AN INTERACTIVE WALKTHROUGH OF VIRTUAL ENVIRONMENT BASED ON THE SUBJECT OF HISTORY SPM SCHOOL TEXTBOOK SYLLABUS

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

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CATATAN: * Tesis dimaksudkan sebagai Laporan Akhir Projek Sarjana Muda (PSM)

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I hereby declare that the project report entitled:

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

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(DR. HAMZAH ASYRANI BIN SULAIMAN)

DEDICATION

All praise and thanks to Allah s.w.t. . . .

I would like to give this special dedication for both of my parents, sister and three of my brother. For which I am pleased to write their names here who have contributed so much enthusiasm, encouragement and assistance, especially both of my beloved parents, Suzana Hj. Abdul Manan and Mohd Khanapi Abd Ghani.

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ABSTRACT

History is what happened in the past which cannot be retrieved, known or understood. History is something that needs to be known for the new generation to learn and improve. People engaged with history in many ways, such as by going to the museum, going to the place that had an artefact building and etc. We are profound that history subject are compulsory for student in elementary school especially for form four and five student. It is one of the ways for us to engage our generation with history for them to know thing from the ancient time. However, most of the history book used lengthy sentences or paragraph. Some of the students are having a hard time to engage with history subject by reading those lengthy sentences and paragraph. Even their text book doesn't have enough pictures or any interactivity manner for them to visualise or remember all the facts in their text book. More over when they had to memorize all the facts and names from the people at the ancient time. Thus, to overcome this matter is to make something for the student to interestingly learn history. There are three primary learning styles that can be implementing in this method of learning, which is listening, hearing and speaking and kinaesthetic where learners tend to learn by experiencing, moving and doing. Interactive walkthrough of virtual environment is to help the student learn how was the ancient time by visually show 3D virtual walkthrough of the environment in the ancient time. Therefore, 3D method will be used to model environment that probably happened in the ancient time based on the text book. This 3D environment is then shown output in the computer screen.

ABSTRAK

Sejarah adalah perkara yang telah berlaku yang tidak boleh di dapatkan kembali dan di fahami. Sejarah adalah perkara yang perlu di ketahui oleh generasi baru untuk di ambil iktibar dan di fahami. Setiap orang melibatkan diri dengan sejarah dalam pelbagai bentuk, seperti melawat ke museum-musium bersejarah, melawat tempat bersejarah dan lain-lain lagi. Seperti yang kita ketahui, sejarah adalah perkara yang wajib di pelajari oleh pelajar menengah yang sedang mengambil SPM.Ia adalah satu perkara yang dapat melibatkan pelajar dengan sejarah dengan lebih mendalam, supaya mereka dapat mngetahui sejarah masa purba. Tetapi, kebanyakan buku teks sejarah di sekolah mengandungi ayat dan perenggan yang panjang. Sesetengah pelajar mempunyai kesukaran untuk menghafal dan membaca semua fakta-fakta walaupun ada disediakan gambar-gambar bersejarah di dalamnya. Untuk menyelesaikan masalah ini, bagi menghasilkan produk yang dapat menarik perhatian pelajar untuk belajar subjek sejarah. Terdapat tiga pembelajaran asas iaitu pendengaran, penglihatan dan sentuhan di mana pelajar dapat mengalami situasi di dalam subjek sejarah. *Interactive walkthrough of virtual environment* untuk membantu pelajar belajar sejarah pada zaman purba dengan penggunaan persekitaran 3D. Justeru itu, penggunaan 3D akan digunakan untuk menghasilkan objek yang terdapat pada zaman purba berdasarkan buku teks.

TABLE OF CONTENT

LIST OF TABLES

TABLE OF FIGURE

CHAPTER I

INTRODUCTION

1.1 Introduction

History is what happened in the past which cannot be retrieved, known or understood. History is something that needs to be known for the new generation to learn and improve. People engaged with history in many ways, such as by going to the museum, going to the place that had an artefact building and etc. We are profound that history subject are compulsory for student in elementary school especially for form four and five student. It is one of the ways for us to engage our generation with history for them to know thing from the ancient time. However, most of the history book used lengthy sentences or paragraph. Some of the students are having a hard time to engage with history subject by reading those lengthy sentences and paragraph. Even their text book doesn't have enough pictures or any

interactivity manner for them to visualise or remember all the facts in their text book. More over when they had to memorize all the facts and names from the people at the ancient time.

Thus, to overcome this matter is to make something for the student to interestingly learn history. There are three primary learning styles that can be implementing in this method of learning, which is listening, hearing and speaking and kinaesthetic where learners tend to learn by experiencing, moving and doing. Interactive walkthrough of virtual environment is to help the student learn how was the ancient time by visually show 3D virtual walkthrough of the environment in the ancient time. Therefore, 3D method will be used to model environment that probably happened in the ancient time based on the text book. This 3D environment is then will be shown in the computer screen for them experience.

1.2 Problem statement

In Malaysia, it is a compulsory for student to pass the history subject in order to pass the S*ijil Perlajaran Malaysia*, SPM exam. Due to some problem on understanding history subject, many of them don't have the chance to pass.

Firstly, many history subjects are using lengthy paragraph and sentences and using fewer pictures. There was no interactivity going on in the class. Therefore, student will just study only for the sake to pass the exam.

Secondly, school will only bring student to museum only once a year. Not many museums in Malaysia are complete with facilities that states in the history textbook for them to visualise and interact. This will cause them to have less interest on visiting the museum.

Lastly, most of the school are using the same technique for the student to learn history subject in class. They were asked to read and copy the extra note that the teacher wrote at the board. They were then explained by the teacher in short amount of time. Sometimes they do not have time to finish the syllabus on time.

1.3 Objectives

- To virtualize the content of SPM History subject in interactive way.
- To create a virtual environment walkthrough of ancient time for users to explore while learning.
- To analyse before and after (using survey) the effects on having an interactive walkthrough using virtual environment for History subject.

1.4 Scope

This project is specially design for SPM student. That includes the student of form four and five. The age range is from 16 – 17 years old. This is because of the compulsory of the history subject in order for the student to pass SPM examination. It is also a platform for the teacher to look up to for them to teach. It is also the platform for them to interact while studying by walking around the environment using keyboard and mouse.

Furthermore, this project is focus on the computer platform only. The platform can be open for the entire latest windows platform: Windows 7, Windows 8 and also Windows 10. Other than that, since it is a virtual walkthrough, mouse and key board is used for them to move around.

Lastly, to make this project, only one of the sub chapters is being used. The chosen sub chapter is about the ancient Egypt time that consists of five characteristic. These characteristic are signifies of how the ancient Egypt were. While only certain sub chapter is being modelled is because there were two text book and chapters that needs to be modelled in limited of time. This project is developed to see the effectiveness way to study history apart

from reading the lengthy sentences and paragraph. Only one of the sub chapters are chosen to be tested in this virtual walkthrough project.

1.5 Project Significance

Interactive virtual walkthrough is specifically for student from form four and five who will be undertaking their SPM exam. This project is design not to replace the textbook. It is designed to make the project one of the way student can learn history subject at school or home. This aim is to let them understand the history much effectively in fun way by using computer based.

With this interactive virtual walkthrough, the student can get to see their imagination of the ancient time clearly. To see the history environment from different places like Egypt is impossible for the student because of distance and money. Interactive virtual walkthrough can make them feel as if they were in those environments.

Interactive virtual walkthrough needs to use the device such as mouse and keyboard in order for them to move around the 3D environment in computer. It consists of sound and information in each artefact that they point to. Such as, information about the king Egypt and how they have many different God such re, Anubis and etc.

Thus, by developing this product teacher will obtain benefits from it. The teacher does not have to worry about explaining to student to imagine how the environment life of past decade was.

1.6 Conclusion

In conclusion, this project is developing an interactive virtual walkthrough that deliver information fact of history from form four and five textbook. This virtual walkthrough will ease the student from just reading those lengthy sentences and paragraph. Besides, this virtual walkthrough will increase their interest to learn history virtually due to interactivity that will be applied in this product. This product is very convenience for computer based. Student will learn by applying learning style that has been stated in their daily life.

For the next chapter is to discuss about the literature review. The literature will be about the technology and technique that will be used to make this product. Besides that, next chapter will compare of the previous technology and technique that has been applied will be discussed. Project methodology will be identified that will be used in this project in order to get this product finish in period of time that has been planned.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

This chapter will be discussed a literature review and project methodology for developing this Interactive walkthrough of Virtual environment for SPM student. Literature review play a role of evaluating report of studies that related to this project. Literature review should give a theoretical basis and help understanding about this topic. Sources of the literature review are most from the article, journal, reference book and internet. This literature review will include the comparison between previous products. The research of literature review is most about the technology that is used to make this product.

Purpose of project methodology is to guide the process of making the project. Project methodology used in this project is Multimedia production. Project methodology is to explain why you want to do the research in a particular way. Doing project methodology will help other view whether the project is doing well. It is also enables you to track the weaknesses or limitation of your project as well as its strengths. Besides, hardware and software requirement is listed in this chapter as well as the milestone of this project.

2.2 Facts and Findings

Facts and finding for this project include the study of virtual walkthrough, virtual tour, virtual environment and other technique that similar to this project. The comparison of the existing interactive virtual walkthrough will be done with the one that going to be built.

2.2.1 3D Virtual environment/walkthrough

Virtual walkthrough is being able to walk through a design and experience its circulation. Virtual walkthrough experience 3D architecture which always goes through time. Besides, it is highly personal service that takes interactivity with the users. (CMCS, 2015)The first-person of view that controlled by user in real time is described as synthetic, three-dimensional worlds. It is essentially surrounding a user, in space so that the user feels immersed in the environment. (Xue Yang, Semiha Ergan, & Katie Knox, 2015)Virtual environment created through the integration of range hardware and software system. Virtual environment is usually being present to single users, such as study participants, via head mounted display system. (Smith, 2015)

3D visualisation uses computer programs to create a three-dimensional object that represent a natural or manmade object that can be manipulated, altered and efficiently communicated to others. (Weagly, 2003-2016)Visualised and animated image are powerful tools for teaching design courses. Three dimensional free-body diagrams have its own speciality for the student that has a difficulty with an analysis and design problem. (Haque, 2007)

3D walkthrough presentation provides viewers to feel on how the actual feeling walking through the art. It is no longer a single image that has been created, but it is most likely as a whole new movie or experience to a user. There are two most advanced concept of 3D walkthrough. First, they used 3D rendering which delivers very realistic images that can persuade emotional response. Second, viewers can view different angles of the eye view that should be provided to the viewers from different angle. (Christensen, 2012)

Studies show that, by providing learning environments in varied learning methods, educators can provide students with more different means of receiving and applying knowledge of information that resulting in more engaging and interactive educational settings. (Scott, et.al, 2003) It is very beneficial for the student conceptual understanding, if three dimensional objects can be presents on the web and also be interactively changed or navigated. (E. Haque, Aluminiumwalla, & Saherwala, 2005)Many researchers have shown that in virtual environments, students can experiences in identity roles doing real task of scientists in situations not possible in a traditional classroom. Besides, in recent years many researchers doing a research in educational virtual environments at the elementary and middle school level. The result has shown promise for increased academic achievement, enhanced engagement, and development of 21st century competencies such as inquiry, critical thinking, collaboration and communication and technology use. (Smith, 2015)

2.3 Existing system

There are many ways of interactivity that can be used for elementary student in ways to learn subjects in school for their better memorising and understanding. There is plenty of website that has learning game for student to practice what they have learnt in class. In Malaysia, virtual environment via walkthrough has not been applied in history subject or any other subject. However, there is plenty of online learning virtual environments via walkthrough in other country such as, United Kingdom, United States and etc.

2.3.1 Walkthrough Geffrye UK

The Geffrye walktrough UK is to explore the home and the way people live. It showed how homes have been used and furnished for the past 400 years and it is reflecting changes in society as well as their behaviour including style, fashion and taste. Each room lead visitors to walk through time from 17th century oak furniture and panelling, past muted Georgian elegance and eclectic Victorian style, to 20th century modernity and contemporary living.

Walkthrough Geffrye UK used 2D pictures for their character and the environment in the home tour. It provides an objective to be the reason for user to explore the home. The user character in this walkthrough is as two kids that searching for their lost dog. The users are seeing the environment through first person shooter camera's view. To walk around the house, arrow button is provided to enter each room that available to find it objective. In some room there will be question provided from the conversation that two characters heard. To know more of information for the material in the house, move the cursor around and clickable material will glow. When click on the glowing material, there will be a pop up window that consists of information.

2.3.2 Death in Rome

Death in Rome is located in Ostia, river port of Rome back in 80's AD. The death in Rome is to discover the death of the victim which is Tiberius Claudius Eutychus in his apartment. The user needs to investigate his room to solve this mystery. And the user has until dawn to crack the case. The user then needs to gather the evidence and form a theory.

Death in Rome is in 2D form. The character is static unless if the user hove the mouse to a certain clues, the clues will glow. Some object will resize to be bigger and floating in the air to be noticed. Some of the selected objects are to the information of what the object is back in the ancient time. When you click on the clue of the death, the pop information will showed asking to investigate more the object selected. The user need scroll down the mouse to move around the room. It is very limited space.

2.3.3 Mission US: Interactive way to learn history

Mission US is an interactive way to learn history of the United State. It is a multimedia project that immerses player in learning history through free interactive games. There are three ways to play.

1. Play Online
2. Apple iPad
3. Android Tablet

The user will be give the mission depends on the character they chose. In the game, the character will then give instruction by their mother or the older to do some task. The task will be list at the top of the screen for the user to look at and solve it. To move the character to certain part of the game, users need to point at the glowing object to enter or to have a conversation. An unimportant object, information will pop-up onto the screen. It provide

back button to continue the mission. Every character have different stories in history. Users see the environment as a first person shooter. Map is provided to go to certain area or town.

2.4 Comparison of the existing virtual walkthrough

Table 2.1 Comparison of the existing virtual walkthrough

Categories	Walkthrough Geffrye UK	Death in Rome	Mission US: Interactive way to learn history
Technology applied	Virtual Reality Walkthrough	Virtual Reality Walkthrough	Virtual Reality Walkthrough
Virtual Reality Used	Adobe Flash	Adobe Flash	Adobe Flash
Walkthrough methods	Clickable on arrow & object	Clickable on object	Clickable on object
Price	Free	Free	Free
Platform	Online	Online and desktop	Online, iOS and android
Content creation	2D object, Audio	2D object, Audio	2D animation, pictures and Audio
Additional Features	Allowed to download on your desktop Certificate that can be print.	Has timer.	Available for android and iOS users
Pros	• Provided question before finding the	• It makes the walkthrough as a solving game.	• Provided mission to solve • Provided choice

	missing dog trough the room in this virtual walkthrough. • Provides download on your desktop so that users can play offline • Provides map around the house • Little animation provided	• Every clues-has information through investigation from the experts	what to reply in conversations • Provided maps for the user to go to different places. • Provided a real situation what happened to the character in real time.
Con	• Only clickable button to move • Need to have an account • Need to have Adobe Flash player plug-in in order for user to play	• No maps • Users can on walk around the room using horizontal scrollbar • Limited time to investigate the clues	• Only clickable button to move • Need to have an account • Need to have Adobe Flash player plug-in in order for user to play

2.5 Project Methodology

For the project methodology, this project will be using multimedia development process. Multimedia development process consists of six phases. These six phases is categorised into 3 main stages. Three main stages are pre-production, production and post-production. All the six phase are listed below:

2.5.1 Pre-production

Pre-production is the process where the process before producing multimedia project is done. This phase is extremely important. Pre-production is the phase where all the document and information that has been gathered, will be used in production phase.

2.5.1.1 Analysis

Analysis phase is the beginning of the project. It is the phase where you break down the task or information that has been gathered into more detailed requirement. Gathering document is the main task of the analysis phase. This phase is where the entire requirement needed in this project is gathered.

2.5.1.2 Design

Design phases are where you recognise many potential solutions and narrow down the choice to determine the effective and efficiency on how to construct the solution. it is the system specification of the requirement where the it will be follow when developing the product. This phase is very important to make sure the design is carefully created, which in turn will lead to product flaw. Basically, it is described the design of the system and that can be used as an input to the next phases.

2.5.2 Production

Production is the process where the product is produce. This process will gather all of the information from pre-production process. Production is to make sure all the requirement is in good working order. Follow by in setting up and checking the audio console and equipment needed for your production.

2.5.2.1 Implementation

Implementation is the final process to move the solution from development status to production status. This phase need to be understand for it complexity. It is the action that needs to be followed in any preliminary thinking in order for something to actually happen. This phase should build base on the design phase and the requirement document from the analysis phase. Therefore, Implementation is focus on the quality, performance and etc.

2.5.3 Post-production

While post production is the process where product is finish and ready to be evaluate and publish. Post production will begin when all the specification needed in pre-production and production phase. It is the phase to increase variety of jobs and tasks.

2.5.3.1 Testing

Testing is to verify the code and the response of error condition that has been generated for the product that has been coded follow by its specification. Testing will be done base on the user response, product specification and error response that resulted in project.

2.5.3.2 Evaluation

Evaluation is to examine the organizational performance or the capacity to improve the product performance. Evaluation process is done at every each stage of the project. At this phase, student and teacher of form 5 will be asked to test and used this product at school. The teacher is then will be interviewed. The student is then will answer the questionnaire that will be collected by the developer.

2.6 Conclusion

In conclusion, the literature review and methodology we have discussed is based on the gathering, analysing and concluding the technology and technique that is been applied in education. The gathering of information is found from the internet, references book and articles. From the technology that has been compared, there are many ways to make implement a walkthrough environment. From the research, many virtual walkthrough educations are done by clicking an object. The product fills the page with 2D environment and clickable information from the object.

For the project methodology in developing this 3D walkthrough, multimedia production process is used which consists of pre-production, production and post-production. All activities are divided and listed in the stages respectively.

Lastly, analysis phase will be discussed on the next chapter. Next chapter will be including user requirement, functional requirement, non-functional requirement and system architecture.

CHAPTER III

ANALYSIS

3.1 Introduction

Analysis phase is the most important part in making this project happens. It requires gathering information of the existing systems. Analysis phase require learning about the product and process requirements and how to effectively determine and prioritize user's needs. There are two types of requirements. First, product requirement that describes the product needs in term of deliverable. Secondly, process requirement that describes how people interact with the product.

3.2 Current Scenario Analysis

Current Scenario Analysis consists of flow charts and architecture of the three current existing products that has been described in the previous chapter. There are 2 types of virtual reality walkthrough, which are two-dimensional and three-dimensional environment object. There are many interactive ways to walkthrough the character around.

3.2.1 Analysis of walkthrough Geffrye UK

Geffrye UK walkthrough was using Adobe flash to implement the virtual reality walkthrough technique. It was a well-known tool for making animation, website and mobile application. It was able to catch mouse, keyboard and microphone input. Adobe flash provides a programming language called action scripts.

Contecnt that is used in this walkthrough is 2D animation and linkable button to move around the charater or user trough out the house. There are five option has been provided in Geffrye UK walkthrough. Five important is listed and described at table 3. The flow of Geffrye UK walkthrough is explained at Figure 3.2.1

Table 3.1 : Option of Geffrye UK

Options	Description
Conversation	Conversations that happen in Geffrye have the answer to the clues and quiz to find the missing dog. It started when the characters enter the house and the maid will firstly approach them to allow the character to find the missing dog around the house. At every room they enter, there will be new conversation and some question to be answered.
Quiz	There are five questions that need to be answered. The players need

	to pay attention to the conversation that happen either with the main character or other character in the house. After five questions are answered, the dog will appear.
Linkable arrow	Linkable arrow is for the character to enter every room in the house. You can choose any arrow that provided at that page.
Map	Map is provided for the user to go freely around the house without using the arrow.
Help	Help button is to explain what the users need to do in order to find the dog.

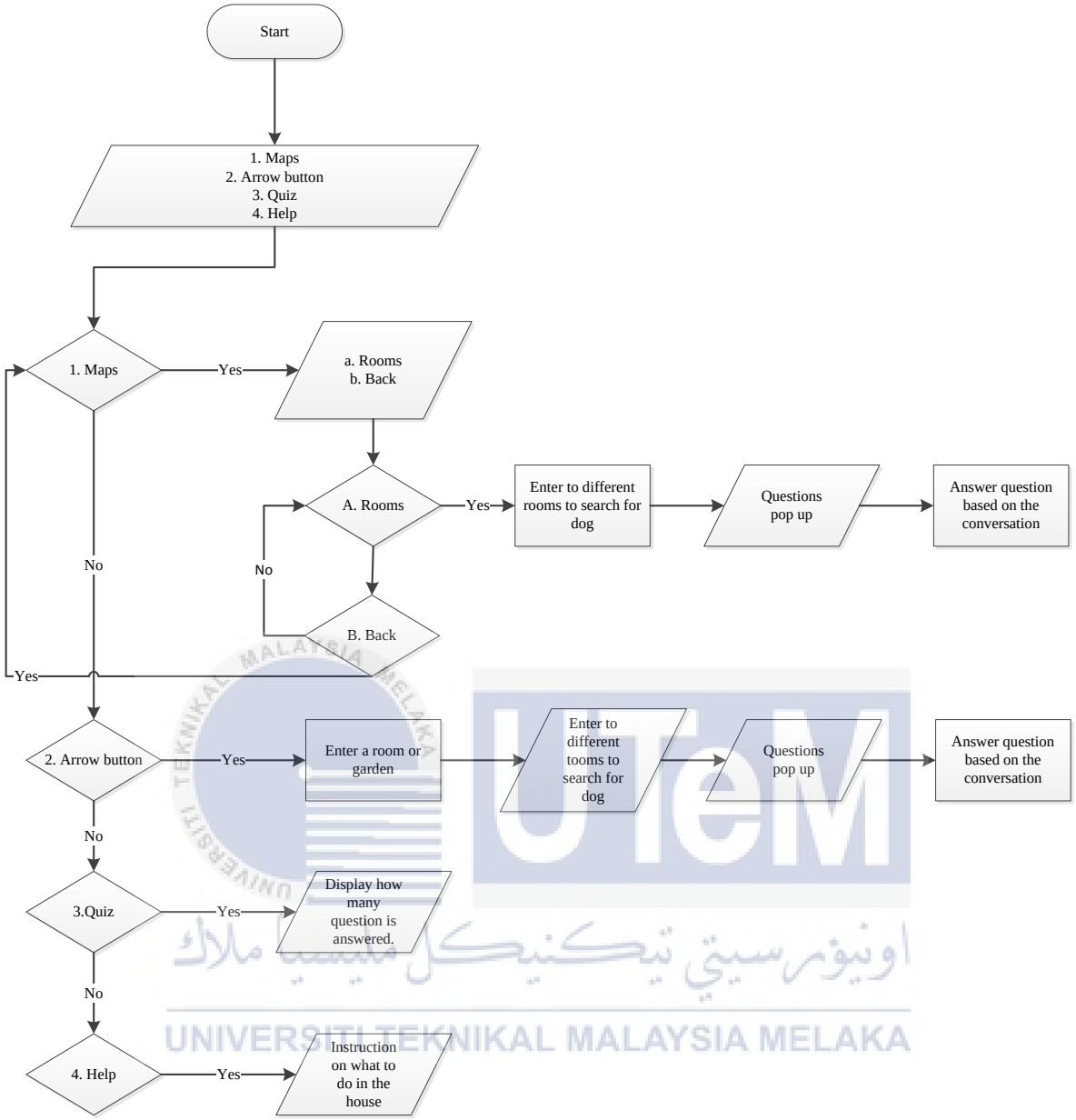


Figure 3.1: Geffrye UK flowchart

3.2.2 Analysis of Death in Rome

Death in Rome is a BBC website that provides a walkthrough to solve a death of in the history of Rome. It is only an online platform. This also using Adobe Flash. User sees the death scene as a first person. To solve the death that happen in an apartment, an experts for further information and witness that can be interrogate is provided in every clues in the rooms. Each interrogation has very limited time. User need to solve the crime in a short amount of time.

There are five options in the death of in Rome. Options are listed and describe in the table 4. Flowchart of Death in Rome is in the figure 3.2.2

Table 3.2 : Death in Rome option

Options	Description
Start navigation	To start solving the death of the man in his apartment
Close	Before playing this walkthrough game, there were instructions of what the user should do.
Pause	To pause or freeze the timer.
Mystery solved	Mystery solved is for users to make a conclusion on the death since. A clue that has been investigated is listed. Users is then need to conclude which clues is the cause of the death and whose witness that is guilty.
Clues	Clues will glow when the user hover the mouse. When user click on the clues, experts to discover items and witnesses of the death is listed.
Experts	Experts will show information on what clues did the user choose to investigate.
Witnesses	There are three witnesses given. Three of the witness is asked whether they knew the clues selected.

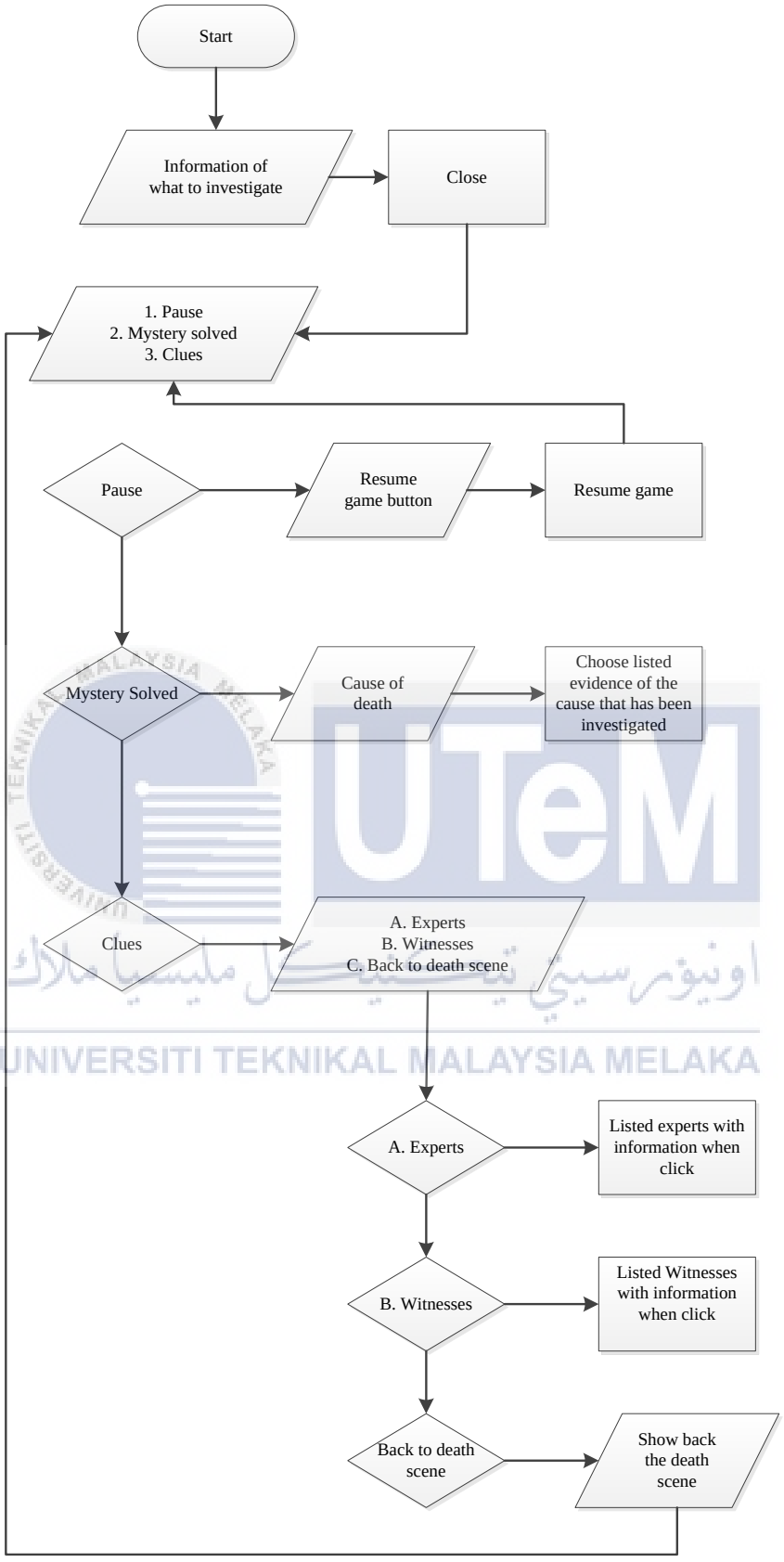


Figure 3.2: Death in Rome flowchart

3.2.3 Analysis of Mission US: Interactive way to learn history

Mission US are a virtual walkthrough that can be access in three platforms, Web-based, iOS and android. User can download in their mobile phone, and also can play on their computer or laptop. This walkthrough is using Adobe flash. This walkthrough has four characters with four situations. For example, Nat wheeler is fighting for the crown or colony, Lucy king fighting for freedom of the black slaves, Little fox that surviving life on the plains and Lena Brodsky from Russia starting her new life in America.

There are 9 options that is provided in Mission US. Options are listed and describe in the table 5. The flow of Mission US is explained in figure 3.2.3.

Table 3.3: Mission US option

Options	Description
Play	For the registered member to play the chosen walkthrough
Register	For those users that has not register into the system
Preview	Video on how the US history happened
Prologue	Prologue is the animation pictures with audio that tells the story of characters and why they must do certain task.
Parts	Levels of the walkthrough. Users must solve the task in every parts to go to the next until they reach epilogue
Epilogue	
Conversations	Users are allowed the chose what they want to reply to every conversations that happen between others characters.
Maps	Users can selects where they should go to complete their task in a day. Every place that available has its own story.

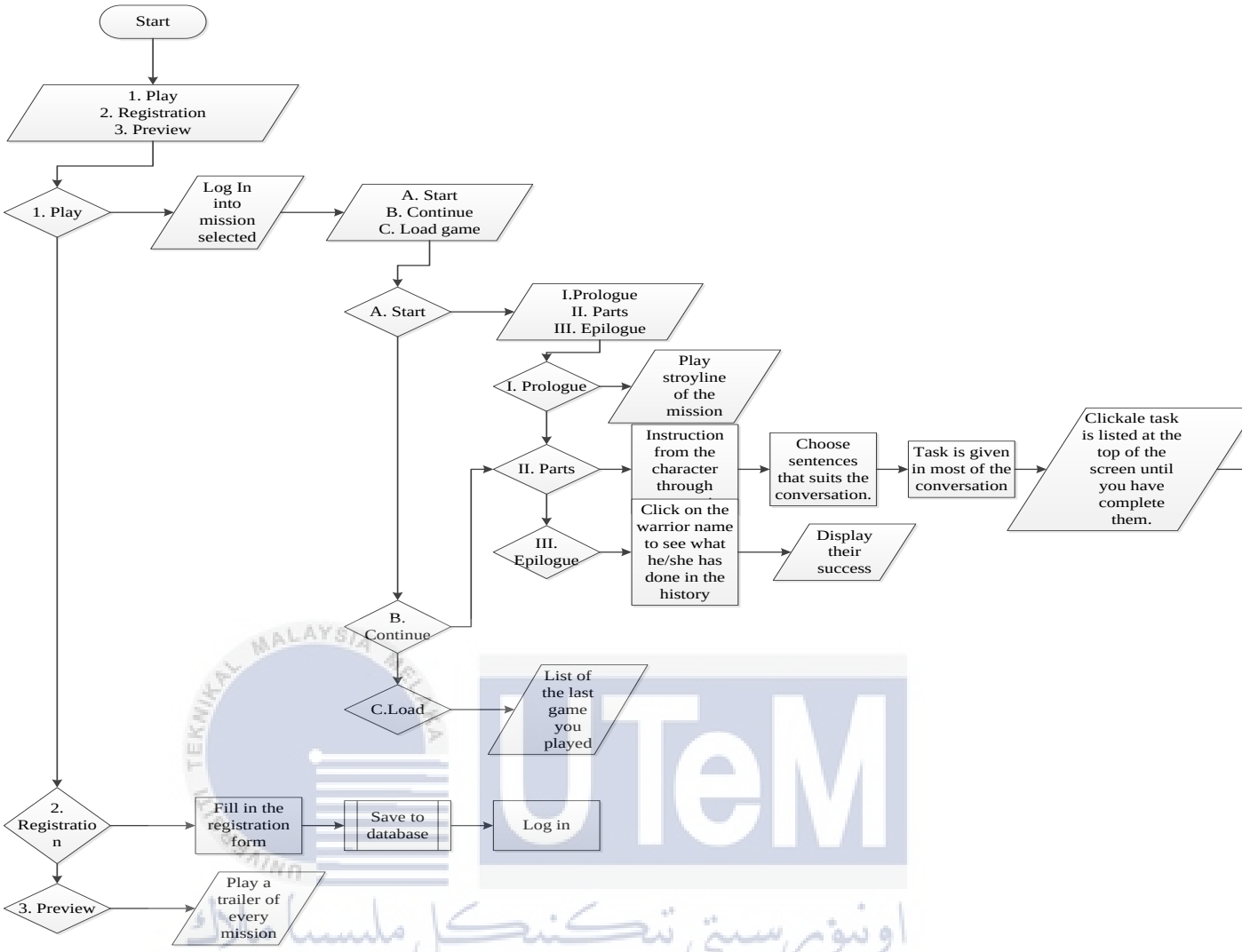


Figure 3.3: Mission US flowchart

3.3 Requirement analysis

Requirement analysis will discuss several categories. Categories that is needed to be discuss is need analysis, user analysis, technical analysis, resources analysis and requirement gathering.

3.3.1 Analysis problem

Problem of the existing virtual reality walkthrough is discussed in detail in this section. The problem from the existing system is listed in the table 6.

Table 3.4: Analysis Problem

Existing Mobile Application	Problems
Geffrye UK	• Geffrye UK only used clickable button to walk around the house. Users only can go to limited places in the house. • User need to focus on the conversations that happen in every room. They cannot skip or avoid the conversation. • The conversation and the question is not relevant to the history that the house had. • They only use 2D image for the animation and also for the object around the house.
Death in Rome	• Death in Rome does not seem like a virtual walkthrough because they only use horizontal scroll bar. Interactivity of walking around the room is very limited. • Too much reading instead of audio or videos or movement. • Very hard to understand on what the user need to do. • Death in Rome only use 2D image.
Mission US : Interactive way to learn history	• Mission US also has limited movement for the user to explore freely through the places that provided • User only use mouse to click on the place on the maps and interact everything via link conversation • It is more of the conversation that happen between the warrior than walking around the environment of the history. • It is also a 2D image.

From the problem of existing walkthrough that stated above, current walkthrough is to aim a new virtual reality that applies walkthrough environment freely around the provided environment. It is focus more on the exploring the environment of the history on what it is living in the ancient time.

From the table 3.3.1, it is found that user is given some task to solve such as quiz, task and etc. Geffyre UK walkthrough and Mission US need users data in order to play. It can be as a security purpose. These three of the existing virtual walkthrough use button to interact and move around. This is not convenient for virtual walkthrough that can explore the environment of the product. Therefore, in order to let the user discover the environment freely, mouse and keyboard input device is used in experiencing the virtual environment walkthrough.

The content of the virtual walkthrough is mainly in 3D. It will give the user an experience a real environment of ancient Egypt. People of the ancient are also model in 3D to show the social structure of the people of ancient Egypt. Information about the important modelling object that has to do with that characteristic of ancient Egypt from SPM book is labelled at the top of it.

3.3.2 Project requirement

Project requirement is listing all the software and hardware that will be used in the making of this project.

3.3.2.1 Software requirement

Software requirement consists of two categories which are development tool and documentation tools.

3.3.2.1.1 Development tool

1. **Maya Autodesk 2012**

   Characters, tree, building and other is model using Maya Autodesk 2012. Every modelling is used different polygon tool such as, cylinder, sphere, plane and lot more of polygon. After modelling an object that you desire according to sketch and references, texturing is also using this software requirement using hyper shade tools. After all modelling has been modelled and textured, it will be export into fbx file because it a format that can support unity.

2. **Unity3D 2015**

   Unity is where the interaction of the mouse is declared for it to be working. Unity3D is then attach with the c# language in order to trigger mouse and keyboard to move around the environment that has been arranged from the imported file from Maya.

3. **Adobe Illustrator**

   Adobe Illustrator is used for making some sketches or illustration for the diagram that been asked in the report. Some of the texture also been traced in Adobe Illustrator.

4. **Adobe Photoshop**

   Adobe Photoshop is used mainly for manipulating textures so that the looks and brightness of it suit the object that has been modelled.

5. Visual basic studio 2010

Visual basic studio is integrated with the unity. This tool eases the making of this product. This tool is happen to call and trigger the object for it to do what has been asked in the coding.

3.4 Project schedule and milestone

Table 3.5 : Schedule and milestone

No.	Tasks	Start Date	End Date	Duration (days)
1.	**Pre-production**	**22 / 02 / 2016**	**29 / 05 / 2016**	7
	1.1 Analysis Phase	**22 / 02 / 2016**	**28 / 03 / 2016**	6
	1.1.1 Brainstorming for project title	22 / 02 / 2016	26 / 02 / 2016	4
	1.1.2 Preparation of proposal	22 / 02 / 2016	23/ 02 / 2016	2
	1.1.3 Submission of proposal	26 / 02 / 2016	26 / 02 / 2016	1
	1.1.4 Proposal revised	01 / 03 / 2016	01 / 03 / 2016	1
	1.1.5 Information gathering	22 / 02 / 2016	01 / 04 / 2016	8
	1.1.6 Analysis Virtual walkthrough/environment	22 / 02 / 2016	01 / 04 / 2016	8
	1.1.7 Analysis the existing system	22 / 02 / 2016	01 / 04 / 2016	8
	1.2 Design Phase	**21 / 03 / 2016**	**22 / 07 / 2016**	121
	1.2.1 Define the project methodology	21 / 03 / 2016	25 / 03 / 2016	4
	1.2.2 Define the hardware and software used	21 / 03 / 2016	25 / 03 / 2016	4
	1.2.3 Define user requirement, functional requirement	04 / 04 / 2016	29 / 04 / 2016	25

		and non-functional requirement			
	1.2.4	Design flow chart of proposed application	30 / 04 / 2016	22 / 05 / 2016	22
	1.2.5	Design user-interface design	23 / 05 / 2016	29/ 05 / 2016	6
	Production		27 / 06 / 2016	22 / 07 / 2016	27
	1.3	**Implementation Phase**	27 / 06 / 2016	22 / 07 / 2016	27
	1.3.1	3D Modeling content object using Autodesk Maya	27 / 06 / 2016	15 / 07 / 2016	13
	1.3.2	3D texturing	15 / 07 / 2016	18 / 07 / 2016	3
	1.3.3	Export all the modelling object to fbx files			
	1.3.4	Import all the modelling object into Unity 3D editor	18 / 07 / 2016	20 / 07 / 2016	2
	1.3.5	Arranging the object	18 / 07 / 2016	20 / 07 / 2016	2
	1.3.6	Add font and information	20 / 07 / 2016	21 / 07 / 2016	2
	1.3.7	Do some coding to move, trigger and collision to the object	20 / 07 / 2016	22 / 07 / 2016	3
	Post-Production		22 / 07 / 2016	05 / 08 / 2016	14
	1.4	**Testing Phase**	22 / 07 / 2016	05 / 08 / 2016	14
	1.4.1	Define test plan	22 / 07 / 2016	27 / 07 / 2016	3
	1.4.2	Make a questionnaire and interview question	27 / 07 / 2016	02 / 08 / 2016	6
	1.4.3	Testing at schools	03 / 08 / 2016	03 / 08 / 2016	1
	1.4.4	analyse the results	04 / 08 / 2016	05 / 08 / 2016	2
	1.4.5	conclusion	05 / 08 / 2016	05 / 08 / 2016	1

3.5 Conclusion

In conclusion, this chapter had discussed the scenario of the existing system. The analysis of the problem is stated to recognise the weaknesses that the existing virtual reality had. The problem of the existing virtual reality of Geffrye UK is that is that it contains too much irrelevant conversation. The questions provided are not related with the history of the house. For the Misson US virtual reality environment, it consists of too much conversation. The movement of the character are based on link map and audio. Lastly, for Death in Rome virtual reality environment is not very much like a virtual reality. It only can move in limited space using horizontal scrollbar.

In the next chapter will discuss about the design phase. Design phase is consisting of the activities of the product that will be developed. It will discuss on the architecture and flow of the virtual reality environment.

CHAPTER IV

DESIGN

4.1 Introduction

This chapter defines the result of the analysis of the preliminary design and the result of the detailed design. This chapter consists of system architecture, preliminary design, storyboard and details of the design product.

4.2 System Architecture

System architecture is the process that explained the structured solution that meets the entire technical and operational requirement. System architecture involves a series of decision that have an impact on the quality of the product.

This virtual reality environment walkthrough is a computer based where the user get output through monitor. The only input in this walkthrough is keyboard to move them around as a character in the virtual environment walkthrough. Users will give input through keyboard and mouse in order to move around the environment. Figure 4.2.1 shows the system architecture of Virtual reality environment walkthrough.

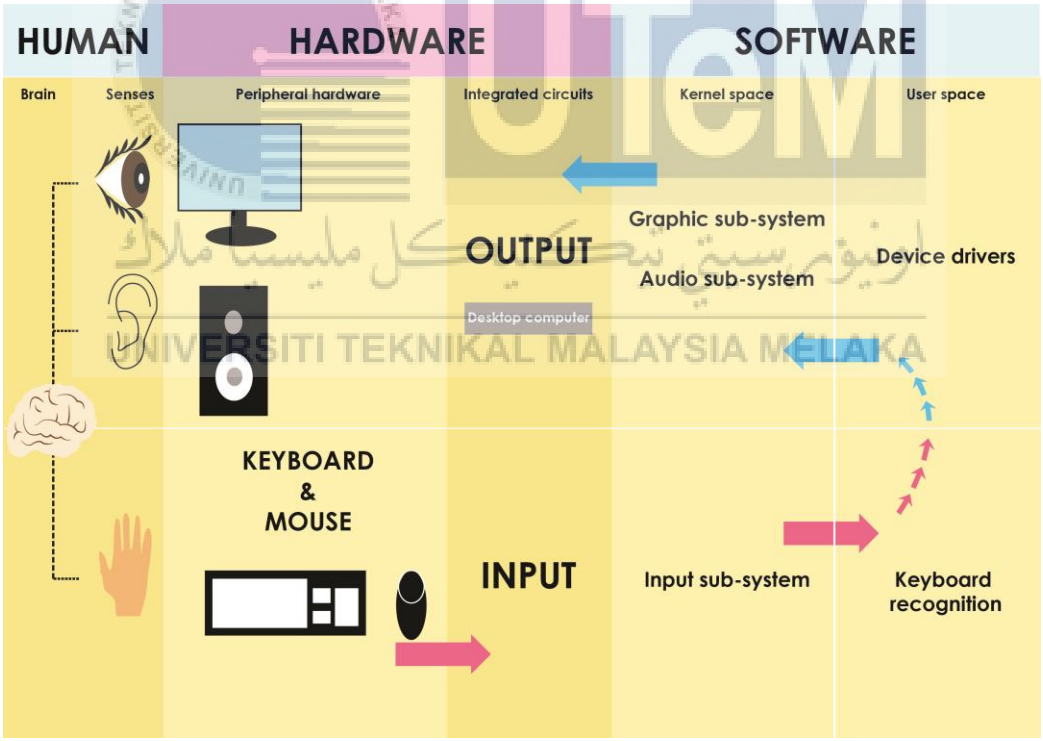


Figure 4.1: Architecture diagram of virtual reality environment walkthrough

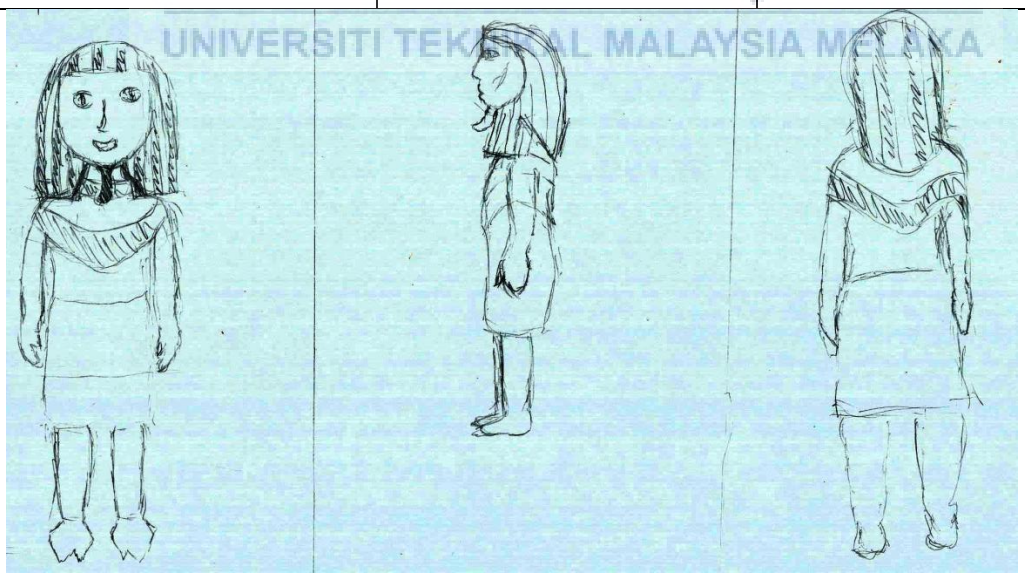
4.3 Preliminary design

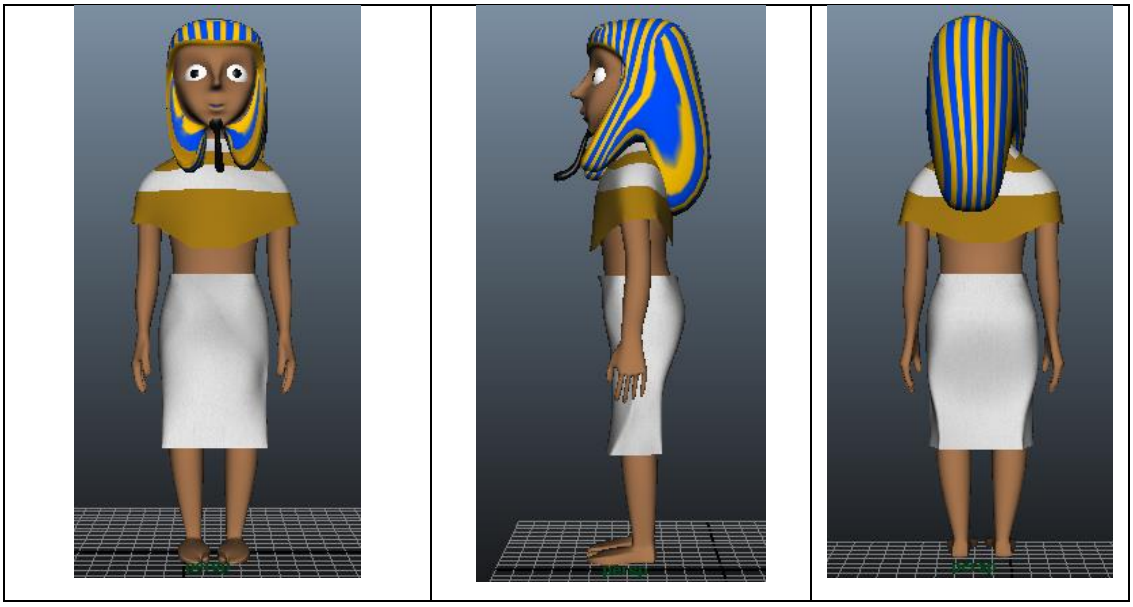
Preliminary design consists of the sketches for the object that need to model. Sketches or references of the design are very important for modeller to model the object accurately. Several design of the object that has been sketches and modelled is included in this chapter as a proof of originality.

4.3.1 Storyboard Design

Ferro is king that has been called in ancient Egypt. Ferro plays a role of the highest level among the community. He declared himself as pure and believes that he is among god. He has so much wealth. He wears lots of gold.

Table 4.1: Ferro sketches and modelling

Ferro Modelling		
Front	Side	Back
		



Ferro wife is a queen of the ancient Egypt. She has black medium length hair. She also wears lots of gold. The clothes are made of silk and are see through.

Table 4.2 : Ferro's wife sketches and modelling

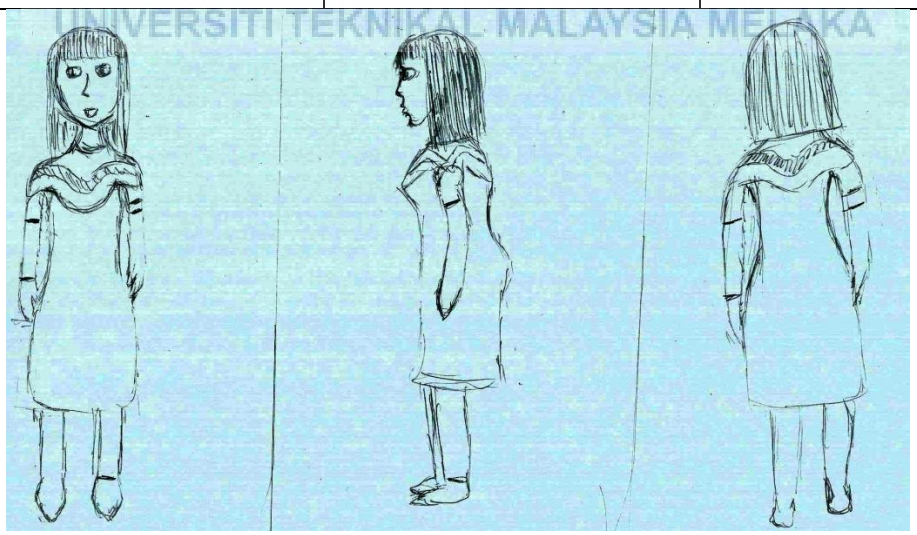
Ferro Wife Modelling		
Front	Side	Back
		

Table 4.3 : Ancient Egypt castle sketches and modelling

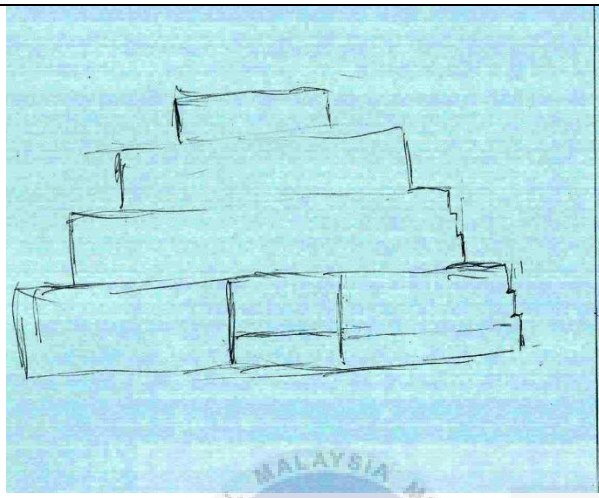
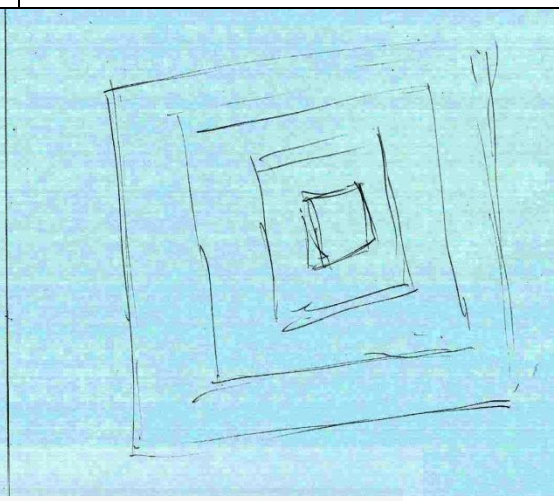
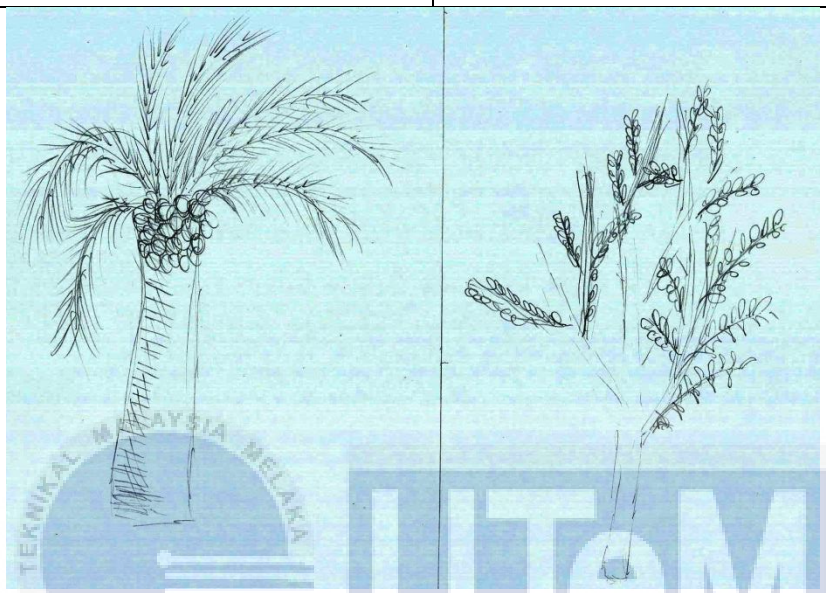
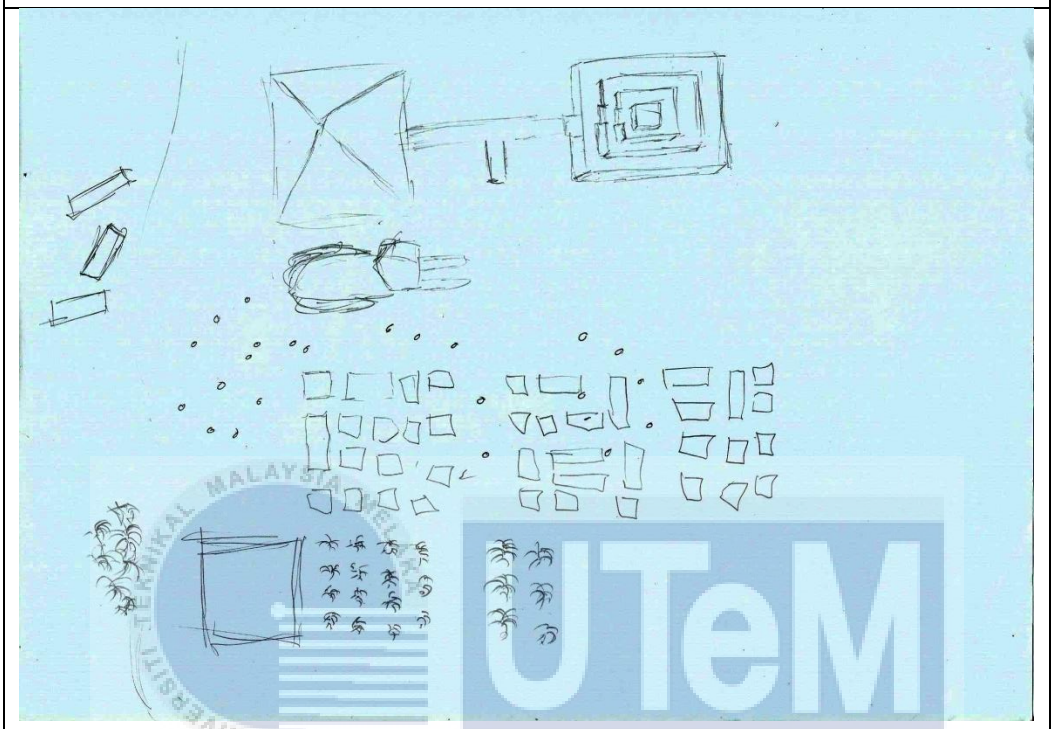
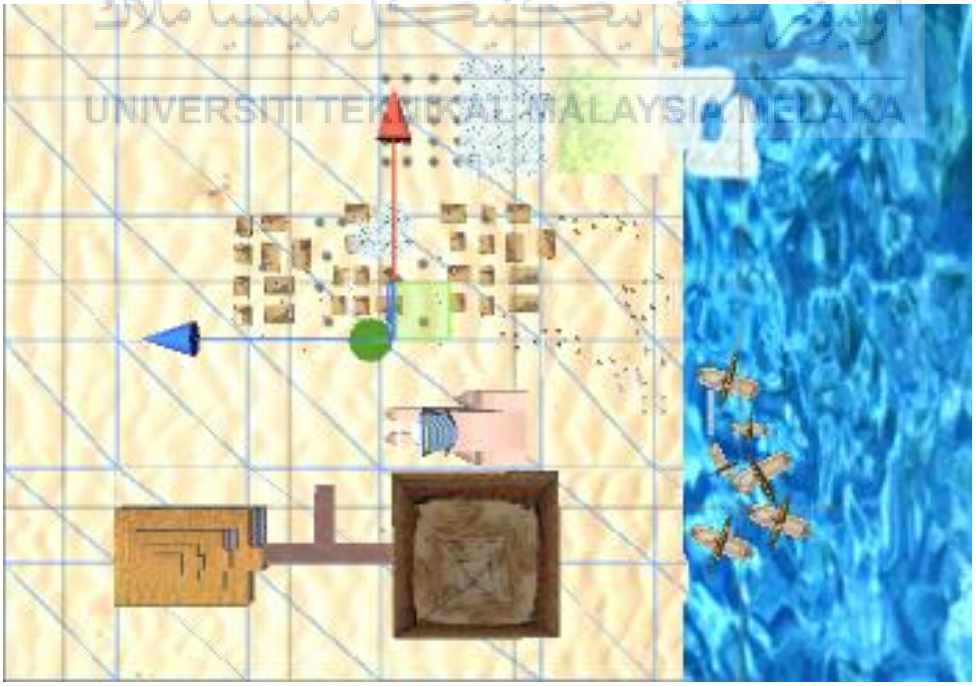
Castle Modelling	
Front	Up
	
	

Table 4.4 : Tree sketches and modelling

Tree Modelling	
Tree 1	Tree 2
	
	

4.4 User Interface Design

Table 4.5: Maps of virtual reality environment walkthrough

Maps of the virtual environment



4.4.1 Input design

The input of this virtual environment walkthrough is keyboard and mouse only. The users will press (W) to move the character forward, (S) to move backward, (D) to move to the right side and (A) to move to the right side. Mouse works as the head of the character where it can look down, look up, look at the right and look at the left.

4.4.2 Output design

For the output of this virtual environment walkthrough are 3D object, some century gothic text of information and textures which contain the history of ancient Egypt. For the 3D object, it was modelled and textured based on its physical appearance which has been search and discovered from text book, research and etc. Figure 4.4.1 shows some of the area in the virtual environment walkthrough.

Figure 4.2: Output of virtual reality environment walkthrough

4.5 Conclusion

In a nutshell, this chapter stated the design of this virtual reality environment walkthrough. System architecture show a bigger picture on how this virtual reality walkthrough take input and given output onto the screen. Some of the sketches and modelling object is described how it should come out in 3D.

Summary of the documentation of this project will be stated in the next chapter. Therefore, improvement of the product as well as the documentation will be discussed.

CHAPTER V

IMPLEMENTATION

5.1 Introduction

Implementation phase is discussed about the quality of media creation, media integration, and product configuration and implementation status. During the discussion, texts, graphics, audio, animation and video that included in the product is elaborated carefully on how it were made. This phase is to make sure the entire production of the product is eighty per cent original.

5.2 Media Creation

The process of making the text, graphic, 3D modelling and sound possible in order to have a successful production of virtual environment walkthrough.

5.2.1 Production of Text

Text is the element that provides information that helps and contains meaning and name of the certain model. The font family, size and colour of the text need to be consistent. It will give the user the ease to read and understand the information provided.

For the font family, Century Gothic which is the sans serif type is chosen because it is suitable for the web or computer monitor. Sans serif also known to be the best font type for children learning to read because of its simplicity of the letter shapes that will make them more recognisable.

The size of the font is depends on the amount of information that written on the image for each model and point. Most of the text for the model is 150 pt. It has to be balance with the size of the objet and screen in the environment.

The colour of the font has been coloured white. This is because the background and the image that has text has dark environment.

5.2.2 Production of Graphic

For this project, bitmap graphic is used for texture that has been used in every object that has been modelled. Most of the picture were taken and downloaded from the website that contains the exact texture needed. The image is then being edited in Photoshop CS6. Its brightness and tone need to be edited to make sure its follow the environment of this product. Some of the image has an appropriate background that need to be removed to fit for the surface of the object. Also some of the images are originally self-created using Photoshop CS6 and also Illustrator CS6.

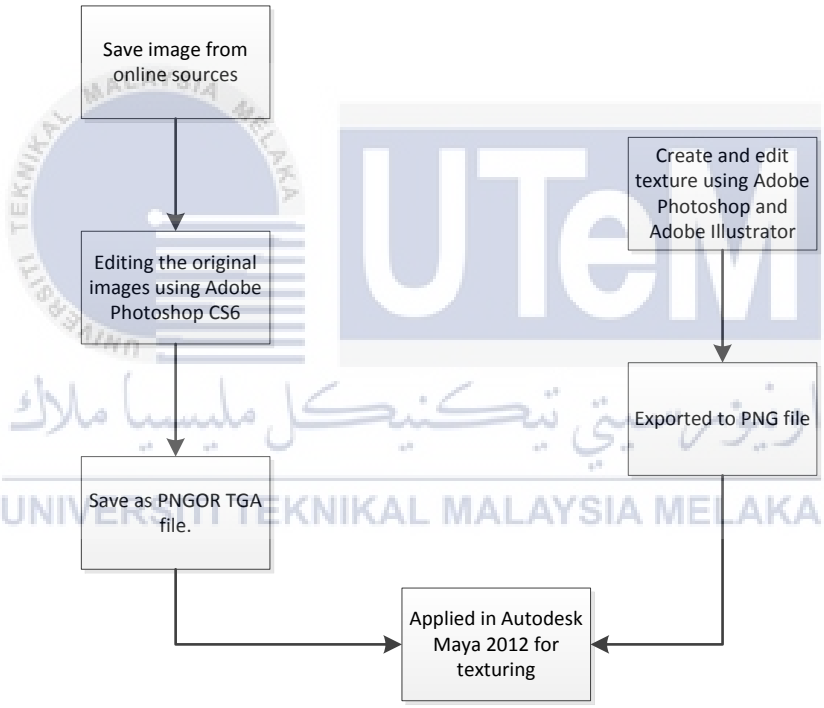


Figure 5.1: Production of Graphic

3D modelling process is the most important process in the production of graphics. The entire model are made using Autodesk Maya. The character, building and the entire object were made with the help from the references from the SPM textbook and the online website. Vertex, surface, edges and point is used to make the shape of each object. It takes 1-3 days sometimes a week to finish the complex modelling such as the human body and the head.

This is because, if the object were done wrongly, it inappropriate to correct them. It needs to be redoing in order to have the exact shape as imagine.

The model is then being texture using UV textures. The UV's or each of the surfaces of an object is being positioned according to the shape of the model by its axis (X, Y and Z). The object model is then being exported to .fbx file in order to be import in unity.

5.2.3 Production of Sound

The production of the sound is not that much of work. The sound is taken from the free sample audio where it has the permission for people to download without payment. The sample audio that has been downloaded is then play repeatedly so that it would not sound bad.

5.3 Media Integration

Media integration is the process of integrating all the media creation in a final version. Text, images, and modelling object were all integrate into Unity 3D to finalize the product.

For this project, Unity 3D is being used as main tool to develops this virtual environment. For the coding part, visual studio C# is being used to code the movement, collision and it trigger. Unity 3D is where the position, resize and material shader takes place in order to have the environment of ancient Egypt as planned.

The integration process is done after all of the production of text, texture, image and model is done. The integration involves export and import of the file. Then to link with the code, Unity 3D has already collaborates with the C# language.

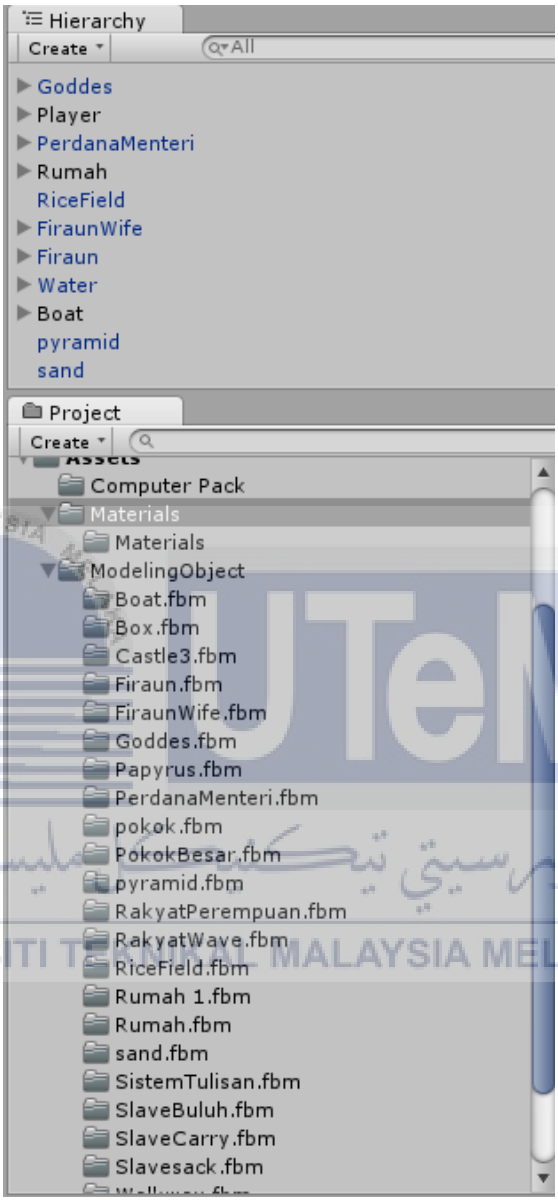


Figure 5.2: Path of importing the entire file object needed

5.4 Product Configuration Management

This section will discuss about the configuration environment setup and the version control procedure. Each of the sub-section is explain how this project configuration management is designed and how the content of the product is implemented.

5.4.1 Configuration Environment Setup

In order to make this project happen, there are many development tool used to configure. The main development tools that are used is Unity 3D and Maya Autodesk. The main development tools will be determined and explain step by step.

5.4.1.1 Installation of Maya Autodesk

To install Autodesk Maya, check if the computer is 32 or 64 bit version in the properties page of my computer.

1. Double click on the Maya excutable file that has been downloaded. Extracted file to the default directory. (C:\Autodesk\Maya2012)

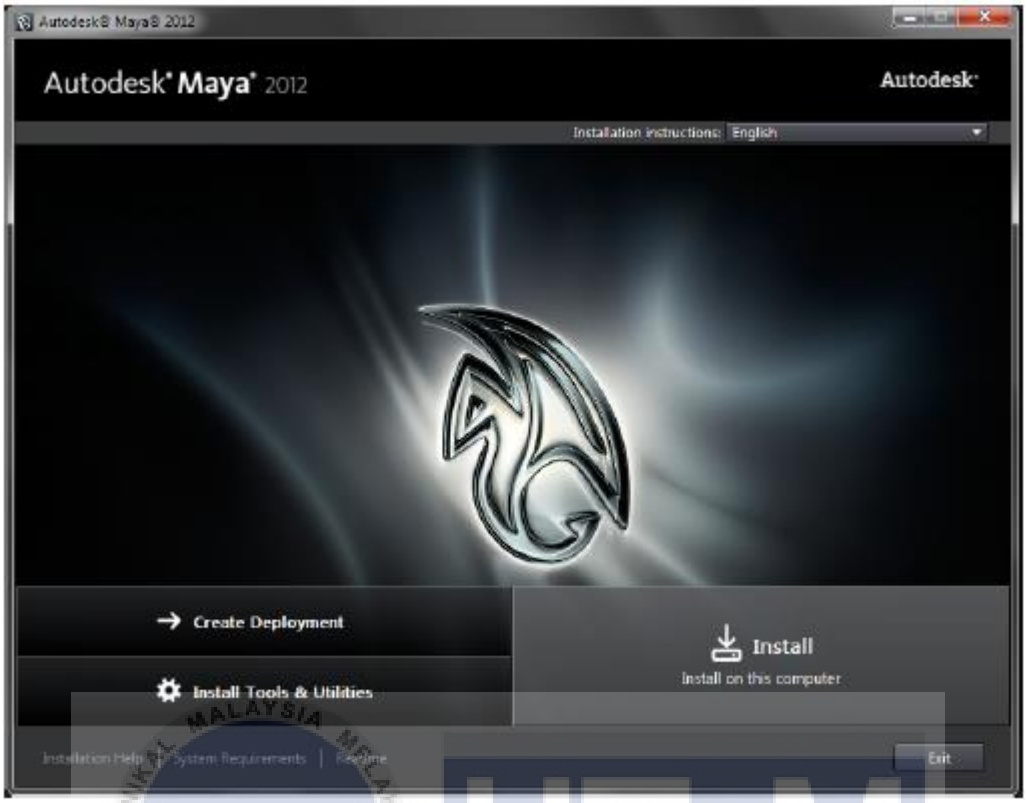


Figure 5.3 : Installation of Maya

2. Licence Agreement will appear. Select country from the drop-down list. Select I ACCEPT from the term of condition button. Then click next.

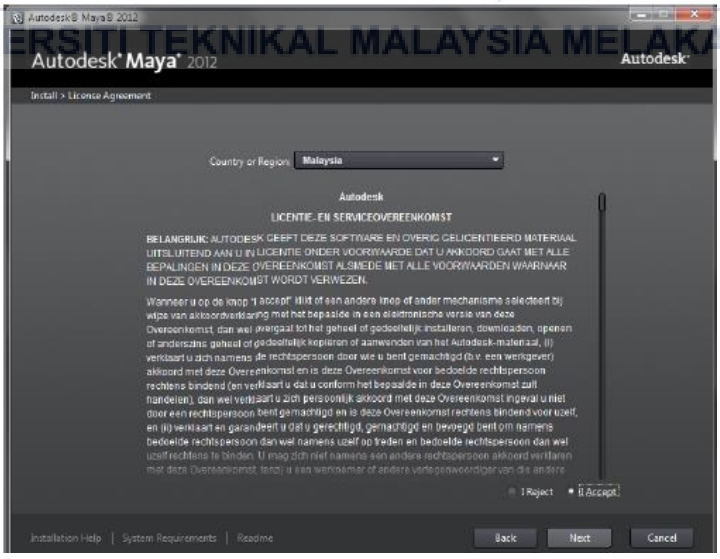


Figure 5.4 : Licence agreement of Autodesk Maya

3. In the product window, select Stand Alone as Licence type. Then select I have my product information and enter student package licence. Where it allowed for education purpose only. Click Next.
4.

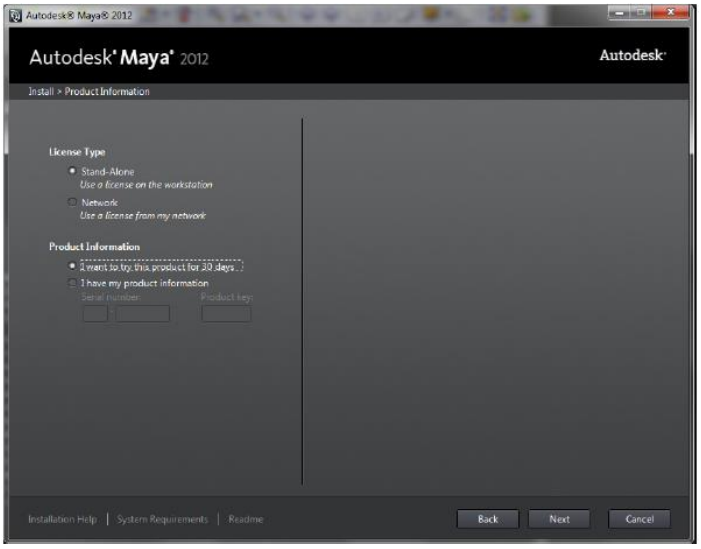


Figure 5.5 : Product selection

5. Configuration installation window will appear and then select the components you want to install. Select Maya 2012.

Figure 5.6 : Configuration installation

6. Installation progress window will appear. Wait until it finishes installing.

Figure 5.7 : Installation Progress

7. After the installation is done, click finish.

Figure 5.8 : Successful installation

5.4.1.2 Installation of Unity3D

To install the Unity 3D, go to the unity website where the installer uses a download assistant. Below are the instruction on the step by step installation of the Unity 3D.

1. First of all, select which component of the unity that wanted to be downloaded and install or leave the default selection and click Continue.

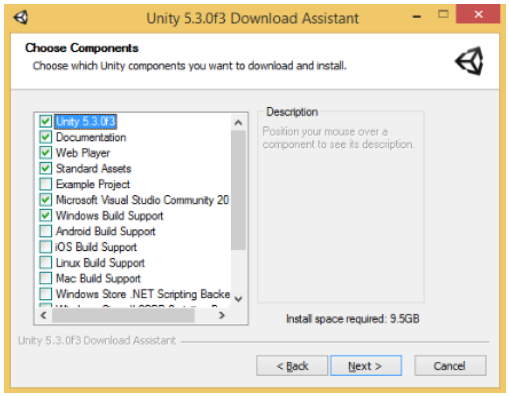


Figure 5.9 : Download Assistant

2. The 'Unity Account' window will appear where it needs to be filled up for the unity developer network account credentials. Then click Sign in.

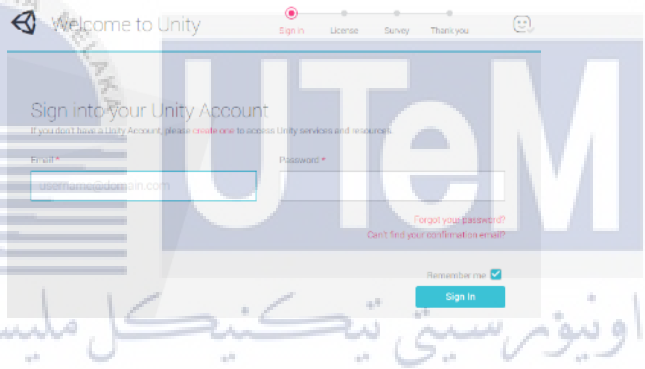


Figure 5.10 : Unity Account

3. There will be a window titled the version of unity. Select the version of unity you wish to activate and click Ok. Then enter the unity serial number generated by the store or a member of sales team. Check the serial number and fill up the license unity.

Figure 5.11 : License Management

4. Lastly, if the license number is correct, proceed to the unity editor by clicking the 'Start Using Unity' button.

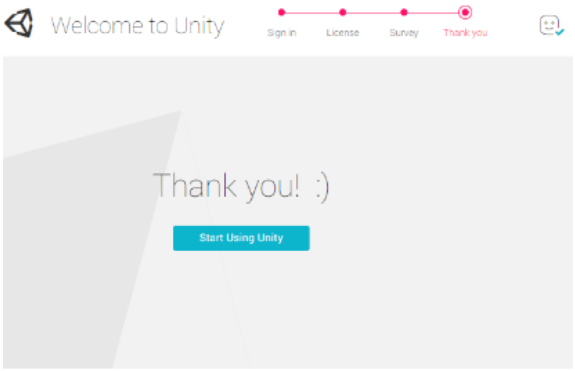


Figure 5.12 : Installation finish

5.5 Implementation status

Implementation status is to discuss about the development status for each of the module or chapters of this project according to the milestone that has been stated in chapter two.

Table 5.1 : Implementation Status

No.	Tasks	Start Date	End Date	Duration (days)
1.	**Pre-production**	**22 / 02 / 2016**	**29 / 05 / 2016**	7
	1.1 Design Phase	**22 / 02 / 2016**	**28 / 03 / 2016**	6
	1.1.1 Brainstorming for project title	22 / 02 / 2016	26 / 02 / 2016	4
	1.1.2 Preparation of proposal	22 / 02 / 2016	23/ 02 / 2016	2
	1.1.3 Submission of proposal	26 / 02 / 2016	26 / 02 / 2016	1

	1.1.4	Proposal revised	01 / 03 / 2016	01 / 03 / 2016	1
	1.1.5	Information gathering	22 / 02 / 2016	01 / 04 / 2016	8
	1.1.6	Analysis Virtual walkthrough/environment	22 / 02 / 2016	01 / 04 / 2016	8
	1.1.7	Analysis the existing system	22 / 02 / 2016	01 / 04 / 2016	8
	2.1 Design Phase		**21 / 03 / 2016**	**22 / 07 / 2016**	121
	2.1.1	Define the project methodology	21 / 03 / 2016	25 / 03 / 2016	4
	2.1.2	Define the hardware and software used	21 / 03 / 2016	25 / 03 / 2016	4
	2.1.3	Define user requirement, functional requirement and non-functional requirement	04 / 04 / 2016	29 / 04 / 2016	25
	2.1.4	Design flow chart of proposed application	30 / 04 / 2016	22 / 05 / 2016	22
	2.1.5	Design user-interface design	23 / 05 / 2016	29/ 05 / 2016	6
2.	**Production**		27 / 06 / 2016	22 / 07 / 2016	27
	3.1 Implementation Phase		27 / 06 / 2016	22 / 07 / 2016	27
	3.1.1	3D Modeling content object using Autodesk Maya	27 / 06 / 2016	15 / 07 / 2016	13
	3.1.2	3D texturing	15 / 07 / 2016	18 / 07 / 2016	3
	3.1.3	Export all the modelling object to fbx files			
	3.1.4	Import all the modelling object into Unity 3D editor	18 / 07 / 2016	20 / 07 / 2016	2
	3.1.5	Arranging the object	18 / 07 / 2016	20 / 07 / 2016	2
	3.1.6	Add font and information	20 / 07 / 2016	21 / 07 / 2016	2
	3.1.7	Do some coding to move,	20 / 07 / 2016	22 / 07 / 2016	3

	trigger and collision to the object			
3.	**Post-Production**	22 / 07 / 2016	05 / 08 / 2016	14
	4.1 Testing Phase	22 / 07 / 2016	05 / 08 / 2016	14
	4.1.1 Define test plan	22 / 07 / 2016	27 / 07 / 2016	3
	4.1.2 Make a questionnaire and interview question	27 / 07 / 2016	02 / 08 / 2016	6
	4.1.3 Testing at schools	03 / 08 / 2016	03 / 08 / 2016	1
	4.1.4 analyse the results	04 / 08 / 2016	05 / 08 / 2016	2
	4.1.5 conclusion	05 / 08 / 2016	05 / 08 / 2016	1

5.6 Conclusion

In conclusion, implementation phase is the major phase in order to possibly developing a quality virtual environment walkthrough. This chapter describes the production of all the content that needed which is text, 3D model and image. Media creations are the main production that needs to be done at the beginning before the integration of media into the main software tool.

Next chapter will explain about the testing phase. The product is tested by the user to detect any inconvenient thing or detect any errors that occur. The testing phase is then be analysed by the user and the data will be record.

CHAPTER VI

TESTING

6.1 Introduction

Testing is the final phase for this product. The purpose of testing is to measure how successful the product has achieved the objective and able to connect with the user very well. User acceptance testing and black box testing is tested in this project.

Black box testing is a method where the software is been tested in which the internal structure or design implementation of the item being tested is not known to the tester. While user acceptance testing is to test the product in the “real world” by the target user.

6.2 Test Plan

Test plan is the first stage of the testing phase. It needs to be done carefully to make sure the operation runs smoothly. The document that required will be used to make sure that the process of this project meets its objective.

6.2.1 Test User

Test user is described the person who involved in the testing phase of the product. The personnel who commonly involved are developer, project supervisor, school teacher and students.

Table 6.1: Test User

Criteria	Alpha Version	Beta Version
Profession	BITM third year students	Secondary school students A school teacher
Responsibility	The testing is done after being tested by the developer of this virtual environment walkthrough. The respondent will test the functionality of this virtual environment which is the interactivity, the content and the functionality of the collision of the object.	The respondent will need to interact with the product and respond the feedback by filling up the questionnaire that has been prepared. A history school teacher will be tested according to the questionnaire prepared and the interview session that

		will be recorded.
Age(Years Old)	20-40	16-17
Gender	Female - 3 Male - 2	Female – 19 Male - 11
Type of learning		Visual - 19 Auditory - 4 Kinesthetic - 7
Total of respondents	5	30

6.2.2 Test Environment

Test environment is to describe about the configuration setup and the location that the testing will be conducted. The location that has been picked must be at the suitable place where the equipment are complete to make the testing run smoothly.

Table 6.2 : Test Environment

Testing	**Alpha Version**	**Beta version**
Profession	BITM third year students	Secondary school students A school teacher
Location	UTeM Melaka	Sekolah kebangsaan ledang tangkak, Johor
Environment	A comfortable room or laboratory with desk, laptop and chair.	A comfortable classroom that has enough chairs and equipment for demonstration.
Hardware	• A laptop • A mouse	• A laptop • A mouse

		• A • A digital camera
Other		Hardcopy of questionnaire A permission letter An interview question for recording pupose

Only the interview session with the school teacher will be recorded using digital camera. This interview is in the alpha version testing.There are five questionnaire will be ask in order to have a solid idea of what to improve and how the product give an impact to student.

6.2.3 Test Schedule

The duration and timeline of testing to be conducted will be elaborate in the test schedule session.

Table 6.3 : Test Schedule

Testing	**Alpha version**	**Beta version**
Profession	Developers Supervisor Multimedia student	Secondary students School teacher
Total of participation	6	30
Date	8th June 2016	31st July 2016
Duration per session	15 minutes	2 hour 30 minutes
Number of participants per session	1	30
Total time spent	90 minutes	2 hours 30 minutes

6.3 Test Strategy

Test strategy is a testing approach to see whether the testing that will be conduct is achieved its objective. It is a set of guideline that explains how the test design is determined. Black box testing is used for the testing phase.

As mention before, black box testing is a method where the software is been tested in which the internal structure or design implementation of the item being tested is not known to the tester. It examines the functionality of the product without having to examine the internal structure of the product. This testing will be carried out in two ways. One way is by opinion of the supervisor, a judge and some of the BITM student.

Alpha and beta testing is used in order to test the product. Alpha version is the interview session between the teachers regarding the teacher opinion about the product. Other than that, all based on the opinion and comment mostly from supervisor and the judge. For Beta version of testing, the tester is given questionnaire where they need to answer based on the rating shown in the table below.

Table 6.4 : Test Strategy

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

Alpha version

Alpha version testing is the functionality testing where it improves the quality of the product. This testing version is most known as the critical issues are fixed and some features will be changes based on the early feedback.

There are no questionnaires provided for this version of testing. This testing is based on the feedback and comment that has been supervised by the supervisor. The tester will be asking the developer to change several things to meet the quality of product.

The teacher will be answering both type of question. First, the teacher needs to test the interactivity and the content of the product. Then the teacher will be asking to answer the questionnaire. After the testing session, the teacher is then will be ask the five interview question regarding the product.

Beta version

Beta version of testing is to improve the quality of the product within the user on the complete product. By making the beta version of testing in the “real world” with the real user, the feedback helps much more than the alpha version because it is the user’s opinion and comment that matter the most in order to get a quality that meet its objective.

There are questionnaire provided. The questionnaire will be given after each student from selected class test the product completely. The question are deign based on the user interface, interactivity and learning. They will be asked to run the product using the interactivity hardware which is keyboard and mouse.

6.4 Test Implementation

Test Implementation is the phase where the developer needs to ensure all of the procedure, available tester and the data that has been defined are organized properly. When all of the requirement are perfectly done and finalized, the tools and equipment that need to be used by the tester has been met the criteria of testing.

6.4.1 Test Description

In the test description, only the beta version of the description of question will be measured and also the description of its expected result.

Alpha version

Table below are the interview question between the teacher regarding of the product and the teacher personal opinion.

Table 6.5 : Interview question test description

Soalan Interview Interview question
1. Berapa tahun telah anda mengajar mata pelajaran sejarah? How many years have you teach history subject?
2. Apakah pengalaman yang sukar dalam mengajar subjek sejarah? What is your difficul experience teaching history subject?
3. Apakah pandangan anda jika pembelajaran subjek sejarah di ajar secara maya?

What is your opinion if the teaching of history subject is taught in virtual?
4.Bagaimana produk ini boleh membantu pelajar yang mempunyi pelbagai tahap pembelajaran? How is this product can help student from different various level of study?
5.Apakah kekurangan dan kekuatan jika aplikasi ini di guna pakai? What are the weakneses and strengths if this product is apply?

Beta version

Table below are the questionnaire that has been hands out to the tester and also the interview question that has been asked to one of the teacher on the opinion of the product.

Table 6.6 : Questionnaire test description

Mesra pengguna ***User Interface***	
1	Persekitaran maya ini di reka dengan lengkap mengikut tajuk zaman mesir purba. This virtual environment is designed to complete according to the ancient Egyptian era title.
2	Paparan penuh di persekitaran maya ini membolehkan andah melihat objek dengan mudah. Full display in this virtual environment allows you to see objects easily.
3	Objek-objek telah di reka dengan teliti The objects have been carefully designed

Interaktiviti ***Interactivity***	
4	Pergerakan pemain utama dengan menggunakan *keyboard* berfungsi dengan lancar. The main player movement using the keyboard run smoothly.
5	Pergerakan pemain utama dengan menggunakan *mouse* berfungsi dengan lancar. The main player movement using mouse run smoothly.
6	*Pop up* maklumat berfungsi dengan baik. Pop up information pop properly.
7	Pelanggar bagi setiap objek berfungsi dan diletakkan dengan baik. Collision of each individual object are worked and positioned properly.
Reka bentuk ***Design***	
8	Saiz tulisan yang digunakan membuatkan persekitaran maya ini kelihatan menarik pada pengguna. The size of the font is used in the virtual environment look attractive to user.
9	Latar belakang persekitaran maya yang telah di virtualisasi adalah menarik bagi pengguna untuk belajar dan mudah untuk diingati. The background of this virtual environment that has been virtualise are attractive for user to learn and easy to remember.
10	Grafik yang di gunakan membuatkan persekitaran maya ini kelihatan menarik. Gaphic that has been used in this virtual environment look attractive.
Pembelajaran ***Learning***	

11	Saya percaya bahawa pembelajaran perlukan teknik penglihatan, pendengaran, penulisan dan praktik. I believe that there are visual, hearing, writing and kinesthetic levels of learning that everyone has.
12	Dengan cara pembelajaran melalui medium persekitaran maya ini, pelajar dapat memahami dan mengingati maklumat yang disampaikan lebih mudah From this virtual environment learner, student are ease the remembrance and understanding of the information of the content better .

6.4.2 Test Data

Test data is the result of the collected result that was answered by the tester. The Questionnaire that has been answered by the tester and the interview question for alpha version that has been answered and recorded will make the product more solid in terms of information, how it should be design, its interactivity and how it gives an impact to the tester. The result of questionnaire is attached in the Appendix session.

6.5 Test result and analysis

The result of the questionnaire that has been collected will be display in this session. From the overall testing, some of the content and design are not meets the intended user requirement. The result were rate in five rates which are, strongly disagree, disagree, not sure, agree and strongly disagree.

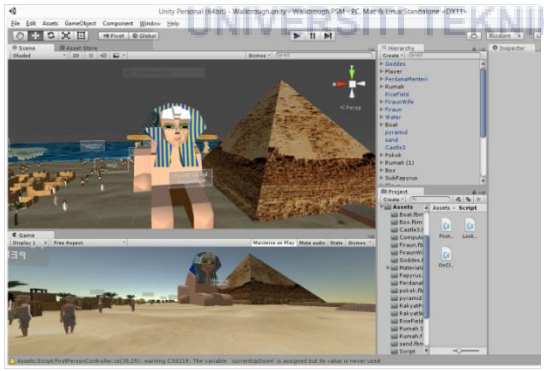
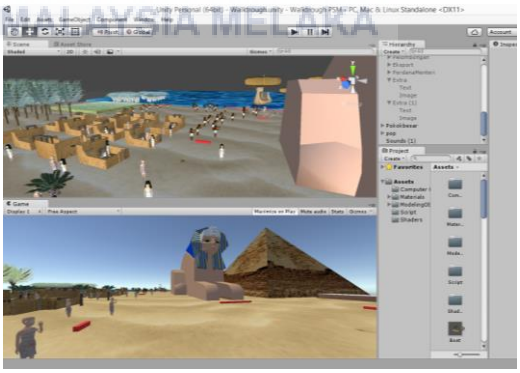
6.5.1 Test result

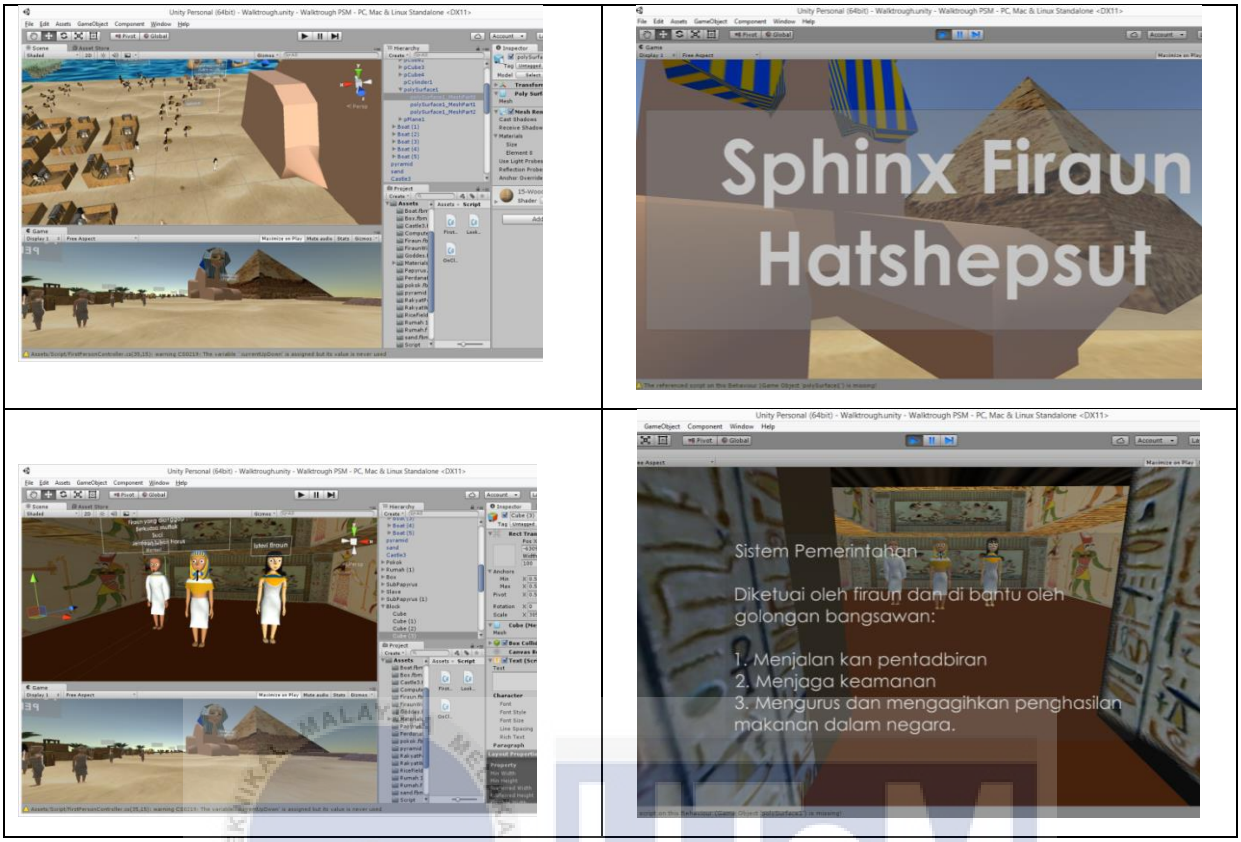
This section is the result of the questionnaire that the tester tested. It is then calculated into strongly disagree, disagree, not sure, agree and strongly disagree.

Alpha version testing

The result of the alpha testing has been recorded by digital camera. The result from the comment of supervisor has been corrected in the Table 6.7. The table shown the first version of the product and the after correction of the product. The table includes some pictures of proven result of the alpha testing in the table below. The answer that has been taken from the video was explained in the alpha version section below. The answer that has been taken from the video is attached to appendices.

Table 6.7 : Test result before and after alpha version

Before	After
	



Interview Session

For the interview session, one of the teachers agreed to be recorded and give his opinion about this product. Mr Mohd Azan has experience eighteen years teaching history subject to secondary school students. He pursued his study in history at University Kebangsaan Malaysia. The toughest in teaching history that he faced is to make the teacher accept what the teacher trying to deliver about this history subject. He also mentioned that, the teacher had used so many methods for student to understand and learn history in other ways, for example, doing exercise, storytelling and some ICT method.

His opinion about this product is that this product is one of a good method to be applied in history class. This method could attract the student interest in learning history profoundly. The interviewer also mentioned that if this method is applied to learning method in class, the students not only learn by reading, they can also learn by visual, kinaesthetic and

hearing. He also relates to when he was in school, he can still remember the story of JWW Birch until now by only watching a video about it.

He also mentioned that by learning history through virtual environment will teach the student to independently learn the content by themselves anywhere, such as at schools, public library and at home. The teacher will only act as their guidance at school, where they will be collect all the data or information at home and will bring them at school especially during presentation.

Every project and process has its own strength and weakness. The interviewer has mentioned that because of that this product is new thing which never ever someone use this product and applied this method in classroom in Malaysia. The usual methods that they usually use are learning by PowerPoint with pictures. The strengths that he mentioned is that this product gives an experience to the student to explore the content in interactive way where they visits the place that they learned in textbook virtually. While his opinion upon the weaknesses, is that the content need to be specifically position in group following its tittle in textbook, so that the content will be neatly arranged according to their topics.

Summary of alpha version

From the results of the interview session, the teacher has given so much information regarding of what can be improved on the product regarding of the teacher experience in teaching history subject for ages. The teacher agreed if the product if it apply in the classroom as their learning tools in order to boost their understanding and remembrance of the information in different level of learning.

However, there are some of the things that can be changed in this product. It is the design of the content, where the teacher said that it can be very confusing to the student where they cannot differentiate which information are belong to which characteristics or

tittle. The teacher gives the solution where the designs of the content need to be design by grouping the information as if like they walking in the museum. When they go to certain section, the information is complete and easily to get the information more particular.

Beta version

However, the beta version has been recorded in questionnaire where the 29 student will be asked to use this product within 15 minutes in order to explore the content. Table below are the medium and mode of the result. The raw result of the testing is graph and attach in the appendices.

Table 6.8 : Test result questionnaire beta version

No.	**Question**	**Rate from 1-5**	
		Medium	Mode
User Interface			
1	This virtual environment is designed to complete according to the ancient Egyptian era title.	4	4
2	Full display in this virtual environment allows you to see objects easily.	4	4
3	The objects have been carefully designed	4	4
Interactivity			
4	The main player movement using the keyboard run smoothly.	4	4
5	The main player movement using mouse run smoothly.	4	4

6	Pop up information pop properly.	4	4
7	Collision of each individual object are worked and positioned properly.	4	4
Design			
8	The size of the font is used in the virtual environment look attractive to user.	4	4
9	The background of this virtual environment that has been virtualise are attractive for user to learn and easy to remember.	5	4
10	Gaphic that has been used in this virtual environment look attractive.	5	4
Learning			
11	I believe that there are visual, hearing, writing and kinesthetic levels of learning that everyone has.	5	5
12	From this virtual environment learner, it ease the remembrance and understanding of the information of the content better.	4	5

6.6 Analysis Testing

This part is to analyse the result that has been corrected and summarized in the testing data. The data will be analyse in a chart bar form and evaluated according to the result.

Result of Beta version

The results of beta version are charted from the result that has been collected from the tester. After the analysis of the collected result, the result is then being summarised.

User interface

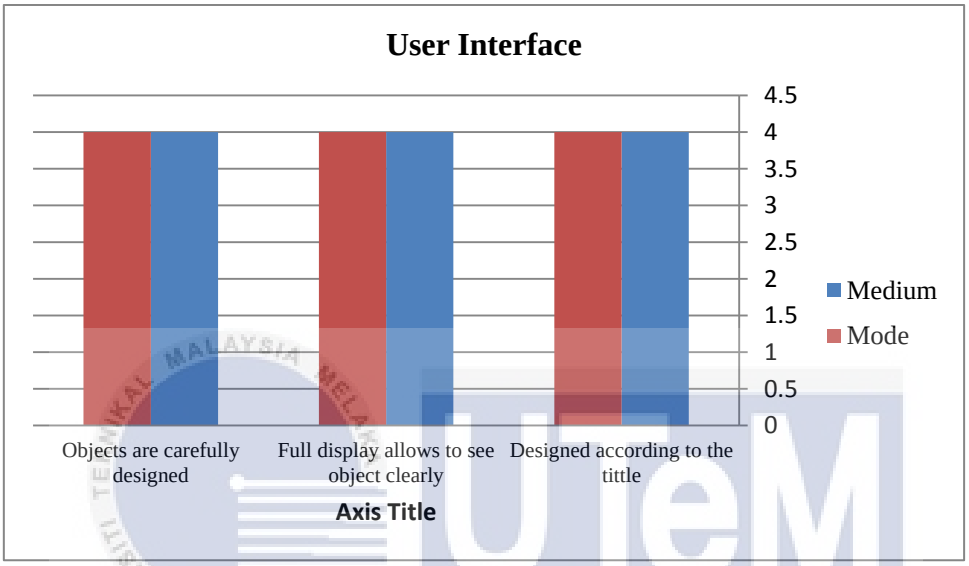


Figure 6.1 : Graph result of interface section

Figures 6.6.1 are the question that has been categorized as user interface. For question number one, it is clearly shown that almost the entire student agreed with completeness of the virtual environment according to the ancient Egyptian era title. The rest are not sure with the content object that has been designed. This is because they do not have a clue how the object in the virtual environment should be. Strongly agree rate has the same result as a not sure rate where the users are strongly understand and agree with the content design of this virtual environment walkthrough.

Question number two shows that most of the users are agreed and strongly disagree with the full display of the environment where the entire objects are clearly seen. Some user does not agreed and not sure with the display result of this virtual environment on screen. This cause of the modelling of the object in this virtual environment is too big and it keep on

render so it hardly seen from far. To prevent from this problem happened, is by reduce the number of polygon from each object.

Question number three where the question is about the accuracy of the design for each object in the virtual environment. The results are shown that the users are mostly agreed with the accuracy of the design object according to its characteristic in the textbook.

Interactivity

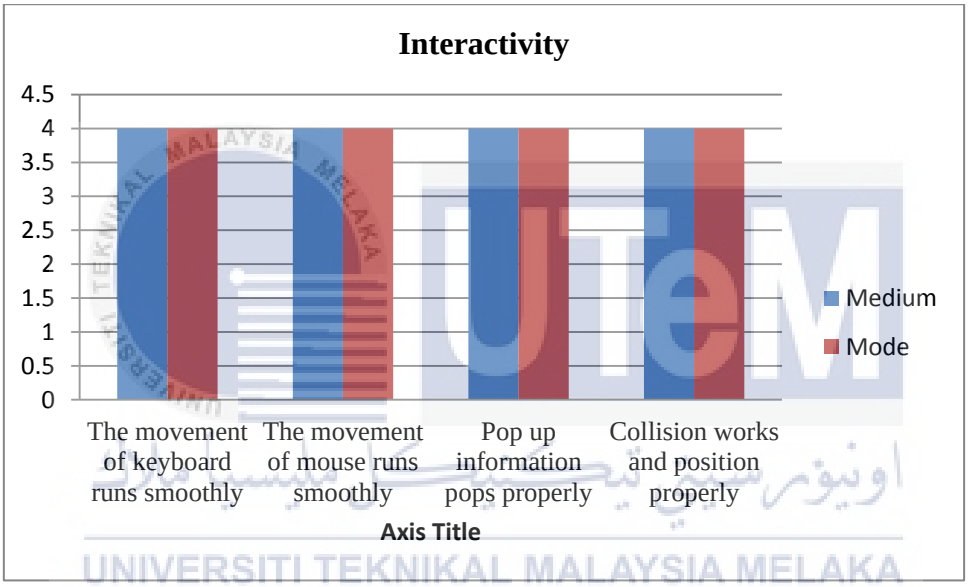


Figure 6.2 : Graph result of interactivity section

This section are regarding of the interactivity that has been applied in the product, the results for the first question according to the interactivity section are the main player movement using keyboard. The results shows that most of the student answered agree and not sure. The cause of this is because some of the student who has not experienced with the keyboard or any hardware are feeling dizzy by using this product that cause of the unsmooth movement of the character. The cause of dizziness, make the character move inappropriate path in this virtual environment.

For the second question, is about the movement of the eye of the character using mouse. The result shows that most of the users are agreed with the mouse movement. There are few that not sure. This is because mouse and keyboard are connected and the users were confused which interaction that cause of the dizziness. The rest of the result, the user doesn't agree with the smoothness of the mouse that connected to the keyboard.

The third question, are about the pop up information that trigger and information will appear. The results show positive feedback from the users that most of them agreed with. Only some of the user are not sure and disagree with pop up information. This is because of, there are some of the information were overlap the other because its trigger both information collider.

The last questions for the interactivity session are about the collision of each individual object. The users give a good impact where the entire object collision works properly. Some of the users are not sure of how the collision supposed to work on the object. During the testing, there are some of the testers suddenly out of control and the main character falls from the environment out of nowhere. None of the tester disagrees with this question and gives a positive feedback to the developer.

Design

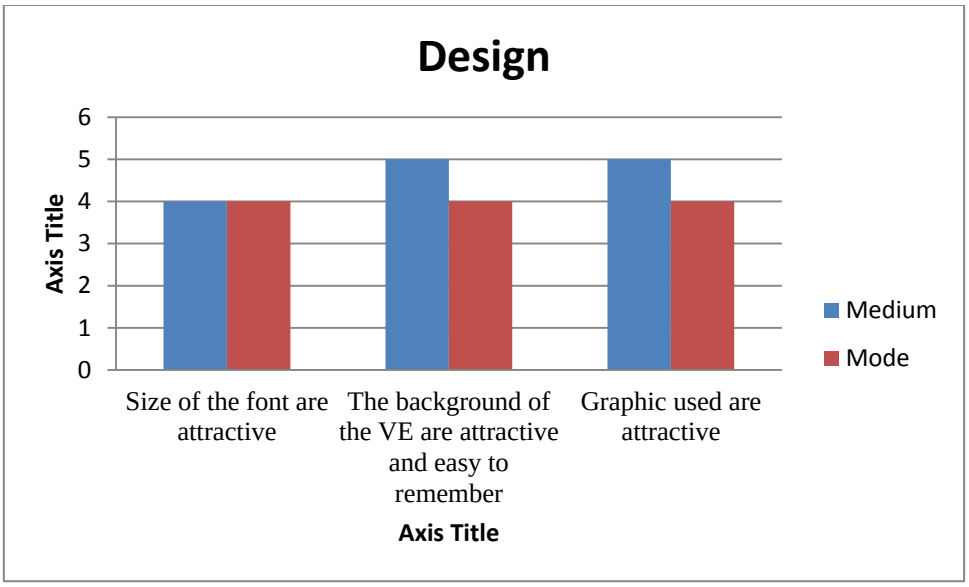


Figure 6.3 : Graph result of design section

There are three questions for the design section. The entire question shows the positive result where the users are agreed with the design. The first question are regarding of the size of the font that make the virtual environment looks interesting. It is shown that most of the users agreed and some of them are strongly agreed with the output of the font. Some of the users have little understanding on the design of the font so they are not sure of it.

The second question are about the ease of the background of virtual environment that has been virtualise are attractive for user to learn and remember. The results are positive that tells most of the users agreed with the background design. When each tester played and others watched several time, they learn and remember the content quickly. Only few people that is still not sure.

The third question shows intense decision of the user where most of the user agreed about the graphic that has been used are attractive. Where the differences of the decision made between strongly disagree and agree are only five pointless.

Learning

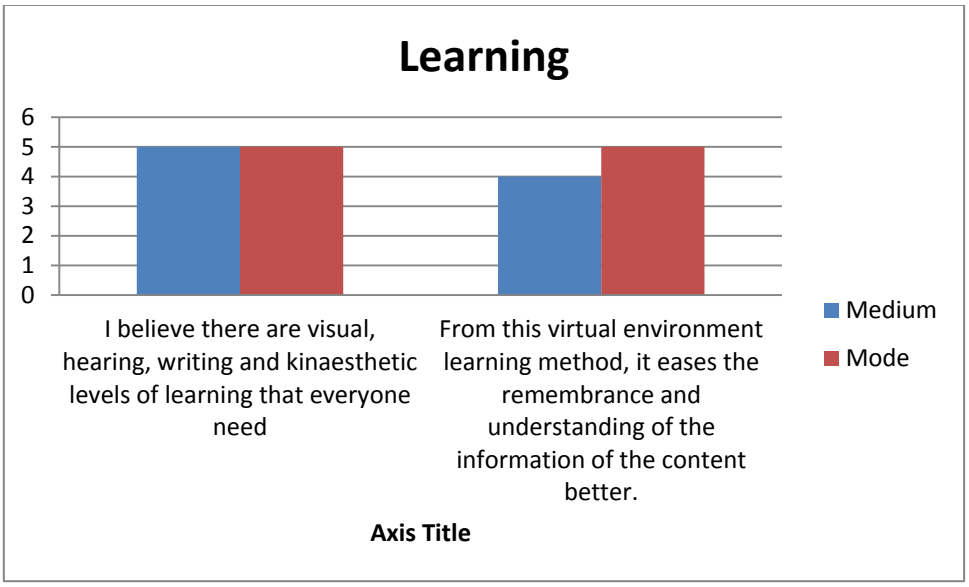


Figure 6.4 : Graph result of learning section

The last sections of the questions are how this virtual environment gives an impact to the users learning style. The first question give a satisfied strongly agree answers. The user believe that everyone has different technic of studying which is visual study, audio study, writing study and kinaesthetic study where the leaner has to be interacting and engaging to the thing they are studying in order to understand and remember. Only some of the user answers they are not sure about the level of the study among students.

From this medium of virtual environment walkthrough learning, student are easily understand and remember what they went through by walking around the environment by using mouse and keyboard. The result are tied between agree and strongly agree.

Summary of beta version

From the results of overall section of question, it is shows that this virtual environment walkthrough is able to deliver the information through this new medium of learning toward the student. Almost of the user that tested the product are agreed and

accepting the new change that can be applied in the future. The contents that delivered to them are easy to understand and remember.

6.7 Conclusion

For the conclusion, the testing process was done according as planned at Sekolah Menengah Keangsaan Ledang, Tangkak, Johor. The tester given their fully attention to what need to be delivered to them. The virtual environment walkthrough is mostly able to work according to the target user and it is able to deliver the information smoothly. From the feedback of the tester, they were all happily want to experience more in learning history in this medium of learning.

However, there are certain thing needs to be changed in order this concept of learning can be applied to the school in Malaysia. Other than that, this tool is a new concept of technology in Malaysia and the concept are not clearly exposed among Malaysian. The weaknesses and strength of this product need to be improve and took care of in the next step in order to seriously apply into the learning method in the classroom.

CHAPTER VII

PROJECT CONCLUSION

7.1 Introduction

This chapter will summarised the entire chapters that has been write throughout the production of the product and also documentation of an interactive walkthrough of virtual environment based on the subject of history from form five secondary school textbook syllabuses. This chapter will discussed about the project summarization, project contribution, project limitation, future works and conclusion of this chapters.

7.2 Observation on weakness and strength

This project objective is to virtualize the content of SPM history subject in interactive way, creating a virtual environment walkthrough of ancient time for user to explore while learning and analysing before and after the effects on having an interactive walkthrough using virtual environment for history subject. Throughout the testing phase, this project has achieved all entire objective stated.

Firstly, the objective has achieved by virtualise some of the content that has been chosen in the syllabus by modelling as much detailed as it should look like in real life. To virtualise all the object content in this project is using 3D maya tools and then it has been imported into the unity editor to make the virtual environment happen.

Secondly, by achieving the second objective which is, creating virtual environment walkthrough of ancient time for users to explore while learning are by coded some trigger of information when the character walkthrough the chosen collision, information of the chapters will pop up.

Lastly, by achieved the last objective which is to analyse before and after effects on having an interactive walkthrough to the expected users, two types of testing has been done, which is alpha and beta version testing. The alpha version has approved that this project gives a lots of benefits towards both tester, a history teacher and students. The beta version also gives an impact and beneficial experience to the tester on how to use the product and how it gives impact to the student based on different level of learning for each individual.

However, every beneficial has its weakness. The weakness that has been collected from the tester are some user has no experience using the tools such as keyboard controller and mouse controller that make them dizzied. Other than that, the weakness that has been stated by the teacher is the content are not accurately organize into appropriate tittle.

7.3 Proposition for improvement

To improve the product that has been built within this couple of month is to take note as what the teacher has said in the interview session where the content need to be specifically done by following its chapters to have a clear understandable fact information in a certain title.

Other than that, to improve this product is by putting animation into the object where it tells story and show what the object do in real life. Moreover, this product can be improve if more audio and sound effect is added into the object and also into the environment such as, the sound of river, boat and etc.

7.4 Project contribution

This project is specially design for SPM student which is form 4 and form 5 student. The age ranged is from 16-17 years old. The reason of this project is because of the compulsory of the history subject in order for the student to pass SPM examination. It is also a beneficial for history teacher to look up to for them to teach.

The interaction of the mouse and keyboard are abit dizzy for some people who has not familiar with this technology. However the teacher has said that this platform has potential to go further and can be used in the class room to enhance their level of study for them to easily understand and remember.

This virtual environment has increasing the excitement of the student to explore and search for the information at the pit stop of the important object in the environment. The

information that has been gathered from previous chapters helped a lot in terms of developing this project especially when this product given positives impact toward most tester.

7.5 Project Limitation

In every project, has its own limitation. Same goes to this project. Since this virtual environment is based on the textbook and real world, the first limitation is the lack of time in designing or modelling the object that based on the textbook. Within the time that has been given to finish the product, the modelling object is not very accurately design compare to the original references. Other than that, the limitation of time to virtualise the entire chapters in this virtual environment with the short amount of time is impossible. It is impossible because it is done alone and if there are more staff that help and have their part in doing this project, this can enhance the speed of making this project.

Secondly, the limitation that occurs is lack of tools for this virtual environment to increase the quality of the content, object and sound. The tool that has been used is all the free tools for student. Example of incomplete tools is Autodesk Maya and unity 3D.

Other than that, the limitation in order to make this product possible is the information and knowledge about the object that need to be designed. The process of researching about what need to be virtualise is lacking because this project objective is not really focus on the content, rather it focus on the tools that has to be build.

7.6 Conclusion

In conclusion of the whole chapters, virtual environment walkthrough had achieve its objective because it had evolves from idea to reality. Other than that, this project had meet its objective from the tester and interviewer. If given a chance to further this idea from every feedback that has been taken from the tester, students and teacher will clearly receive so much knowledge not only from the subject that they learn, they also receive from the knowledge of the technology that applied.

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APPENDICES

Appendix A

Appendix B

No.	Answer
1	*Saya cik mohd azian bin mohd sam. Saya telah mengajar matapelajaran sejarah selama 18 tahun. Latar belakang saya, saya telah menuntut di University Kebangsaan Malaysia dalam bidang sejarah. Dan pada 1996 saya telah mengajar di salah satu sekolah di sabah. Pada 2007 saya telah berpindah di SMK Ledang sehingga sekarang.*
2	*Dari segi pengalaman yang sukar untuk mengajar sejarah, mengajar sejarah ini kesukarannya bagi saya adalah bagaimana untuk pelajar menerima apa yang cikgu sampaikan berkaitan denga subjek sejarah. Itu yang utama. Kita nak mengajar sejarah ini adalah untuk membolehkan pelajar faham apa topik – topik yang kita hendak sampaikan samada pelajar – pelajar dapat terima ataupun tidak. Satu lagi kesukaran dia, dari segi kita lihat bagaimana cara penyampaian kita untuk membolehkan pelajar dapat memahami pendekatan kita dalam pmp kita. Guru perlu menggunakan pelbagai kaedah untuk memolehkan pelajar dapat menerima. Contohnya adalah menggunakan latih tubi, kaedah bercerita, menggunakan pendekatan ICT yang sekarang ini kita boleh guna pakai. Satu lagi, pelajar kurang berminat dalam mata pelajaran sejarah. Tak tahu lah adakah kerana mereka belajar perkara-perkar yang telah lau atau telah mati jadi mereka kurang berminat untuk mengetahui perkara – perkara masa lampau. Tetapi, sejarah perlu di pelajari oleh belajar sebab sejarah ini adalah pengalaman masa lalu dan kita boleh menjadikan ia sebagai satu iktibar untuk diri kita dan proses pembentukan bangsa.*
3	*Pada pandangan saya, pembelajaran sujek sejarah ini di ajar secara maya, itu adalah satu kaedah yang baik. Mungkin dari satu segi ia membantu untuk menarik minat pelajar, untuk mendalami tentang mata pelajaran sejarah yang di ajar oleh guru. Kalau kita lihat, pembelajaran secara maya ini kita boleh guna pelbagai cara seperti video, peristiwa gambar –gambar yang menarik yang di ambil daripada sumber internet atau website yang berkitan sejarah. Mungkin pelajar lebih terdorong untuk menimbulkan minat di dalam kalangan pelajar sebab kita lihat kalau kita mengajar hanya berpandukan buku teks sahaja, ia mungkin kurang berkesan. Tetapi mungkin dengan melihat video ataupun gambar, ia mungkin kurang berkesan. Tetapi mungkin*

	dengan melihat video ataupun tayangan peristiwa-peristiwa penting, maknanya mereka bukan dapat melihat dari segi melihat sahaja, tetapi dari segi pengalaman mereka daripada tayangan dan persembahan-persembahan, mereka cepat ingat. Sebab pengalam sendiri pun, kalau masa sekolah rendah pun, kalau sesuatu peristiwa, contohnya pembunuhan JWW birch, saya boleh ingat sampai sekarang melalui tontonan video. Saya boleh ingat. Itu adalah satu cara pendekatan. Dan pembelajaran maya ini juga dapat membantu pelajar untuk berdikari kendiri. Maknanya mereka ini, boleh berusaha mendapatkan maklumat – maklumat dengan secara sendiri. Mereka boleh akses samada di rumah, di perpustakaan dan sebagainya. Maknanya guru cuma menjadi pembimbing, iaitu memberi panduan kepada pelajar untuk mendapatkan maklumat- maklumat dan mereka akan mendapatkan maklumat tersebut dan bawa semula ke sekolah terutamanya jika ada pembentangan. Itu dari satu segi lah. Maknanya, pelajar boleh mendapat kan maklumat berpandukan tunjuk ajar guru. Dan satu lagi, pembelajaran secara maya ini adalah sangat pantas dan tepat untuk guru dan juga pelajar. Sekali gus boleh habiskan silibus dengan cepat untuk membuat ulangkaji bersama pelajar.
4	*Pada pandangan saya, sebenarnya produk yang sedang di lakukan ini boleh membantu dalam pembelajaran pelajar berdasarkan tahap kepakaran atau kemahiran pelajar – pelajar. Kalau kita lihat, mungkin pelajar lebih jelas untuk cuba menjelajah ataupun dapat gambaran tentang topic – topic yang di ajar ini yang di buat ini, iaitu tamadun mesir purba. Seolah – olah pelajar berada di negara mesir melihat keadaan negara mesir sekali gus menarik minat dan cepat pelajar dapat ingat tentang perkara yang di pelajari melalui penglihatan dan juga pembelajaran berdasarkan topic – topic yang ada di dalam produk ini. Kemudian, pada saya, secara tidak langsung ia dapat memberi keyakinan kepada pelajar untuk cuba sesuatu yang baru. Sekaligus boleh menarik minat pelajar untuk mempelajari mata pelajaran sejarah itu sendiri.*
5	*Pada pandangan saya, dari segi kekuatan pada saya, produk ini satu kekuatan yang baru, yang saya belum pernah lihat berbanding yang sedia ada. Yang biasa lihat kebanyakannya dalam bentuk power point dan tulisan yang bergambar. Tetapi produk ini, kekuatan dia pelajar oleh mengalami sendiri tentang keadaan sesuatu yang di sediakan dalam produk ini. Contohnya pelajar dapat belajar tentang kehidupan mesir*

	purba dengan cara pelajar itu sendiri. Di samping disediakan maklumat – maklumat yang berkaitan dengan topic-topik yang ada dalam mata pelajaran sejarah itu sendiri. Dari segi kekurangan, bahan yang bagi topic yang di pilih perlu lebih mengkhusus tentang perkara yang hendak di sampaikan. Macam dalam produk ini, ciri – ciri tamadun mesir purba. Pada saya ia perlu lebih spesifik, contohnya tentang agama dan kepercayaan satu bahagian, ciri pemerintahan, organisasi social dan sebagainya. Maknanya dia lebih tersusun. Jadi pelajar akan lebih memahami dan lebih jelas. Kalau lihat dari keseluruhan, itu pada saya pelajar boleh keliru dan tidak mendapatkan maklumat itu dengan lebih jelas.

Appendix C

Jantina : ☐ Lelaki ☐ Perempuan
Gender: Male Female

Umur: _____ Tahun
Age : _____ *Year*

Jawatan: ☐ Pelajar ☐ Guru Sekolah
Position: Student Teacher

Tingkatan: _____
Form : _____

Anda adalah : ☐ Pelajar Visual ☐ Pelajar Auditori ☐ Pelajar Kinestetic
You are : *Visual Learner* *Auditory Learner* *Kinesthetic Learner*

No.	**Soalan** **Question**	**Kadar dari 1-5** **Rate from 1-5**				
		Sangat tidak setuju Strongly disagree	Tidak setuju Disagree	Tidak pasti Not sure	Setuju Agree	Sangat setuju Strongly disagree
Mesra pengguna ***User Interface***						
1	Persekitaran maya ini di reka dengan lengkap mengikut tajuk zaman mesir purba. This virtual environment is completely designed according to the ancient Egyptian era title.	1	2	3	4	5
2	Paparan penuh di persekitaran maya ini membolehkan andah melihat objek dengan mudah. Full display in this virtual environment allows you to see objects easily.	1	2	3	4	5
3	Objek-objek telah di reka dengan teliti The objects have been carefully designed	1	2	3	4	5
Interaktiviti ***Interactivity***						
4	Pergerakan pemain utama dengan menggunakan *keyboard* berfungsi dengan lancar. The main player movement using the keyboard run smoothly.	1	2	3	4	5
5	Pergerakan pemain utama dengan menggunakan *mouse* berfungsi dengan lancar. The main player movement using mouse run smoothly.	1	2	3	4	5
6	*Pop up* maklumat berfungsi dengan baik.	1	2	3	4	5

	Pop up information pop properly.					
7	Pelanggar bagi setiap objek berfungsi dan diletakkan dengan baik. Collision of each individual object are worked and positioned properly.					
Reka bentuk ***Design***						
8	Saiz tulisan yang digunakan membuatkan persekitaran maya ini kelihatan menarik pada pengguna. The size of the font is used in the virtual environment look attractive to user.	1	2	3	4	5
9	Latar belakang persekitaran maya yang telah di virtualisasi adalah menarik bagi pengguna untuk belajar dan mudah untuk diingati. The background of this virtual environment that has been virtualise are attractive for user to learn and easy to remember.	1	2	3	4	5
10	Grafik yang di gunakan membuatkan persekitaran maya ini kelihatan menarik. Gaphic that has been used in this virtual environment look attractive.	1	2	3	4	5
Pembelajaran ***Learning***						
11	Saya percaya bahawa pembelajaran perlukan teknik penglihatan, pendengaran, penulisan dan praktik. I believe that there are visual, hearing, writing and kinesthetic levels of learning that everyone has.	1	2	3	4	5
12	Dengan cara pembelajaran melalui medium persekitaran maya ini, pelajar dapat memahami dan mengingati maklumat yang disampaikan lebih mudah From this virtual environment learner, it eases the remembrance and understanding of the information of the content better.	1	2	3	4	5

Appendix D