HIDDEN OBJECTS VIRTUAL REALITY:

THIS IS MALAYSIA

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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This report is submitted in partial fulfilment of the requirement for the
Bachelor of Information Technology (Game Technology)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
2017

BORANG PENGESAHAN STATUS TESIS*

JUDUL: HIDDEN OBJECTS VIRTUAL REALITY: THIS IS MALAYSIA

SESI PENGAJIAN: 2016/2017

Saya   AIMI ATHIRAH BINTI MOHD PISOL

(HURUF BESAR)

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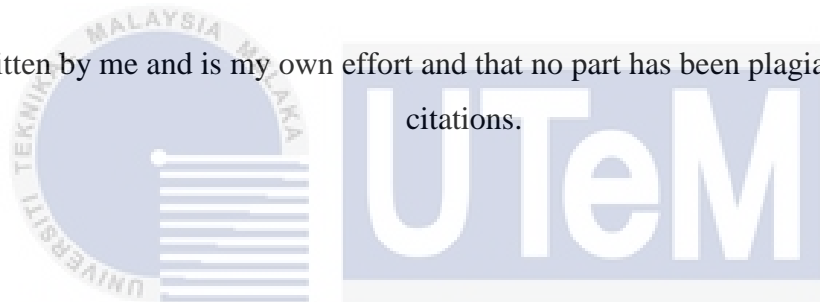   berkuasa.

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I hereby declare that this project report entitled

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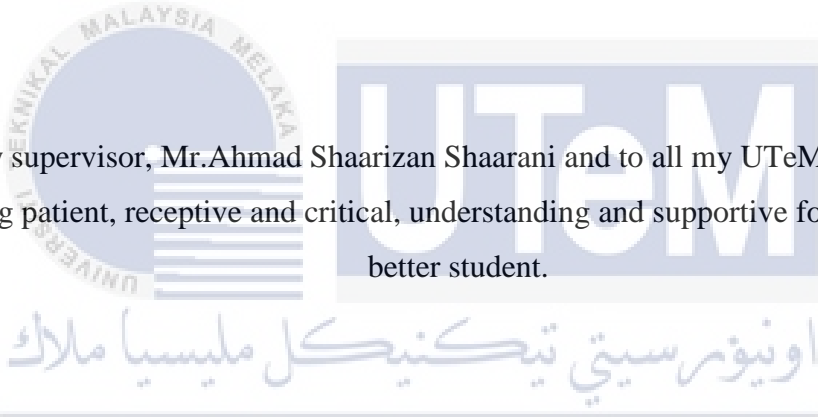SUPERVISOR   :   Date : 28/8/2017

                     (AHMAD SHAARIZAN SHAARANI)

DEDICATION

I dedicated this PSM project to my beloved parents, your love and support are my strength and inspiration.

To my supervisor, Mr.Ahmad Shaarizan Shaarani and to all my UTeM lecturers, for being patient, receptive and critical, understanding and supportive for me to be a better student.

To my friends, it is for your sacrifices in time and energy, encouragement, and support all this while.

ACKNOWLEDGEMENTS

ABSTRACT

The title for this project is Hidden Objects Virtual Reality: This Is Malaysia. The report is written to fulfil the requirement for the final year student of session 2016/2017. The purpose of developing this game is to implement Virtual Reality technology and traditional elements and Malaysian culture in hidden object game. Aside from that, this project will provide users an experience of Virtual Reality game that have Malaysian setting and learn more about Malaysia. There are three main field in this project which are Virtual Reality technology, hidden object games, and traditional elements and culture of Malaysia. The target of this game is to the youngsters in Malaysia and tourists aged 13 years old and above to help them improve their knowledge about traditional elements and culture in Malaysia. The methodology used in this game development is Game Development Life Cycle (GDLC) model which is the derive model of Software Development Life Cycle (SDLC) model. As a result, a complete hidden object game that implement virtual reality technology and local elements was successfully developed and tested. All the participants like the game because it help them in improve their knowledge about Malaysia traditional elements and culture. A lots of knowledge and experiences are gained while developing this game. As a conclusion, this report will show all the details and information of the researches made for the game and development process of the game achieved by the student.

ABSTRAK

Tajuk untuk projek ini adalah Hidden Objects Virtual Reality: This Is Malaysia. Laporan ini ditulis untuk memenuhi keperluan bagi pelajar tahun akhir sesi 2016/2017. Tujuan permainan ini dibangunkan adalah untuk mengaplikasikan teknologi realiti maya dan alat-alat tradisional dan budaya yang terdapat di Malaysia. Selain itu, projek ini turut memberi pengguna merasai pengalaman permainan Realiti Maya yang mempunyai suasana Malaysia dan mempelajari dengan lebih lanjut mengenai Malaysia. Terdapat tiga bidang utama dalam projek ini iaitu teknologi Virtual Realiti, permainan objek tersembunyi, dan alatan tradisional dan budaya Malaysia. Sasaran permainan ini adalah untuk golongan muda di Malaysia dan pelancong yang berumur diantara 13 tahun ke atas bagi membantu mereka meningkatkan pengetahuan mereka tentang alatan tradisional dan budaya yang terdapat di Malaysia. Metodologi yang digunakan dalam membangunkan permainan ini adalah model *Game Development Life Cycle* (GDLC) yang merupakan model derivasi model *Software Development Life Cycle* (SDLC). Hasi daripada ini, satu permainan objek tersembunyi yang mengaplikasikan teknologi realiti maya dan elemen tempatan telah berjaya dibangunkan dan diuji. Permainan ini diuji dan disukai oleh pemain kerana ia membantu mereka dalam meningkatkan pengetahuan mereka tentang alatan tradisional dan budaya Malaysia. Banyak pengetahuan dan pengalaman diperoleh semasa membangunkan permainan ini Banyak pengetahuan dan pengalaman telah diperolehi semasa membangunkan permainan ini. Kesimpulannya, laporan ini akan menunjukkan segala butiran dan maklumat daripada kajian yang telah dibuat untuk permainan ini dan prosess membangunkan permainan ini yang dicapai oleh pelajar.yang dicapai oleh pelajar.

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CHAPTER I

INTRODUCTION

1.1 Introduction

Hidden Objects Virtual Reality: This Is Malaysia game is a hidden objects game develop for android users by using a game engine. The game genre for this game is puzzle. Puzzle game is a game that involve problem solving skills including logic, pattern recognition, sequence solving, and word completion. Therefore, hidden object is one of the game that fall into this genre because it involve problem solving skills to play this game because it require the player to find items within the given list. For example, the game named House Secrets, Little Shop of Treasures 2 and many more. The gameplay for this game are, players are required to find objects or items according to the check list hidden within the pictures in order to move to another levels or places in order to win the game. This game will implement virtual reality technology and implement local element of Malaysia.

Due to the increases in virtual reality (VR) usage nowadays, the game is set to let the player plays this game in a new way whereby a VR Box is required for this game. Apart from that, the game settings for this game will be different from other

published game because this game settings will be inside Malaysia and the items need to be found are mostly the traditional things in Malaysia that are almost extinct so with this player will know more about Malaysian culture and traditional things apart having new experience of playing hidden object game.

The main purpose of the game are to explore about culture and traditional concept in Malaysia related to digital game, to develop new virtual reality hidden object game platform which implement Malaysian traditional culture and to analyse users' acceptance of hidden object game using virtual reality as a new game platform.

1.2 Problem statement(s)
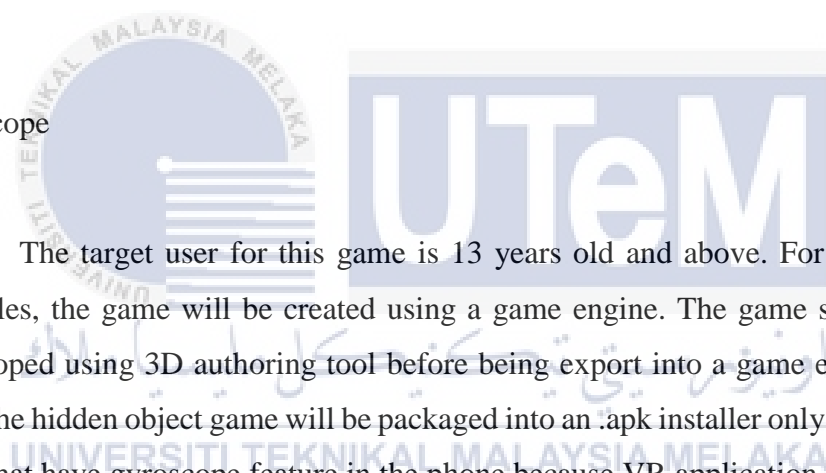
The motivation for developing this project comes from the ideas of that, the traditional elements and culture are no longer becoming part of the young generation in Malaysia. Most of the youngster nowadays have forgotten about the traditional elements and culture of Malaysia as days go by. Having the youngsters lacking in knowledge about the traditional culture and elements in Malaysia will lead to extinction of our old, valuable and interesting Malaysian culture. Apart from that, there are less hidden object game that implement VR technology and game that implement Malaysia local element inside game are available in the appstore or online. Therefore, this game will indirectly help the players improve their general knowledge about Malaysian culture and traditional things while playing the game. Besides being an entertainment in itself, this game can also be one of the medium that indirectly helps in promoting and introducing Malaysian culture and traditional things worldwide.

1.3 Objective

This study embarks three main objectives:

1. To explore about culture and traditional concept in Malaysia related to digital game.
2. To develop new virtual reality hidden object game platform which implement Malaysian traditional culture.
3. To evaluate users' usability of hidden object game using virtual reality as a game platform.

1.4 Scope

The target user for this game is 13 years old and above. For the content or modules, the game will be created using a game engine. The game settings will be developed using 3D authoring tool before being export into a game engine. Besides that, the hidden object game will be packaged into an .apk installer only for 4.3 android user that have gyroscope feature in the phone because VR application can only run in phone that have gyroscope.

1.5 Project Significance

This game let the android users explore about culture and traditional concept in Malaysia through digital game because all the setting inside the game will take place in Malaysia and the hidden object inside the game will be the traditional things in Malaysia from various cultures. Apart from that, the game will also present a new

hidden object game platform to Malaysian people whereby a VR box is use to play the game. Therefore, this game will help in spreading Malaysian culture and traditional concept to the players and also improve general knowledge among Malaysian people about extinct culture and traditional things in Malaysia.

1.6 Conclusion

As a conclusion, the expected outcomes from the project is that this game will give benefits to the player such as gain additional knowledge about Malaysia beside experience the feeling of playing a new form of virtual reality game and hope that this project will achieve the entire objectives stated earlier. The next chapter to be developed discusses about literature review and project methodology.
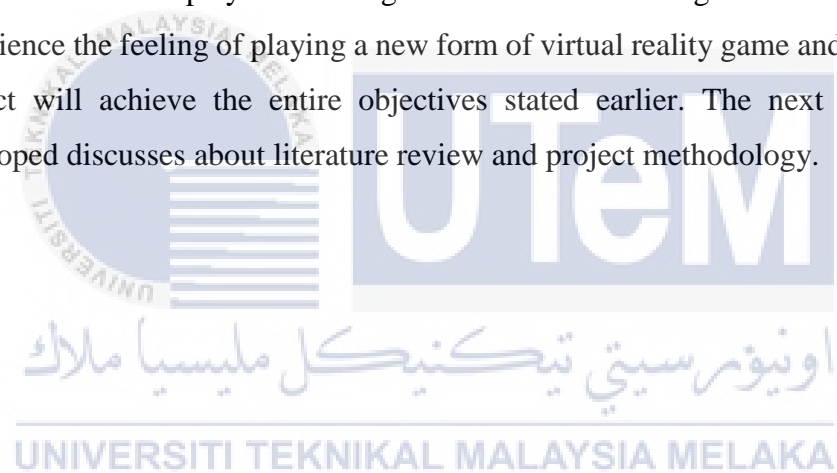
CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

In this chapter, all related literature review that have been written in the proposal to support the game idea and project title will be describe in details. Literature review can be refers as the study on collection of published materials in selected area of studies such as thesis, online library, articles, journals, technical documents and case studies. Literature review is the theoretical base for research and to support the research topic through analysis, summarize and evaluation of the literature from valid source.

2.2 Domain

The traditional culture and things in Malaysia are no longer becoming part of the young generation in Malaysia which day by day it have been forgotten. Having the youngster lacking in knowledge about the traditional culture and things in Malaysia will lead to extinction of our old, valuable and interesting Malaysian culture.

This is because Malaysians nowadays began to adopt and adapt many foreign values and practice them in their daily life due to the advances in technologies. These modern Malaysians have passed this new set of norms and values such as being open minded, practice the spirit of competitiveness and accept challenging ways of getting things done to their children who are the present generation. This have impacts on Malaysians' attitudes which have changed their traditional values and identities which have made the culture and identity can no longer be seen as a stagnant process. (Lee Su Kim, Azianura Hani Shaari, Siti Hamin Stapa, 2010).

According to Hashim P.Mamat (2014), Malaysian were urged to preserve the arts, customs and culture, but these are marginalized, especially among the younger generation. Folk art is a symbol of the way of life of a nation that has values and reflects the customs and culture of their daily lives. Art is our nation therefore should continue to be strengthened and must be inculcated in the younger generation who will be the heir to the art of his own race.

Game is one of the platform that can be used to implement traditional culture and a medium to spread the culture to the younger generation in a relax and entertaining way. This is because game is the best tool to be used as it can express thought and feelings to the user in a creative ways. (C. R. Ruiz, Salimi, Chodnok, & Ha, 2009).

Virtual Reality is one of the platform that is widely used in games nowadays and has been a good tool to make the player gains more experience and appreciative as it makes the player more immerse into the game or simulation. According to (Chen, Lin, Chien, & Tsai, 2016) Virtual Reality Simulation can give more satisfaction to the interaction and operation efficiency as it can give valuable insight into improving the user experience in digital while improve the user satisfaction and optimize interactive usability / interactive operation.

This is proved through a pilot study that implemented user experience to test whether Virtual Reality simulation system can ensure usability and increase the user satisfaction which involve 70 participants to test a Virtual Reality simulation system to reconstruct a non-extant Historic east Taiwan railway station. This pilot study also confirmed that through Virtual Reality the participants perceived that they were more appreciative of the historic railway stations and railway culture using this virtual reality simulation.

Therefore, this game will present the players a new platform of hidden objects games as it uses virtual reality as one of the tools to make the players more immerse plus it will indirectly help the players improve their general knowledge about Malaysian culture and traditional things while playing the game besides being an entertainment in itself. This game can also be one of the medium that indirectly helps in promoting and introducing Malaysian culture and traditional things worldwide.

2.3 Existing System

Hidden-Object game has high demand for visual search and the need to focus on only the objects need to be found among clutter of objects within a hidden object scene, that can lead in improve in visual search performance and spatial memory.

Study showed that, visual search and spatial memory can be improved through the hidden-object itself because it help in training to improve spatial working memory accuracy as the improvement can be seen clearly for dual-task conditions in the game.(Oei & Patterson, 2013)

Virtual Reality or known as VR can be defined as a way to visualize, manipulate and interact with computer and complex data. Apart from that, VR also can give experience to user by providing a physical immersion and psychological presence (Guttentag, 2010; Schultheis & Rizzo, 2001). A study was conducted on 22 participants to test on how Virtual Reality immersive display impact gaming quality of experience to user. The test was conducted by making the users interact with the same forklift driving serious game in both environments which are in 2D PC screens and head-mounted Oculus Rift as a device that can provide virtual reality environments. The result shows that virtual reality can perceive high realism and naturalness in the game itself by making 3D environment that can be explored 360 degree. User said that it is more easily to play and learn through this platform as it have high level of immersion into the game world itself by using virtual reality as a platform of playing this game (Hupont, Gracia, Sanagustín, & Gracia, 2015).

Hidden Object game can help in training and improve spatial memory while virtual reality platform can help in making player immerse into the game. Therefore in this project this two games are overview for designing this game.

i. Criminal Case

Criminal Case is a detective-themed hidden object game released on November 15 2012 and develop by French indie studio named Pretty Simple .This game allow the player to act as a detective to solve a several cases by searching for relevant clues at the crime scenes by click the items in the crime scenes given as shown in Figure 2.1. Player need to collect stars to be used to perform other task such as examining evidence and interrogating suspects to allow the player to arrest the suspects that fulfill

all the criteria that are collected and analyse by the player throughout the game and allow the player unlock level and proceed to the next level when complete the case in the chapter. Besides that, this game are also integrated with several puzzle element, bonus features and various progression. This game can be play on computer through Facebook or smartphones that using iOS and android. Through this game player will improve their memory and vocab.

Figure 2.1: Criminal Case

ii. InMind

InMind is a game that combine game and education that use virtual reality as a platform to play game. This game is developed by an independent company known as Nival which is founded in 1996 by games industry veteran Sergey Orlovskiy the current CEO of Nival. The game is released on January 22, 2015. This game require the player to search for a neurons that cause mental disorder as the game will make the player experience the miracles in the human brain by making the player feel like they have been submerge into the microworld inside the human mind as shown in Figure 2.2.This game can be play though computer by download through steam and also support for smartphones which use the android and iOS.
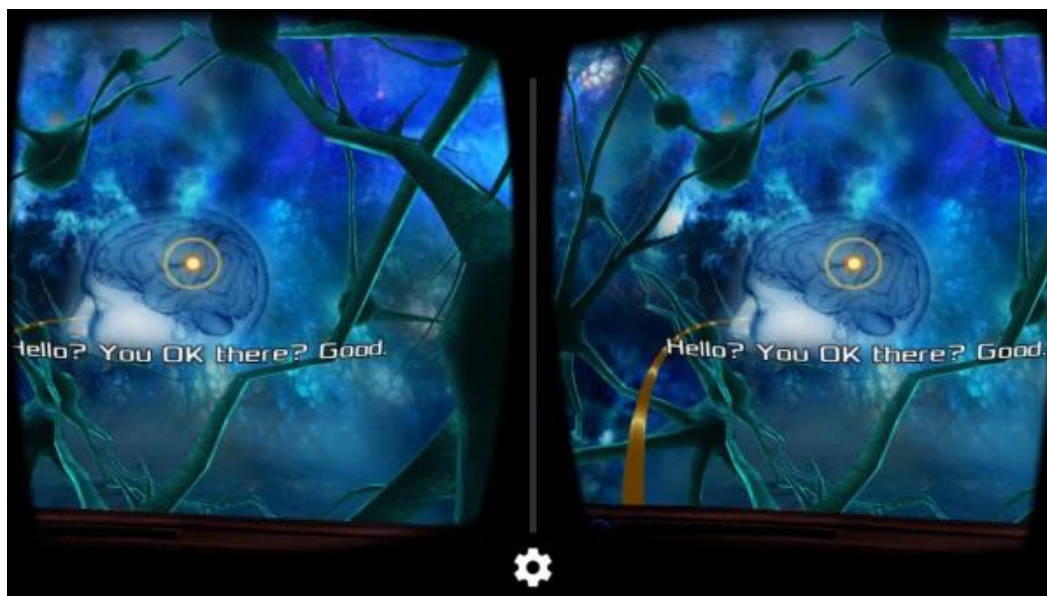
Figure 2.2: InMind

iii. Virtual Reality Hidden Objects : The shopping lists

Virtual Reality Hidden Objects: The shopping lists is the hidden object game that use virtual reality platform to play this game. This game is released on 27 May 2015 and develop by Diego Bezares. This game require the player to look around using smartphones to find the hidden objects inside the supermarket. Player need to look around for the item in the trolley at the shelves inside the supermarket as shown in Figure 2.3. Player need to search for the items in a given time limit and need to be fast to achieve 3 stars and to unlock the next level which will have more variety shopping list. This game is firstly release for iOS but on 6 Jun 2015 this game is released for android user too. This software require a smart phones and a VR box to achieve natural virtual reality experience. Through this player will get a new experience of hidden object game because it let the player to play it in a virtual reality platform which will make the player immerse into the game world and feel like they are in the real supermarket.
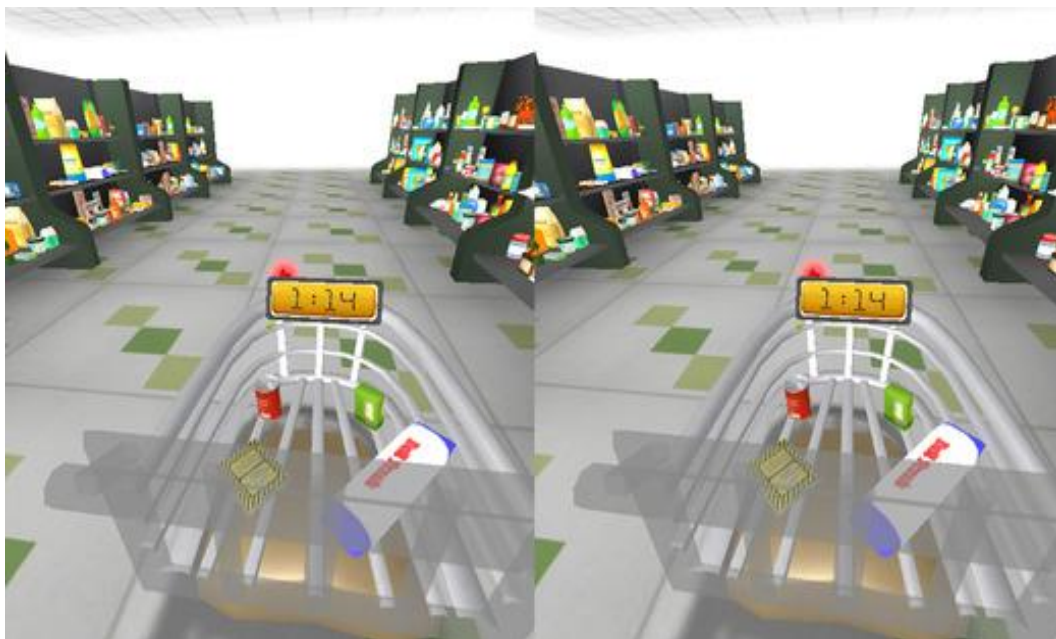
Figure 2.3: Virtual Reality Hidden Objects: The shopping lists

2.3.1 Comparison of Existing System

Table 2.1 show the comparison made for both of game to analyze the differences of those games on the term of platform used, advantages and disadvantages.

Table 2.1: Comparison of Existing System

Types ⟋ Games	Criminal Case	InMind	Virtual Reality Hidden Objects: The shopping lists
Genre	Puzzle	Action-Adventure	Puzzle
Platform used	PC(Facebook), iOS, android	PC(oculus-rift, htc-vive), iOS, android, mac	PC(oculus-rift), iOS, android

Input devices	Mouse, touch screen	Gaze input	Keyboard, Mouse, Gamepad, and Hydra for PC while gaze input for smartphones
Advantages	Allow player to improve memory and vocabulary.	Allow the player to experience and learn about neuron disorder inside human mind	Allow player to experience Virtual Reality and play in 360 degree mode if player does not want to use VR.
Disadvantages	Player cannot experience VR. Player cannot move 360 degree inside the game.	Does not require many action from the player as the player only need to gaze at disorder neurons	Player cannot improve vocabulary through the game as it only allow the player to find the same item inside the trolley on the shelves.
Similarity	Only can be play as a single player		

2.4 Project Methodology

For this project the methodology use is Game Development Life Cycle (GDLC) model as shown in Figure 2.4. GDLC model is the derive model of Software Development Life Cycle (SDLC) model. GDLC is mostly use in all game development because there are several challenges faced when developing game that make this

model a suitable approach to be use in the game development project. There are several steps in this model that help to direct the flow of game development and reduce the risk for the game. GDLC consists of five (5) phases which are phase 1: initiation, phase 2: pre – production, phase 3: production, phase 4: alpha testing and phase 5: beta testing and release product.

Phase 1: Initiation

This phase is where the idea and concept for the game is brainstorm. A couple of ideas are brainstormed. All the ideas have a roughly gameplay. The pros and cons for this project were also discuss here. Once the best idea is pick, the idea is refine by brainstorming more content for the idea about the design, rules, theme and settings of the game.

Phase 2: Pre-production

After having a stable idea, gameplay, and a rough idea about how the game looks like, the designing phase will start. Firstly, the game flow-board will be sketched, to make the idea and the flow of the gameplay clearer and like the one designed. After the sketch, the game items, the game world and other game assets will be designed. Apart from that, at this phase all information needed for the game will be gathered such as the problem statement, objectives of the game, project scope, schedule development and cost estimate. The game architecture (refer figure 1) is also drafted in this phase. At this phase, gameplay and the game mechanic will be refined to ensure all the elements are perfectly strong before starting the production phase.

Phase 3: Production

After obtaining the flow need to be done in the phase two, all the focus is on what and how to make the game assets for the game such as 2D assets, 3D assets, and 3D world, sound effects and the programming for the game. Once all the main assets are prepared, the game base is created and the prototype for the game is started to be developed. This phase usually take a longer time than other phases.

Phase 4: Alpha Testing

After the prototype is done, the evaluation and play testing on the game is started by testing it myself to check whether the game is like how it supposed to be or not, if it is not, I will go back to phase 3 and refine the game again, or fix any bug that I have encountered, then back to this phase to play testing again, until it has less bug as possible or until new bug is detected. I will also demonstrate the game to my supervisor and discuss with him so that the game can be improved further and make the game stable enough to go to the next phase.

Phase 5: Beta Testing and Release Product

Once the game is stable enough more than the prototype and able to play as beta version, some play testers and a number of people from the target audience will play test the game ,evaluate and give comments which will help in refining the game even better. After making the refinement based on all the comments and evaluation the game will be released officially.
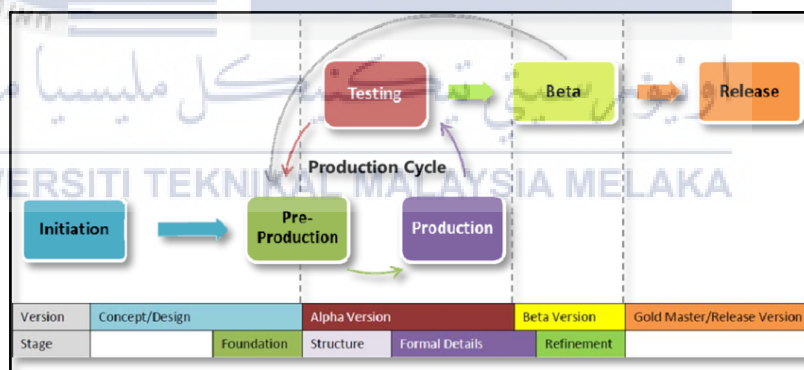
Figure 2.4: GDLC

2.5 Project Requirements

This part will list in details about all the software required for this project. Project requirement will be divided into two which are software requirement and hardware requirement.

2.5.1 Software Requirement

- Unity 5.5
- Adobe Illustrator
- Adobe Photoshop
- Maya 2014
- Android Studio
- Cinema 4D

2.5.2 Hardware Requirement

- Android Smartphones with gyroscope and android 4.4 and above
- VR Box
- Bluetooth Controller
- Laptop (MSI)

2.6 Conclusion

In this chapter, related literature review that have been written in the proposal to support the game idea and project title will be describe in details and existing system is compare and explain. The used of VR in hidden object game is the new issue or case

study that really famous now is identified. The methodology use for this project is identified and explained. The next activities to be developed are about analysis in the current scenario and also the project, software and hardware requirement analysis, project schedule and milestone.

CHAPTER III

ANALYSIS

3.1 Introduction

In this chapter, it will explain and discuss in details about the project requirement analysis, software and hardware requirement analysis, project schedule and milestone including analysis for the current scenario.

3.2 Current Scenario Analysis

Current Scenario Analysis is important because it will explain more on details and information of current situation. The analysis phase will detect the solution that can be used to solve the problem that occur in the existing game. There are many Hidden Object and Virtual Reality game that exist through app store and at game website that let the player to play the game for free.

3.3 Requirement analysis

In this section all the project requirement, hardware requirement and software requirement used for the development of this the project are analysed and listed.

3.3.1 Project Requirement

- Requirement analysis

  Table 3.1 shown the comparison of 3 existing games and the game that will be develop for the genre of games, platform used for the games, input devices used in each games, advantages of each games, and beside comparison there also will be similarity for the games.

Table 3.1: Requirement Analysis

Types Games	Criminal Case	InMind	Virtual Reality Hidden Objects: The shopping lists
Genre	Puzzle	Action-Adventure	Puzzle

Platform used	PC(Facebook), iOS, android	PC(oculus-rift, htc-vive), iOS, android, mac	PC(oculus-rift), iOS, android
Input devices	Mouse, touch screen.	Gaze input	Keyboard, Mouse, Gamepad, and Hydra for PC while gaze input for smartphones.
Advantages	Allow player to improve memory and vocab.	Allow the player to experience and learn about neuron disorder inside human mind.	Allow player to experience Virtual Reality and play in 360 degree mode if player does not want to use VR.

Types / Games	Hidden Objects Virtual Reality: This Is Malaysia
Genre	Puzzle
Platform used	Android
Input devices	Bluetooth Controller
Advantages	Allow player to experience Virtual Reality and know more about Malaysia traditional things and culture.
Similarity	Only can be play as a single player.

All the assets designed to be used in the game are based on all the information collected from a number of museums in Malaysia. The environment for the game is also based on the information from museums and photos captured from historical places in Malaysia.

- Technical analysis

Virtual Reality technology will be used in this game. A VR Box is needed for this project because player can only experience Virtual Reality when they play game using the VR box. Plug-ins will be installed in Unity 5 to make sure the Virtual Reality technology can be implemented in the game.

A Bluetooth controller also will be used for interaction input in this game. The controller will be used to help the player to move inside the game and to click on the hidden object.

A smartphones with an android 4.3 above and gyroscope features is needed in this game. Gyroscope is to support for the VR to function while for android version is the lowest system that could support the game.

3.3.2 Software Requirement

The software requirement for this project is listed in a table by divide into four part which are game engine, game development tool, game art and other software as shown in table 3.2.

Table 3.2: Software Requirement

	Software	Purpose
Game Engine	Unity 5.5.0f3	Unity 5.5.0f3 is a free source game engine that allow user to develop any kind of game for any game platform using C# or Java as a programming language. This game engine is use to develop this game.

Game Development Tool	Audacity	Audacity is a sound editing software that is used to edit the sound or audio used for this project.
Game Arts	Adobe Illustrator CS6	Adobe Illustrator CS 6 is a software used to illustrate and design the asset and texture used in the game.
	Adobe Photoshop CS6	Adobe Photoshop CS6 is a software used to edit photo and texture used for this project.
	Maya	Maya is a 3D authoring tool that is used to model and texture the game assets.
	Cinema 4D R12	Cinema 4D is a 3D authoring tools that is used to model game assets for this project.
Other Software	Microsoft Word 2013	Microsoft Word 2013 is used to write proposal and report for this project.
	Android Studio	Android studio is a software that is used as one of the plug-ins for the game engine to allow the process of develop the game for virtual reality (VR) to be import as .apk.
	Adobe Reader	Adobe reader is used to open the file save as pdf.
	EndNoteX6	EndNoteX6 is a software used for citation in report.

3.3.3 Hardware Requirement

The hardware requirement for this project is listed in a table as shown in table 3.3 and the hardware is analyst to ensure that the usage and compatible of it is necessary for this project development.

Table 3.3: Hardware Requirements

Hardware	Purpose
Laptop	• MSI GP60 2PE LEOPARD • Windows 8.1 • Intel® Core™ i7-4710HQ CPU@ 2.50GHz • RAM: 16GB • Graphic Card: NVIDIA GeForce 840M 2GB VRAM DDR3
Smartphone	• Samsung Galaxy Note II N7100 • OS: Android OS, v4.4.2 (KitKat) • CPU: Quad-core 1.6 GHz Cortex-A9 • GPU: Mali-400MP4 • Bluetooth: v4.0, A2DP, EDR, LE • USB: Micro USB v2.0 (MHL TV-out), USB Host • Display: Super AMOLED capacitive touchscreen, 16M colors • Sound Alert Types: Vibration; MP3, WAV ringtones • Features: Sensors for accelerometer, gyro, proximity, compass, barometer
VR Box	• CLiPtec Portable Virtual Reality VR Glasses (PVR220) • Compatibility: Android and iOS • Suitable Size: 4.5-6.0" • Material: ABS • Install Phone Method: Open cover with magnet • Have IPD adjustment • Have Sight adjustment • Lens: 42mm HD Optical Blue light firm lens
Gamepad	• MOCUTE-050 • Wireless Protocol: Bluetooth 3.0 compliant • Wireless Distance: Up to 10 meters • OS compatibility: Android, IOS, PC • Battery: Rechargeable lithium battery 400mAh • Working Time: About 40 Hours • Recharging Current: 5V, Less than 300 mA
Mouse	• Use for designing and model assets, and navigate software use for project development.
Headphones/ Speakers	• Use to listen when edit sound to be used for the game.
Printer/Scanner	• To print document for project proposal and report, and scan selected picture used for report and project development.

3.3.4 Others Requirement

Other requirements for this project include collected information about traditional things and relevant photos captured to be used in the game. The information gathered and photos captured are from four museums in Penang which are Penang State Museum, Malay Gallery, Museum and Arts Gallery Penang, WonderFood Museum and Museum Negeri Sembilan. In addition some information and photos required for this project are also gathered from Pinang Peranakan Mansion in Penang and Gunung Baling in Baling, Kedah.

3.4. Project Schedule and Milestones

Table 3.4: Milestones of Project Activities for PSM 1

Key Milestones	Start Date	End Date
Assigning student to supervisor	13 Feb	19 Feb
Discuss/verify title and synopsis	20 Feb	5 Mar
Submit proposal	27 Feb	5 Mar
Progress 1	27 Feb	2 April
Progress 2	3 April	1 May
Project implementation	2 May	21 May
Final presentation and submission report	22 May	31 May

Table 3.5: Gantt chart of Project Activities for PSM 1

Task\ Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Assigning student to supervisor	■														
2. Discuss/verify title and synopsis	■	■													
3. Submit proposal		■													
4. Concept Art and Research for Game Assets Design			■												
5. Design Gameplay and Construct Architecture				■											
6. Construct Flowboard					■										
7. Construct Hierarchy of Challenge and Game Rules							■								
8. Designing 2D Asset							■								
9. Modelling, Texturing and Animation 3D Assets								■	■						
10. Sound Production											■				
11. Project implementation												■	■	■	
12. Final presentation and submission report															■

The table 3.4 and table 3.5 shows the Milestones and Gantt chart of project activities for PSM 1. The chart shows the activity and progress of the project development from week 1 until week 15. Meetings with supervisor have been made at

least once a week. Confirmed proposal was summited at FYP e-Repository Online System on 3 March 2017.

Concept art and research for game assets design is done by going to museum and real location in Malaysia to collect some data for this game. After that, the gameplay for this game is refine from the proposal and the game architecture for this game is construct. Apart from that, the flowboard for this game is also constructed in order to assure the flow for this game is smooth. The hierarchy for this game is design and construct in order to make sure all the challenge for this game is suitable for each level according to the construct game rules. Lastly, all the 2D assets that will be used is sketch and design using 2D software in the designing 2D assets part. All this activities can be summaries as progress 1 as shown in the milestone.

In Progression 2, all the 3D assets that will be used in the game is model, texture and animate. Besides that, the also sound production occur in this progression. Project implementation is where all the asset is coded and a prototype is developed. The prototype of the game was evaluated by the evaluator and supervisor on 12 May 2017. The report for this project is written from chapter 1 to chapter 4 simultaneously with game development. The game was improved and debug fixed before final presentation and report submission.

3.5 Conclusion
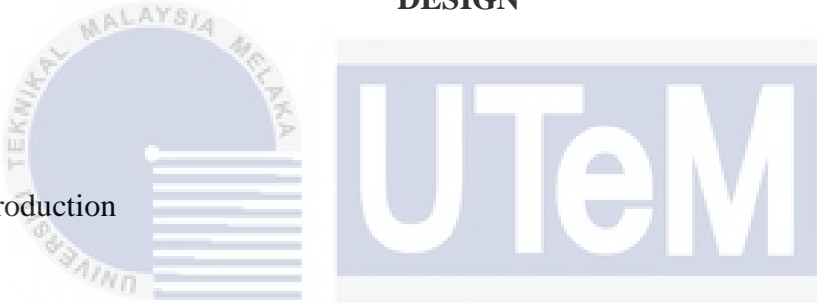
As the conclusion, analysis is important part for game development to identify what should be improve form existing games and what can be implement in the game that will be develop for this project. The next chapter will discuss on the design part for the game that will be develop for this project such as storyboard and user interfaces.

CHAPTER IV

DESIGN

4.1 Introduction

This chapter will discuss in detail about overall game flow for this project. The elements that will be discussed in this chapter are game architecture, game design and game art. A big picture in game architecture will explain the flow of architecture for the game. A storyboard will show the flow of the game.

4.2 System Architecture
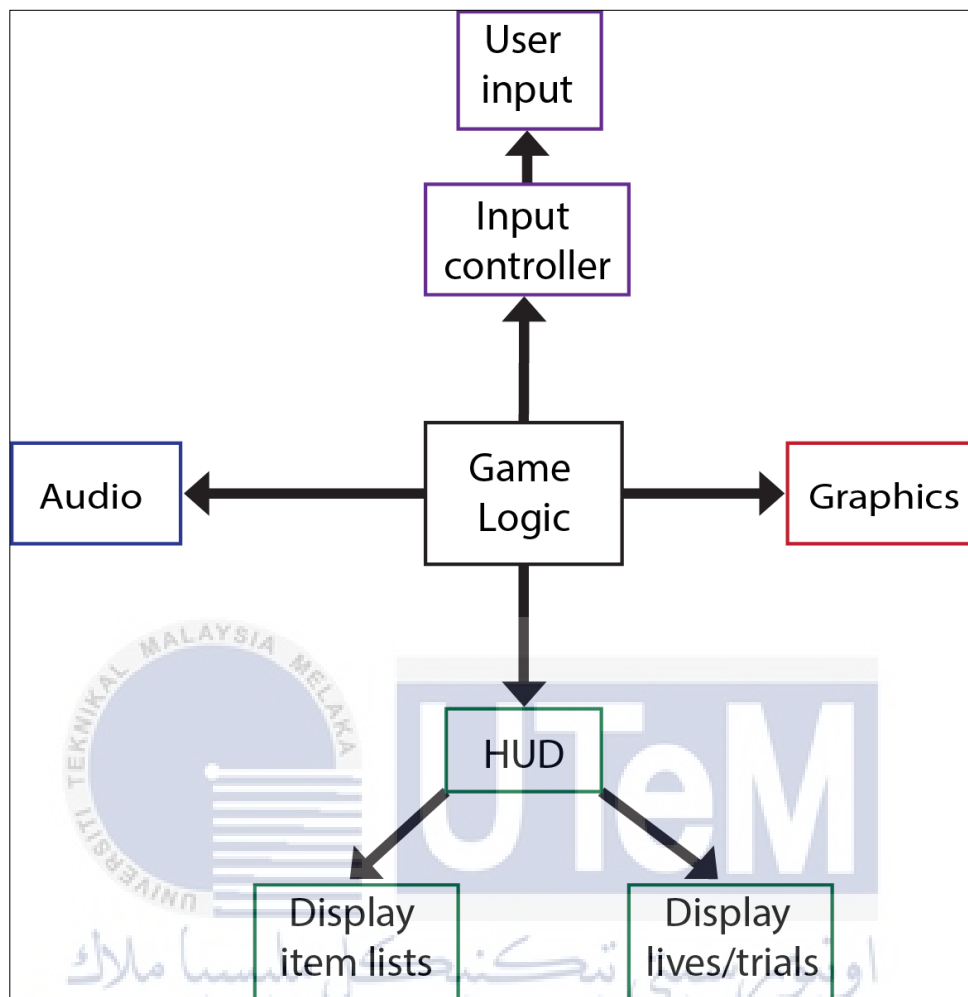
Figure 4.0: Game Architecture

Figure 4.0 shown the game architecture for this project. The game logic will consist the programming part that are coded in the game engine to produce four (4) main components for this game. The four (4) main components are input controller, graphics, audio and head-up display (HUD). Bluetooth controller will be used in this game as an input device that have been programmed to allow user's usage of the input button and axis to interact with the game world. Graphics is the output for this game that will perform as a place where the user will interact. Audio is used to play background music for the game. The HUD will show the clues, list of items that need to be found and timer.

4.3 Game Design

This part will explain the gameplay, core mechanic, flowboard and the user interface for this project in details.

4.3.1 Gameplay
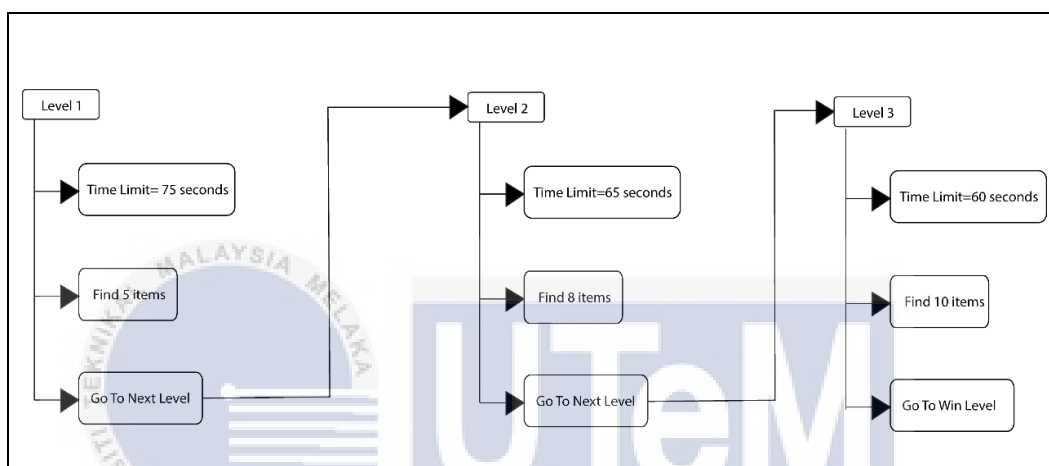
Figure 4.1: Hierarchy of Challenge

Figure 4.1 show the gameplay hierarchy of challenges for this game. Player will start the level by entering the level 1 and finish the game on given time limit and find five items listed on that level in order to go to the next level. Level 2 will need the player to find eight items in order to go to the level 3. Level 3 is the last game level before the player enter the win level the player is require to complete the level by finding all the ten items listed in level 3.

4.3.2 Core Mechanics

The core mechanics for this game are, player are require to finds objects or items according to the check list hidden given in order to move to another levels or place in order to win the game within a time limit for every level. The time limit for level 1 is 75 seconds, 65 seconds for level 2 and 60 seconds for level 3.The player will be given 3 times to use the clues in Level 1, 5 times to use the clues in Level 2 and 6 times to use the clues in Level 3. The game will be over if the player lost if they do not manage to find all the items listed within the time limit.

4.3.3 Flowboard
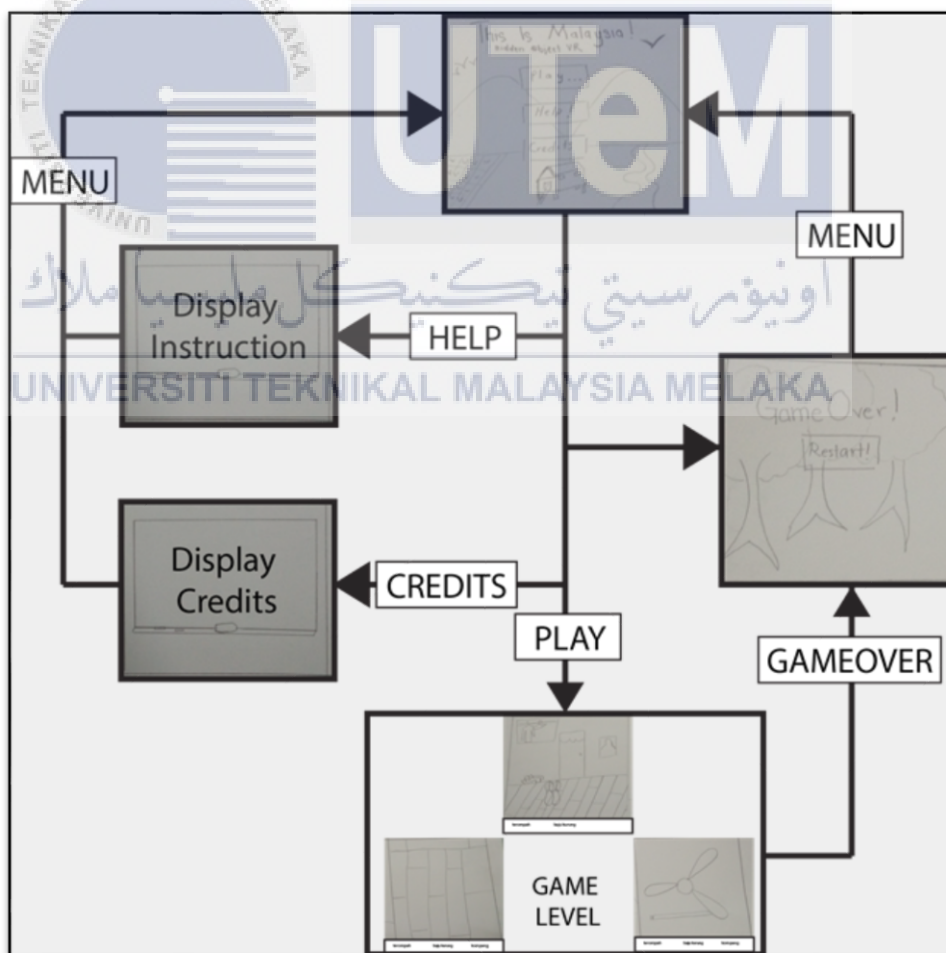
Figure 4.2: Flowboard of the game

Figure 4.2 show the flowboard for this game. The game will be start at the menu of this game. If the player turn left it can see the instruction for this game while the credits on the right in the same level as the menu part. The player will enter the game level when they press the play button the menu level. If the player win the first level the player will get to go to the next level if the player lose it will pop up a game over screen and the player will need to go back to the menu screen on order to play the game again.

4.3.4 Level Progression

In level 1, players need to find five items within 75 seconds to move to the next level. Players are given three clues to help them find the items much easier. One of the items that players need to find is keris which is one of the weapons used by Malay warriors.

In level 2, players need to find eight items within 65 seconds to move to the next level. Players are given five clues to help them find the items much easier. Some of the items that players need to find are baju kurung which is a Malay traditional clothes for women and Chinese Go which is the traditional game for Chinese. .

In level 3, players need to find ten items within 60 seconds in order to win the game. Players are given six clues in this level to help them find the items much easier. One of the items that player need to find is pengukur kelapa which it is a Malay traditional utensil.

4.3.5 User Interface

- User Interface

Figure: 4.3: Main Menu
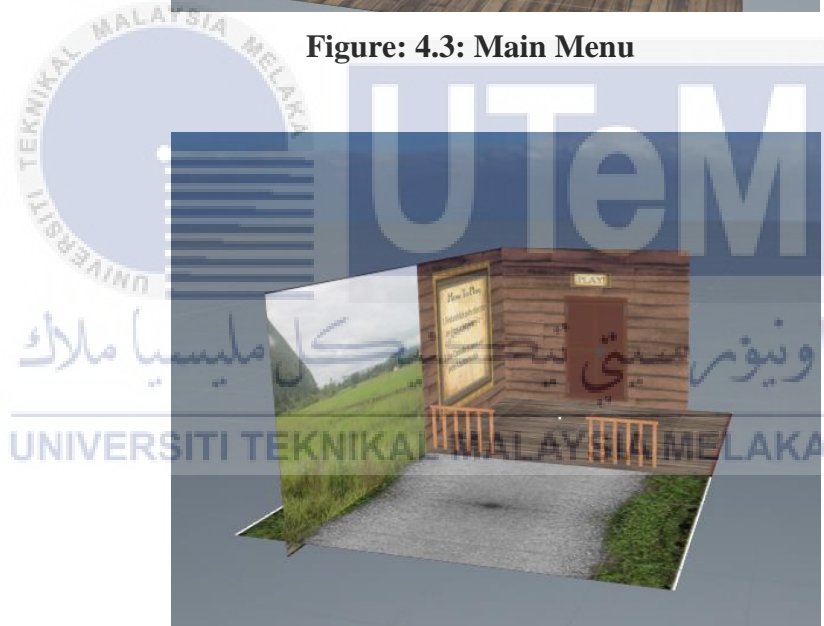
Figure: 4.4: Level 1
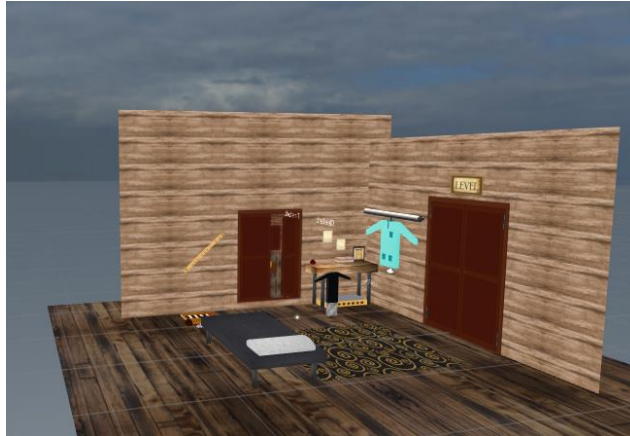
Figure: 4.5 Level 2

Figure: 4.6: Level 3

Figure: 4.7: Win Level

- Navigation Structure
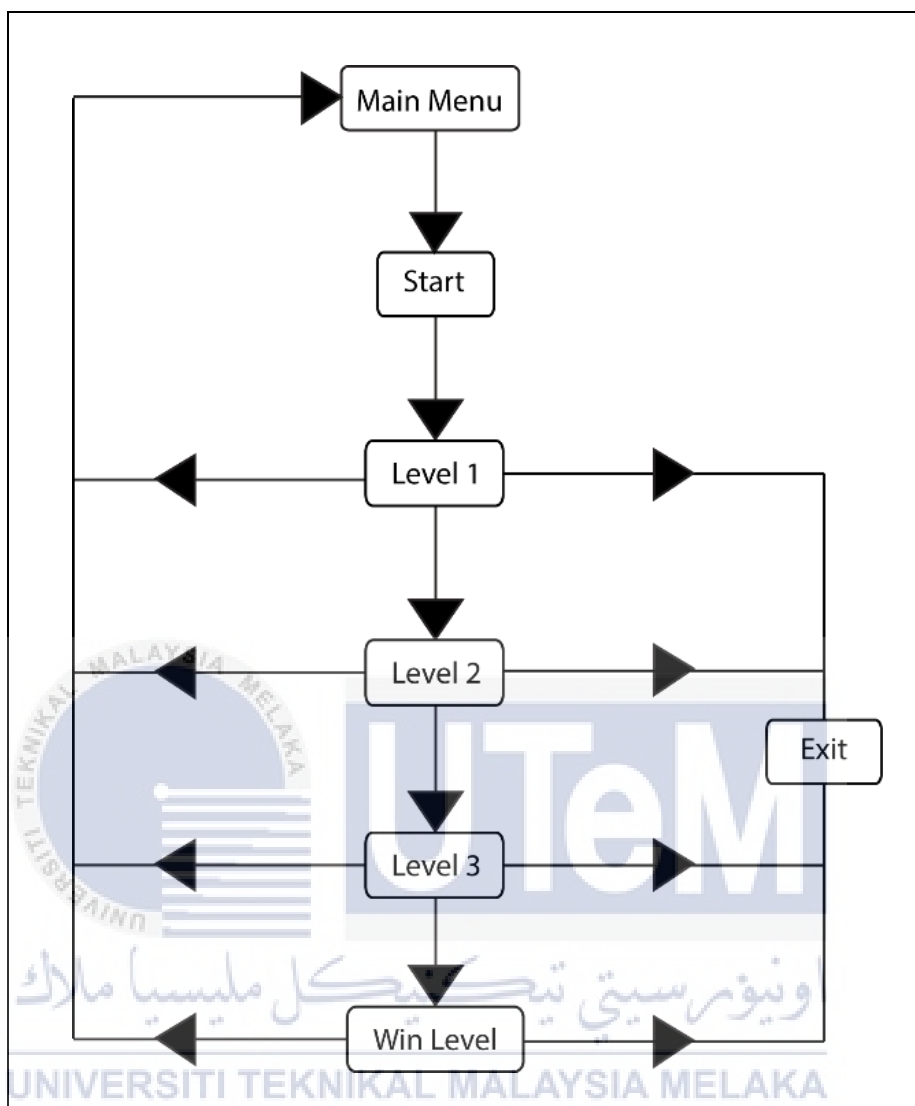
Figure 4.7: Navigation Structure

Figure 4.7 shows the navigation structure for this game. The game will start at the main menu of this game. When the game is start the player will enter the level 1 of this game if the player complete level 1 it will proceed to the next level until they manage to complete level 3 they will win the game and go to wining level. From the wining level the player are given two choice whether exit the game or go back to main menu level. If the player does not manage to complete level 1 or any other level the player will lose the game and be given choice whether to exit the game or go back to the main menu and start the game all over again.

4.4 Game Art

The game art for this game are divided into 3 sections which are game background, game assets, and game menu.

4.4.1 Game World

For the game world, the background is designed using Adobe Illustrator (AI) and some of the photos were taken by myself at some of the places that I have visited.

Figure 4.8: One of the background design using AI

4.4.2 Assets Design

All the assets design in this game is refer to picture taken from a couple of museum and historical place. The asset is model using 3d authoring tools such as MAYA and Cinema4D R12.
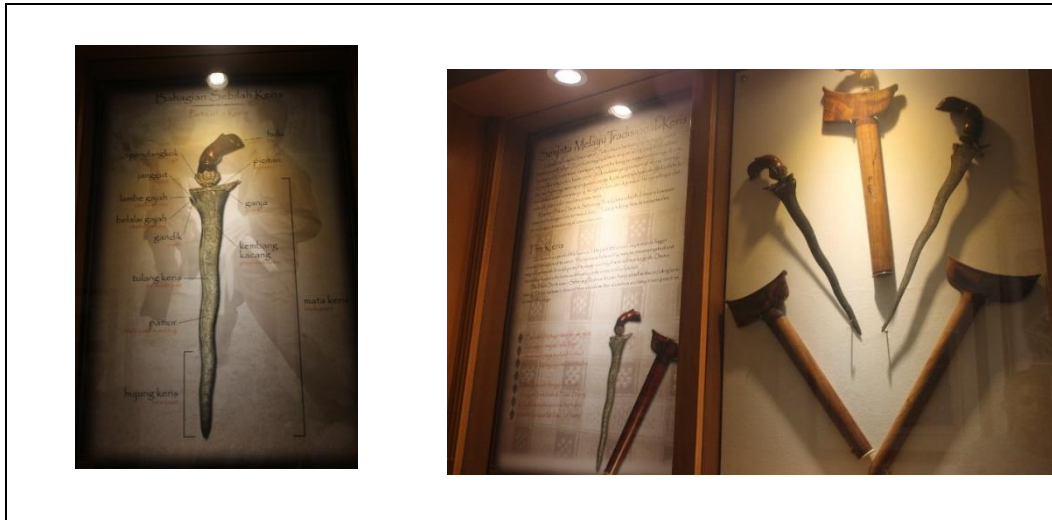
Figure 4.9: Picture of Keris taken from Penang State Museum

Figure 4.10: Picture of Keris model using Maya
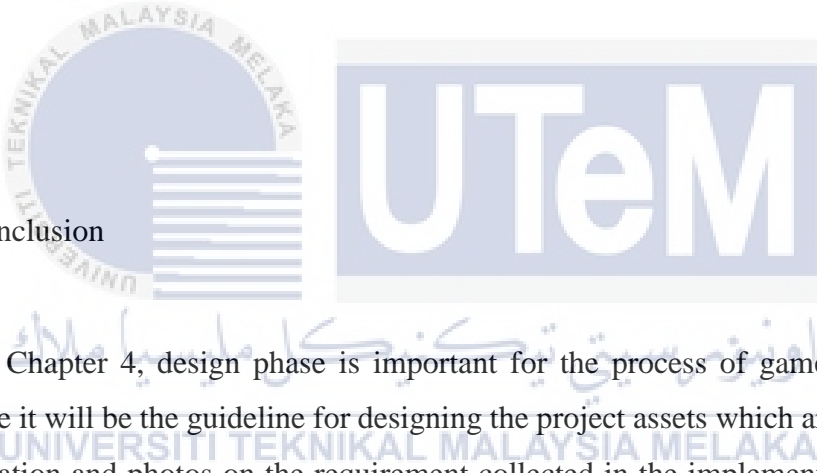
4.4.3 Camera model

The type of camera model used in this project are perspective with the Google Virtual Reality Reticle to allow the Virtual Reality mode to function.

4.4.4 Audio / Sound Effect

The audio used in this project is background music that loop in the game when the game starts.

4.5 Conclusion

Chapter 4, design phase is important for the process of game development because it will be the guideline for designing the project assets which are based on the information and photos on the requirement collected in the implementation phase in chapter 3.

CHAPTER V

IMPLEMENTATION

5.1 Introduction

This chapter will explain and discuss more about Game Art for this game. For implementation phase, all contents for the game such as graphics, sound and music, game assets and etc. is create, developed and integrate. Every output from this phase will be use as a guideline to build the game for this project.

The expected output after completing this chapter which is the implementation phase are player will improve their general knowledge about Malaysian culture, player get experience to play hidden object game that implement virtual reality technology and traditional culture of Malaysia is used for the game settings and as a game assets.

The main objective for this chapter will highlight on what type of techniques and elements that will be used to develop this game as the outline. The implementation process and creation of the Game Art will be cover in this chapter will be divide into

a several parts which are production of text, production of graphics, production of animation and production of audio for this project.

5.2 Creation of Game Art

As discussed in chapter 4, this part will explain more about the process of game art for the game assets used inside the game.

5.2.1 Production of Text

There are several types of fonts used in the game such as Papyrus, Poor Richard, Eraser Regular and Arial. The fonts Papyrus, Poor Richard and Eraser Regular are download from online free source for fonts. The fonts are installed to be used inside Adobe Illustrator (AI).

Papyrus is used for text on the buttons which the font size is 12 and for designing clues and several splash screens such as pause, level complete and game over that will be used in the game. The clue title font size is 18 while the clues description and instruction on the splash screens are from 10 to 48 depend on the length of the description.

The Poor Richard fonts is used for the game title, text on the winning level and play button. The font size use for the game title is 72 while for the winning level text is 30 and for play button the font size is 36.

The loading bar for this game used the font Eraser Regular with the font size of 54. Apart from that, this font is also used in the icon used for this game application and for recipe board that will be used to put the clues for level 3.

For the font type Arial, it is use inside the game engine unity. This is because this fonts is the font type that already be given by unity. This font is used for the Head-Up Displays inside this game that will show the clue left, time limit, list of hidden objects and some instructions to the player. The font size is determine by scaling the 3D text that have axis x, y and z.

One of the font used in Adobe Illustrator to create loading bar can be seen in figure 5.1 and the font used as Head-Up Displays for the game can be seen in figure 5.2 below.
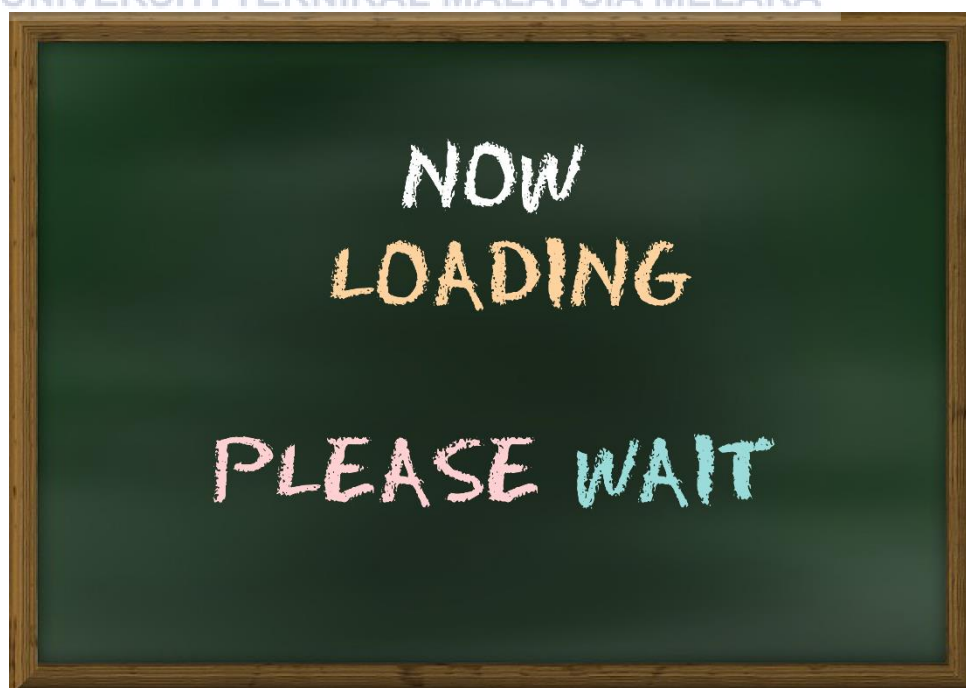
Figure 5.1: Loading bar using Font type Eraser Regular
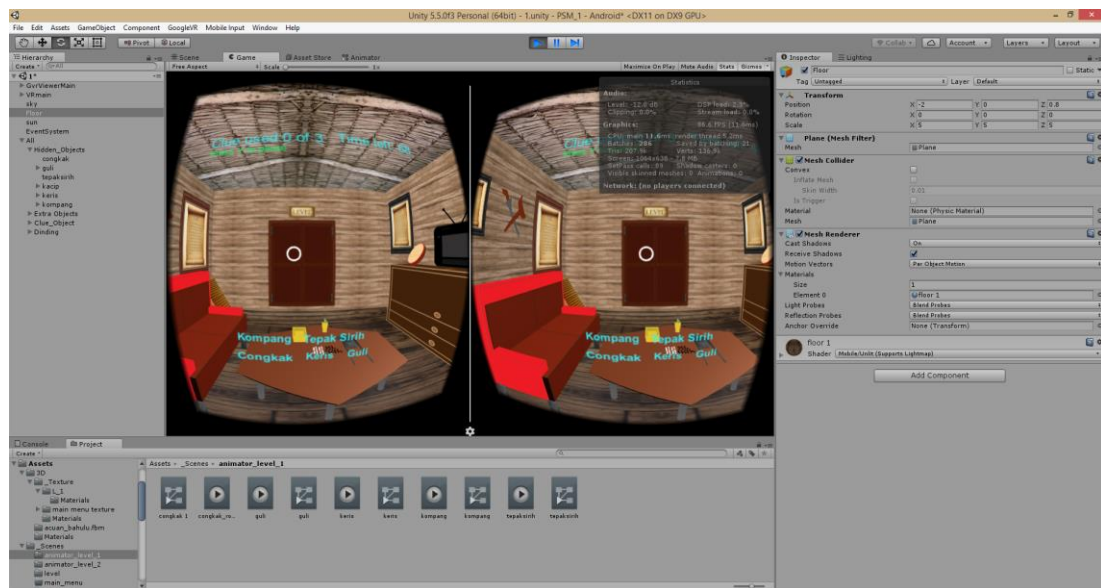
Figure 5.2: Head-Up Displays inside the game.

5.2.2 Production of Graphics

All assets used in the game is created in the production of the graphics. There are two types of graphics for the game assets which are 2D graphics assets and 3D graphics assets.

The 2D graphics used for this project can be divide into two types which are bitmap and vector. Vector type of image is used the most for the games assets compare to bitmap type. This because vector image can easily be scalable without loss it quality when it size is being enlarge or reduce. Apart from that, vector image has smaller sizes compare to bitmap type which it will reduce the use of processor to process the assets used for the game.

Vector image is design, create and edit using Adobe Illustrator while for bitmap image it is edited using Adobe Photoshop. Bitmap image used for this project are

mostly taken from real place in Malaysia such as Baling Mountain, Kedah which is used as the game background before starting the game.

The 3D graphics assets for this game is create and model using 3D authoring tools based on the bitmap image taken from some museum and place in Malaysia as a guideline for modelling the traditional things. The texture for the 3D used the image is the 2D graphics and materials given inside the 3D authoring tool. Some of the assets are also model inside the game engine Unity5.5

The vector image can be seen in figure 5.3 below while the bitmap image that is taken from real place can be seen in figure 5.4 and 3D graphic assets created using 3D authoring tools that is texture using vector image can be seen in figure 5.5 below.
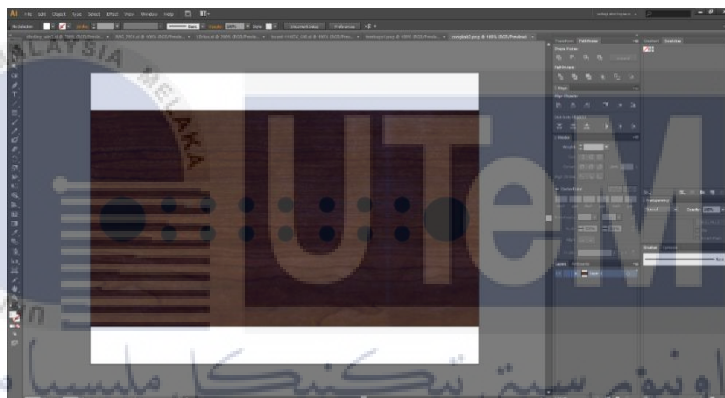
Figure 5.3: Vector image create using Adobe Illustrator
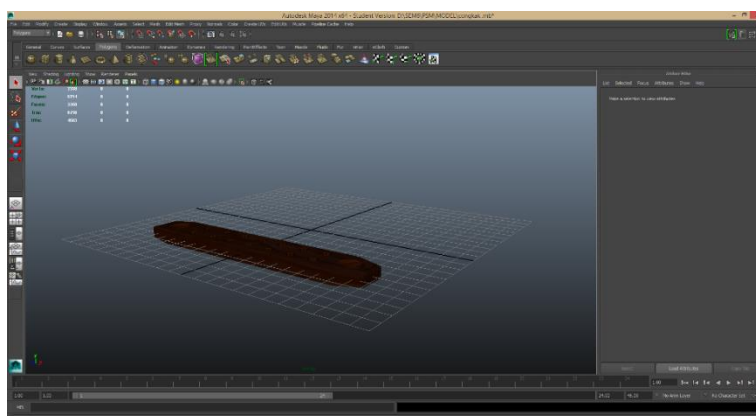
Figure 5.4: Picture taken at Baling Mountain, Kedah

Figure 5.5: 3D asset that is textured using 2D vector image

5.2.3 Production of Animation

The animation for this project is only be implement for the assets that is used as hidden objects. All the assets used as hidden objects in every levels is animate using the game engine Unity 5.5. The rate for all the assets animation is 60 frames per seconds. The animation will only be play when the player press the clues. The production of animation can be seen in the screenshot one of the 3D assets animate using Unity 5.5 in figure 56.
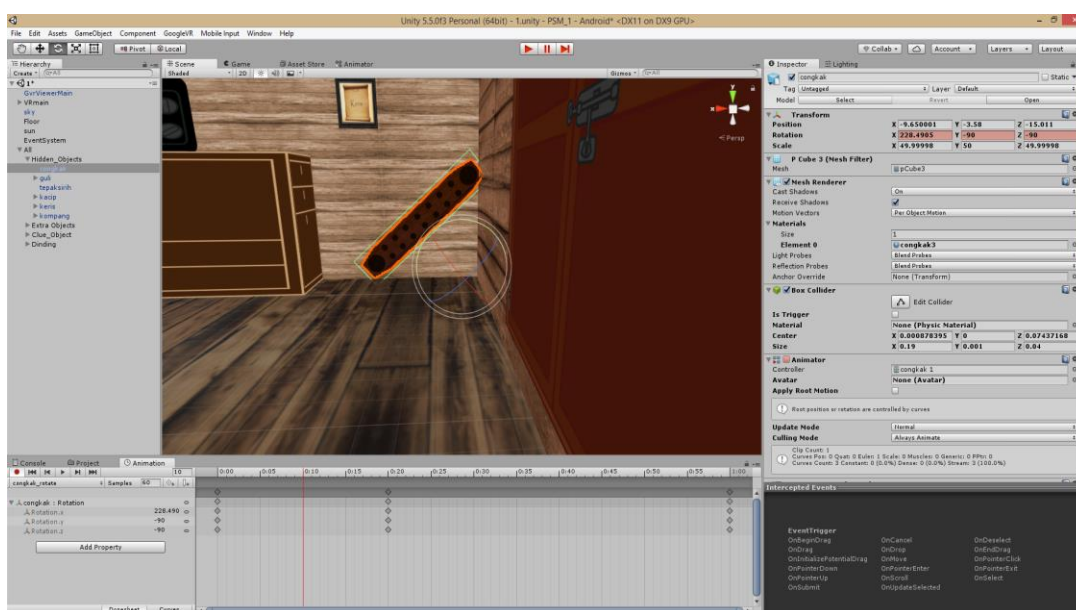
Figure 5.6: Screenshot for production of animation in Unity 5.5

5.2.4 Production of Audio

The audio used inside this game is downloaded from online free source. The audio is edit and mash inside the sound editor software which known as Audacity.

There are a two type of sound that are mixed up together and is used as a background music that will play and loop across the game. Figure 5.7 shows the mixed audio in the Audacity software.
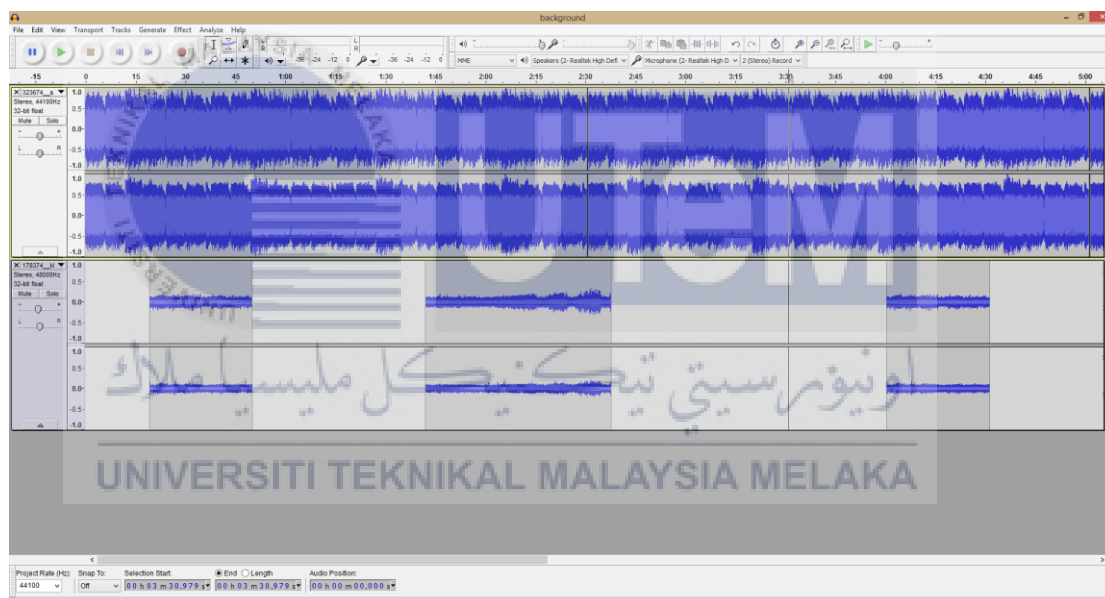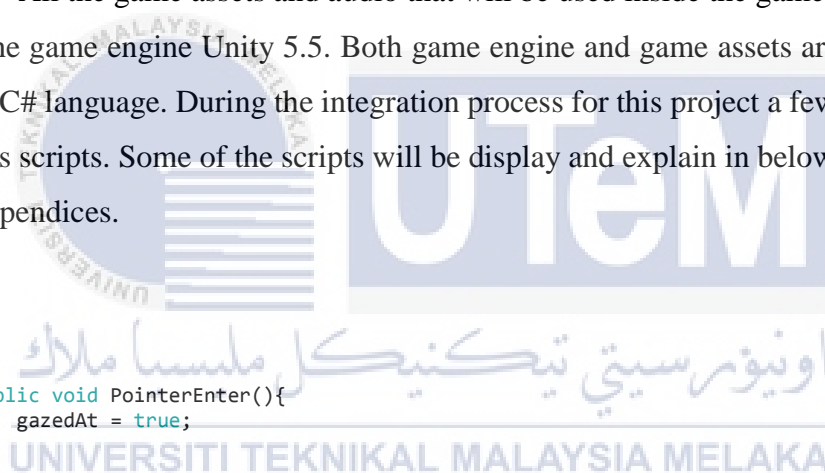
Figure 5.7: Screenshot for production of Audio using Audacity

5.3 Integration of Game Components

The integration of Game Components was divided into a few types which are integration of graphic and integration of game engine. The integration of graphic can be divide into two which are 3D game assets and 2D game assets.

For 3D game asset the 3D authoring tool software used to model, texture and edit are Maya and Cinema4D. Adobe Illustrator and Adobe Photoshop are the software used to create, design and edit the 2D game assets.

All the game assets and audio that will be used inside the game were imported into the game engine Unity 5.5. Both game engine and game assets are integrated by using C# language. During the integration process for this project a few functions and classes scripts. Some of the scripts will be display and explain in below figures and in the appendices.

```
public void PointerEnter(){
    gazedAt = true;
}
public void PointerExit(){
    gazedAt = false;

}

public void PointerDown ()
{
    Debug.Log ("Pointer Down");//show info at console that pointer have click the object
}
}
```

Figure 5.8: The gaze code

Figure 5.8 show the gaze code. This function is used to detect the player gaze point. There will be a gaze symbol inside the game. The gaze symbol will change it shape from small circle to a big circle when detect object with collision box. This function is important because it need to be used to detect all the object inside the game whether it can be click or cannot be click by the player. This function is use in 3 main

scripts for this game which are Click_scene scripts, Interaction script and Clue_manager script.

```
void Update () {
 Time.timeScale = 1;
 if (Input.GetButton("Joystick_A")&& gazedAt && play == true){ //Check whether input &
gaze & button are true or not.
    Debug.Log ("CLICK");
    Destroy (play); // play button destroy
    loading.gameObject.SetActive (true); // game object will appear
    SceneManager.LoadScene("1");//load scene 1
        }

      if (Input.GetButton("Joystick_A")&& gazedAt && nextHTP == true){
          Debug.Log ("CLICK");
          HTP2.gameObject.SetActive (true);
          backHTP.gameObject.SetActive (true);
      }
      if (Input.GetButtonDown("Joystick_A") && gazedAt && backHTP == true){//
          Debug.Log ("CLICK");
          HTP2.gameObject.SetActive (false);
          backHTP.gameObject.SetActive (false);
      }
}
```

Figure 5.9: Scene change and button code

Figure 5.9 show the gaze code. This function is used to take input from user. The input will be true if the game object and the gaze are true, if the game object and the gaze is false the input will also be false.

There is also a function used for setting the time limit for the game which can be refer in the appendices. The time limit is set it initial value inside the start function. The time limit will stop when the game is finish or game over. If the time limit equal to zero the game will be over and some gameobject set in the function will be true and destroy.

```
public void Click_HO(){ //function for object when been click

    tekan=Input.GetButton("Joystick_A");

    if (tekan&& gazedAt && congkak == true) {
        Debug.Log ("CLICK");
        Destroy(congkak);
        Destroy (clue);
        Destroy (C_object);
        Click_Count.Instance.AddClick_Count (1);
    }

    if (tekan && gazedAt && kompang == true) {
        Debug.Log ("CLICK");
        Destroy (kompang);      //make object dissappear when click
        Destroy (clue_1);
        Destroy(C_object1);
        Click_Count.Instance.AddClick_Count (1);
    }

    if (tekan && gazedAt && tepaksirih== true) {
        Debug.Log ("CLICK");
        Destroy(tepaksirih);
        Destroy (clue_2);
        Destroy (C_object2);
        Click_Count.Instance.AddClick_Count (1);
    }

    if (tekan && gazedAt && keris == true) {
        Debug.Log ("CLICK");
        Destroy (keris);
        Destroy (clue_3);
        Destroy (C_object3);
        Click_Count.Instance.AddClick_Count (1);
    }

    if (tekan && gazedAt && guli == true) {
        Debug.Log ("CLICK");
        Destroy (guli);
        Destroy (clue_4);
        Destroy (C_object4);
        Click_Count.Instance.AddClick_Count (1);
    }

    if (Click_Count.Instance.c_t == 5) {
        next.gameObject.SetActive (true);
        Text.gameObject.SetActive (false);
        All.gameObject.SetActive (false);
        Time.timeScale = 0; //stop at current time when game complete
    }
}
```

Figure 5.10: Clicking code

The function in figure 5.10 above show the coding for clicking. This function will take input from user and used in all level for interaction script. The input will be true if the game object and the gaze are true, if the game object and the gaze is false the input will also be false. The click item will be count by using class click_count when the clicked items is count until it equal to five the gameobject will be true, the time will stop and the player will win that levels.

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class Clue_CountL3
{
    private static Clue_CountL3 TLk_instance2 =null;
    public int TLk_t;//bilangan klue di tekan

    public static Clue_CountL3 Instance_2 {
        get {
            if (TLk_instance2 ==null) {
                TLk_instance2 = new Clue_CountL3();
            }
            return TLk_instance2;
        }
    }

    public void SubClue_CountL3 (int TLkt)
    {
        TLk_t += TLkt;
        Debug.Log ("Current clue:" + TLk_t);
    }
}
```

Figure 5.11: Class count code for clue

Figure 5.11 show the function used to count. This class count will be call in other script to count clues that clicked by the user. This function is also used to count clicked hidden objects items but different instance is use and can be seen as in the appendices.

For the function that allow player movement inside the game it can be refer in appendices. The used function will take input from player for vertical and horizontal axis. Player are allow to move only forward, backward, left and right inside the game using the left joystick as input device.

Apart from that, function used to manage the clue when it been click can also be refer in appendices. The used function will take input from user when the gaze and gameobject of the clue is true until the set limit. Every level have different clue limits. After the clue count reach it limit the gameobject of clue that not being used will be destroy. This function also will play the animation after the clue is click.

```
public void NextScene(){
    if (Input.GetButtonDown("Rehat") && gazedAt && next == true) {
        Destroy (Text);
        Destroy (All);
        Destroy (next);
        Clue_Count.Instance_1.k_t = 0;
        Clue_CountL2.Instance_2.LTk_t = 0;
        Clue_CountL3.Instance_2.TLk_t = 0;
        Click_Count.Instance.c_t = 0;
        Click_CountL2.Instance_3.LTc_t = 0;
        Click_CountL3.Instance_3.TLc_t = 0;
        loading1.gameObject.SetActive (true);
        SceneManager.LoadScene ("Level_2");

    }
```

Figure 5.12: Next button code

For next button function it can be seen as shown in figure 5.12 above. It will be appear after the player complete the level. It will take input from the user to move to the next level and will destroy all the things inside the current level. This type of function also be used inside the restart script as shown in appendices.

Besides that, there are also a function for pause in this game which the coding can be refer in the appendices. The game will be pause if the player click button Y on the controller. This will make the time limit inside the game pause and gameobject that have pause description to appear because it became true and other gameobject to become false which also make the audio to become mute. The game will be continue when the player press the R2 button on the controller which it will make the pause description gameobject to false and other game object to become true and the time limit continue to decrease.

5.4 Game Configuration Management

The main platform used to develop this game is Unity 5.5 game engine. The configuration setup for this software is done according to the needs for developing this

project before begin to develop this game. All changes in the game need to be suitable with the hardware and software requirement to make sure the final output for this project can be support and work properly on the software and hardware used as planned.

Apart from that, a few plug-ins are require in this project. The plug-ins that need to be install for this project are plug-ins to support the used of android and google VR. For android this plug-ins is important because it is used to make the game can be export as .apk to allow user to install the game and to set the lowest android version that suitable is suitable to be used for this game. The google VR is needed to make the game is supported for virtual reality technology. All this configuration requirement was setup to make sure the project run smoothly and run with satisfactorily.

5.4.1 Configuration Setup

The game will be publish for android platform which the android version is 4.3 above and this game can only be play using Bluetooth controller. The project was develop by using the game engine Unity 5.5 and build into Android Package Kit (.apk) format installer to be used to install the game in smartphones before the game can be play. The game can be play on any smartphones that have gyroscope function and android version 4.3 above.

5.4.2 Version Control Procedure

The most important procedure in developing phase is version control because it will ensure the game can be complete and run smoothly at the final of the game development. The first version of the game is published to test the compatibility of phones and the virtual reality to function in the phones. The second version is publish

to test whether the graphic inside the game can be load smoothly and supported by the smartphones used. Next version, of the game is to test whether the coding of the controller work on the phones properly.

The forth version of the game is where the gameplay of the game is test. For the fifth version of the game the game audio and the scene manager function is tested whether it work the same on the smartphones compare in the game engine unity 5.5. The last version of game where the load screen in implement into the game. A low fidelity prototype is complete and publish for the alpha testing purpose.

The project is update and improve based on feedback and comment from the tester. The latest version of game have improve a couple of other new features such as button for pause, next button, restart button, gameover screen and level complete screen. The latest version of game is known as a high fidelity prototype because it have completely develop and published in Android platform.

5.5 Implementation Status

The status progression of activities to be done in completing this game is shown in implement status. General component tasks for overall implementation phase for this project are list down. As shown in table 5.1, some task are able to finish on time such as designing 2D assets, modelling, texturing and animation 3D assets as well as project presentation and report submission. Apart from that, there are also some task that is delay due to the problem in finding a suitable game tester and suitable place to play test the game as well as some tester do not want to be interview. Although the delay task has been affected the process in completing the task but everything is still in control.

Table 5.1: Implementation Status

Task	Duration	Status
Concept Art and Research for Game Assets Design	3 week	In time
Design Gameplay and Construct Architecture	1 week	In time
Construct Flowboard	1 week	In time
Construct Hierarchy of Challenge and Game Rules	1 week	In time
Designing 2D Asset	2 week	On time
Modelling, Texturing and Animation 3D Assets	3 week	On time
Sound Production	1 week	In time
Play Testing	2 week	Delay
Game Refinement	1 week	In time
Project Presentation and Report Submission	2 week	On time
Thesis Writing	5 week	In time

5.6 Conclusion

As a conclusion, all the process of implementation for this project is discussed in this chapter. Apart from that, the process of the game art production such as text, graphics, animation and audio were also focus in this chapter. Besides that, the use of all this elements is important to ensure that the output work as planned. The next chapter will discuss on the game testing and evaluation part for this project which the test plan and the test strategy will be discuss. Apart from that, the test implementation and all the data analysis including the test result will also be cover in the next chapter.

CHAPTER VI

TESTING AND EVALUATION

6.1 Introduction
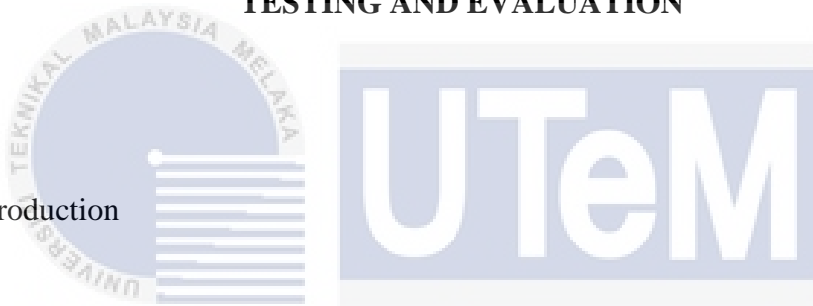
This chapter will discuss in detail about the testing part of this project. Apart from that, the test plan, test strategy and the test implementation including the test result and data analysis will also be explained in this chapter. In the test plan, it will discuss about which tester involve, where the test is conduct and test schedule. All the testing method used for this project will be explained in the test strategy section. For the test implementation section, the process of testing and evaluation such as how to conduct the testing is discussed in this section. All the data collected from the survey question distribute to the user will be discuss in test result and analysis.

6.2 Test Plan

Test plan section will discuss in detailed about the game testing purpose, the testing is conducted in which phase, which target group that will involve in the testing, method used for the game testing and whether the game features is accepted by the user.

6.2.1 Test User

The tester involve in this game testing is from variety of ages from range 13 years old to 25 years old which involve male and female tester. The tester are some from secondary school, university and others. There are fifteen person involve in this testing part which including the expert in the game industry.

6.2.2 Test Environment

There are many location and environment involve when the game test is carry out. For the experts the game is carry out at Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka (UTeM) which four students from the Game course and one lecture from Multimedia department. For the tester age 20 years old and above which involve some university students from different university which are one respondent from Universiti Malaysia Terengganu and two repondents from Universiti Tun Hussein Onn Malaysia and this game testing is carry out at Netherlands Maritime Institute of Technology (NMIT), Johor Bahru. Apart from that, there are two respondents from Universiti Teknikal Malaysia Melaka (UTeM) and the test is carry out at Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka (UTeM). The test for the secondary

students is carried out at Sekolah Menengah Kebangsaan Munshi Abdullah, Melaka which involve five students form this school.

All the hardware used is setup before the game test is carry out. All the tester is given to play the game as soon as the game is setup. The hardware involve in the testing part is smartphone which the game have been install, VR box, Bluetooth controller and headphone.

6.2.3 Test Schedule

The test schedule for this game is set from one to two hour for the game test for every section. For individual the game testing the limit time given for every game tester is fifteen minutes. The cycle the game can be play is depend on the tester themselves. This is because some of the testers can finish the game less than 1 time when they play the game for the first time and some take more than 3 time to win the game.

6.3 Test Strategy

The test strategy used for this game testing used many methods to collect the data. The method used for this testing is play testing method and usability testing. Play testing is done by gathering feedback using questionnaire and interview. This method is used to test whether the game is working correctly or not and to whether the user accept this kind of game that implement traditional culture of Malaysia in the game.

For the usabiliy testing, the accessibility, utility and ease to play this game is tested. This method is used to detect how the player interact with the game and track functional and content problems for this game. The interactive experience for this game is also collected through a few interview question whether the game is fun, immersive and engaging for the user.

6.4 Test Implementation

The prototype for this project will be published during alpha phase where all the requirement for this project is completed. All testing method has different testing plan. For this project there are two types of testing which are play testing and usability testing.

6.4.1 Test Description

Play Testing for this game will be conducted to fifteen respondents that agreed to participate for this testing. Each respondents will be given about fifteen minutes to play the game before they answer the questionnaire distribute to them. This testing is carry out to test the difficulty level of the game to the user whether it is easy or hard to complete the game and is it suitable to implement the traditional culture inside this game. Apart from that, this game is to find out whether the player understand or not the main goal and massage of this game.

For the usability test, it is carry out to test how the player interact with the interface design, functionality of the game, sound, social interaction, immersion of the player for the game, additional knowledge and feedback from the user toward the

game. The main purpose of this testing is to find out whether the game working well and the theme used is suitable to be implement inside the game or not.

This testing is also conducted to fifteen respondents that agree to participate in this game testing. All the respondents' number is calculated in order to get the accurate results. All the respondents are required to play the game first before they answer the questionnaire distribute to them and being interview a couple of questions related to the objective of this game.

6.4.2 Test Data

The tested data for this game testing will be gather through distributed questionnaire and the answer from the interview. This data will be shown into a charts form. The test data is mostly about virtual reality, the game usability and how the player interact with the game.

6.5 Test Results and Analysis

The feedback and opinions from the testers is collected through an interview and questionnaire distributed to them. The respondents that participate in this project testing are fifteen respondents including the expert in the game industry. All the data is collected form the questionnaire distribute to them and the interview is conduct to them after the game testing is conducted to them. The analysis data collected were divided into three part which are the part 1, part 2 and part 3. Part 1 is about the respondent demographic while for part 2 it is about respondent knowledge on virtual reality and for part 3 it is about the respondent's feedback about the game they test.

Apart from that, there are also data analyst from the answer from the interview conducted to the respondent after they play the game and most of the questions asked in the interview is about their opinion on game that implement traditional elements.

6.5.1 Respondents Demographic

This section will analyse the collected data about respondents demographic which the data are about the respondent's age, gender and study place. The data will be shown in table and figure form.

Table 6.1: Participant Gender Summary

Gender	Number of participant
Male	5
Female	10

Participant Gender
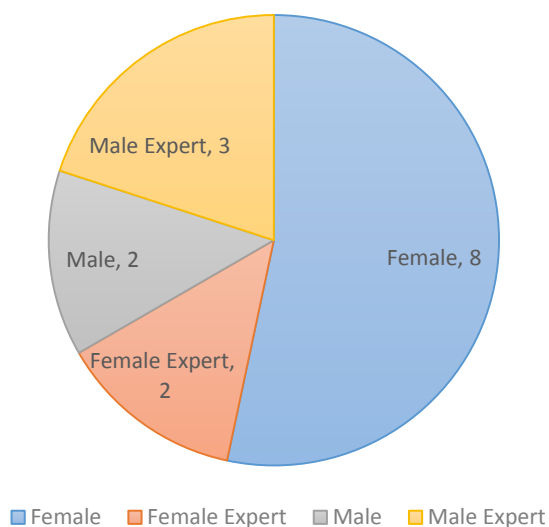
Figure 6.1: Participant Gender in detail

Table 6.1 shows the total number for each gender involve in the game testing in general for the total of fifteen respondents. The gender number in details involve in this project is shown in figure 6.1 which it shows the number of expert and target user involve according to each gender. The male expert involve in this game testing are three participants while for target user are two participants this make a total of male involve in this game testing are five participants. For female the total numbers of participant are ten participants which two participants from expert and others from target user.

Table 6.2: Participant Age Summary

Age	Number of Participants
13 to 17	5
18 to 20	0
20 and above	10
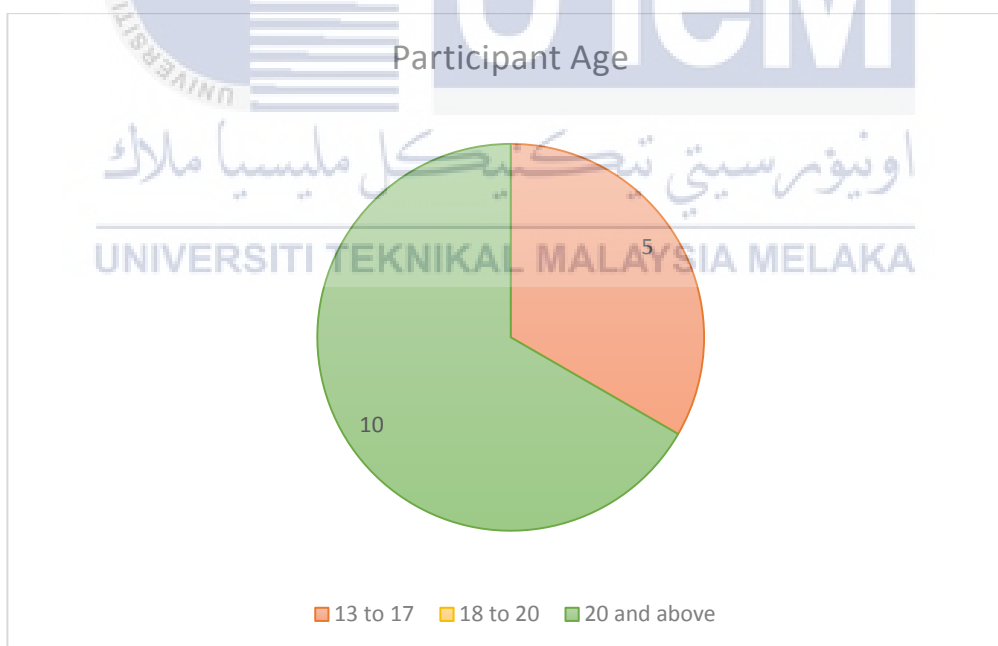
Figure 6.2: Participant Age

Figure 6.2 shows the age for the participants involve in the game testing. There are three range of age for this game which is from 13 years old to 17 years old, 18

years old to 20 years old and, 20 years old and above. But form the pie chart is can be seen that only two range age that participant in this game testing which are five participants from age 13 years old to 17 years old and ten participants form the age 20 years old and above while zero participants from age 18 years old to 20 years old.

Table 6.3: Participant Study Place

Type	Number of Participant
Secondary School	5
College/Matriculation	0
University	9
Others	1
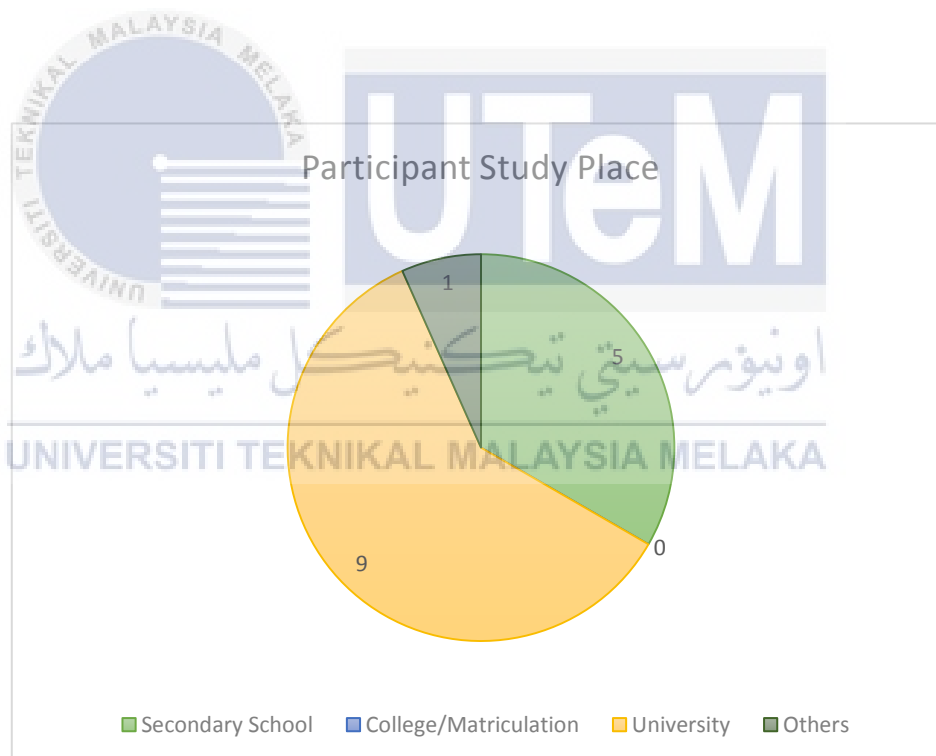
Figure 6.3: Participant Study Place

Based on figure 6.3 there are four types of place the participants involve studies which are secondary school, college or matriculation, university and others. Most least for the type is from college or matriculation which is zero participants and the second least is from others which only one participant involve. There are five participants

from secondary school involve in this game testing and other nine participants are from university.

6.5.2 Respondents Knowledge

This part will ask about the participant general knowledge about Virtual Reality technology and questions whether they play game or not which including how often they play and which platform they usually play game.
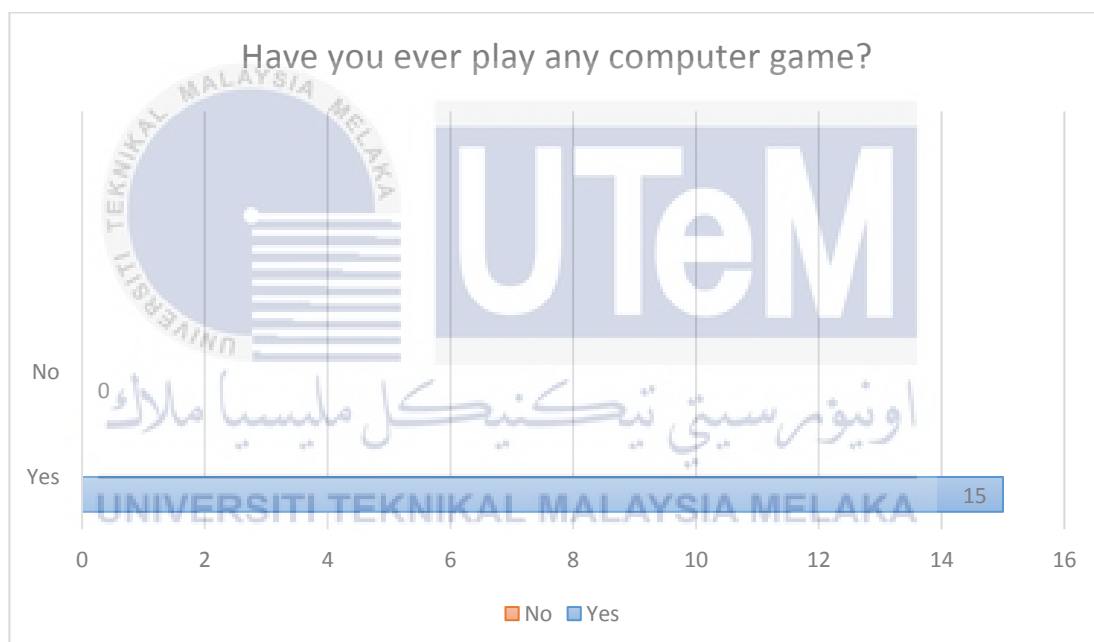
Figure 6.4: Participant result whether they have played game

Figure 6.4 shows the result collected from the participant whether they have played any computer games. The result shows that all the fifteen respondents have play game before they play test this game.

Figure 6.5: How often participant play games

Figure 6.5 shows the analysis result of the participant based on the question 2 which is about how often does the participant play games. There are just a slightly different for the number of participant for each given choice of answer. Most of the respondent answer they only play game once a month which the total respondents vote for this answer choice is six respondents. There are four respondents that answer they play game once a week. From this we can conclude that most of the respondents are not a hardcore gamer because the respondents that play game every day is only five respondents.
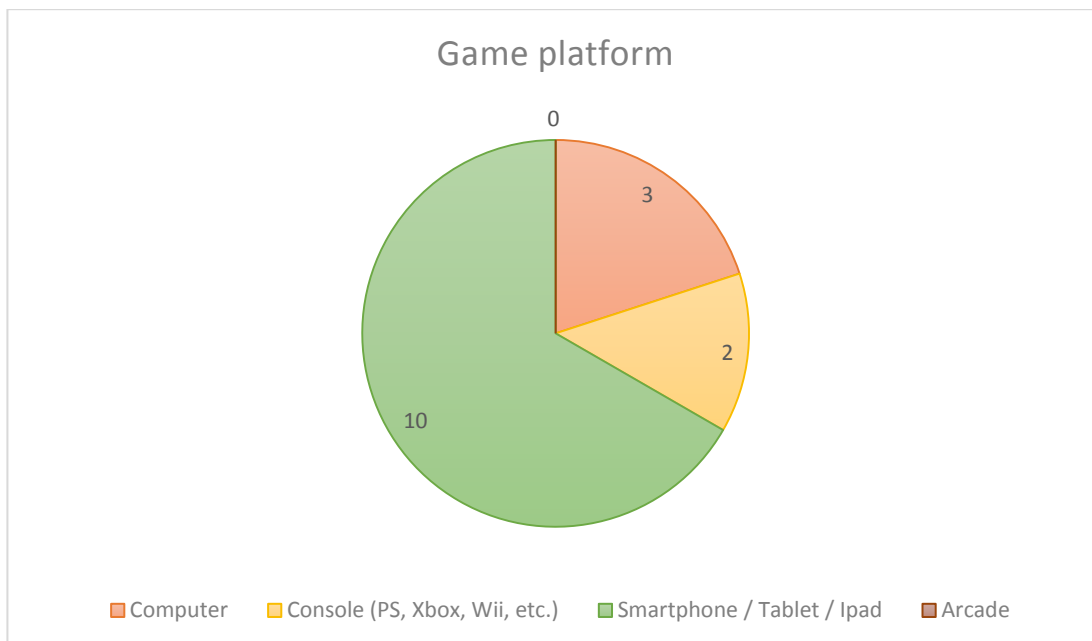
Figure 6.6: Game platform choose by participants

Figure 6.6 shows the game platform types that the participant usually play game. There are four types of game platform given in the questionnaire answer for question 3 which the question is what kind of platform they usually play game. Based on the pie chart, three participants play game using computer while another two participant's play game using game consoles and zero participants choose the arcade platform type. There are ten participants choose smartphones as their platform to play game and this is the most answer choose by the participants. From this we can conclude that most of the participants is a casual gamer because they play game using smartphones.
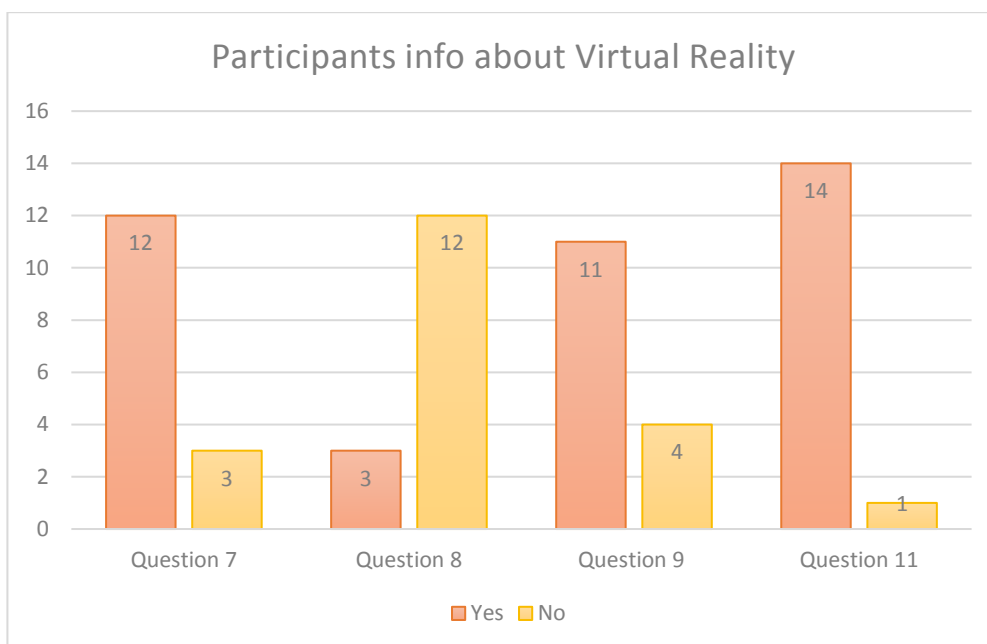
Figure 6.7: Participants info about virtual reality

Based on figure 6.7 it shows the bar graph for four questions which is question 7 is about whether the participant ever heard about virtual reality before, question 8 about whether the participants own any virtual reality headset and question 9 is about whether they had experienced any type of virtual reality with a head mounted display while for question 11 it is about their opinion about whether playing virtual reality games that implement Malaysia culture will help them improve their knowledge about Malaysian culture . For question 7 answer we can conclude that most of the participant have heard about virtual reality and only three participants have never heard about virtual reality. For question 8, only three participants own a virtual reality headset while the other twelve participants does not own any virtual reality headsets. Based on question 9, most of the participants have experience virtual reality with head mounted display and only four participants never experience any type of virtual reality with head mounted display. For question 11, only one participants do not agreed that they can improve that they can improve their knowledge through playing virtual reality games that implement traditional culture while the other respondents agreed that they can improve their knowledge through this type of games. Based on the data form this four questions we can see that all the participants know about virtual reality and agreed that by playing virtual reality games that implement Malaysian culture can help them

improve their knowledge more about Malaysian culture but most of them does not own any virtual reality headset.
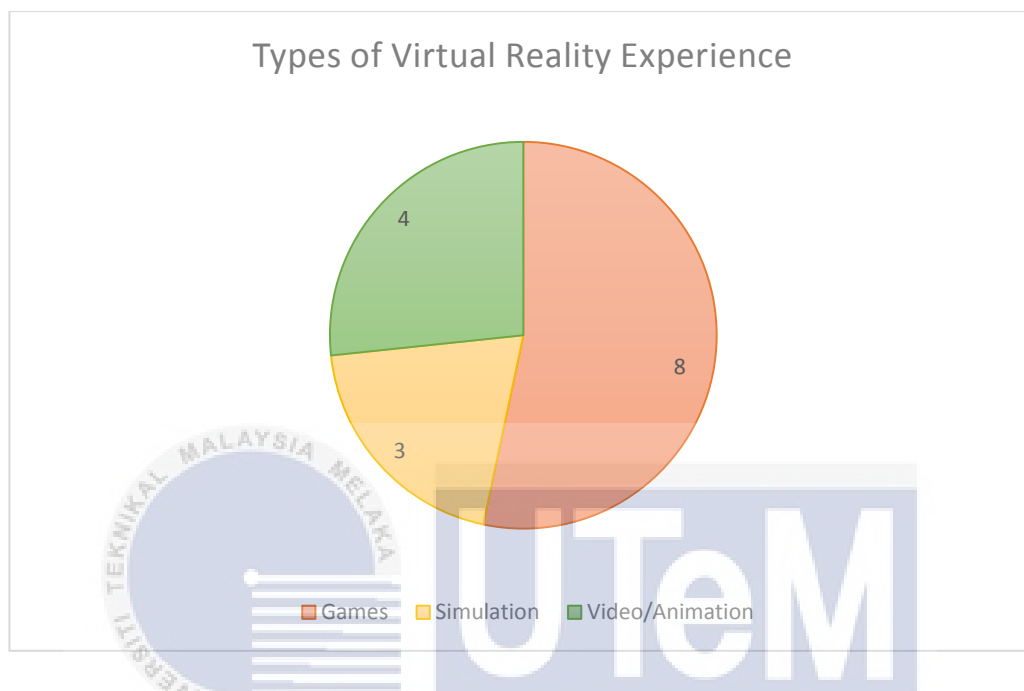
Figure 6.8: Types of Virtual Reality participants experience

Based on figure 6.8, eight out of fifteen participants experience virtual reality through games. Only three participants experience for simulation type of virtual reality experience and four participants experience virtual reality in video and animation. From this pie chart, we can conclude that most of the participants have experience virtual reality even though for different type of virtual reality experience.

6.5.3 Respondents Feedbacks

This part will explain the data analyse collected from the feedback from the fifteen respondents that participate in this game testing.

The Game Playability to Participant

I made it through without problems — 4

I made it through — 11

I didn't know what to do — 0

| 0 | 2 | 4 | 6 | 8 | 10 | 12 |
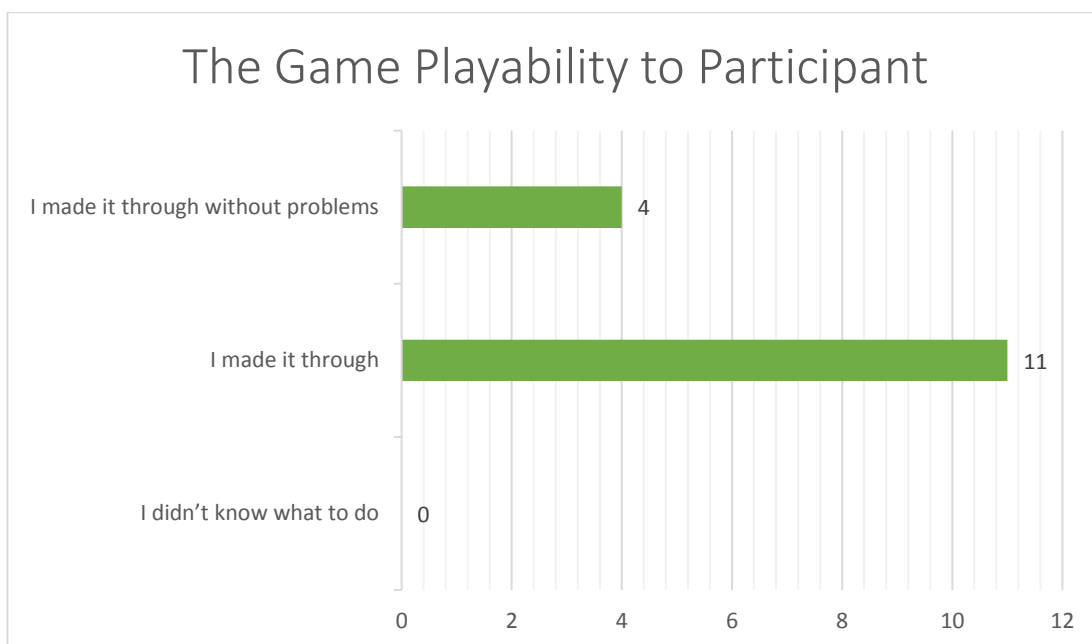
Figure 6.9: The Playability of the Game

Based on figure 6.9, eleven from fifteen participant made it through the game while only four made through the game without problems and zero participants for do not know how to play the game.

Times taken to win the game

1
2
12

□ 1   □ More than 1   □ More than 3
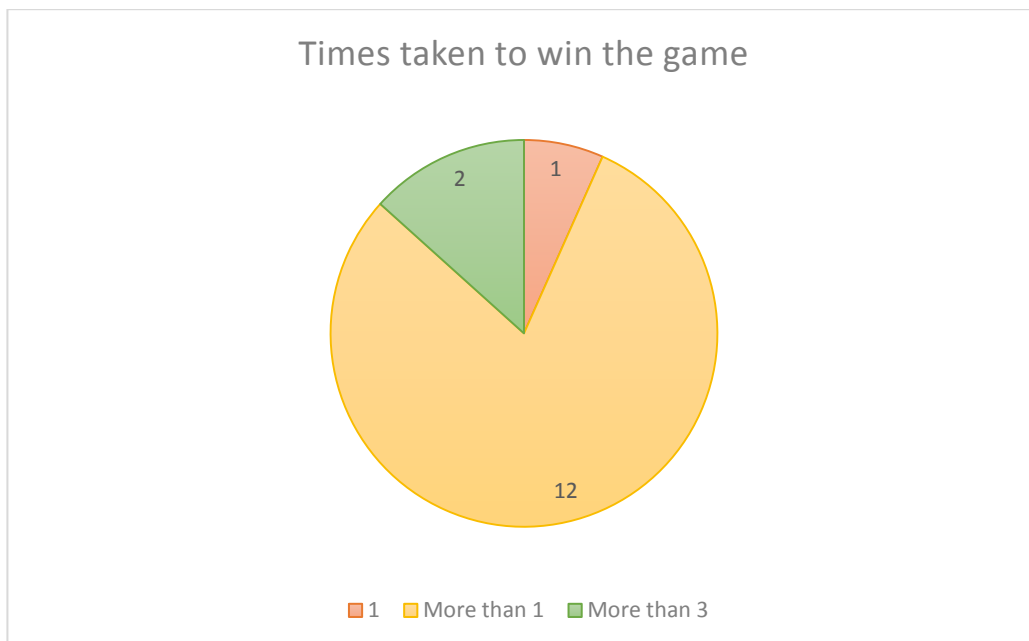
Figure 6.10: Times taken to win the game

Figure 6.10 shows how many time do the play need to play the game in order for them to win the game. Most of the participant manage to win the game after more than one time they play the game while only one participant manage to win the game when play the game for the first time and two participants take more than three times to play the game in order to win the game.
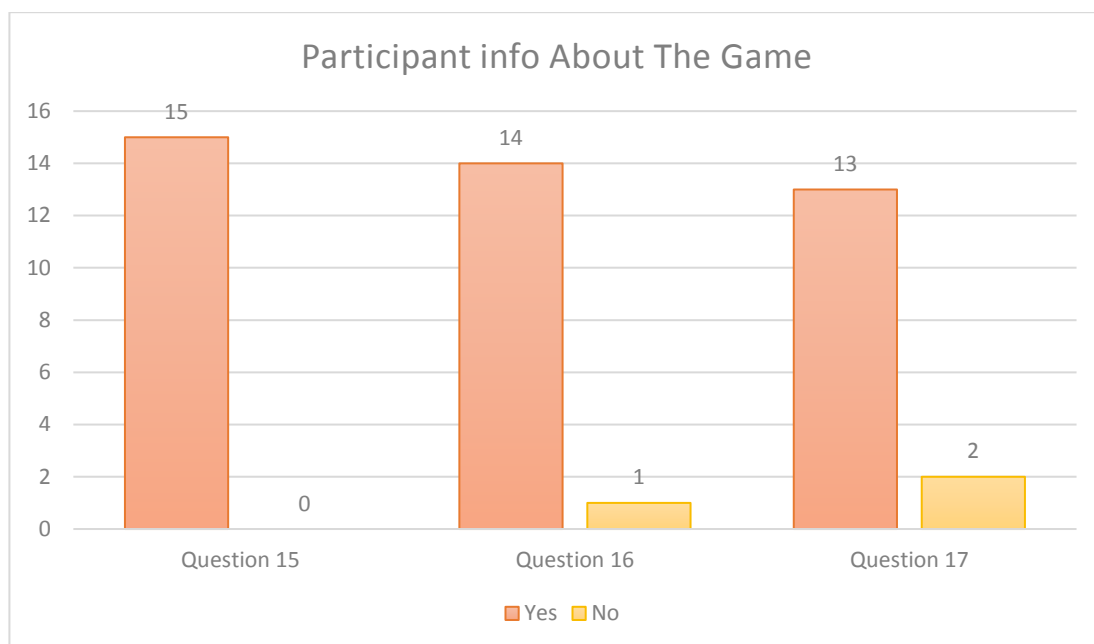
Figure 6.11: Participant info about the game

Figure 6.11 shows the participant info about the answer based on the three questions asked in the questionnaire. Question 15 asked the participant about whether the instruction in the game clear to them or not, all the participants for this game testing answer yes for this question which they clearly and understand the instruction of this game. For question 16, the participant were asked whether the game feedback clear to them. Only one participant answer no for this question and the other participants answer yes for this question. In question 17 the participant were asked whether the game help them improve their knowledge about Malaysian traditional elements. Two of the participant's answer no this is because they already know all the items listed in the game while the other thirteen participants agreed that this game help them in improving their knowledge about Malaysia because most of the items listed inside the game they do not know.
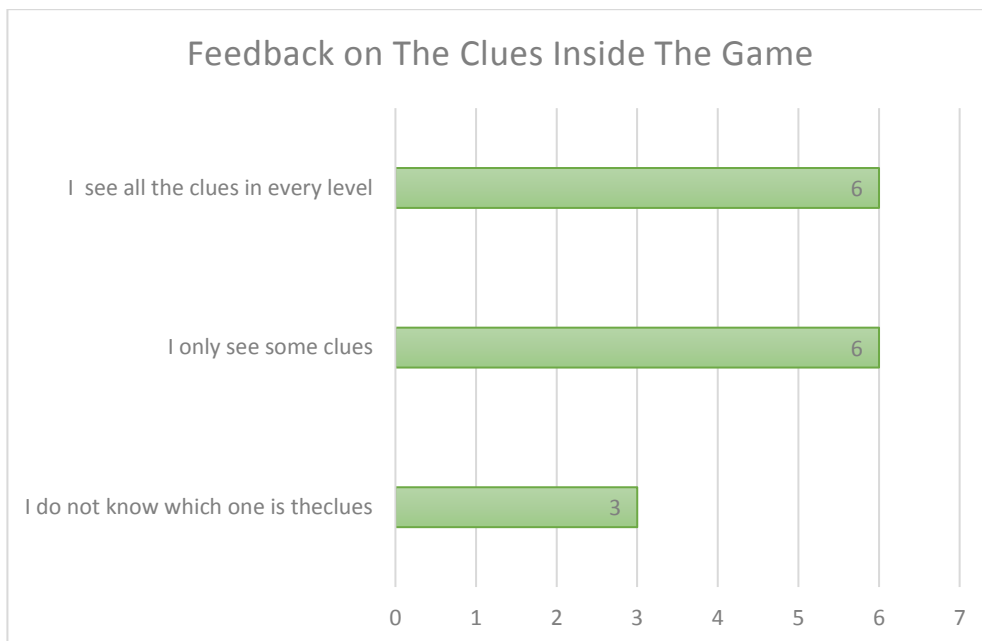
Figure 6.12: Feedback on the clues inside the game

Figure 6.12 shows the feedback from the participants about the clues given inside the game whether it is clear to be seen or not to them. Three participant out of fifteen participant say that they do not know which one is the clues inside the game. There are two answer that have the same number of participants which are six participants say that the only see some clues and the other six participants say that they see all the clues in every levels. We can see that the clues for this game is easy to see in every and each levels because majority of the participants knew which one is the clues given to them inside the game.
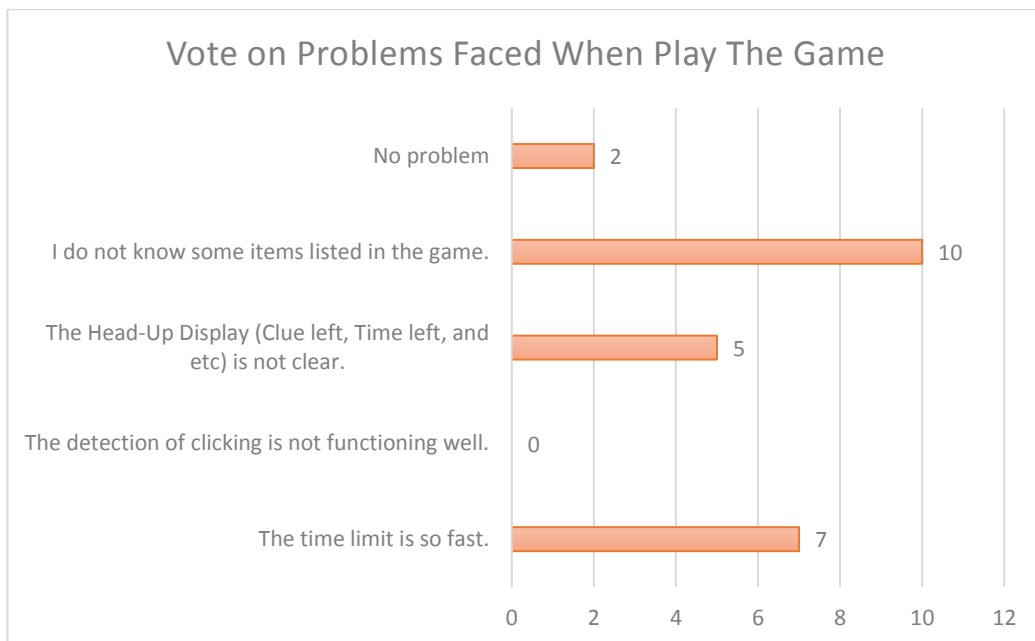
Figure 6.13: Problems faced by participants votes

Figure 6.13 shows that the problems faced by the participants when play the game. The participants is allow to tick more than one problem they faced inside the game. From the bar chart above, the problem faced by most of the participants is they do not know the listed item inside the game. For the second high voted problem which voted by seven participants that said the problems run by them when playing the game is the time limit for the game is so fast. Only five participants vote for the problem run by them in the game that the Head-up display inside the game is not clear to them and two participant voted that they do not have any problem when play the game. Based on this voting result, it can be conclude that the detection of clicking is functioning well as no participant run to this problems and most of the participants have problem with the items listed inside the game as they did not know some items listed inside the game which make them do not have enough time to finish the game in given time.

6.5.4 Respondents Interview and Open Ended Questions Feedback

This part will analyse and summaries all the data collected from the interview questions that were asked to the respondents at the end of the game testing. There are five questions and three open ended questions in the questionnaire.

The first question out of five questions are their opinion whether games can help the students to understands more what they learn at school if it is used as one of the teaching tools in schools. For the first questions most of the respondents agreed that if games is used as one of the teaching tools in school it will help the students to understand more about what they learn because game is more interactive than traditional learning method.

The second questions is about games in Malaysia implement about local elements in Malaysia. There are two type of answer that is famously answer by most of the respondents that agreed games in Malaysia should implement local elements of Malaysia because young generation nowadays do not really know about traditional culture of Malaysia and another answer is because Malaysia is the only country that are multiple culture therefore we should take it as advantage to spread our own culture uniqueness. Only one respondents that do not agreed that games in Malaysia should implement local elements of Malaysia this is because games should not be focus on anything as it is something that involve creativity.

The respondent's opinions about whether virtual reality game can help people gain knowledge and experience the same feeling like the real world was asked in question three. There are two most favorite answer given by the respondents which are some of the respondents agreed that help people gain knowledge and experience the same feeling like the real world because when they play virtual reality game they feel like they are in the real world while the other answer they do not agreed that virtual reality game can help people gain knowledge and experience the same feeling like the real world because the game is still a game to them and the realism is not real.

All the respondents agreed that game that implement local elements of Malaysia will help the younger generation to understand more about Malaysia which this is the questions four that is asked to the respondents. All the respondents agreed to this questions four is because young generation nowadays are mostly exposed to technology and have theirs' owns device. Therefore, when the young generation play games that implement local elements it will indirectly improve their knowledge and help them to understand more about Malaysia in a different way.

The last interview question asked to the respondents is their opinion on which platform spread the uniqueness of Malaysia more effectively whether games or advertisement. Most of the respondents answer games because when they play games they will become more focus and indirectly learn something compare to advertisement that does not involve any interaction. Some respondent's state that both platform can help in spreading the uniqueness of Malaysia but depend on the content of the platform whether it is interesting or not interesting enough to grab the user attention.

For open ended questions, the respondents were ask about what they like, dislike and their opinions about the message of the game they play test. The most common answer for the question what they like about the game are the part where the game require the respondents to interact with the game world to find the hidden object. This is because it make the player feels like they are like finding the object in the real world because they require to more 360 degree. Another common answer for this questions is the user interface of the game which implement the traditional elements inside the game. Some unique answers for this questions are because the game is virtual reality and simple to play apart from it is their first experience of using virtual reality.

The most common answer by the respondent for the question what they do not like about the game are the clues are not clear and smalls, they do not realise the game time limit and some respondents does not like the game sound because the tempo is the same for every level. There are two uniqueness answers for this question which are

they feel dizzy when playing the game because they need to rotate 360 degree and some respondents does not have anything that they dislike about the game.

For the last question all the respondents answers that the message of this game are about to introduce and help people to improve their knowledge about Malaysia local elements and culture.

6.6 Conclusion

As a conclusion, this chapter discuss about all the testing part of this project which are the test plan, test strategy and the test implementation including the test result and data analysis. All the data and feedback collected is analyse and explain in details for every section. The next chapter will discuss about the project strength and weakness apart from suggestion to improve the game based on the comment and feedback given by all the participants.

CHAPTER VII

CONCLUSION

7.1 Introduction

This chapter will explain in details about the project strength and weakness apart from suggestion to improve the game based on the comment and feedback given by all the participants including the project contribution.

7.2 Observation on Weaknesses and Strengths

- Weaknesses

There are a few weakness that can be detect in this project based on the data and feedback in previous chapter. The weakness of this game are the clues, the Head-up display and the time limit for this game is not clear to the respondents.

Apart from that, the time limit for this game is also fast which make the player loss the game on their first time playing the game because some of the respondents does not know the items listed in the game.

Besides that, there are a few limitation for this game such as some player will feel dizzy when playing this game for a long duration and for people who wear spectacles will have problem when playing this game because they could not see clearly when playing the game using VR box.

- Strengths

According to Nielsen.J (2012) usability is a quality attribute that assesses how easy user interfaces used by the user. It can be defined by five quality components such a learnability which is how easy the user to complete simple task when the used the application for the first time, efficiency which how quick can the user complete the task after they learn to use the user application, memorability which can the user know how to use the application after a period of time they do not used the application, errors which how many mistakes do users make, how bad are these errors, and how can they easily recover from mistakes they have made and satisfaction is how friendly the application to the user whether it is pleasant or not to be used by the user.

The strengths of this game is the game have a good usability as it achieve the five quality components for the usability which are learnability, efficiency, memorability, errors and satisfaction.

Learnability achieved is because most of the respondent know how to play the game on their first time play the game while for efficiency is when most the respondent complete all the level after they play the game for the first time.

Memorability is achieved when some of the respondent play the game for the second time still know how to play the game three week after they tested the alpha version of the game.

For error, most respondents do not know the items listed in the game which make they do not have enough time to finish the game within the given time limit but it is recover by playing the game the second time which they already know some items make them manage to complete the game on time.

Satisfaction is achieved when the game is like by all the respondents because of user interface of the game which implement the traditional elements inside the game and the interaction with the game world make them feel like in a real world although the clues in the game is not clear to be seen for some respondents.

Apart from that, the combination of the three elements which are virtual reality technology, hidden object genre of games and the implementation of local elements of Malaysia is like by all the respondents because it make them improve their knowledge about the traditional culture of Malaysia aside experience a new way to play hidden object games which used virtual reality technology.

7.3 Propositions for Improvement

The improvement that can be made for this game are changing is Head-up display text colour and make it more bigger so that it can be see clearly by the player. Besides that, the game also can be improve by making the sound effect have a tempo which will make the player realise the time limit inside the game is decrease from time

to time for example then the time limit left 10 second the background music will change it tempo from slow beat to fast beat.

Other improvement can be make is adding more sound effect inside the game which is put sound for every clicked object. Apart from that, the clues given in the game can be change into more recognize icon that will make the user know that which one of the element inside the game is the clues that can be clicked so that they can used the clue to find the hidden object that they could not find.

7.4 Project Contribution

The contribution of this project is mainly for young generation of Malaysia. This game is develop to help them improve their knowledge on Malaysia traditional elements and culture. Apart from that, the project is also contribute to the effort of spreading Malaysia traditional elements and culture to the public whether from Malaysia itself or the international.

7.5 Conclusion

In conclusion for the whole project, the studies and exploration about culture and traditional concept in Malaysia related to digital game have contribute in completing the project. A complete hidden object game that implement virtual reality technology and local elements was successfully developed and tested. The tested game feedback and data collected have shown that the game have a good usability because all the participants like the game because it help them in improve their knowledge

about Malaysia traditional elements and culture although the there are some part of the game was not clear to the participants. The main point in developing this project is to develop new virtual reality hidden object game platform which implement Malaysian traditional culture. Therefore, all the objective for this game is successfully achieved which are to explore about culture and traditional concept in Malaysia related to digital game, to develop new virtual reality hidden object game platform which implement Malaysian traditional culture and to evaluate users' usability of hidden object game using virtual reality as a game platform.

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APPENDICES

Questionnaire:

Hidden Object Virtual Reality: This is Malaysia!

I am Aimi Athirah Binti Mohd Pisol from the Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka (UTeM).

First of all, thank you for participating in the playtesting for my game entitle "Hidden Object Virtual Reality: This is Malaysia!" which have been develop for my final year project for the course Bachelor of Information Technology (Game Technology).

This survey is made to evaluate user's usability on the game that have been developed or being develop which combine virtual reality and hidden object game that implement traditional culture in Malaysia. All the information given in the survey will be confidential and will be used for final year project research purpose only.

Thank you for your time and willingness to participate in this study.

* Please circle your answer for multiple choice questions and fill in the bank in the space provided

Demographic

1. What is your age?

 A. 13 to 17   B. 18 to 20   C. 20 and above

2. What is your gender?

 A. Male   B. Female

3. Where do you study?

 A.   Secondary   B. Matric/College   C. University   D. Others
 School

Part 1

4. Have you ever play any computer game?

  A. Yes   B. No

5. If YES (in question above), how often do you play games?

  A. Everyday   B. Once a week   C. Once a month

6. What kind of platform do you usually play games?

A. Computer

B. Arcade

C. Console (PS, Xbox, Wii, etc.)

D. Smartphone / Tablet / Ipad

7. Have you ever heard about Virtual Reality?

  A. Yes   B. No

8. Do you own a virtual reality headset?

  A. Yes   B. No

9. Have you experienced virtual reality with a head mounted display (VR box, Google

Cardboard, Oculus Rift, etc.)?

  A. Yes   B. No

10. What kind of virtual reality with a head mounted display do you experience?

A. Games   B. Simulation   C. Video/ Animation/ Pictures

11. Do you think by playing virtual reality games that implement Malaysia culture will help you improve your knowledge about Malaysian culture?

A. Yes   B. No

12. Provide reason for your answer in question 11 above, (both either YES or NO).

Part 2

13. What did you think of the game overall in terms of playability?

A. I didn't know what to do

B. I made it through

C. I made it through without problems

14. How many time does it take for you to win the game?

A. 1

B. More than 1

C. More than 3

15. Were the instruction in the game clear to you?

   A. Yes   B. No

16. Is the game feedback clear to you?

   A. Yes   B. No

17. Does the game help you improve your knowledge about Malaysian traditional things?

A. Yes, because not all the items listed I know.

B. No, because I know all the items listed.

18. What do you think about the clues given in the game?

A. I do not know which one is the clues

B. I only see some clues

C. I see all the clues in every level

* You can tick more than 1 answer for question 19

19. What was the problems you run through when playing the game?

   ☐   The time limit is so fast.
   ☐   The detection of clicking is not functioning well.
   ☐   The Head-Up Display (Clue left, Time left, and etc) is not clear.
   ☐   I do not know some items listed in the game.
   ☐   No problems.

20. Which part of the game did you like? Why?
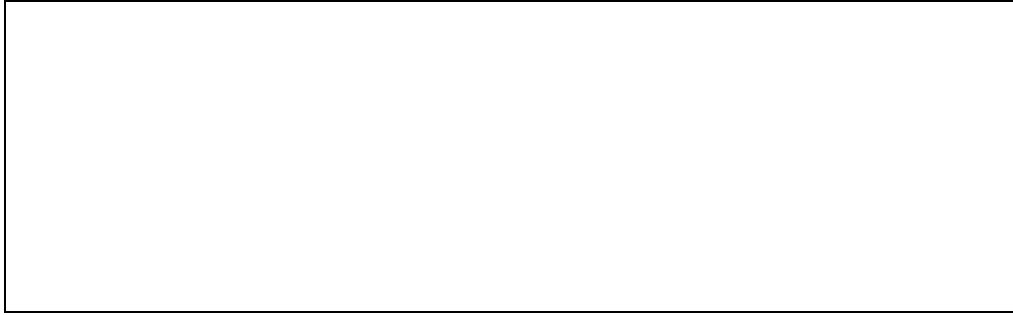
21. Which part of the game did you dislike? Why?
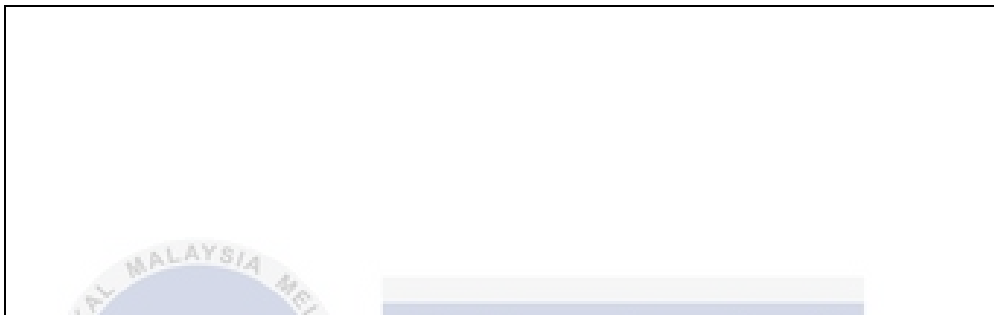
22. From your opinion, what was the message of the game?

Interview questions:

23. From your opinion, if games is made as one of the teaching tools in school will

it help the students to understand more about what they learn in school? Why?

24. From your opinion, should games in Malaysia implement more about traditional culture or local element in Malaysia? Why?

25. From your opinion, do you think virtual reality game can help people gain knowledge and experience the same feeling like they are in real world?

26. Do you think through game that implement local elements of Malaysia will help the younger generation to understand more about Malaysia?

27. From your opinion, can game be one of the platform to spread the uniqueness of Malaysia more effective and easy compare to advertisement?

Game coding:

Player movement:

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class FPSController : MonoBehaviour {

    public float speed = 2f;
    CharacterController player;

    float moveFB; // will move forward & back
    float moveLR; // will move right & left

    void Start () {
        player = GetComponent<CharacterController>(); // Get all the component on this object
    }

    void Update () {
            moveFB = Input.GetAxis ("Vertical") * speed; // Get input
            moveLR = Input.GetAxis ("Horizontal") * speed;

                                        Vector3 movement = new Vector3 (moveLR, 0,moveFB);
            movement = transform.rotation * movement;

            player.Move (movement * Time.deltaTime);
    }
}
```

Next Button:

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.SceneManagement;

public class next : MonoBehaviour {

    public GameObject Loading;
    public GameObject Text;
    public GameObject All;

    protected void Start()
    {
        Time.timeScale = 1;
    }

    public void Update()
    {
        if (Input.GetButton ("Joystick_X")) {
            Application.Quit ();
        }
        if (Input.GetButtonDown ("Joystick_B")) {
            SceneManager.LoadScene ("test_levelmain");
            Destroy (Text);
            Destroy (All);
            Clue_Count.Instance_1.k_t = 0;
            Clue_CountL2.Instance_2.LTk_t = 0;
            Clue_CountL3.Instance_2.TLk_t = 0;
            Click_Count.Instance.c_t = 0;
            Click_CountL2.Instance_3.LTc_t = 0;
            Click_CountL3.Instance_3.TLc_t = 0;
            Loading.gameObject.SetActive (true);
        }
    }
}
```

Background Music:

```csharp
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.Audio;


public class background_music : MonoBehaviour {

    private AudioSource _audio; // The reference to AudioSource

    protected void Start()
    {
        GetComponent<AudioSource> ().Play ();
    }


    public void Update()
    {
        Music_Button ();
    }

    public void Music_Button(){


        if (Input.GetButtonDown ("L1")) {
            GetComponent<AudioSource> ().Stop ();
        }

        if (Input.GetButtonDown ("R1")) {
            GetComponent<AudioSource> ().Play ();
        }
    }
}
```

Pause Button:

```csharp
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class Rehat : MonoBehaviour {

    public GameObject note;
    public GameObject text_L;
    public GameObject All;
    void Start()
    {
    }

    void Update()
    {
        if (Input.GetButtonDown("Joystick_Y"))
        {
            Time.timeScale = 0;
            note.gameObject.SetActive (true);
            text_L.gameObject.SetActive (false);
            All.gameObject.SetActive (false);

        }
        if (Input.GetButtonDown("Rehat"))
        {
            Time.timeScale = 1;
            note.gameObject.SetActive (false);
            text_L.gameObject.SetActive (true);
            All.gameObject.SetActive (true);
```

```
        }
    }
}
```

Restart Game Button:

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.SceneManagement;

public class Restart : MonoBehaviour {
    public GameObject All;
    public GameObject Text;
    public GameObject Loading;

    // Use this for initialization
    void Start () {
    }

    // Update is called once per frame
    void Update ()
    {
        if (Input.GetButtonDown ("Joystick_B")) {
            SceneManager.LoadScene ("test_levelmain");
            Loading.gameObject.SetActive (true);
            Destroy (All);
            Destroy (Text);
            Clue_Count.Instance_1.k_t = 0;
            Clue_CountL2.Instance_2.LTk_t = 0;
            Clue_CountL3.Instance_2.TLk_t = 0;
            Click_Count.Instance.c_t = 0;
            Click_CountL2.Instance_3.LTc_t = 0;
            Click_CountL3.Instance_3.TLc_t = 0;
        }
        if (Input.GetButtonDown ("Joystick_X")) {
            Application.Quit ();
        }
    }
}
```

Interaction Level 1:

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.SceneManagement;

public class Interaction : MonoBehaviour {

    public TextMesh clue;
    public TextMesh clue_1;
    public TextMesh clue_2;
    public TextMesh clue_3;
    public TextMesh clue_4;

    public GameObject tepaksirih;
    public GameObject kompang;
    public GameObject congkak;
    public GameObject keris;
    public GameObject guli;
    public GameObject next;
    public GameObject kacip;
    public GameObject gameover;
    public GameObject Text;
    public GameObject All;

    public GameObject C_object;
    public GameObject C_object1;
    public GameObject C_object2;
```

```
public GameObject C_object3;
public GameObject C_object4;
public GameObject E_object;

public bool tekan;
public TextMesh C_L_Text;
public TextMesh T_Text;
private bool gazedAt= false;


int masabaru;
float timeLeft ;


void HB(){

    T_Text                      =GameObject.Find("Time_text").GetComponent<TextMesh>();
    C_L_Text                    =GameObject.Find("Clue_left").GetComponent<TextMesh>();
    clue = GameObject.Find("clue").GetComponent<TextMesh>();
    clue_1 =GameObject.Find("clue_1").GetComponent<TextMesh>();
    clue_2 =GameObject.Find("clue_2").GetComponent<TextMesh>();//declare as a game object
    clue_3 =GameObject.Find("clue_3").GetComponent<TextMesh>();
    clue_4 =GameObject.Find("clue_4").GetComponent<TextMesh>();

    congkak = GameObject.FindWithTag ("congkak");
    keris = GameObject.FindWithTag ("keris");
    tepaksirih = GameObject.FindWithTag ("tepak_sirih");
    kompang = GameObject.FindWithTag ("kompang");
    guli = GameObject.FindWithTag ("guli");
    next = GameObject.FindWithTag ("next");
    kacip=GameObject.FindWithTag ("kacip");
    gameover=GameObject.FindWithTag ("gameover");

    C_object=GameObject.FindWithTag ("C_object");
    C_object1=GameObject.FindWithTag ("C_object1");
    C_object2=GameObject.FindWithTag ("C_object2");
    C_object3=GameObject.FindWithTag ("C_object3");
    C_object4=GameObject.FindWithTag ("C_object4");
    E_object=GameObject.FindWithTag ("Extra_Objects");

}
// Use this for initialization
void Awake () {
    timeLeft = 75;
    TimeLimit();
}

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


    T_Text.text = "Time left: " + masabaru;
    TimeLimit ();
    Click_HO ();//Click Hidden Object Funtion


}

public void Click_HO(){ //function for object when been click

    tekan=Input.GetButton("Joystick_A");

    if (tekan&& gazedAt && congkak == true) {
        Debug.Log ("CLICK");
        Destroy(congkak);
        Destroy (clue);
        Destroy (C_object);
        Click_Count.Instance.AddClick_Count (1);

    }
    if (tekan && gazedAt && kompang == true) {
        Debug.Log ("CLICK");
        Destroy (kompang);        //make object dissappear when click
        Destroy (clue_1);
        Destroy(C_object1);
```

```
                    Click_Count.Instance.AddClick_Count (1);

        }
        if (tekan && gazedAt && tepaksirih== true) {
            Debug.Log ("CLICK");
            Destroy(tepaksirih);
            Destroy (clue_2);
            Destroy (C_object2);
            Click_Count.Instance.AddClick_Count (1);
        }

        if (tekan && gazedAt && keris == true) {
            Debug.Log ("CLICK");
            Destroy (keris);
            Destroy (clue_3);
            Destroy (C_object3);
            Click_Count.Instance.AddClick_Count (1);
        }


        if (tekan && gazedAt && guli == true) {
            Debug.Log ("CLICK");
            Destroy (guli);
            Destroy (clue_4);
            Destroy (C_object4);
            Click_Count.Instance.AddClick_Count (1);
        }

        if (Click_Count.Instance.c_t == 5) {
            next.gameObject.SetActive (true);
            Text.gameObject.SetActive (false);
            All.gameObject.SetActive (false);
            Time.timeScale = 0; //stop at current time when game complete
        }
    }


    public void TimeLimit(){

        timeLeft -= Time.deltaTime;
        masabaru = (int) timeLeft;

        if (timeLeft <0) {
            Time.timeScale = 0;
            gameover.gameObject.SetActive (true);
            Text.gameObject.SetActive (false);
            All.gameObject.SetActive (false);
            Destroy (E_object);

        }
    }

    public void PointerEnter(){
        gazedAt = true;
    }

    public void PointerExit(){
            gazedAt = false;
    }


    public void PointerDown ()
    {
     Debug.Log ("Pointer Down");//show info at console that pointer have click the object
    }
}


Click Count Class Level 1:

using System.Collections;
using System.Collections.Generic;
using UnityEngine;
```

```
public class Click_Count
{
    private static Click_Count c_instance =null;
    public int c_t;//c_t=click times

    public static Click_Count Instance {
        get {
            if (c_instance ==null) {
                c_instance = new Click_Count ();
            }
            return c_instance;
        }
    }

    public void AddClick_Count (int ct)
    {
        c_t += ct;
        Debug.Log ("Current click:" + c_t);
    }
}
```

Clue Manager:

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.SceneManagement;

public class Clue_manager : MonoBehaviour {

    public   GameObject C_object;
    public                                                      GameObject C_object1;
    public  GameObject C_object2;
    public  GameObject C_object3;
    public GameObject C_object4;
    public GameObject quit;
    public GameObject All;
    public GameObject Text;

    public bool tekan2;

    public TextMesh C_L_Text;
    public GameObject next;
    public Animator congkak_rotate;
    public Animator kompang_rotate;
    public Animator keris_rotate;
    public Animator guli_rotate;
    public Animator tepaksirih_rotate;
    public GameObject loading1;

    public TextMesh T_Text;
    private bool gazedAt= false;

    void HB(){
        C_L_Text= GameObject.Find("Clue_left").GetComponent<TextMesh> ();

        C_object= GameObject.FindWithTag ("C_object");
        C_object1=GameObject.FindWithTag ("C_object1");
        C_object2=GameObject.FindWithTag ("C_object2");
        C_object3=GameObject.FindWithTag ("C_object3");
        C_object4=GameObject.FindWithTag ("C_object4");
        next= GameObject.FindWithTag ("next");
        quit=GameObject.FindWithTag ("quit");
        T_Text= GameObject.Find("Time_text").GetComponent<TextMesh> ();
        loading1 = GameObject.FindWithTag ("Loading1");

    }
    void Update () {
        C_L_Text.text = "Clue used:" + Clue_Count.Instance_1.k_t+" of 3";//show current lives
        Click_HC ();//Click Hidden Object Funtion
        NextScene();
    }
```

```
public void Click_HC(){ //function for object when been click
    tekan2=Input.GetButton("Joystick_A");

    if (tekan2 && gazedAt && C_object == true) {
        Debug.Log ("CLICK clue");
        Clue_Count.Instance_1.SubClue_Count (1);
        congkak_rotate.enabled = true;

        Destroy (C_object);

    }
    if (tekan2 && gazedAt && C_object1 == true) {
        Clue_Count.Instance_1.SubClue_Count (1);
        Destroy (C_object1);
        kompang_rotate.enabled = true;
    }
    if (tekan2 && gazedAt && C_object2 == true) {
        Debug.Log ("CLICK clue");
        Clue_Count.Instance_1.SubClue_Count (1);
        Destroy (C_object2);
        tepaksirih_rotate.enabled = true;

    }
    if (tekan2 && gazedAt && C_object3 == true) {
        Debug.Log ("CLICK clue");
        Clue_Count.Instance_1.SubClue_Count (1);
        Destroy (C_object3);
        keris_rotate.enabled = true;

    }
        if (tekan2 && gazedAt && C_object4 == true) {
            Debug.Log ("CLICK clue");
            Clue_Count.Instance_1.SubClue_Count (1);
            Destroy (C_object4);
            guli_rotate.enabled = true;

        }
    if (Clue_Count.Instance_1.k_t ==3) {
        Destroy(C_object4);
        Destroy(C_object3);
        Destroy(C_object2);
        Destroy(C_object1);
        Destroy(C_object);
    }
}

    public void NextScene(){
        if (Input.GetButtonDown("Rehat") && gazedAt && next == true) {
            Destroy (Text);
            Destroy (All);
            Destroy (next);
            Clue_Count.Instance_1.k_t = 0;
            Clue_CountL2.Instance_2.LTk_t = 0;
            Clue_CountL3.Instance_2.TLk_t = 0;
            Click_Count.Instance.c_t = 0;
            Click_CountL2.Instance_3.LTc_t = 0;
            Click_CountL3.Instance_3.TLc_t = 0;
            loading1.gameObject.SetActive (true);
            SceneManager.LoadScene ("Level_2");

        }

        if (tekan2 && gazedAt && quit == true) {
            Destroy (quit);
            Application.Quit ();
        }
    }
    public void PointerEnter(){
        gazedAt = true;
```
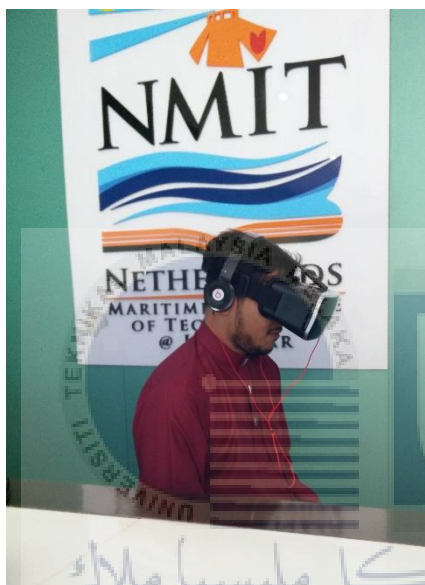
```
    }

    public void PointerExit(){
        gazedAt = false;

    }
    public void PointerDown ()
    {
        Debug.Log ("Pointer Down");//show info at console that pointer have click the object
    }
}
```
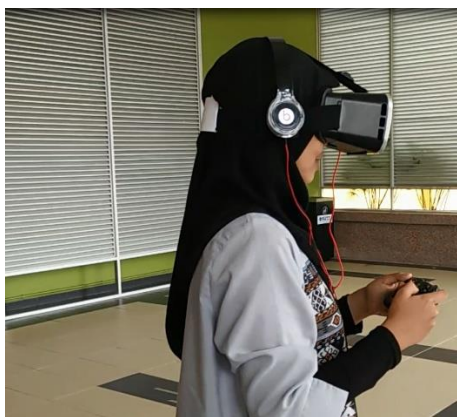
Play Testing Screenshots:

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