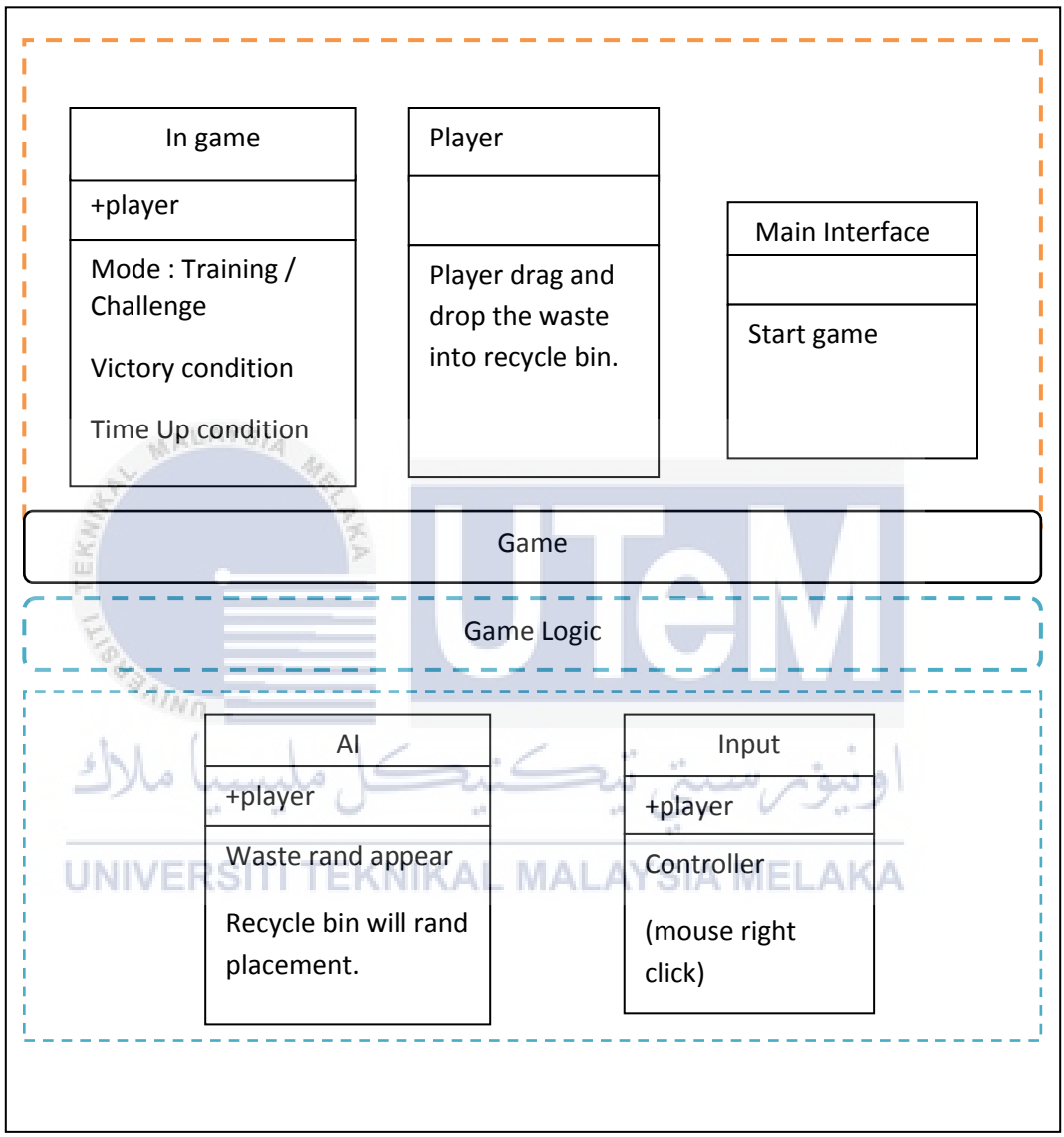


Figure 4: Game Architecture

4.3 Game Design

4.3.1 Gameplay

"Let's Recycle It" game consists of two mode which is training and challenge. In training mode, player has 3 live. Then player needs to score 30 points to pass in this mode. The score will increase when player drag and drop the waste into the correct recycle bin and live will drop when player gets wrong. Then, for the challenge mode, player need drag and drop the waste into correct recycle bin within the time limit.

The time limit is based on the sunset, for example, player need to drag and drop the waste into bin before the sunset. The challenge becomes tricky when the placement of recycle bin is random. Player need to find the correct recycle bin before drag and drop the waste. The score will increase when player drag and drop the waste into the correct recycle bin and the score will decrease when player drag and drop the waste to the wrong recycle bin.

Game Rule

1. Player need drag and drop the waste into correct recycle bin.
2. Training mode, player need score 30 point to pass the mode.
3. Challenge mode, player need drag and drop the waste before the sunset.

Player Role

Player should recognize the type of waste and their corresponding recycle bin. Then, player need drag and drop the waste into correct recycle bin.

4.3.2 Hierarchy Of Challenge

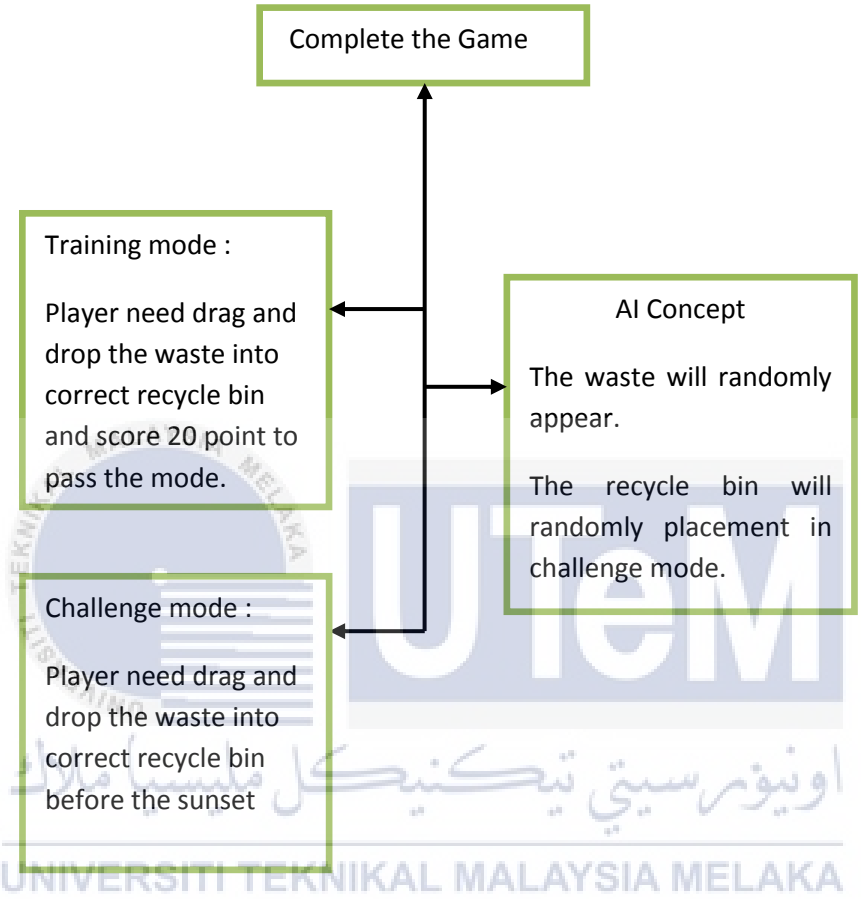


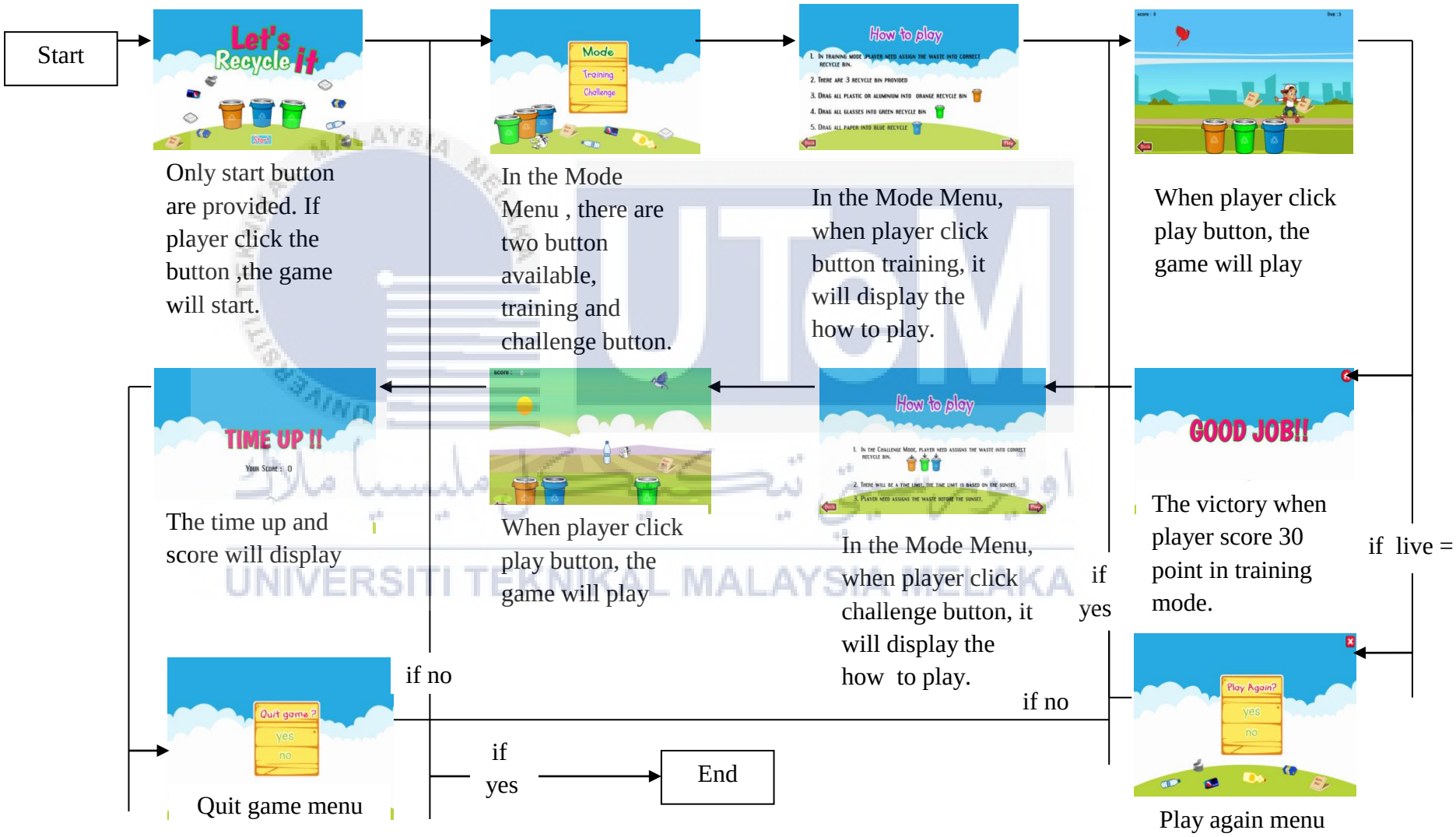
Figure 5: Hierarchy of Challenge

4.3.3 Core Mechanic

"Let's Recycle It" game consists of two modes, training, and challenge. In both modes, there is a core mechanic, which is the score, lives, and time. The score will increase when player drag and drop the waste into correct recycle bin and vice versa. Besides, the live will decrease when player drag and drop the waste into wrong recycle

bin. The time functional when start play the challenge mode and it will set in 30 seconds. In this game, the time set as the sunset. When the sunset, the time up.

4.3.4 Flow board



4.3.5 Level Progression

" Let Recycle it " game start with the main menu .There is start button in the main menu when player clicks the start button, it will go to the mode menu. In the mode menu consists of training and challenge button. When player clicks the training button, training mode will play. If the player gets score 30 points, the victory interface will display. Then if player lives get 0, play again interface will display. For the challenge mode , the challenge mode will play when player clicks the challenge button. The time up interface will display when the sunset. Others, for the training mode, the score will increase when player drag and drop the waste into correct recycle bin and the live will decrease when player drag and drop the waste into wrong recycle bin. In challenge mode, the score will increase when player drag and drop the waste into correct recycle bin and vice versa.

4.3.6 User Interface

Figure 6 : Main Interface

Main interface of game. Consists of title of game " Lets Recycle it" and start button. The start button will go to the mode menu.

Figure 7: Mode Interface

The Mode menu interface. Consists of training and challenge button.

Figure 8 : How to play Interface

How to play interface for training. The interface display when player clicks the training button. How to play consists instruction to play the training mode. There is two buttons available, play and back button.

Figure 9: How to play Interface

How to play interface for challenge mode. The interface display when player clicks the challenge button. How to play consists instruction to play the challenge mode. There is two buttons available, play and back button.

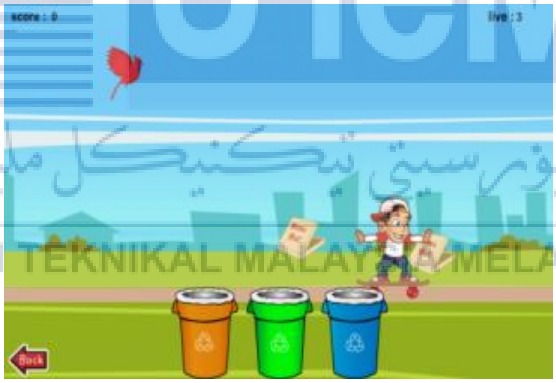


Figure 10 : Training Mode Interface

The interface of training mode. It will display when player clicks the play button in how to play. Consists of head up display such as score and live. There is one button available which is back button.

Figure 11: Challenge Mode Interface

The interface of training mode. It will display when player clicks the play button in how to play. Consists of head up display such as score and live. There is one button available which is back button.

Figure 12 : Victory Interface

The interface of victory display when player gets 30 points in the training mode. Consists of 3 button ,at top right, is home button, at the bottom is replay and quit button.

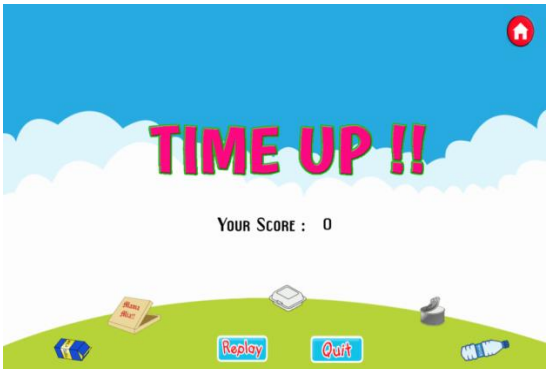


Figure 13: Time up Interface

The interface of time up displays when the sunset in challenge mode. Consists of 3 button ,at top right, is the home button, at the bottom is the replay and quit button.

Figure 14: Play Again Interface

The interface of play again menu. It will display when live equal to 0 since play the training mode. Consists of yes and no button. Also available the exit button at top right.

Figure 15 : Quit Game Interface

The interface of quit menu. It will display when player click the quit button. Consists of yes and no button

4.3.7 Interaction Model

The interaction model use for this project is clicked able button, drag, and drop. Use the mouse right click to the clickable button ,drag and drop. Only the mouse available for the interaction model because the game develops for Personal computer (PC)

Figure 16 : Main Menu

Figure 17: How to Play

Figure 18: Training mode

Figure 19 : Victory interface

4.4 Game Art

There are 4 section in the game art :

Table 5: Game Art

Design Characters	(5 Days)
Design game World	(5 Days)
Design User Interface	(2 Days)
Animation	(2 Days)

4.4.1 Game World

Figure 20 : Main Interface

This is game world interface for menu. The theme of game world for menu is open space and cloudy

Figure 21: Training Interface

This game world interface for training mode. The theme of game world for training is park near of city area.

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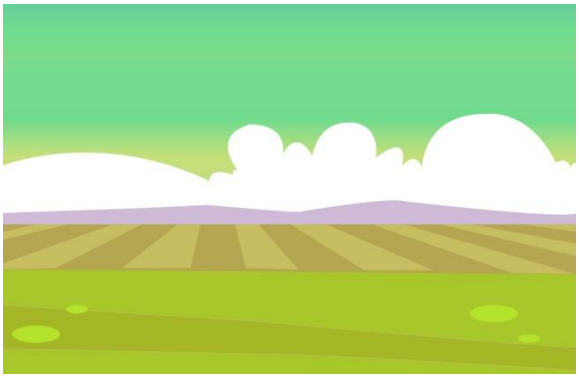

Figure 22 : Challenge Interface

This game world interface for challenge mode. The theme is at the park

4.4.2 Character Design

Figure 23: Blue Recycle bin

This is blue recycle bin. The function is for recycle paper.

Figure 24: Orange Recycle bin

This is orange recycle bin. The function is for recycle aluminum and plastic.

Figure 25: Green Recycle bin

This is green recycle bin. The function is for recycle glasses.

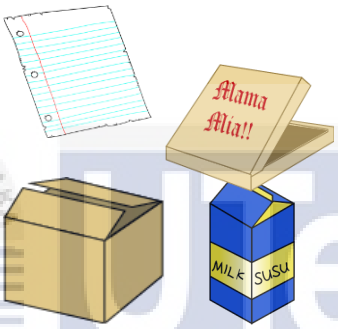

Figure 26: Paper waste

This a few type of waste for paper

Figure 27: Glass waste

This a few type of waste for glasses

Figure 28: Aluminium and Plastic waste

This a few type of waste for Aluminum and Plastic.

4.4.3 Camera Model

The camera model use in this project is single screen. Single screen game perspective can apply in this game which the entire playfield is shown on the screen , and, the character unable to move beyond the boundaries of the screen or scroll the game world.

4.4.4 Audio/Sound Effect

This project are using some audio and sound effect to make the game more interesting . All the audio and sound effect format is mp3.

Background music	: Source is from the Tap the frog game music.
Sound effect correct recycle bin	: Source is from Correct sound in game
Sound effect wrong recycle bin	: Source is from Wrong sound in game
Sound effect for time up	: Source is from Alarm clock
Sound effect for victory	: Source is from Audience clapping

4.5 Conclusion

This chapters in details about the game play, the level and challenge provided in the game. Besides, description about the game art. Game art is a process of creating and designing. In the game art the description more about the character of the game world, the audio used and the animation.

CHAPTER V

IMPLEMENTATION

5.1 Introduction

This chapter explains about the game art, production of graphic, audio, animation. The production of graphic involves the production of character and game world.

5.2 Creation of Game Art

Creation of game art for this project is based on 2D pipeline. 2D pipeline is a sequence of operation required to move art asset from concept to the finished product. In 2D pipeline, there are 3 part, namely concept, creation, conversion. The concept was used in this project is creating and tracing the character image. Mostly the simple character is creating, while the complicated character is tracing. Besides, creation has 4 section which is design the character, game world, user interface, and animation. All the 4 section use the different tool, for example, Adobe Illustrator, Adobe Photoshop, and Unity animation. Next is conversion, conversion is a process where converting the character image to png.

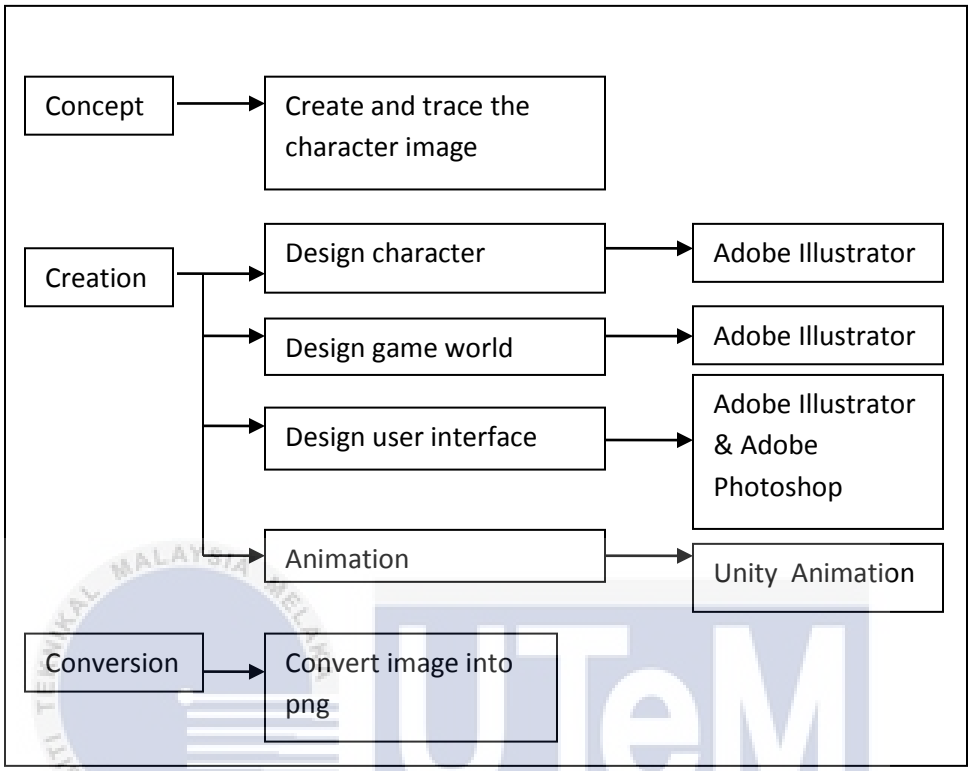

Figure 29: 2D art pipeline

5.2.1 Production of Graphics

Vector image was used in the production of graphic for this project. The image is easy to create and scalable. Besides, there is two productions involve in graphic namely, production of character and production of the game world.

In the production of character, the character gets from the online source and save as a jpeg. All the image have been saved are tracing, texturing and editing by using Adobe illustrator and Adobe Photoshop. The outcome will save as png image.

Production of the game world, find the different image of the game world, the few part from the image will choose, then tracing and texturing the image that has been chosen. The image will combine together and be as one image of the game world.

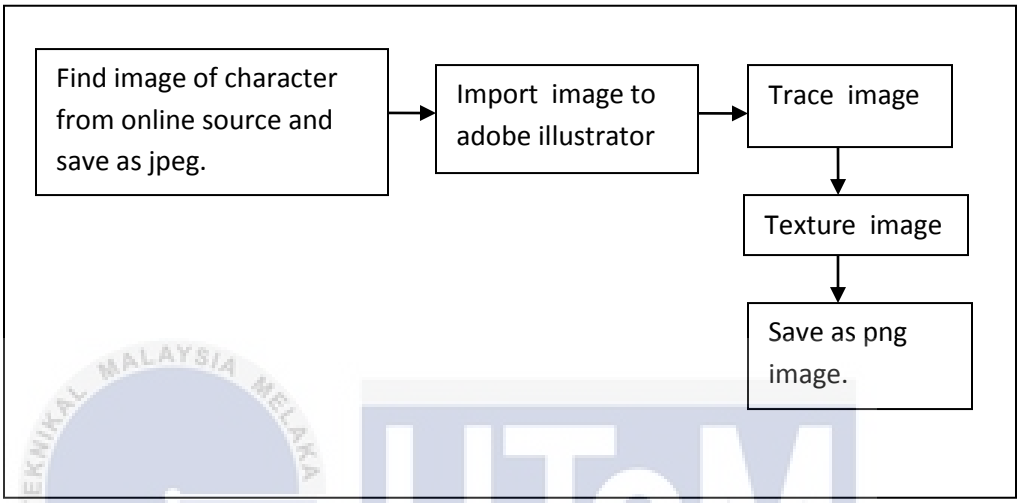

Figure 30: Production of Character

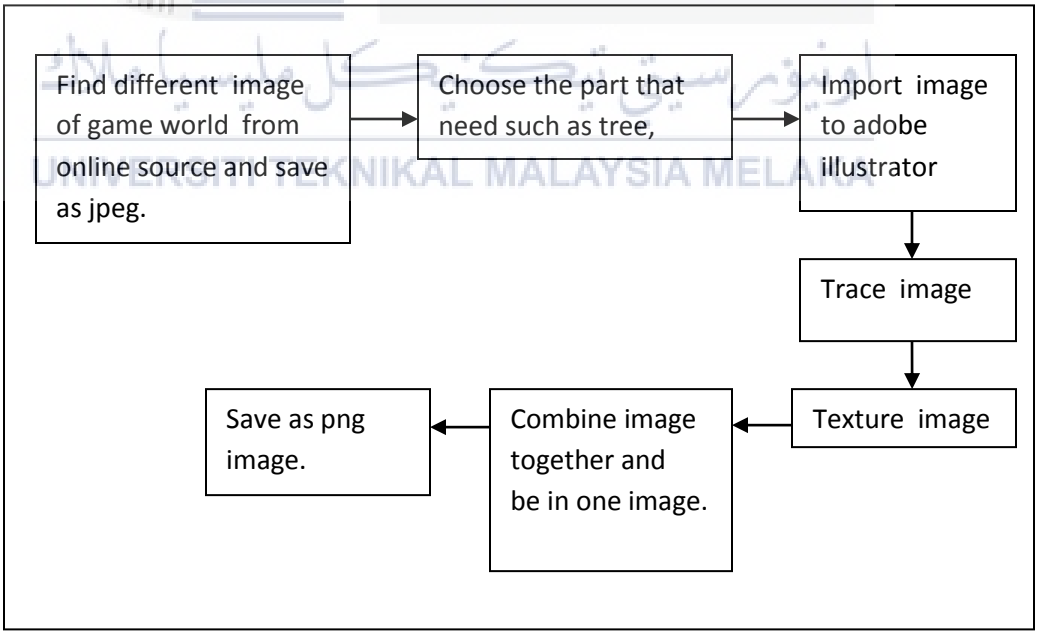

Figure 31: Production of Game world

5.2.2 Production of Audio

The source of audio is from other game or cartoon music. The music is download from internet and edit by using Mp3 cutter online . Besides, not all part of music are taken, only suitable music are cutting to be as a background music and sound effect. The format for audio is mp3.

Background music	: Source is from the Tap the frog game music.
Sound effect correct recycle bin	: Source is from Correct sound in game
Sound effect wrong recycle bin	: Source is from Wrong sound in game
Sound effect for time up	: Source is from Alarm clock

Figure 32: Source of Audio

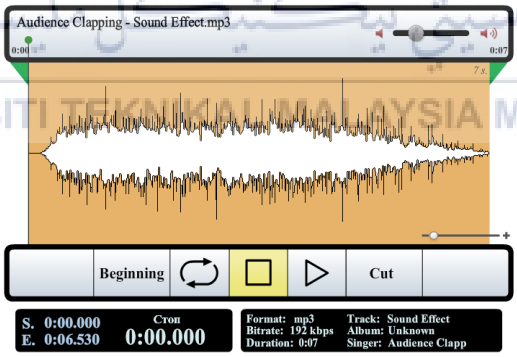

Figure 33: Mp3 cutter online

5.2.3 Production of Animation

The animation is set up Unity. In Unity, the animation is set by using the sprite image then set the sample frame . The sprite image is chosen to animate are shown in the figure 34.The sample by frame was used to set the sprite on the certain frame. Mostly animation in this project used in the game world.

Figure 34: Sprite Animation

Figure 35: Animation sample by frame

5.3 Integration of Game Component

Integration of game component is the process where the character import into unity asset sprite then creates as a game object. The component will be added follow the character requirement, for example of game component namely rigidbody2D, polygon collider2D. Next, insert a script to make the character functional.

Figure 36: Asset Sprite

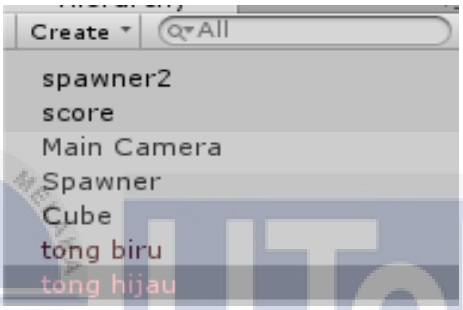

Figure 37: Game Object

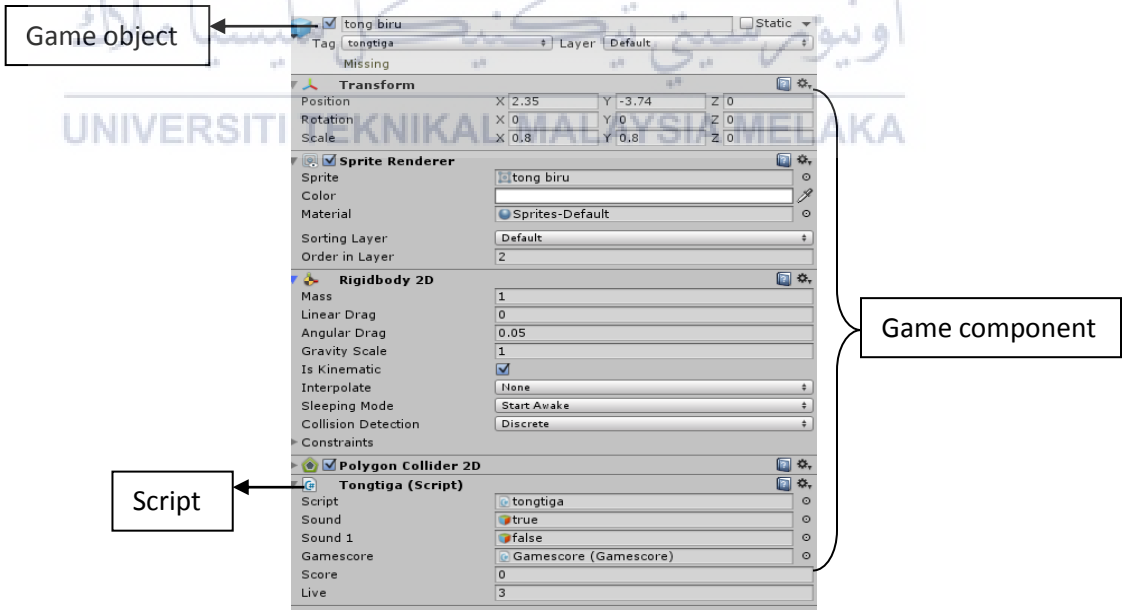

Figure 38: Game Component

```
public void OnCollisionEnter2D(Collision2D other)
{
    //count = ScoreKeeper.keep;
    if ((other.gameObject.tag == "susu") || (other.gameObject.tag == "pizza")
        || (other.gameObject.tag == "kertas") || (other.gameObject.tag == "popcorn")
        || (other.gameObject.tag == "kotak"))
    {
        gamescore.Score += 2;
        sound.GetComponent<AudioSource>().Play();
        Destroy(other.gameObject);
    }

    else if ((other.gameObject.tag == "jug") || (other.gameObject.tag == "cawan") || (other.gameObject.tag == "mentol")
        || (other.gameObject.tag == "botolkaca") || (other.gameObject.tag == "oil") || (other.gameObject.tag == "sos")
        || (other.gameObject.tag == "botol") || (other.gameObject.tag == "polystren") || (other.gameObject.tag == "tin")
        || (other.gameObject.tag == "hanger") || (other.gameObject.tag == "botolsabun") || (other.gameObject.tag == "softlan")
        || (other.gameObject.tag == "plastic") || (other.gameObject.tag == "plasticminum") || (other.gameObject.tag == "petrol")
        || (other.gameObject.tag == "pencuci"))
    {

        gamescore.Lives--;
        sound1.GetComponent<AudioSource>().Play();
        Destroy(other.gameObject);
    }
```

Figure 39: Game Script

Script is one of the game component. It will make the character function properly. Table below show the character and the script assign to that. Refer the script to the appendices B.

Table 6: Character and Script

Character	Script Name	Description
Recycle bin : Blue recycle bin Orange recycle bin Green recycle bin	movetongbiru movetongjingga movetonghijau	The script that set the recycle bin move left and right.
	tongtiga tongsatu tongdua	The script that set the sound for every waste that recognize to correct or wrong recycle bin.
	tongbiru tongjingga tonghijau	The script that set the score and live for every waste that recognize to correct or wrong

		recycle bin
Waste : Bottle Paper Glass Plastic Hanger Box Can	mousedrag	The script that set the waste will drag and drop into recycle bin
	spawnmultipleobject	The script that set waste appear randomly

5.4 Game Configuration Management

In this project, Unity has been used as a platform for project development. Before the game published, it needs to make the configuration setup. Configuration setup is important to make sure end product work properly. There is two step in configuration setup, which is build settings and build and run. As the game published, it will exist in exe format. Besides, to play the game, just need to copy the exe format and data file.

5.4.1 Configuration Setup

The game will be published on PC, the configuration setup started with build setting. In build setting, all the scene need to add in the scene in build. The build setting important to ensure all the scene would play since the game played. Then, the platform will set to PC, Mac & Linux Standalone. Besides, for build and run is set to 1266 x 768 for the screen resolution, the graphic quality is set to fantastic and the select monitor is set to display 1.

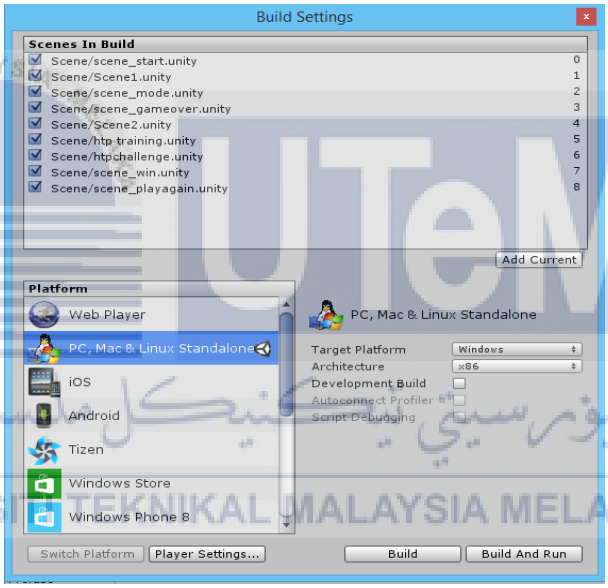

Figure 40: Build Settings

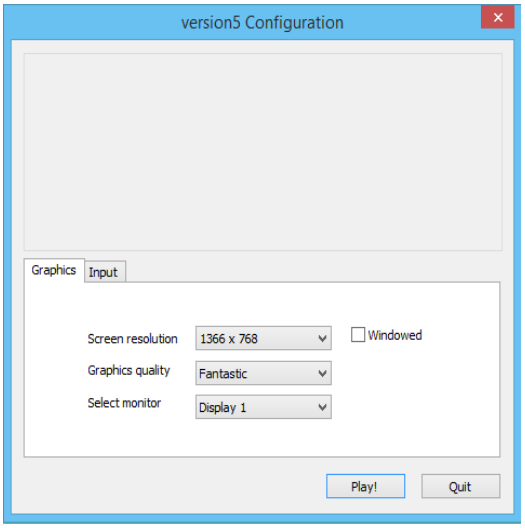

Figure 41: Build and Run

5.4.2 Version Control Procedure

In the development process, there is five version of the game before executing the game. In the first version, only one character was function and used the temporary game world. Besides, for the second and fourth version, the game was tested by BITE student, the tested intended to improve the gameplay, graphic and fun element in the game. The last version, the game was completed and will test to children in two modes of testing .

5.5 Implementation Status

Implementation status is the progress of development for each module based on Gant Chart. Table below show the implementation status for this project.

Table 7: Status Development

Module Name	Description	Duration to Complete	Status
Training mode	The screen where need drag and drop waste intro correct recycle bin and score 30 point	3 weeks	On Time
Challenge mode	The screen where need drag and drop waste into correct recycle bin within time limit	3 weeks	On Time
Design Game Asset	The character involve in game, for example recycle bin ,waste	2 weeks	On Time
Design Game World	The scene for every mode	2 weeks	On Time
Develop Game	Process where involve script, the asset, game world to make a game.	1 months	On Time

5.6 Conclusion

In this chapter, the details about the creation of game art ,integration of game component ,configuration setup. The creation of game art involves of 2D pipeline art, the production of character, the game world, audio, and animation. Besides, the integration of game component. The process where import and adding the game component. Then, the configuration setup to publish the product.

CHAPTER VI

TESTING AND EVALUATION

6.1 Introduction

This chapter will explain in details of the last phase of this project. Testing is the last phase of project requirement and used to measure the effectiveness of player to recognize the waste into corresponding recycle bin. There is two type of testing will be tested and survey question as a testing strategy. Besides this chapter also include test plan, test implementation, and test result and analysis.

6.2 Test plan

The purpose of the testing focuses on how to measure the effectiveness of the player to recognize waste into corresponding recycle bin. The phases of the testing will be positioned in the Post-production, because in that position, the game was completed develop. Besides, the target group of this project is to children aged 7 until 12 years. The target group is chosen to know their knowledge and concerned towards recycling . In the testing method, there is two type of testing, Pre-testing, and Post-Testing. Pre-

testing is a test where the player does not play the game yet while pre-testing is a test where player plays the game. In pre-testing, the tester will be given a question before play the game. Then, post-testing, the tester will be given a question after play the game. Next, tester needs to answer the question survey to test the effectiveness of game. Refer the question in appendices A.

6.3 Test Implementation

Testing is doing in two part, Pre-testing and Post-testing .The two testing is to measure the effectiveness of the player to recognize waste into corresponding recycle bin. Besides, pre-testing conducted with given the question before tester plays the game, then tester will play the game. The tester need start the game with read how to play the game. After playing the game, tester needs to sit pos-testing. Post-testing the question given after play the game .There are 10 students being tested. The survey questions also were given to respondent to know the feedback after play the game. The evaluation of the testing based on the mark of the answer given. 1 mark will be given if 1 question correct. For survey question, tester needs to choose yes or no . All the output of the testing and survey question will display in result and analysis.

6.4 Test Result and Analysis

a) Analysis of Pre-testing and Post-testing

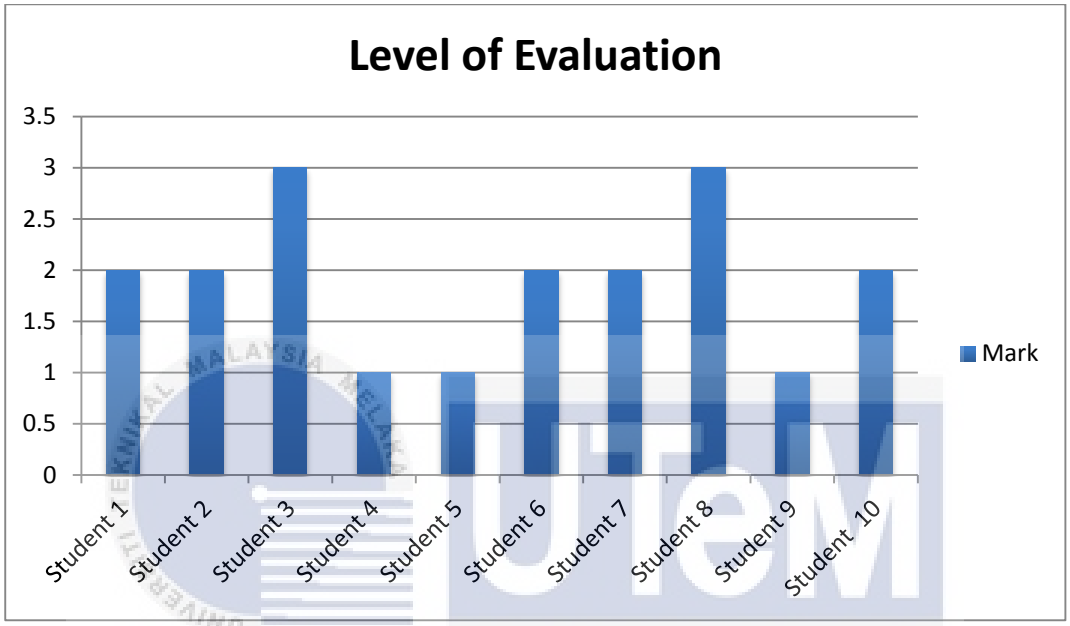

Figure 42: Pre-testing

The figure above show the score student get from the pre-testing question . Student 1,2,6.7 and 10 only get 2 score. Besides student 4,5 and 9 get 1 score while student 3 and 8 get 3 scores. All student get the low mark because not play the game yet, student knowledge toward recycle is low. Mostly, student answer the question based on what they know and certain only just answer the question without know anything about recycle

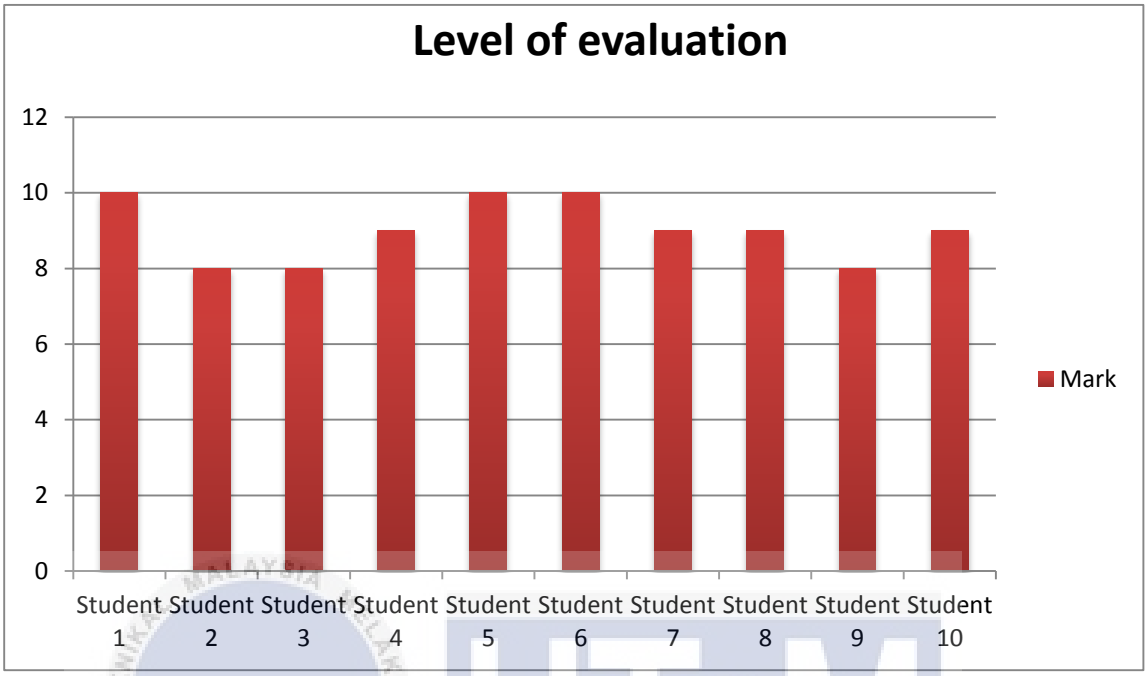

Figure 43: Post-testing

The figure above shows the score student get from the post-testing question. Student 1,5, and 6 get the higher score which is 10. Besides, student 2,3 and 9 get 8 scores while student 4,7,8 and 10 get 9 scores. All student get the high mark after play the game. The student knows when reading the how to play and can recognize the waste into corresponding recycle bin.

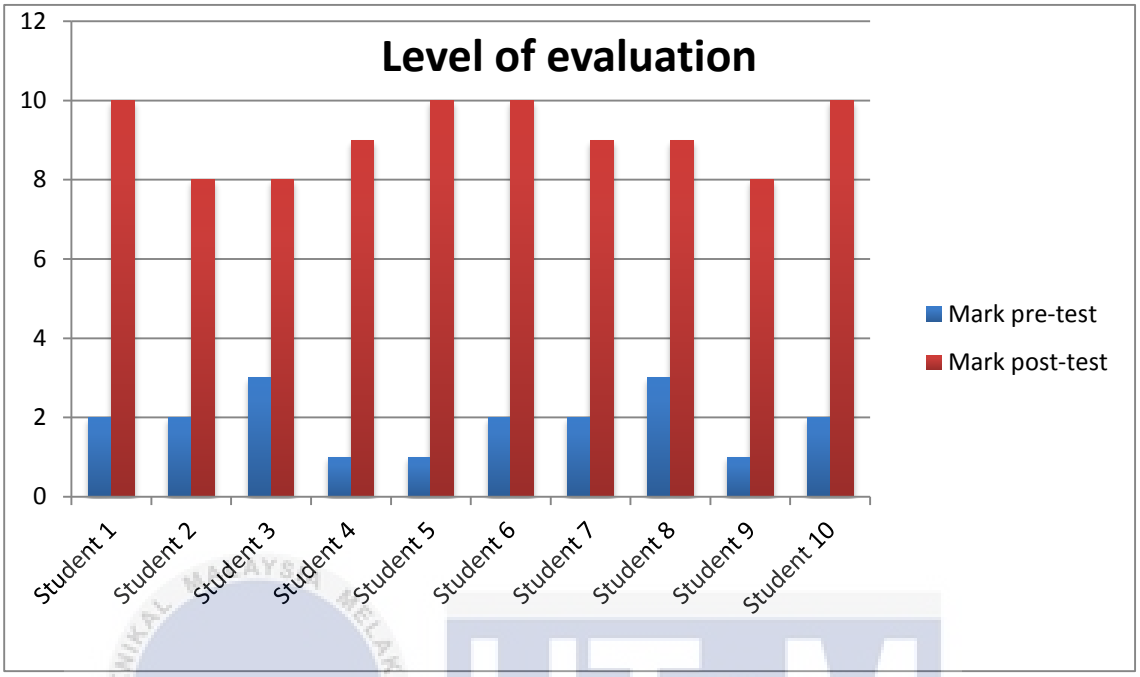

Figure 44: Pre-testing vs. Post-testing

The figure above shows the comparison of student score in pre-testing and post-testing. Students score higher in post-testing compare pre-testing. The result shows that player able to recognize the waste into corresponding recycle bin effectively. Student will score higher in the post- testing compare the pre-testing because they have played the game. In the game, it provides how to play the game. The comparison of two testing shows that after play the game, student know recognizes waste recognize the waste into corresponding recycle bin.

b) Analysis of question survey

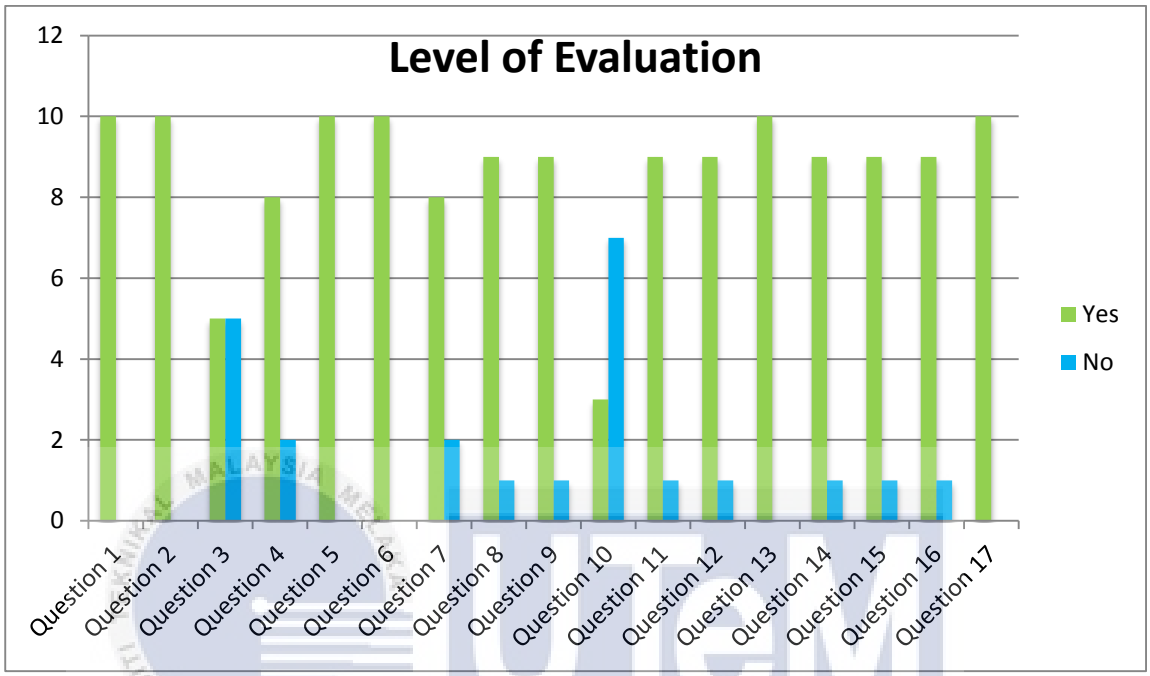

Figure 45: Question Survey

The figure above shows the result of question survey. Based on question 1,2 and 3, the question is focus on concentration, all student agree that Let's Recycle It game grab the attention and know the game related to recycling waste. But student not agrees that not distracted to recognize many types of waste. Student distracted in challenge mode because of moving recycle bin .

Besides, based on question 4 and 5, the question focus on goal clarity. The student agrees that overall game goal presents clearly and understand how to recognize the waste into corresponding recycle bin. Only 3 students not clear the game goal because not read how to play.

Then, based on question 6,7 and 8,the question focus on feedback. The student agrees that receive feedback when to drag the waste, notified of the task when press how to play and receive information since playing the game. Only 3 students didn't notify the task because not press how to play button and only 1 not receive information.

Based on question 9,10,11,the question focuses on the challenge. The student agrees that enjoy the game without feeling bored and believe the difficulty challenges improved their skill. But, 7 students do not agree that the challenge is adequate ,neither too difficult nor too easy. This is because of challenge mode, it difficult due to the timer and the moving recycles bin, the student needs to score before the timeout. The moving recycles bin make student difficult to drag the waste.

Next, question 12,13,14,the question focus on autonomy. The student agrees that feel sense control of the menu, control over action and knows the next step in the game. It is because student easy to control the game and clear about button and character in the game

Last, the question 15,16 and 17,focusing on knowledge improvement. The student agrees that the game increases the knowledge, try to apply the knowledge from the game in daily life and the game motivates player the importance or recycle waste. From the statement ,it can be concluded that student understanding the game.

6.5 Conclusion

This chapter discussed how testing phase is being conducted. The process included test plan, test implementation, result, and analysis. From the analysis, the player able to recognize the waste into corresponding recycle bin effectively. Student will score higher in the post- testing compare the pre-testing because they have played the game. In the

The game, it provides how to play the game. The comparison of two testing shows that after play the game, student know recognizes waste recognize the waste into corresponding recycle bin.

Besides, student is effectiveness recognize the waste into corresponding recycle bin based on the survey question, mostly student are concentrated with game, clear the goal of game, receive feedback from game, feel control of game and increase the knowledge.

CHAPTER V11

PROJECT CONCLUSION

7.1 Observation of Strength and Weaknesses

Project Strengths :

I. Develop by using the Unity as game engine
II. Provide the graphic ,sound effect and animation
III. Provide two modes ,training and challenge
IV. Player able to recognize the waste when reading how to play

Project Weakness :

I. No database record for score
II. Player distracted to recognize many type of waste
III. Confused the waste ,either glass or plastic

7.2 Preposition for improvement

The suggestion improvement is to develop the game in the mobile version, so no need to open the computer to play the game. Besides, develop in 3D mode, so the player

will clear see the waste either glass or plastic. Provide the database, so can view the high score.

7.3 Project Contribution

The contribution of this game is in the educational field and increase the awareness towards recycling. The element of this game, the graphic, audio animation have been applied in this game attract children to play it. By applying the interactive element in this game , it can grab children attention at the same time increase knowledge about recycling when to play the game. This game also introduces the game mechanic which is a game of emergence and game of progression. Game of emergence has a small number of rule and highly replayable while the game of progression has walkthrough instead of strategy guides. Walkthrough detail all of the player action required completing the game. This game is categorized as a game of emergence and it suitable to be played by children because of highly replayable and easy to play. Besides, this game helps child to recognize waste into corresponding recycle bin because this game provides how to play.

7.4 Conclusion

In a conclusion ,this project has some strengths and weakness need to consider. The improvement need to attract children play and at the same time increase the awareness towards recycle.

Besides, this project has successfully developed and achieve the objective to evaluate players' effectiveness to recognize types of waste and their corresponding recycle bin. Players understand the content of the game ,for example how to play and able recognize waste effectively.

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APPENDICES A

(Question Survey)

A 2D PC GAME FOR RECOGNIZE TYPE OF WASTE AND HOW TO RECYCLE IT

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Below are statements regarding how to measure the effectiveness of player to recognize type of waste and their corresponding recycle bin. Please read each one and indicate to what extent you agree or disagree with each statement.

No	Question	Yes	No
	Part 1 : Concentration		
1	Lets Recycle It game grabs my attention		
2	The game activity are related to recycle waste into corresponding recycle bin		
3	I am not distracted to recognize many type of waste into corresponding recycle bin once		
	Part 2 : Goal Clarity		
1	Overall game goals were presented clearly		
2	I understand how to recognize the waste into corresponding recycle bin through the game.		
	Part 3 : Feedback		
1	I receive feedback when drag waste into corresponding recycle bin such as sound		
2	I notified of the tasks immediately when I press how to play button		
3	I receive information since play the game, such as score		
	Part 4 : Challenge		
1	I enjoy the game without feeling bored or anxious		
2	The challenge is adequate, neither too difficult nor too easy		
3	The difficulty of challenges increase as my skills improved		
	Part 5 : Autonomy		
1	I feel a sense of control the menu (such as start, play, back)		
2	I feel a sense of control over actions of roles or objects		
3	I know the next step in the game		
	Part 6 : Knowledge Improvement		
1	The game increase my knowledge on how to recognize waste into corresponding recycle bin		
2	I try to apply the knowledge from the game in daily life		
3	Lets Recycle It game motivates player the importance of recycle waste		

(Question Pre-testing and Post-testing)

Match each waste with correct recycle bin

RESPONDENT

APPENDICES B

Code	Function

using UnityEngine;
using System.Collections;
 	
public class SpawnMultipleObject : MonoBehaviour
{
 	
private Vector3 startPosition;
 	
private float newXPos = 0f;
 	
public float moveSpeed =10f;
 	
public float moveDistance =15f;
 	
public GameObject[] gameObjectSet;
	Spawn Random waste

```
      public float timeLeftUntilSpawn = 0f;
      public float startTime = 0f;
      public float secondsBetweenSpawn =3f;

      // Use this for initialization
      void Start ()
      {
            startPosition = transform.position;
      }
      void SpawnRandomObject ()
      {

      int whichItem = Random.Range (0, 21);
      Debug.Log ( "Our random number is " +
whichItem);

      GameObjectmyobj=
Instantiate(gameObjectSet[whichItem])as
GameObject;
      myobj.transform.position=
transform.position;
```

```
	}
	// Update is called once per frame
	void Update () {
		newXPos = Mathf.PingPong (Time.time * moveSpeed, moveDistance) - (moveDistance/2f);

		transform.position = new Vector3 (newXPos, startPosition.y, startPosition.z);

		timeLeftUntilSpawn = Time.time - startTime;
		if (timeLeftUntilSpawn >= secondsBetweenSpawn)
		{
			startTime = Time.time;
			timeLeftUntilSpawn = 0;
			SpawnRandomObject();
		}
	}
}
```

using UnityEngine;
using System.Collections;
 	
public class movetongjigga : MonoBehaviour
{
public float delta = 7.9f;
public float speed = 1.0f;
private Vector3 startPos;
void Start ()
{
startPos = transform.position;
}
void Update ()
{
Vector3 v = startPos;
v.x += delta * Mathf.Sin (Time.time * speed);
transform.position = v;
}
}
	Set random placement of recycle bin

Spawn multiple object

```
using UnityEngine;
using System.Collections;
//using Assets.Script;

public class SpawnMultipleObject : MonoBehaviour
{

      private Vector3 startPosition;

      private float newXPos = 0f;

      public float moveSpeed =10f;

      public float moveDistance =15f;

      public GameObject[] gameObjectSet;

      public float timeLeftUntilSpawn = 0f;

      public float startTime = 0f;
```

```
public float secondsBetweenSpawn =3f;
// Use this for initialization
void Start ()
{
      startPosition = transform.position;
}
void SpawnRandomObject ()
{
int whichItem = Random.Range (0, 21);
Debug.Log ( "Our random number is " +
whichItem);

GameObjectmyobj=
Instantiate(gameObjectSet[whichItem])as
GameObject;

myobj.transform.position = transform.positio
}
// Update is called once per frame
```

```
     void Update () {
      //newXPos++;

newXPos =Mathf.PingPong (Time.time * moveSpeed,
moveDistance) - (moveDistance/2f);

transform.position = new Vector3 (newXPos,
startPosition.y, startPosition.z);
timeLeftUntilSpawn = Time.time - startTime;

if (timeLeftUntilSpawn >= secondsBetweenSpawn)
{
      startTime = Time.time;
     timeLeftUntilSpawn = 0;
//Debug.Log ("Spawn One here");

SpawnRandomObject();
}
```

<pre>using UnityEngine;
using System.Collections;
using UnityEngine.UI;
public class Timer : MonoBehaviour
{
    float timeLeft = 30;
    public Text text;
 	
    // Use this for initialization
    void Start()
    {
    }
    // Update is called once per frame
    void Update()
    {
        timeLeft -= Time.deltaTime;
        text.text = " Time Left :" + Mathf.Round(timeLeft);
        if (timeLeft < 0)
        {
       Application.LoadLevel("scene_gameover")</pre>
	Set of timer

using UnityEngine;
using System.Collections;
 	
public class mouseDrag : MonoBehaviour
{
 	
float distance = 10;
// Use this for initialization
void OnMouseDrag ()
{
Vector3 mousePosition = new Vector3
(Input.mousePosition.x, Input.mousePosition.y,
distance);
Vector3objPosition=
Camera.main.ScreenToWorldPoint (mousePosition);
 	
transform.position = objPosition;
 	
}
}
	Mouse drag

using UnityEngine;
using System.Collections;
 	
public class tongjingga : MonoBehaviour {
 	
public GameObject sound;
public GameObject sound1;
public gamescore1 gamescore;
public int score = 0;
 	
void Start()
{
sound = GameObject.Find ("true");
sound1 = GameObject.Find ("false");
}
 	
public void OnCollisionEnter2D(Collision2D other)
{
	Game score

```
        if ((other.gameObject.tag == "botol") ||
(other.gameObject.tag    ==    "polystren")    ||
(other.gameObject.tag      ==      "tin")      ||
(other.gameObject.tag     ==     "hanger")     ||
(other.gameObject.tag    ==    "botolsabun")    ||
(other.gameObject.tag     ==     "softlan")     ||
(other.gameObject.tag     ==     "plastic")     ||
(other.gameObject.tag   ==   "plasticminum")   ||
(other.gameObject.tag     ==     "petrol")     ||
(other.gameObject.tag == "pencuci"))
        {
            gamescore.Score += 2;

     sound.GetComponent<AudioSource>().Play();
            Destroy(other.gameObject);
        }
 else  if  ((other.gameObject.tag  ==  "jug")  ||
(other.gameObject.tag     ==     "cawan")     ||
(other.gameObject.tag     ==     "mentol")     ||
(other.gameObject.tag    ==    "botolkaca")    ||
(other.gameObject.tag      ==      "oil")      ||
```

```
(other.gameObject.tag      ==      "sos")      ||
(other.gameObject.tag      ==      "susu")     ||
(other.gameObject.tag      ==      "pizza")    ||
(other.gameObject.tag      ==      "kertas")   ||
(other.gameObject.tag      ==      "popcorn")  ||
(other.gameObject.tag == "kotak"))
        {
            gamescore.Score--;
     sound1.GetComponent<AudioSource>().Play();
            Destroy(other.gameObject);
        }
    }
}
```