LEARNING COVID-19 RESTAURANT STANDARD OPERATING PROCEDURE THROUGH VIRTUAL REALITY GAME

SOH YI JIN

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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This report is submitted in partial fulfillment of the requirements for the Bachelor of [Computer Science (Interactive Media)] with Honours.

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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DECLARATION

I hereby declare that this project report entitled

LEARNING COVID-19 RESTAURANT STANDARD OPERATING PROCEDURE THROUGH VIRTUAL REALITY GAME

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

STUDENT : _____ Date : 5/9/2021
(SOH YI JIN)

I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of [Computer Science (Software Development)] with Honours.

SUPERVISOR : _____ Date : 12/9/2021
(TS. NORAZLIN BINTI MOHAMMED)

DEDICATION

Specially dedicated to my beloved family and friends who always giving the support throughout my journey in education.

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ABSTRACT

COVID-19 SOPs keep on changing according to the pandemic situation which cause confusion among people. This project is to applicate VR game into the understanding and learning of COVID-19 restaurant SOPs. The implementation of the gaze interaction will increase the excitement of the VR game. The game is a based on simple puzzle solving game with three different stages. In the first two stages, the player plays as the restaurant worker with aim to make sure the customers follow the SOPs. Whereas the last stage, the player will play in the role of customer which required to follow all the previous SOPs. The expected outcome for the VR game in practicing COVID-19 restaurant SOPs is to allow the player to become familiar with the COVID-19 restaurant SOPs in the sense of protecting self-individuals from COVID-19 and stopping the spread of COVID-19.

ABSTRAK

COVID-19 SOPs sentiasa berubah atas situasi pandemik dan oleh sebab perubah tersebut menyebabkan kekeliruan antara masyarakat. Projek ini adalah untuk mengaplikasikan VR game dalam penyebaran dan pendidikan COVID-19 SOPs restoran. Untuk mempertingkatkan keseronokan pengguna dan dapat interaktif dalam VR game tersebut, interaktif secara pandangan digunakan. VR game ini dalam bentuk puzzle game dan mengandungi tiga tahap. Dalam tahap pertama dan kedua, pengguna bermain dalam role pekerja restoran yang bertujuan untuk memstikan pelanggan restoran tersebut mengikut SOPs. Manakala, unutk tahap ketiga, pengguna akan bermain sebagai pelanggan dan perlu mengamalkan semua SOPs yang diberitahu dalam tahap pertama dan kedua. VR game ini bertujuan untuk membolehkan masyarakat dapat melatih diri sendiri COVID-19 SOPs restoran yang betul dan mempertingkatkan kesefahaman dan mengurangkan kekeliruan masyarakat atas COVID-19 SOPs restoran agar mereka dapat mempertahankan diri sendiri daripada dijangkiti COVID-19 dan mengatasi penyebaran COVID-19.

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FYP	**-**	**Final Year Project**
VR	**-**	**Virtual Reality**
SOP	**-**	**Standard Operating Procedure**
SOPs	**-**	**Standard Operating Procedures**
COVID-19	**-**	**Coronavirus Disease**
UAT	**-**	**User Acceptance Test**

LIST OF ATTACHMENTS

Chapter 1: INTRODUCTION

1.1 Introduction

Standard Operating Procedures (SOPs) is a document or written instructions which describes the regularly recurring operations or a routine to ensure that the operations are carried out correctly (quality) and always in the same manner (consistency). SOPs are specific sets of practices that are required to be initiated and followed at specific circumstances. In 2020, SOPs were introduced by the Malaysia government in response to COVID-19 pandemic such as Movement Control Order (MCO) and Conditional Movement Control Order (CMCO). Due to uncontrollable circumstances, the fight with COVID-19 has been prolonged till today and SOPs requirements are constantly changing based on the current situation of the pandemic. Malaysian are confused towards the SOPs introduced by the government from time to time as they look similar but different. For instance, MCO1.0 dine-in is prohibited in all cases yet on the other hand, MCO 2.0 allows dine-in with 2 pax per table.

Beside confusion of the current SOPs among Malaysian, teenagers are uninterested towards current issues and situations. Teenagers lack awareness and understanding about COVID-19, consequences of getting it and the correct SOPs to be followed. With the advance of technology, teenagers tend to be tricked and misled by fake news and information across the internet causing them to have different understanding toward SOPs and even following the wrong SOPs. To aid the spread of information, implementing VR game increases efficiency of spreading COVID-19 restaurant SOPs.

1.2 Problem Statement

SOPs change based on the situation of the pandemic and cause people to be confused and misleading. Movement Control Order (MCO) and Conditional Movement Control Order (CMCO) are the examples of SOP that were introduced by the Malaysia Government in response to COVID-19 pandemic. MCO prohibited people to dine in while CMCO allowed people to dine in with physical distancing rules. When the first MCO was introduced, almost all daily activities were prohibited and only one person per household was allowed to go out for groceries shopping. However, when MCO2.0, people start to confuse it as it is totally different from what it used to be in MCO1.0 as dine-in are allowed and two passengers are permitted in one car based on the car capacity. People are confused and not sure which to which should be followed and moreover there will be fine of 1000 Malaysia Ringgit (MYR) for those who did not obey the SOP.

Next, the dullness and ineffective ways of information delivered to citizens. Infographic and video has been applied by the Malaysia government to raise awareness towards COVID-19. However, teenagers still lack of COVID-19 SOPs awareness and understanding as they do not obey the COVID-19 SOPs properly and some even find loopholes in SOP just to hang out with friends. Furthermore, they are not aware of the severity of the COVID-19 virus toward our body. As a result, the daily cases of COVID-19 in Malaysia keep on increasing. Yet, many methods and preventions have been taken by the government to decrease the COVID-19 cases.

1.3 Objective

The objective of this project are as below:

- To study Virtual Reality (VR) application requirement for development of COVID-19 Restaurant Standard Operating Procedures.
- To develop a VR game application in practicing the COVID-19 Restaurant Standard Operating Procedures.
- To evaluate the User Acceptance Test (UAT) of VR in practicing the COVID-19 Restaurant Standard Operating Procedure among teenagers.

1.4 Scope

This game is localized for Malaysian society, especially for the teenagers. This project applicate Virtual Reality (VR), to let the user have better understanding about COVID-19 Standard Operating Procedures (SOPs) in the restaurant. This game allow the users personate as a worker and customer of the restaurant in first-person perspective. The users can interact with the customer (NPC) in the game to check whether the customers obey the COVID-19 SOPs or not in the restaurant.

1.5 Project Significant

This project will help the teenagers to enhance their knowledge of COVID-19 standard operating procedure (SOP) to avoid the spread of the COVID-19. This project will also further point out how to obey COVID-19 SOP by Virtual Reality (VR) game based learning. By using VR, the user will be more immersed in the environment to obey the COVID-19 SOP and able to more understanding of how SOPs actually works in restaurant to decrease the risk of spread of COVID-19.

1.6 Conclusion

A Virtual Reality (VR) game related with COVID-19 restaurant standard operating procedure (SOP) will be developed in this project. In conclusion, this chapter briefly explained the main core idea and objective for this project. The literature review and methodology used for this project will be discussed in Chapter II.

Chapter 2: LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

This chapter is going to discuss Virtual Reality in COVID-19 restaurant standard operating game system and existing game system about VR game. VR is not a new technology but it is still trending as a helping tool to let the user immersed in the real environment for learning something new.

2.2 Domain

This subchapter will discuss the concept of virtual reality, visualisation, types of virtual reality, virtual reality devices, virtual reality application, virtual reality in learning and basic concept of COVID-19 Pandemic.

2.2.1 Visualisation

Based on the Merriam-Webster Dictionary, visualisation can be defined as the formation of mental visual images or the act or process of interpreting visual terms or of putting them into visible form. Visualisation employs graphics to make visible form or pictures that give insight into certain abstract data and symbols. Based on Shneiderman .B (1996), Visualisation technique is applicable to certain types of data which include Scatter Data, Scalar Data and Vector Data and dimensions such as a linear (1D), planer (2D), volumetric (3D) or multidimensional (nD). However, high complexity or high dimensionality of modern data sets represent a critical obstacle to us as humans are biologically optimized to see the world and the patterns in three dimensions by Ciro Donalek et al. (2014). Based on Steven Segenchuk (1997), the

purpose of visualisation to be used in such a variety field is to facilitate the learning of knowledge, identify patterns and trends and also conduct analyses such as predictive analysis. For example, traditional educational methods are hard to understand anatomy in biology. With the aid of Visualisation such as image and videos, learning anatomy is easier than before and fun.

2.2.2 **Virtual Reality Concept**

Joe Bardi (March 2019) reviewed that Virtual Reality (VR) refers to visualisation of a virtual environment or simulation with use of computer technology which is significantly different compared to traditional user interface as users are immersed and able to interact with the environment instead of viewing an interface in front of them. Based on Cory Mitchell (2020), virtual reality can also be defined as a computer-generated simulation of an alternate three-dimensional world with the aid of virtual reality devices such as Head Mounted Display (HMD) which is a special goggles with a screen display and controller with gloves design. and reality which temporarily shut the user out of the real world and immersed the user in the virtual environment . In order to convince the brain that the synthetic world is authentic, the computer simulation continuously monitors the movement of the user and adjusts the sensory display which gives the feeling of being immersed or present within the simulation by Craig A. B. et al. (2009). According to Schulze J. P. et al (2011), since the beginning of 1990s, several attempts at bringing VR into the video game industry such as Trocadero in London. However, the attempts failed as technology at that time was not advanced enough to realize VR and make it economically affordable by the world. Over the past decade, VR made a tremendous growth as adoption of the technology is favourable towards VR and it is gaining widespread recognition across the continents by Praveenkumar Yadav (2021). Based on Statistics provided by Thomas Alsop (2021), shows that virtual reality is getting more popularity and recognition which increases linearly from 2017 with total shipments unit of 3.7 millions virtual reality devices worldwide by vendor to 2019 with total of 6 millions.

2.2.3 Types of Virtual Reality

Bridget Poetker (2019) explained that there are three types of virtual reality which are non-immersive virtual reality, semi-immersive virtual reality and fully-immersive virtual reality.

(a) Non-immersive VR

Based on Bridget Poetker (2019) review, non-immersive virtual reality are the most common types of virtual reality as it is commonly used in everyday life and the majority of the gaming industry. Users experience the computer-generated environment but allows the user to stay aware and control of their physical environment. Average video games nowadays are technically considered as non-immersive virtual reality as users are experienced and interacting with a virtual space through display such as computer monitor or game console display while physically controlled by using keyboard and mouse or console controller. The Advisory Group on Computer Graphics (AGOCG) also mentioned that non-immersive virtual reality can be regarded as the lowest cost VR solution and can be used for many applications. However, the AGOCG also reviewed that due to low cost, this type of virtual reality can be easily outperformed by more sophisticated implementations such as other types of virtual reality.

Figure 2.1 Example of Non-immersive VR

(b) Semi-immersive VR

Semi-immersive virtual reality provides users with a partially virtual environment to interact with by Bridget Poetker (2019). Dave Greco (2019) reviews that semi-immersive virtual reality is most typically used for educational and training purposes as the controllers are designed to be technically same and identical to the real mechanism while the visuals provided are virtual through high-resolution displays. Semi-immersive virtual reality gives users the perception of being in a different reality by providing realism through 3D graphics which are also known as vertical reality depth but still connected to their physical surroundings.

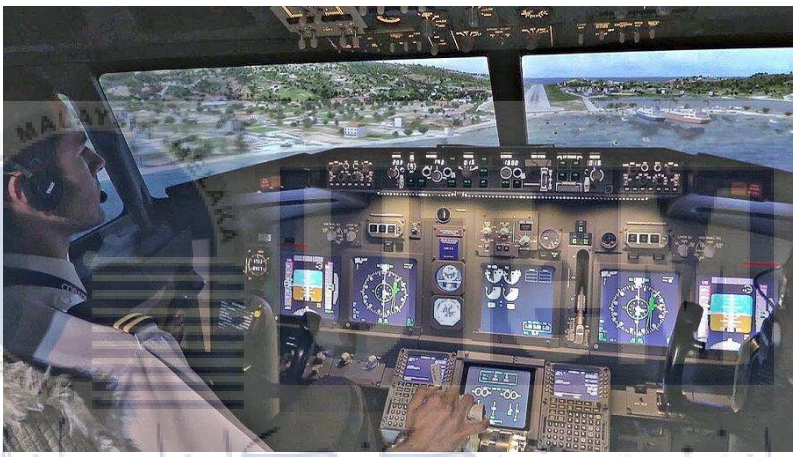


Figure 2.2 Example of Semi-immersive VR

(c) Fully-immersive VR

Bridget Poetker (2019) stated that fully-immersive virtual reality can be experienced when users are fully geared with head-mounted displays (HMD) for visual sense, headphones for auditory sense, gloves for haptic sense and treadmill or suspension apparatus for vestibular sense. Fully-immersive virtual reality provides the users to experience synthetic virtual environments as the real world which immerses users in a simulation which stimulates the user's senses by Dave Greco (2019). Dave also mentioned Fully-immersive VR has been commonly adapted for gaming and entertainment purposes and also for education purposes in recent years.

Figure 2.3 Example of Fully-immersive VR

2.2.4 Virtual Reality in Learning

Based on Nick Babich (2019), application of virtual reality in education is to enhance student learning and engagement. VR education transforms the way of educational content delivered to the student compared to traditional education. VR works on the premise of creating a virtual world and allows the user to not only see it but also interact with the environment. Based on the review of American University in Washington, DC stated that the benefits of virtual reality in education are embraced by many educators to use it s. However, some are still reluctant to implement it in their classrooms as the costs of the technology is unbearable by the school administrators and also current technology for VR is more biased to gaming industry which leads others to think of it as an entertainment instead of education purpose. Tanner Higgin (2018) said that it is crucial to adjust the VR content based on the student age appropriately so that students will not miss use them as entertainment instead. Nick Babich also reviewed that the student learning with VR will have a better understanding and sense of historical places and also develop creativity and imagination where students are able to show their capability in VR tools such as Tilt Brush.

2.2.5 **Virtual Reality application**

Virtual Reality (VR) has been around for decades but in recent years, it has taken off in global popularity thanks to the continuously enhanced technology and the shifting digital entertainments trends. In Malaysia, virtual reality is a growing industry such as entertainment, education, tourism and gaming. In the tourism industry, the most famous virtual reality related attraction definitely goes to The Rift, the largest VR theme park in Malaysia located in Mid Valley Megamall, Kuala Lumpur. The Rift provides numerous VR games and entertainment to experience such as Zero Latency and Hado which players are fully-immersed in the game for better game experience.

Figure 2.4 The Rift, Largest VR Theme Park

Hiverlab is also another company with implementations of virtual reality, augmented reality, mixed reality and cloud computing to empower organizations around the globe to build their future digital infrastructure. About 150 clients from 14 different industries have cooperated with Hiverlab in developing their digital infrastructure. In terms of education, Hiverlab has collaborated with numerous schools in Singapore such as Nanyang Technological University (NTU) in their heritage conservation project using VR.

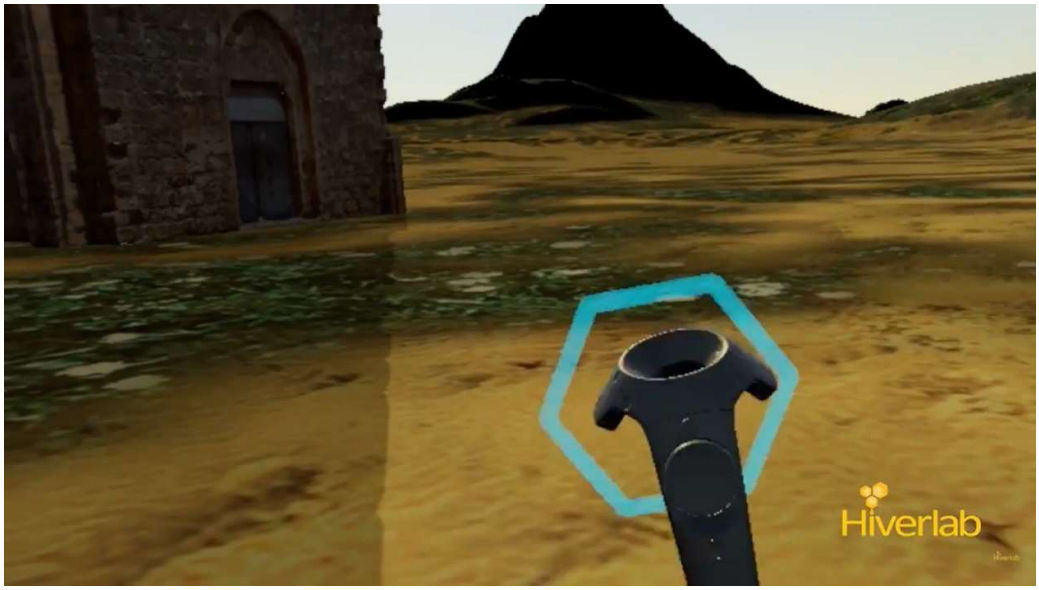


Figure 2.5 NTU heritage Conservation Project using VR

2.2.6 Virtual Reality Devices

When we talk about virtual reality, we usually relate it with the head mounted display (HMD) which provides high resolution visual sense for the user with a wide field of view. Based on the AGOCG, the Binocular Omni-Orientation Monitor (BOOM) is the oldest HMD invented by Mark Bolas in 1994. In recent years, gaming and IT companies such as Valve, Sony PlayStation and Oculus have introduced their VR headset device to the world which is Valve Index, Sony PlayStation VR and Oculus Quest with a variety of price ranges. VR headsets function as to track user head movements and adjust the visual projectile on the screen within the headset in a simple definition that is where the user looks is what the user sees which envelop the user in another dimension of virtual environment. Among all those VR headset, Oculus Quest 2 is currently the best standalone VR available in the market. With self-contained and wireless, it provides better versatility for the users to immersive in VR and also great touch controllers which bring comfort for the user while using it. Not just Oculus Quest come with touch controllers, basically almost all current available VR headsets all come with their own touch controller which provide additional haptic sense for the user to be immersed in the virtual environment.

Figure 2.6 Oculus Quest 2

Beside high-end VR head mounted device (HMD), there is also an economically affordable version of VR device which is the VR box with the use of the user own smartphone device as the screen display. Google also introduced a similar version of VR box which is called Google Cardboard. However, before purchasing any of the VR boxes, users have to ensure whether their smartphone is compatible for VR or not by simply downloading a cardboard app or gyroscope sensor from play store to check VR compatibility.

Figure 2.7 Google Cardboard

Figure 2.8 VR Box

2.2.7 COVID-19 Pandemic

According to the World Health Organization (WHO), Coronavirus disease 2019 so called as COVID-19 is a highly infectious disease caused by a newly discovered coronavirus. COVID-19 is the fifth pandemic after the 1918 flu pandemic. The first report and subsequent outbreak from a cluster of novel human pneumonia cases in Wuhan City, China in the late December 2019. The disease initially was called Wuhan pneumonia by the press because of the area and pneumonia symptoms. On 12 January 2020 the World Health Organization (WHO) officially announced it as coronavirus disease 2019 (COVID-19). The virus has rapidly spread worldwide causing it to be a global threat. On 11 March of 2020, the WHO made an assessment that COVID-19 can be characterized as a pandemic right after the 2009 Pandemic flu (H1N1). Based on Merriam-Webster Dictionary, Standard Operating Procedure (SOP) is defined as an established or prescribed method to be followed routinely for the performance in designated situations. The Madhav M. S. (2019) reviews that SOPs can be found to be of immense use in proper working, training of personnel and favourable outcome in every industry. In terms of healthcare, Madhav explained that SOPs is defined as a written set of instructions that a healthcare worker should follow to complete job safety with no adverse effect on personal health and in a manner that maximises the probability of a beneficial health outcome in an efficient manner.

Movement Control Order (MCO) is one of the COVID-19 SOPs introduced by Malaysia Prime Minister Tan Sri Muhyiddin Yassin on 16 March 2020. The Prime Minister mentioned that the MCO is made under the Prevention and Control of Infectious Diseases Act 1988 and the Police Act 1967. Based on the statement from Malaysia Health Ministry, MCO prohibited all business premises except supermarkets, public markets, sundry and convenience shops. Only essential service and business are allowed to operate as usual such as water supplies, electricity, telecommunication and others. All outdoors activities and worship must be halt including Muslim Friday prayer.

2.3 Existing System

The game, In Mind VR 2 places emphasis on the chemistry behind human emotion, greatly inspired by the Pixar/Disney movie "Inside Out" and (more scientifically) Lövheim's theory of emotions. In Mind 2 is a VR game with a decision making strategy game which embraces children on critical thinking and making their own decision. On the gameplay side, we take the best from our experiences developing the games InMind and InCell, to create an innovative and eye-catching VR experience. A unique experimental project made by Luden.io to test the opportunities of the new Virtual Reality provided by Google Cardboard.

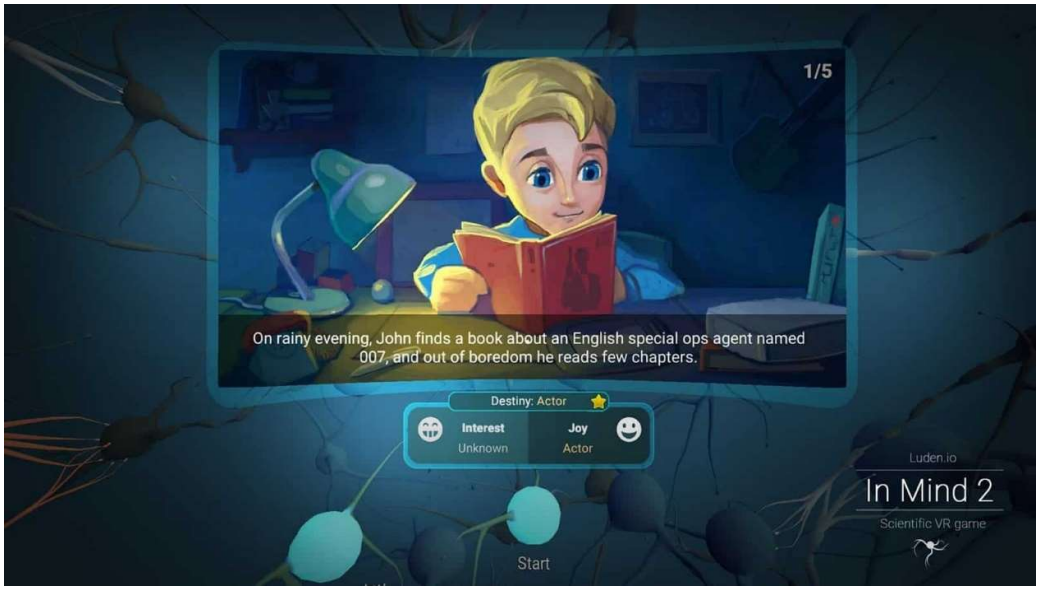


Figure 2.9 In Mind VR 2

Titan of Space allows users to explore and learn about the universe in an interactive way, Titans of Space provides an in-depth tour of planets and stars in the galaxy. With great music and entertaining visuals, it makes learning about the solar system much more exciting. The planets were shrunk down to 1 millionth of their actual size for a more surreal experience. For instance, Earth will appear to be of the size of a small house or a 12.7-meter-wide holographic ball. Titan of Space is self-paced and comes with a variety of options, where users are able to fully control the pace and depth of the tour. It can be used with VR devices such as the Oculus Rift, HTC Vive, and Google Cardboard.

Figure 2.10 Titans of Space

Anatomyou VR is an educational mobile application that presents human anatomy to the user in an immersive way. Antomyou is a new way of learning and teaching human anatomy by visualising the body feature within the human body through VR. Using virtual reality, you will be able to navigate along anatomical structures, becoming part of the human anatomy: circulatory, respiratory, digestive, urinary, lacrimal and female reproductive system. On different systems, users are able to stop at a particular position and observe what is happening inside the organs and get information with the hotspot.

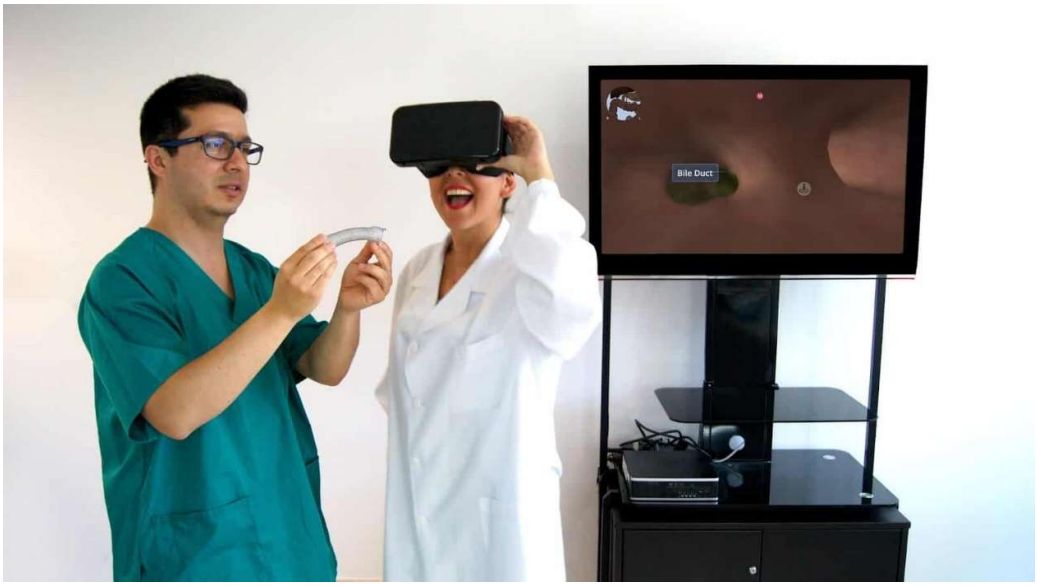


Figure 2.11 Anatomyou

VR Lessons by ThingLink is a collection of interactive, 360° image and video journeys on a variety of topics including science, language, and arts. The users can turn their heads to look around, they can spot details and unlock additional information of each habitat in a narrated virtual reality environment. VR Lessons by ThingLink utilizes three key feature additions to ThingLink's core product, the image editor: audio annotations, background audio for 360° images, and the ability to connect several 360° images or videos into a one immersive story.

Figure 2.12 VR Lessons by ThingLink

A world heritage initiative by EON Reality, King Tut VR allows users to explore and understand an important part of history. This app takes you on a 360-degree tour of the world-renowned tomb of Egyptian Pharaoh King Tutankhamun, which was discovered in 1922. Through this VR app, users can get as near to the Death Mask of Tutankhamun as they want, marvel at intricate hieroglyphics, and learn about certain historical artifacts of Ancient Egypt. The full 360 degree virtual environment provides users to be immersed in a spectacular and historical virtual environment. Allow users to experience being able to travel to Egypt without bearing the cost of travelling.

Figure 2.13 KingTut VR

Tiltbrush allows you to do away with traditional art materials by encouraging students to make any virtual space their canvas. It comes with a large palette of dynamic brushes, a variety of interfaces, and the option to share artworks either in the form of animated gifs or large scale masterpieces. In the virtual 3D empty space, users are able to unleash their creativity and imagination by recreating it using the controller as the dynamic brushes.

Figure 2.14 Tilt Brush

2.3.1 Comparison of Existing System

Table 2.1 Comparison of Existing System

Name of System	InMind VR 2	Titans of Space	Anatomyou	VR Lessons by ThingLink	KingTut VR	Tilt Brush
Platform	Mobile, Computer	Mobile	Mobile	Mobile Computer	Mobile	Computer
Objective	To enhance critical and logical thinking for making decision	To explore and understand the unknown of the universe	To educate the human anatomy	To share notes and observations about real-world space with 360 view	To explore and understand an important part of history Egypt	To embrace user creativity and imaginary
Language	English	Multiple languages	English	Multiple languages	-	English
Type of VR	Fully-immersive VR	Fully-immersive VR	Fully-immersive VR	Fully-immersive VR	Fully-immersive VR	Fully-immersive VR
Subscription fee	Free	Free	USD0.99 - USD4.99	Free	Free	RM38.00

2.4 Project Methodology

The methodology used for this project is the Multimedia Development Life Cycle (MDLC). There are a total of six stages included in the MDLC and described as follows.

(a) Define

In this phase, the idea of brainstorming was done. Then, the research of the selected topic was done after the domain is decided. This main objective for this phase is to search for ideas for raising awareness for target users.

(b) Planning

In this phase, analysis was done to identify the need to develop the VR application for the project requirement and to determine the objectives and problem statement for the project. The hardware and software requirements are also stated in this phase.

(c) Implementation

All the VR software that needs to be used in the project such as Unity and Blender is installed in the phase. The required hardware like VR box is also prepared in this stage too.

(d) Construction

The 3D models are created in this stage by using the Blender software that had been installed. To make the 3D models more visualised, it uses the Unity to combine with the VR technique. Then, technical testing will be done in this stage to ensure that there are no bugs before handover presentation and demonstration.

(e) Evaluate

The evaluation by the target user will take place in this stage. The user's feedback will be collected to improve the application. Last, documentation for the entire development project also will be prepared in this stage.

2.5 Project Requirement

2.5.1 Software Requirements

Unity and blender are the main required software to be used in order to develop this project.

(a) Unity 2020

A cross-platform game engine or ultimate game development platform which can develop three-dimensional, two-dimensional, virtual reality and augmented reality games as well as simulations for computer, consoles and mobile devices. It is free to use.

(b) Blender

A platform to create 3D models.

2.5.2 Hardware Requirement

(a) Mobile phone devices

The mobile device that needs to have a minimum of 2GB ram and CPU speed of minimum 1.4 GHz. For more visual impact, it is recommended to have 1080p resolution display or higher. Mobile also needs to support Android 7.0 or IOS 8.0 or higher in order to run most of the VR games available within the Play Store and App Store.

(b) VR box

This VR device provides virtual reality for the user. The goal of the VR headset is to provide an immersive virtual reality experience.

(c) PC or laptop requirement

At least have Intel i5-4590 / AMD FX 8350 equivalent or greater as the processor, 4GB RAM of memory and NVIDIA GeForce GTX1050 or equivalent, Windows 7, screen resolution 1280x800 and 3.1GB of storage space in HDD.

2.5.3 Software Requirements for Documentation

(a) Microsoft Word 2016

Microsoft Word 2016 is a word processing application that allows you to create a variety of documents.

(b) Microsoft PowerPoint 2016

Microsoft PowerPoint 2016 is a presentation program that allows you to create dynamic slide presentations. These presentations can include animation, narration, images, videos, and much more.

2.6 Conclusion

In conclusion, the virtual reality definition and concepts are introduced in this chapter. Besides, COVID-19 Pandemic also explained briefly. The application of VR in game based learning is also discussed. The existing system for game based learning is listed and is compared in this chapter. The methodology used and the requirement of the project is stated clearly. The analysis of the project will be made in the next chapter.

Chapter 3: ANALYSIS

3.1 Introduction

This chapter will be focusing on the analysis of data in detail of the project to have a better understanding of the project purpose and be able to be comprehensive to the current scenario. Hence, current scenario analysis and requirement analysis are conducted in the approach of identifying and understanding the needs of the target users. The information collected is based on the questionnaires survey using Google form to identify the users demands. The software requirement and hardware requirement for this project will also be listed down as an assistance for the development phase.

3.2 Current Scenario Analysis

Based on the literature review in Chapter 2, many articles, researches and projects have proven the capabilities of VR in education. However, usage of VR as a way to raise public awareness on certain issues is still a new norm. This project is developed with the reference of the "Titan of Space" which is introduced in the Chapter 2. The objective of "Titan of Space" is to allow users to explore, identify and understand the unknown of the space which is similar to the project purpose through interaction with virtual environment. Instead of using traditional classroom learning methods, Titan of Space implements VR in learning to make it interesting and eye-catching for the target users.

Current Situation of COVID-19 Pandemic can be mainly classified into 3 categories which are Movement Control Order (MCO), Conditional Movement Control Order (CMCO) and Recovery Movement Control Order (RMCO) which is different from one and another. The application design will be focusing on MCO

Standard Operating Procedure in Restaurant. With application of Virtual Reality in game-based learning aiding the spread of information and raising self-awareness in public.

3.3 Requirement Analysis

Requirement analysis is a process of defining the expectations of the users for an application that is to be built or modified. In order to create an user friendly application, requirement analysis is needed to analyze documents, validate and manage software or system requirements which include the hardware requirement and software requirement.

3.3.1 Project Requirement

The application made in this project will be in the puzzle game genre which emphasizes problem solving. The types of puzzles can test many problem-solving skills including logic thinking, pattern recognition, sequence solving and also word completion. This project will be focusing on logical thinking and also pattern recognition where users are first given briefed instruction or rules and regulation which is the standard operating procedure of Movement Control Order (MCO). After briefing and simple control guiding, levels will be given to the user to be chosen for in which consist of different MCO standard operating procedures that need to follow and the user need to figure which NPC is disobeying in order to pass the level with limited time given. Higher the level, higher the difficulties for the user to pass with a perfect score as more SOP needs to follow.

The project main scene will be set in a restaurant and the user will act as a worker in the restaurant. Different levels will be in different parts of the restaurant. Level 1 users will be focus on the mask wear, level 2 will add on others SOPs like scan application “MySejahterah”, distance while level 3 will more difficult than level 1 and 2.

3.3.1.1 Requirement Gathering

(a) Questionnaire

Questionnaire is a set of printed or written questions with a choice of answer, devised for the purposes of a survey or statistical study. Due to COVID-19 Pandemic, questionnaire surveys take place through virtual with the use of Google Form and the aid of social media.

The questionnaire is to determine the understanding of the COVID-19 Pandemic standard operating procedure and understanding of game based learning and also virtual reality. There are a total 10 questions to be answered which consist of 5 questions related to COVID-19 Pandemic SOPs and the rest is related to VR game-based learning.

With a total of 30 candidates took part in the questionnaire survey with 13 of the respondent (43.3%) is male while another 17 respondent (56.7%). The male respondent is slightly more than the female respondent.

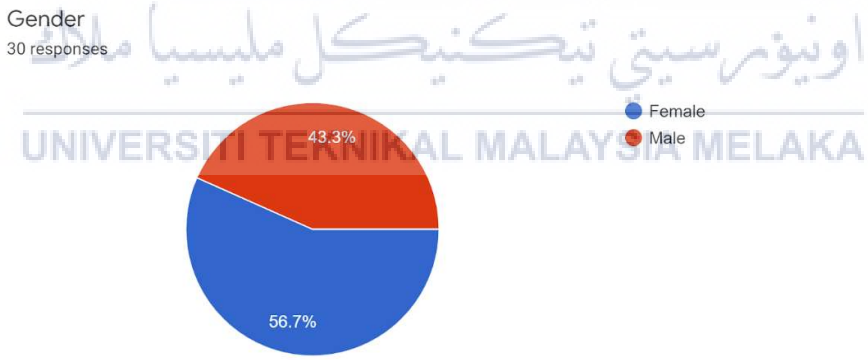


Figure 3.1 Gender of Respondents

Through the survey, almost all respondents with a total of 28 out of 30 (83.3%) know what is COVID-19 standard operating procedure (SOPs) while 2 of the respondents (6.7%) have doubt on their understanding about COVID-19 SOPs.

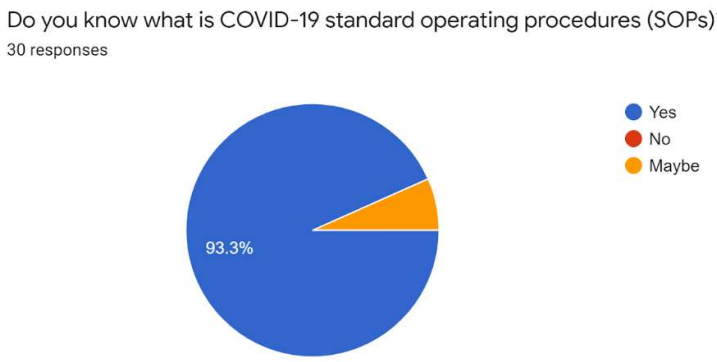


Figure 3.2 Understanding of Respondents towards SOPs

All respondents know the reason behind of following the COVID-19 SOPs during this pandemic period.

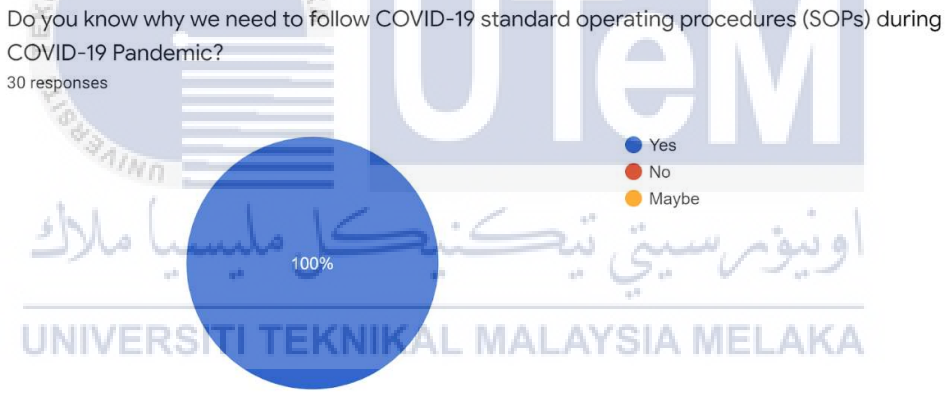


Figure 3.3 Understanding of Respondents towards Reason behind Following SOPs

However, the majority (43.3%) of the respondents stated that the reason which led them not to follow COVID-19 SOPs is because it is not well stated and they are not clear about the current COVID-19 SOPs. 10 out of 30 respondents stated they forget to follow the SOPs from time to time while 3 respondents felt that the SOPs is troublesome and not willing to follow it. Only 4 respondents (13.3%) stated they have no reason for not following the COVID-19 SOPs.

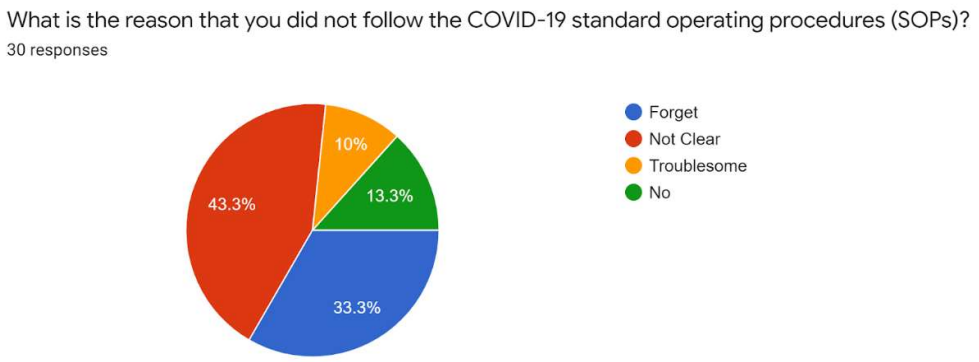


Figure 3.4 Respondent's Reason of Not Following COVID-19 SOPs

In the questionnaire, respondents are requested to select the COVID-19 SOPs which they follow, acknowledge and understand in different criteria which include General SOPs, Clothing Industry, Restaurant, Laundry Shop, Car Wash Shop and also Gas Station.

All respondents understand and follow the General SOPs which are applicable in shops, markets or malls. With the 23 respondents (76.7%) aware of all premises are allowed to operate from 6 a.m. to 10 p.m. and also understood that they must follow the correct pathway of entrance and exit. 22 respondents (73.3%) understood that they must follow the premise capacity which is based on the premise area to prevent overcrowding. 28 out of 30 of the respondents is well aware of the purpose of scanning QR code using application "MySejahtera" as a record of where they have been to. However, the compulsory of wearing face masks only 27 respondents (90%) follow even though the Malaysia Government try their best to emphasize the reason for wearing face masks. 25 of the respondents (83.3%) follow the social distancing SOPs which is one meter apart.

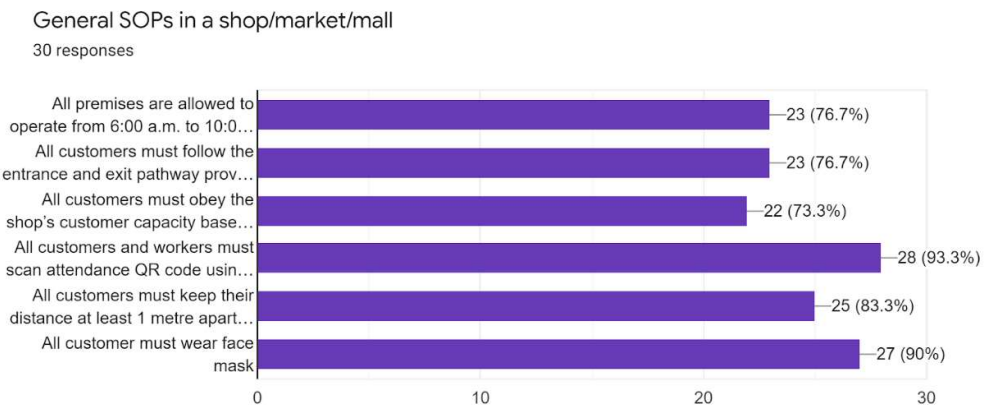


Figure 3.5 General SOPs in shop/market/mall

In the clothing industry or premise, Other than the general SOPs, The premises must provide gloves for customers for them to wear as to prevent the spread of the COVID-19 virus through physical contact. Only half of the respondents are well aware of such SOPs where they must wear gloves provided by the premise when selecting clothes.

Figure 3.6 SOPs in Clothing Industry

In the catering industry which includes restaurants, cafes, cafeterias and hawker centers, It is surprising that only 13 of the respondents (43.3%) are aware of the SOPs in restaurants they need to follow other than the general SOPs. Only 3 out of the 12 respondents (23.1%) understand and follow the SOPs which only allow 2 people to dine with a distance of 2 meter apart and limited dining time. 12 out of 13

respondents (92.3%) were aware of the recommendation of the Pre-order or reservation for dine-in or take away stated in the SOPs of COVID-19.

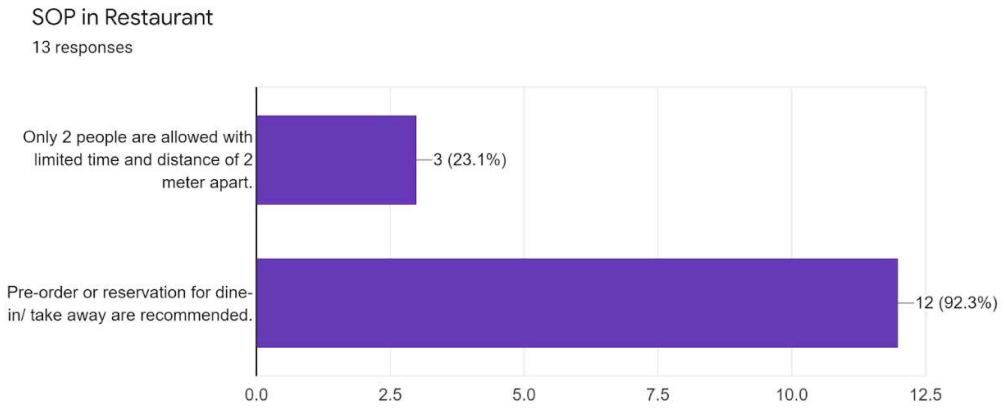


Figure 3.7 SOPs in Catering Industry

Next, at total of 17 respondents (56.7%) understand the COVID-19 SOPs in laundry shop where all the device must be clean and sanitized 3 times per day during operating hours and also once after operating hours.

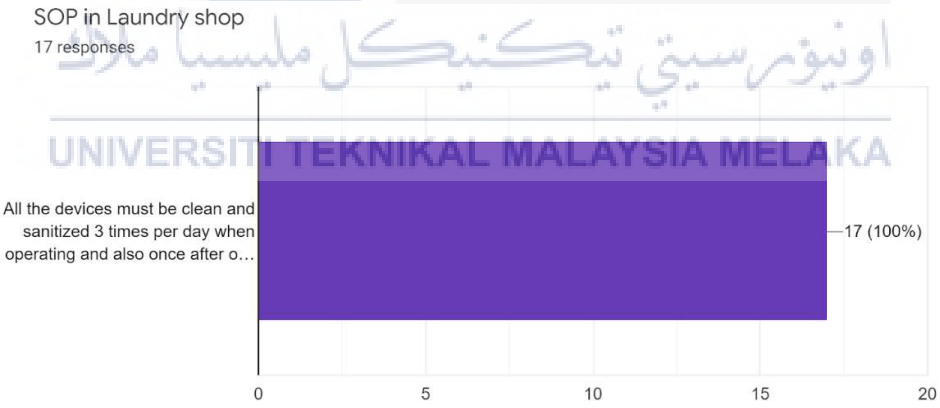


Figure 3.8 SOPs in Laundry Shop

In the car wash shop, a total of 18 respondents (60%) are aware of the COVID-19 SOPs which they need to follow other than the general SOPs which include All customer must remain seated inside the car excluding followed by 17 out of 30 of the

respondents (56.7%) and only 3 car allowed in the car wash shop per time followed by 11 respondents (36.7%).

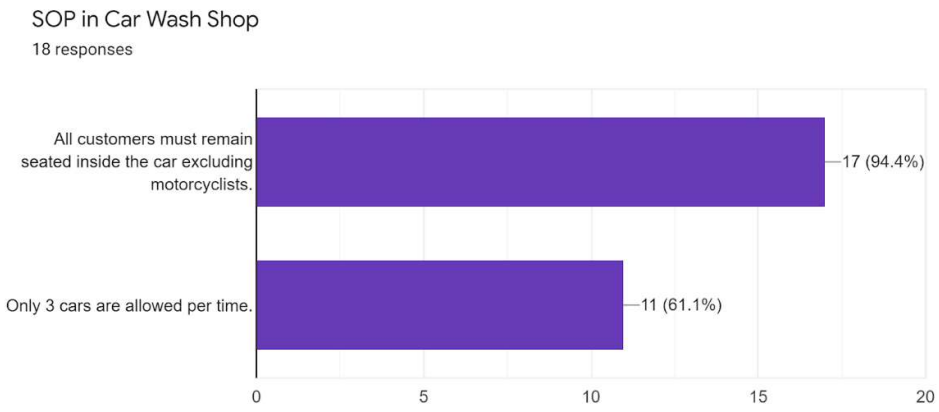


Figure 3.9 SOPs in Car Wash Shop

With the most respondents a total of 28 out of 30 responded towards SOPs in Gas Station. 19 of 28 respondents follow the car capacity limitation of the gas station and follow the instruction given by the gas station employees. For the exclusion of scanning the QR code through MySejahtera part, third-fifth of the respondents are well aware that it can be excluded when using Debit/Credit card or online payment whereas 14 respondents (46.7%) understand that it can also be excluded when using payment through the car window to the employee. SOPs which recommend and promote the public to use cashless payments are only appreciated by 19 out of 30 respondents (63.3%). For facilities other than refilling, only half of the respondents know that filling car/motorcycle tires is excluded from scanning QR code and 14 out of 30 respondents (46.7%) aware of using fully automatic car washing facilities are also excluded from scanning the QR code.

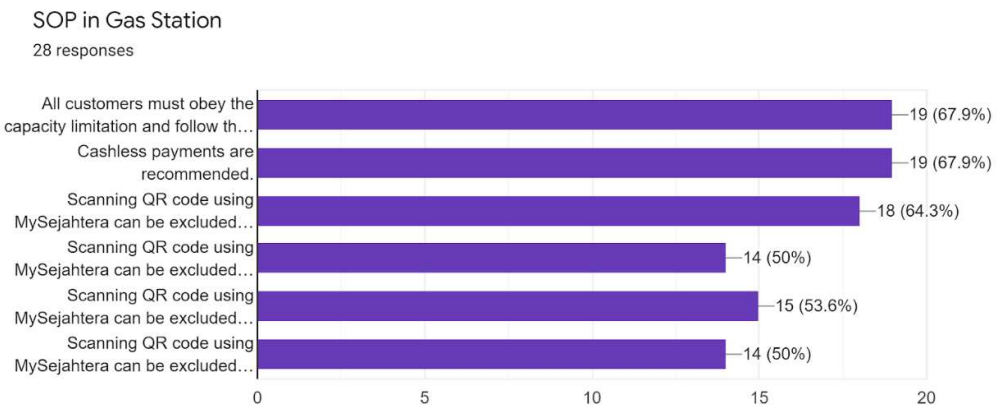


Figure 3.10 SOPs in Gas Station

In the third part of the survey which is mainly on the understanding toward virtual reality and game based-learning. All of the respondents are well aware of what virtual reality (VR) games stand for.

Figure 3.11 Understanding of VR game

However, only 19 out of 30 of the respondents (63.3%) have an actual exposure to virtual reality games and the rest of 11 respondents (36.7%) have never experienced a virtual reality game which led to a doubt on their understanding towards virtual reality games.

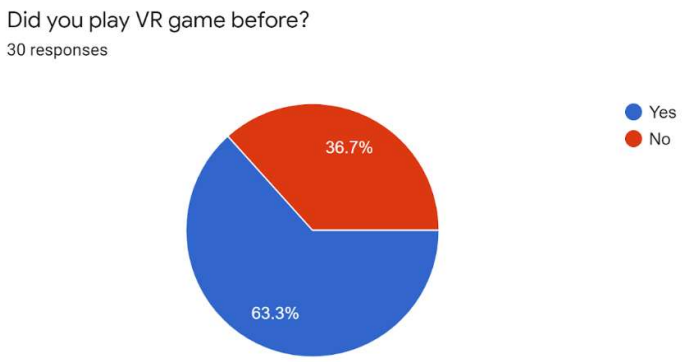


Figure 3.12 Exposure to Virtual Reality

In the survey, we also collected data from the respondent on what type of game genre which they have played before as a game-based learning. The majority (86.7%) stated that Puzzle game genre is the most preferable game-based learning method. Game genres such as sports, role-playing, adventure, action are the second favourable with 9 responses (30%) by the respondents in terms of game-based learning followed by Strategy games (5 responses, 16.7%), Simulation games (4 responses, 13.3%), Action-Adventure games (3 responses, 10%) and Idle games (1 response, 3.3%).

Figure 3.13 Favourable Game-based Learning Experience

Through surveys, we are able to make hypothesis that public have high expectation for appliance VR game in the spreading the information of COVID-19 SOPs as 25 out of 30 of the respondents (83.3%) agree that it will be a fun way to learn COVID-19 SOPs through VR game instead of words while 3 respondents (10%)

have doubt on the capabilities of the usage VR game as a method to spread information of COVID-19 SOPs. 2 respondents (6.7%) denied that using VR game in learning COVID-19 SOPS is fun than black and white.

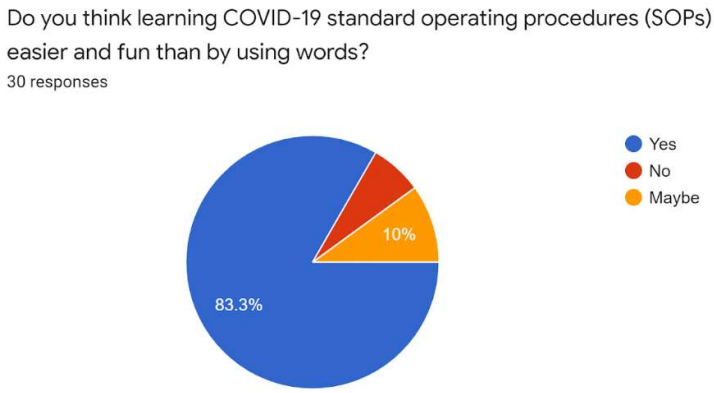


Figure 3.14 Expectation of appliance of VR in learning COVID-19 SOPs

With a hypothetical question, asking respondents whether they will give a try if there is a Virtual Reality (VR) game with the purpose of learning COVID-19 SOPs. Surprisingly, Majority of the respondents (25 responses, 83.3%) will give it a try and 5 of the respondents (16.7%) not sure if they should give it a try or not.

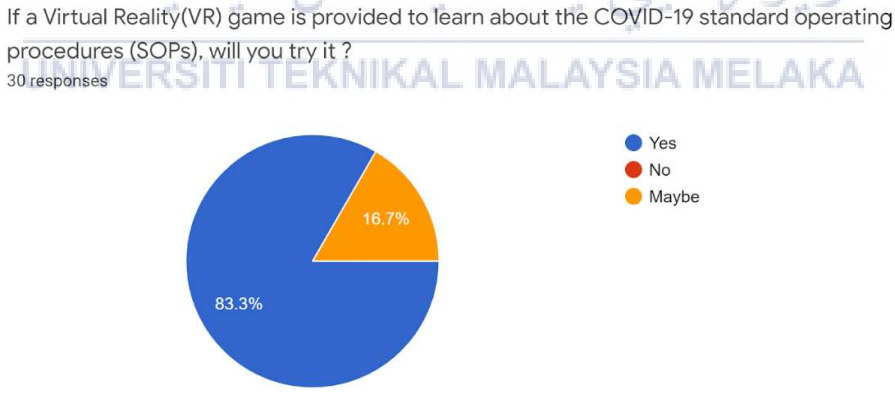


Figure 3.15 Response towards COVID-19 SOPs VR game

Through the questionnaire survey and based on the data collected, assuming the respondents represent the citizens of Malaysia unbiasedly. We can conclude that the public have the least understanding towards the SOPs in restaurants compared to

other sectors. Based on the data, it shows that the public is willingly to try out new methods in the spread of public awareness towards COVID-19 SOPs which apply VR game-based learning. Hence, based on the statistic of the survey, it strengthen the purpose of the project which is to develop a VR application for learning COVID-19 SOPs purpose and will be focused more towards to catering industry.

3.3.2 Software Requirement

Unity will be used to develop the game. Also, Blender will be used to model the character. Adobe Audition will be used to design the audio and the sound effect.

3.3.3 Hardware Requirement

For the hardware, a computer will be used to develop the game. Also, a mobile device with VR Box will be used to test the game.

3.4 Project Schedule and Milestone

Table 3.1 Milestone

Activity	Start Date	End Date
PSM 1	**15/3/2021**	**25/6/2021**
1. Initiating	**4/3/2021**	**5/3/2021**
• First meeting with supervisor and discuss the title of project	4/3/2021	4/3/2021
• Confirmation of title with supervisor	5/3/2021	5/3/2021
2. Planning	**6/3/2021**	**28/3/2021**
• Analysis and determine the problem statement of the project	6/3/2021	7/3/2021
• Produce the proposal	8/3/2021	13/3/2021
• Submission of proposal	13/3/2021	13/3/2021
• Improvement and correction of proposal	24/3/2021	28/3/2021
• Submission of final proposal	28/3/2021	28/3/2021
3. Implementation	**2/4/2021**	**28/5/2021**

• Draft Chapter 1 and Chapter 2	2/4/2021	5/4/2021
• Correction of Chapter 1 and Chapter 2	5/4/2021	8/4/2021
• Submission of Chapter 1 and Chapter 2	9/4/2021	9/4/2021
• Draft Chapter 3	23/4/2021	30/4/2021
• Discussion with supervisor the implementation of project	30/4/2021	7/5/2021
• Draft Chapter 4	7/5/2021	14/5/2021
• Improvement of Chapter 3	14/5/2021	21/5/2021
• Submission of Chapter 4	21/5/2021	21/5/2021
• Draft Chapter 5	21/5/2021	28/5/2021
• Submission Chapter 5	28/5/2021	28/5/2021
4. Testing	**1/6/2021**	**25/6/2021**
• Project demo 50%	1/6/2021	11/6/2021
• Project demo 70%	12/6/2021	18/6/2021
• PSM showcase	25/6/2021	25/6/2021

3.5 Conclusion

As a conclusion, this chapter mentioned about the analysis of the current system and the requirements for this project including software, hardware, project and other requirements. The technique of questionnaire helps to collect data and provide the data analysis in order to complete the project.

Chapter 4: DESIGN

4.1 Introduction

This chapter will be focusing on the preliminary design of the project which is defined as the part of the development phase where all of the geometric design elements, including a preliminary estimate of the preferred design solution are documented for input to the detailed design stage. This chapter will be further discussed in detail such as the architecture of the system, the preliminary design of the project and the user interface design.

4.2 System Architecture

System architecture is abstract, conceptualization-oriented, global, and focused to achieve the mission and life cycle concepts of the system. System architecture also focuses on high-level structure in systems and system elements. The purpose of system architecture activities is to define a comprehensive solution based on principle, concept and properties logically related to and consistent with each other. (Alan Faisandier, 2012)

4.2.1 Front End

For the production of the VR application, an asset, GoogleVR, is imported in this project. GoogleVR is an SDK that provides data of the user to the system.

Figure 4.1 GoogleVR Setting

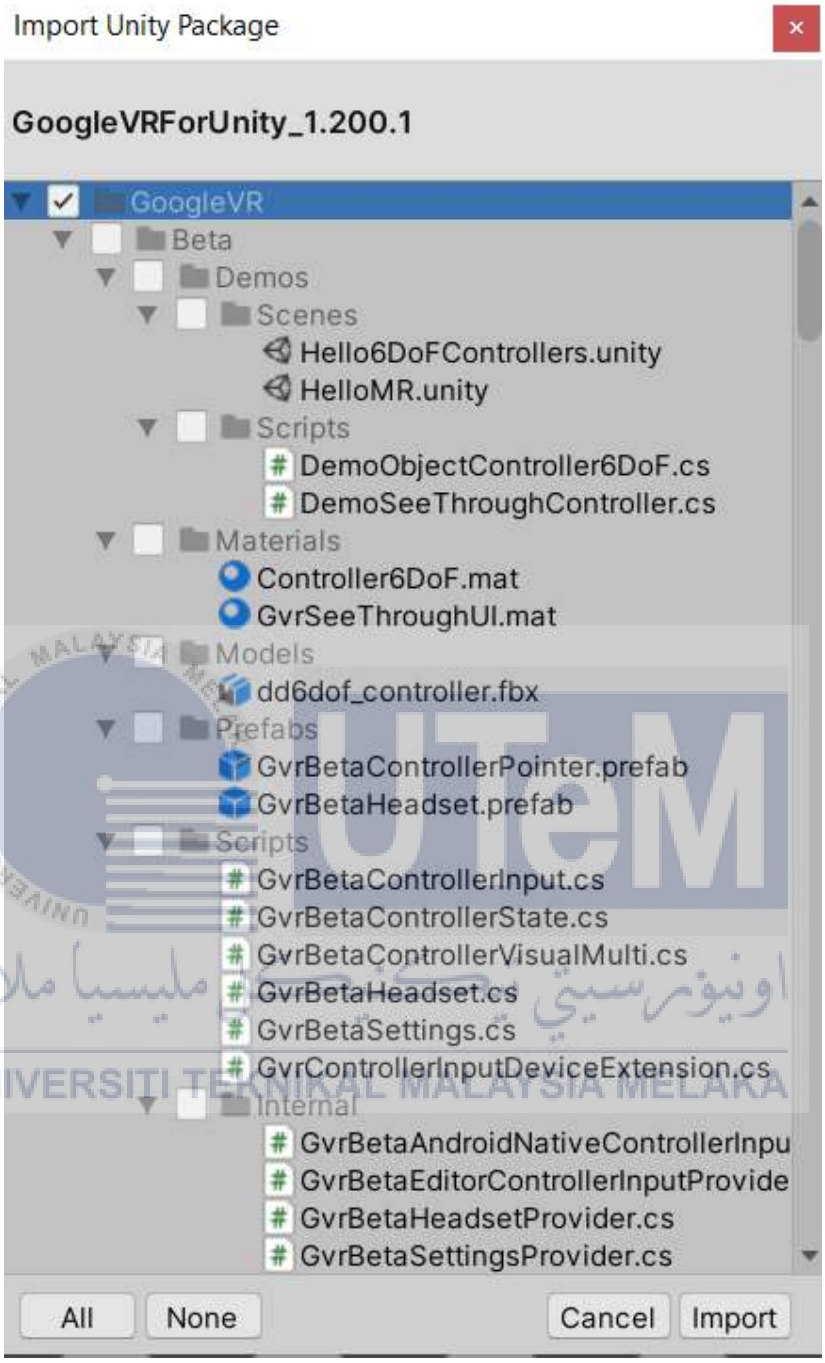


Figure 4.2 GoogleVR Package

4.2.2 **Back End**

The Unity setting which is set to an android version in which this application can be run by using an android phone.

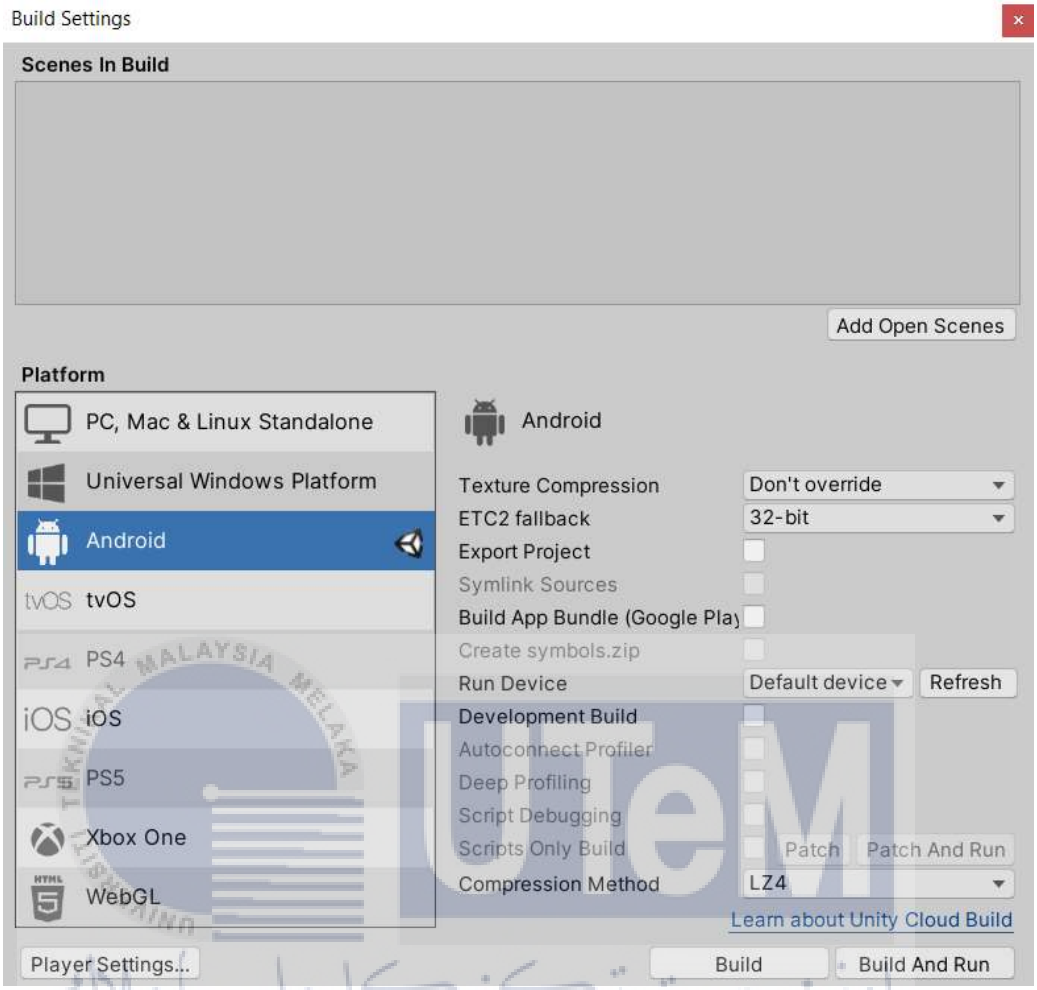


Figure 4.3 Unity Setting

4.2.3 Flow of the project

After the game is installed, upon starting the game user will first interact with the tutorial to learn how to move and how to interact with the Non-Player Character (NPC). Afterwards, the player is able to choose the level they desire to play with. The player will be placed in the designed environment as the game begins. The player is required to interact with the NPC which did not obey the SOPs in order to get scores. Failing to do so will result in mark deduction. After finishing the game, players are able to choose the next level to challenge. At the end where the player finished all the levels, the SOPs will be displayed again as what they have learned during the process.

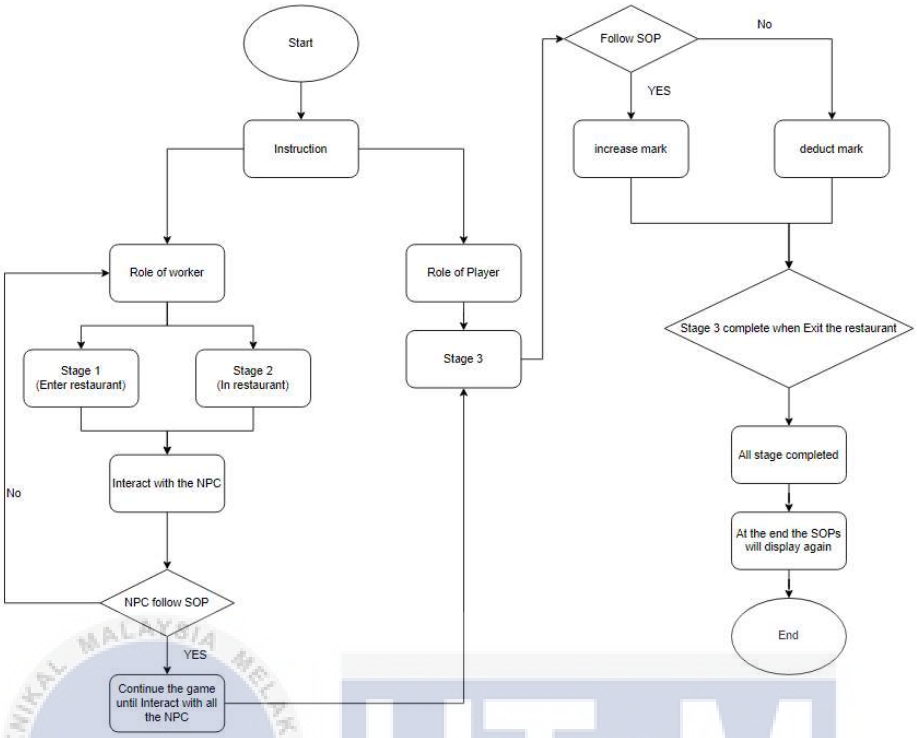


Figure 4.4 Flowchart of the project

4.3 Preliminary Design

4.3.1 Interactive Storyboard

According to the Oxford English Dictionary, storyboard can be described as a sequence of drawings, typically with some directions and dialogue, representing the shots planned for a film or television production or animation. Storyboard is used to pre-visualise the flow of the application in a proper sequence using simple sketching and some simple dialogue and label.

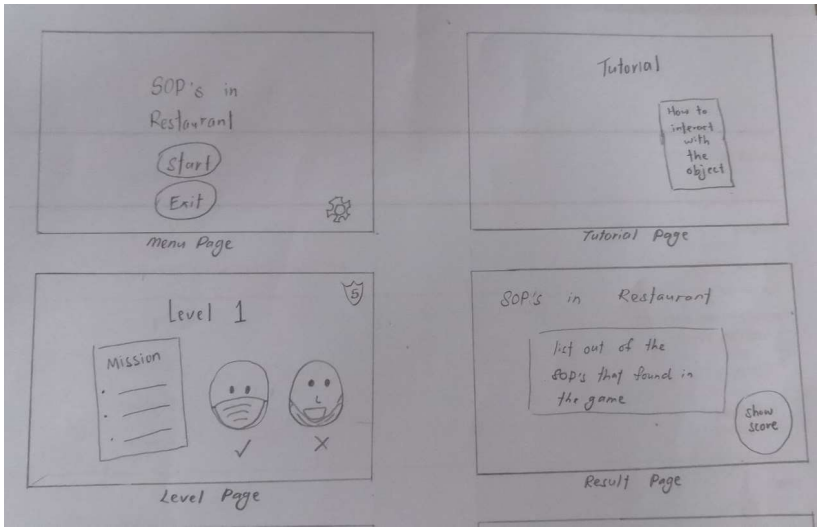


Figure 4.5 Storyboard

4.4 User Interface Design

4.4.1 Logo Design

The logo design consists of tableware which will make users to have an idea of the game theme which is related to the catering industry. The logo also consists of two keywords which are “Restaurant” and also “SOP”. Restaurant is to strengthen the expression of the game theme to the user, to let them understand what is the game that they are going to play with. Meanwhile for the SOP is the short form of the standard operating procedure which is the main objective of this project. User will have a concept of what is going to be played in the game which is related to the restaurant and its standard operating procedure.

Figure 4.6 Logo Design

4.4.2 **Three Dimensional Model Design**

3D modelling is the process of creating a 3D representation of any surface or object by manipulating polygons, edges and vertices in simulated 3D space (Justin Slick, 2020). The 3D model is used to visualise the object inside the restaurant. 3D modelling is also used to design the Non-Player Character (NPC).

Figure 4.7 Restaurant 3D Model

Figure 4.8 NPC 3D Model with Mask

Figure 4.9: NPC 3D Model

4.5 Conclusion

The chapter covered the system architecture, the preliminary design and also the user interface design of the project. All this design mentioned above is to aid and will be used in the further development of the application in the implementation and development phase.

Chapter 5: IMPLEMENTATION

5.1 Introduction

This chapter is going to discuss the activity that carries on in the implementation phase. The expected output after completing the implementation phase also will be included in this chapter. The list of activities that need to be completed in implementation phase are media creation, media integration, and product configuration management and implementation status.

5.2 Media Creation

5.2.1 Production of Text

The button text, hint text and the timer used in this project will be Liberation Sans. With the black background for the button, the text will be in white color. The font size of the text will be 0.3 for every button. The font size of the hint text is 0.2 in red color while the text for timer is 3 in white color.

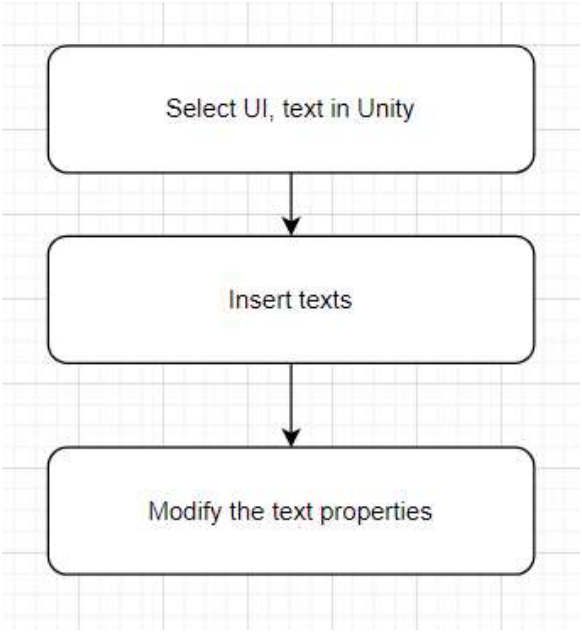


Figure 5.1 Production Flow of Text

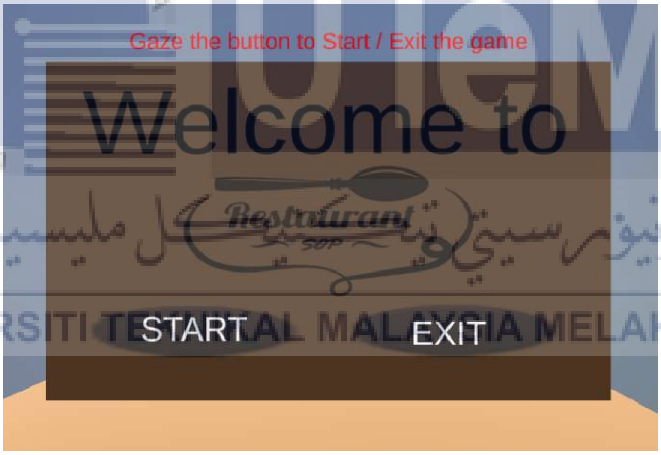


Figure 5.2 Use of Liberation Sans Font in Title, Button and Hint

Figure 5.3 Use of Liberation Sans Font in Timer

The text used in the explanation of each stage of game will be Arial. It is in black color match with the light brown background. The font size for every explanation will be 1.

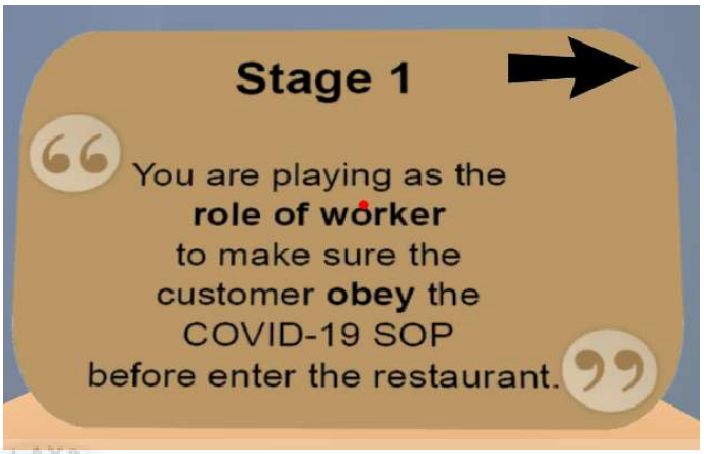


Figure 5.4 Use of Arial Font in Explanation

5.2.2 Production of Image

The assets used is designed by using Adobe Illustrator. The image used in this project are 2D vector images. The rules of COVID-19 SOPs is shown by the format of image to let the player easy to understand what they need to do in the game.

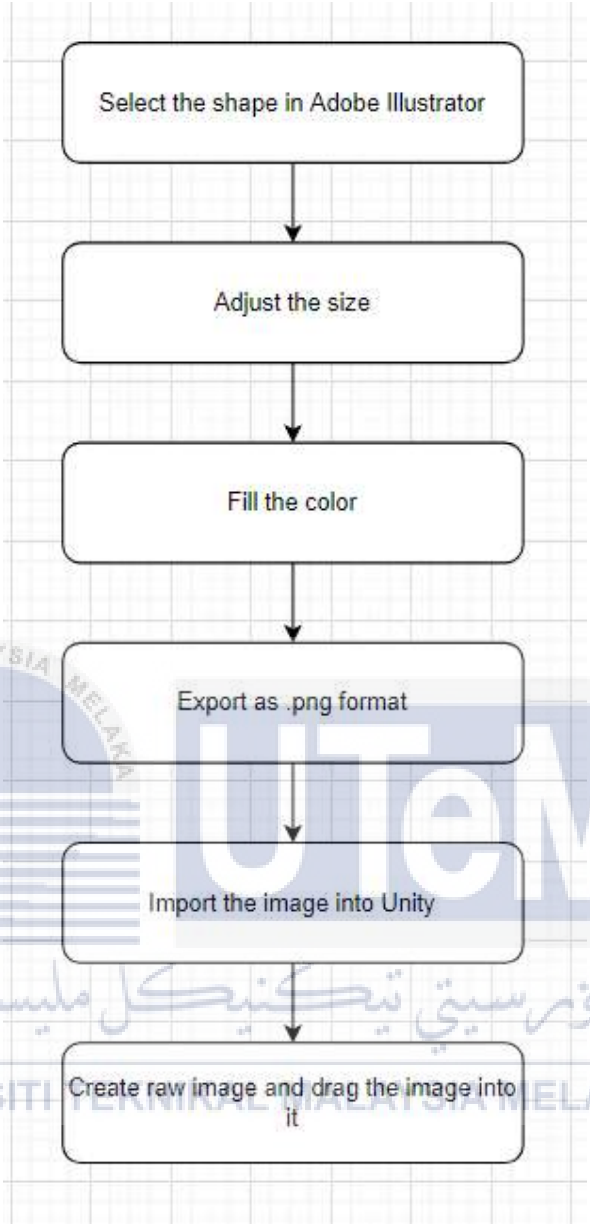


Figure 5.5 Production Flow of Image

Figure 5.6 Image of Instruction in Stage 1

5.2.3 Production of 3D Model

The 3D model used is designed by using Blender. For the characters, a base design is created with low poly model. Then, the accessory that used by the character are the same which are mask and phone.

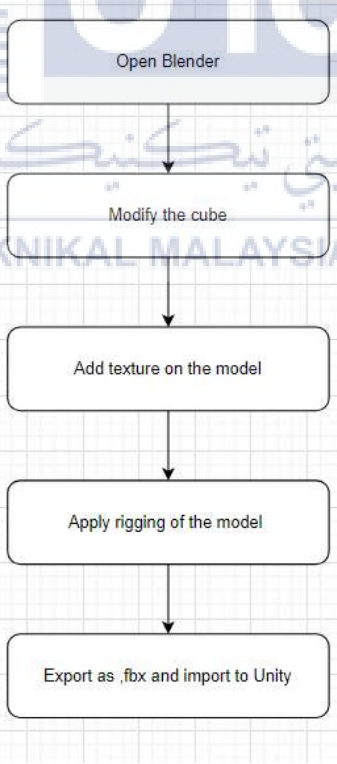


Figure 5.7 Production Flow of Model

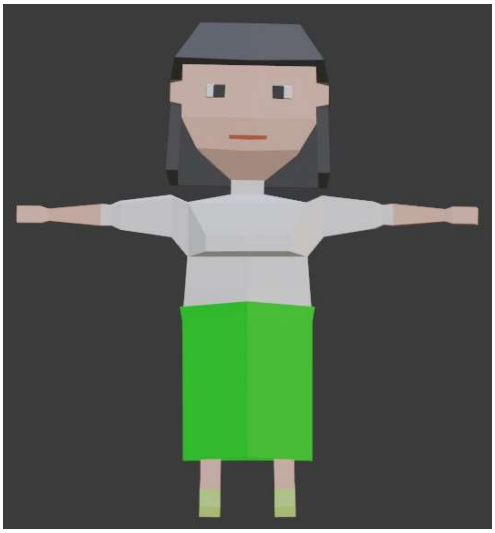


Figure 5.8 Character Model

Figure 5.9 Mask Model

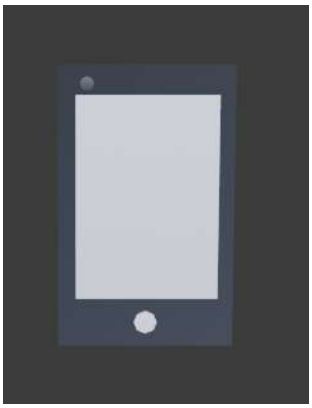


Figure 5.10 Phone Model

5.2.4 **Production of Animation**

There are some simple animations in this project. The animations can be found in every character when enter the restaurant. The animations are done with simple key frames like walk, sit, scan MySejahtera, and serve food.

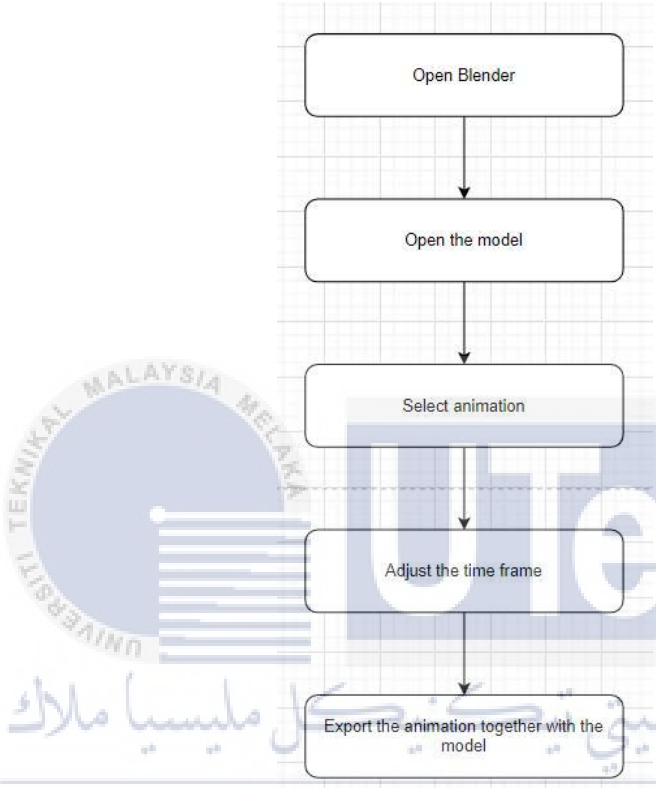


Figure 5.11 Production Flow of Animation

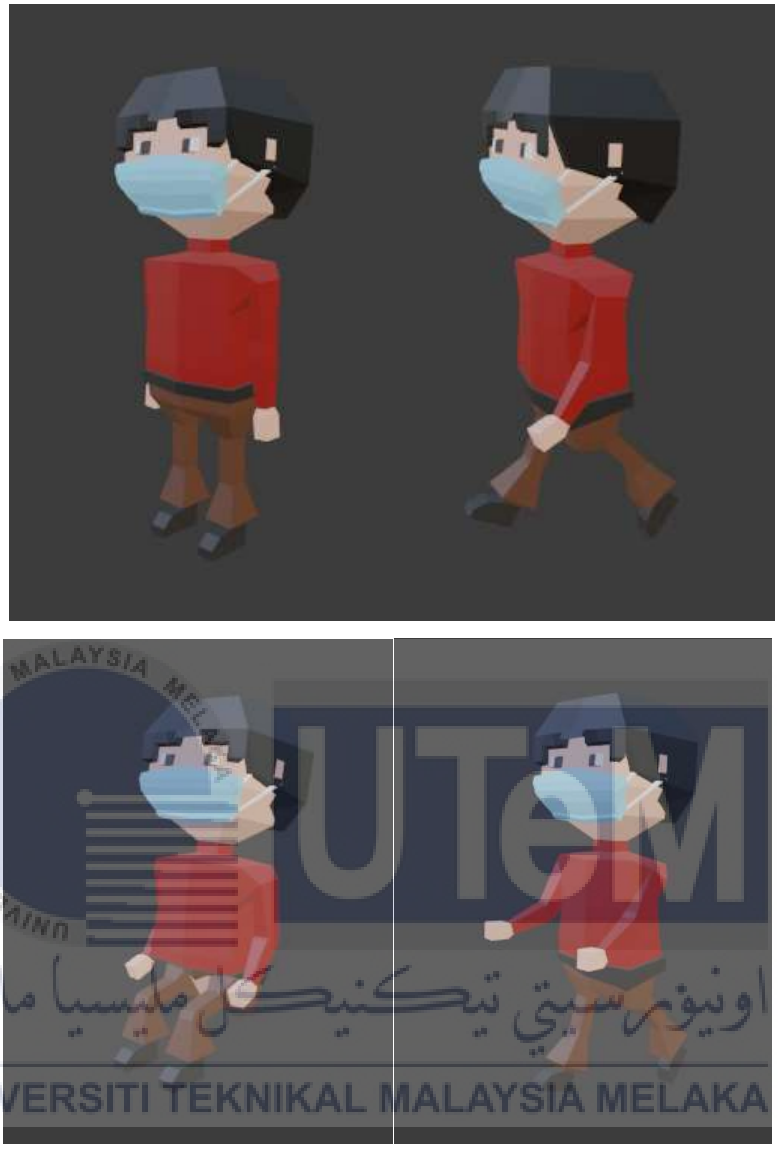


Figure 5.12 Design of Key Frame

5.2.5 **Production of Sound**

The audios used in the project can be found in YouTube Library. All of the audios found in this library are free to use.

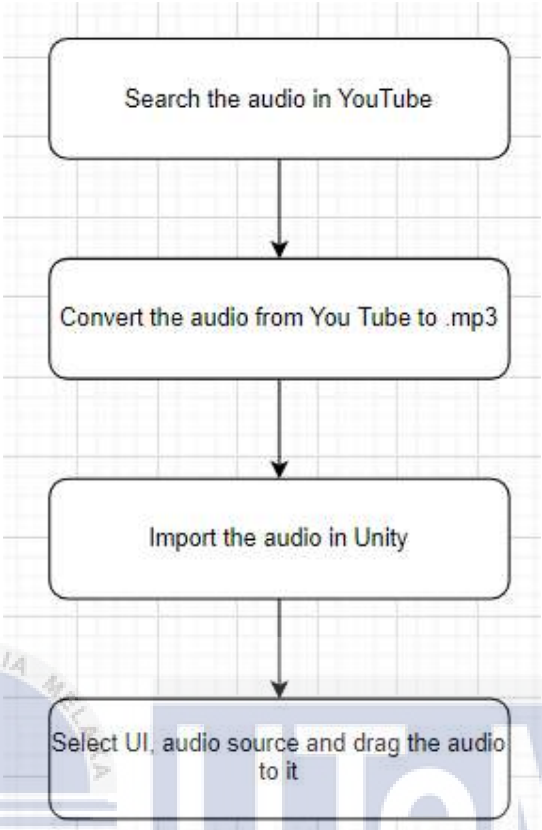


Figure 5.13 Production Flow of Audio

Figure 5.14 Sound Used in Unity

5.3 Media Integration

The media stated in the above is integrated in Unity. The Unity version used in this project is 2019.4.24f1 and it is free to use for personal usage. Also GoogleVR SDK can be found and installed into the Unity project.

The integration is firstly done by creating a project from Unity. Then, some scenes are created based on the requirement needed. The assets are placed into the scenes accordingly. There is a window in Unity called as “Hierarchy” to show the objects used in this scene.

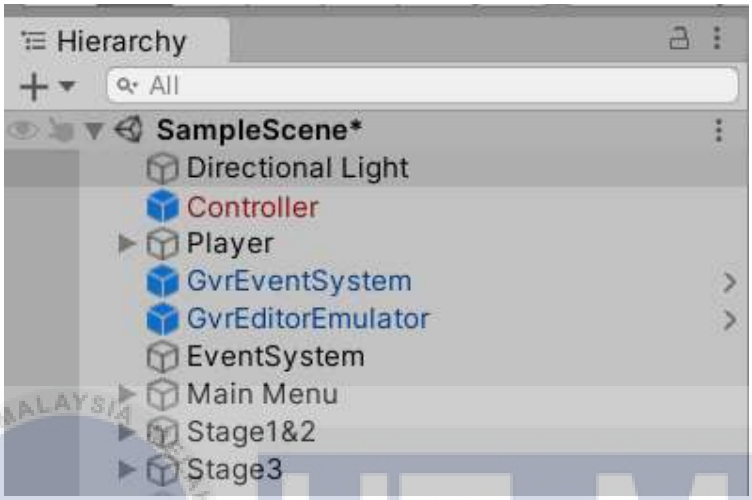


Figure 5.15 Hierarchy Window in Unity

The animation are created using the animation editor in the application. The keyframe is placed into the editor and the timing is adjusted so that the animation looks better. The sample rate can be adjusted to set the speed of the animation.

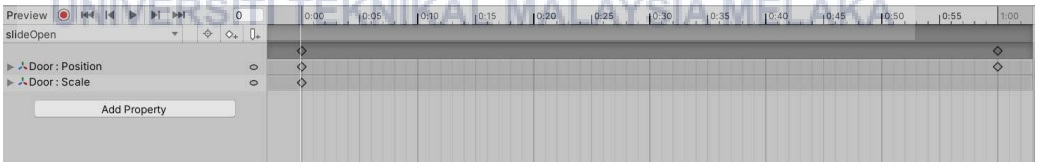


Figure 5.16 Animation Window

Some scripts is used in order to manage the images sequence and the timing to play or show. The language of the scripts used in this project is C#. Also, the behavior of the game object can be stated by using scripts. The elements of the script in a game object such as the attribute and the method can be seen and can be altered in “Inspector” window.

Figure 5.17 Inspector Window of a Game Object

5.4 Product Configuration Management

The configuration of the product is done in Unity. Since the product is targeted for Android mobile device, the product is adjusted for this direction. First of all, Android SDK and JDK are downloaded and installed in Unity at the Unity Hub. Then, the platform of the product is set to “Android” in Build Setting.

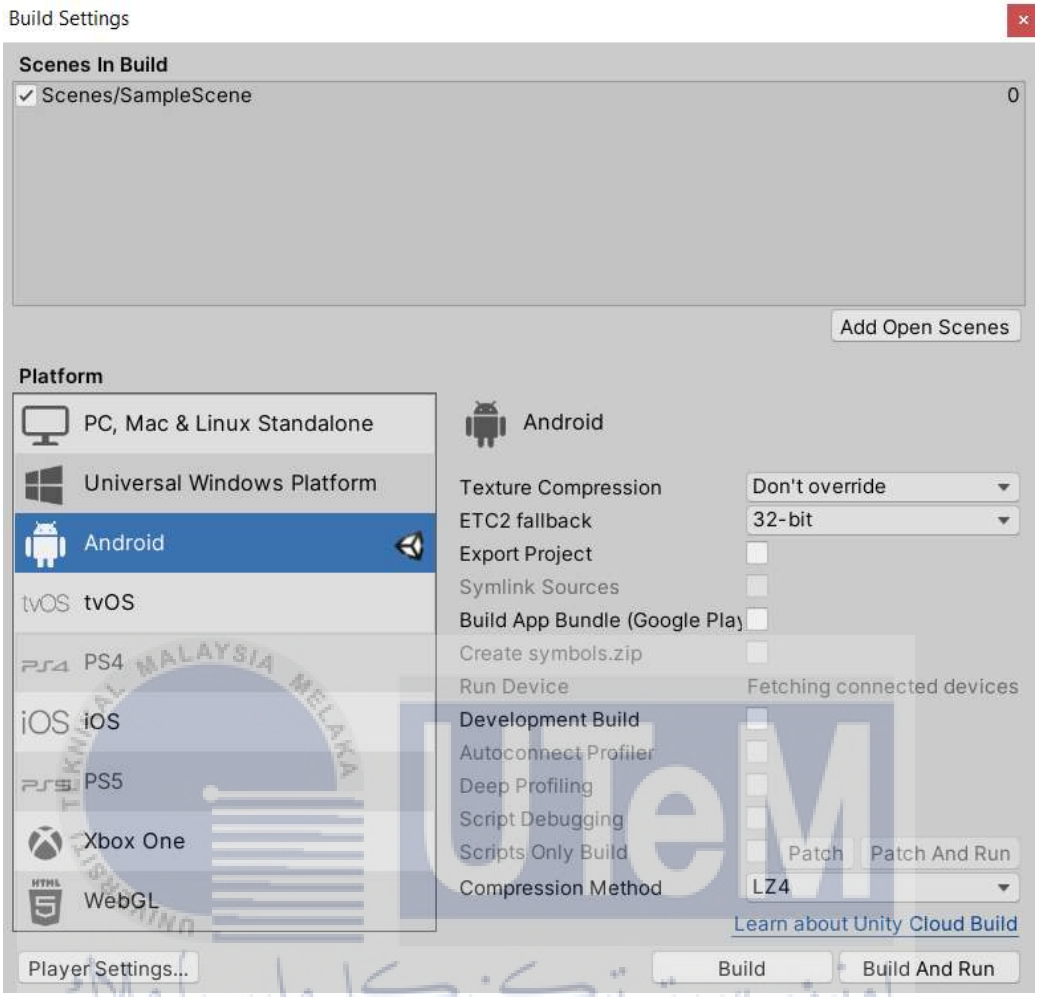


Figure 5.18 Build Setting

Since the resolution of each of the Android devices is different, the User Interface setting must also be done. In this product, the reference resolution will be 16*9 landscape.

Figure 5.19 Interface Setting

5.5 Implementation Status

The implementation status lists out the development progress of the project from the beginning of the project until the final output. The progress status is able to help the developer to keep track of the working progress according to the planning.

Table 5.1 Implementation Status of the Project

Task	Start Date	End Date	Completed Date	Status
Phase 1: Project Assign	**1 Mar 21**	**6 Mar 21**		
Determine problem statement	1 Mar 21	2 Mar 21	2 Mar 21	On-time
Brainstorming ideas	2 Mar 21	4 Mar 21	4 Mar 21	On-time
Meeting with Supervisor	5 Mar 21	5 Mar 21	5 Mar 21	On-time
Determine the project title	5 Mar 21	6 Mar 21	6 Mar 21	On-time
Phase 2: Project Planning	**6 Mar 21**	**8 Mar 21**		
State the problem statement	6 Mar 21	6 Mar 21	6 Mar 21	On-time
Determine the objectives	6 Mar 21	6 Mar 21	6 Mar 21	On-time
Preparing the proposal	6 Mar 21	8 Mar 21	8 Mar 21	On-time
Discuss with supervisor	7 Mar 21	8 Mar 21	8 Mar 21	On-time
Proposal submission	8 Mar 21	8 Mar 21	8 Mar 21	On-time
Phase 3: Project Design	**9 Mar 21**	**22 Mar 21**		
Storyline and scripting	9 Mar 21	15 Mar 21	15 Mar 21	On-time
Storyboarding	15 Mar 21	18 Mar 21	18 Mar 21	On-time
Scenes and characters design	19 Mar 21	22 Mar 21	22 Mar 21	On-time
Phase 4: Project Implementation and Development	**23 Mar 21**	**31 May 21**		
Character and object modeling	23 Mar 21	13 Apr 21	13Apr 21	On-time
Rigging	2 Apr 21	6 Apr 21	5 Apr 21	In-time
Texturing	7 Apr 21	11 Apr 21	10 Apr 21	In-time
Animation	13 Apr 21	21 Apr 21	21 Apr 21	On-time
Setup VR environment	22 Apr 21	30 May 21	30 May 21	On-time
Discuss with supervisor	31 May 21	31 May 21	21 Jun 21	Delayed
Export final Product	31 May 21	31 May 21	21 Jun 21	Delayed
Phase 5: Project Testing and Maintaining	**1 Jun 21**	**24 Jun 21**		
Project testing	1 Jun 21	15 Jun 21	21 Jun 21	Delayed

Project improvement	15 Jun 21	23 Jun 21	21 Jun 21	Delayed
Presentation	24 Jun 21	24 Jun 21	24 Jun 21	On-time

5.6 Conclusion

In conclusion, this chapter discussed all activity took place in the implementation phase. Implementation phase took longer time compared with other phases due to it require many materials and sources that have been prepared before enter this phase. The next chapter will discuss the application testing.

Chapter 6: TESTING

6.1 Introduction

This chapter will discuss about the test plan and the test strategy which include the test user, test environment and test schedule. The test implementation will also be discussed in this chapter. Lastly, the test result analysis will also be conducted in the chapter.

6.2 Test Plan

6.2.1 Test User

The target test is define as the real people who have been granted a tester role on your application. The test user for the Restaurant SOPs application is targeted on teenager between the ages of 10 to 19 years old. A total of 30 target user will be selected randomly to carry out Pre-Post Test Quiz and User Acceptance Testing (UAT) based on the Restaurant SOPs application. The responsibility for the target test user is to test the effectiveness of the application based on their test result.

6.2.2 Test Environment

The test environment require the combination of material, software, and hardware to execute the tests for the Restaurant SOPs application. Due to the COVID-19 pandemic, the test will be conducted through online virtually. The questionnaires will be prepared by using the Google form, and will be distributed for target test user through online. Besides, the APK folder for the Restaurant SOPs application are also distributed to the tester. The hardware requirement for the testing process is an Android

smart phone with minimum version of Android 7.0 (Nougat) or higher versions. The target test user are required to answer the Pre-Test Quiz before experience the Restaurant SOPs application. Next, the tester are required to install and play the Restaurant SOP application before answering the Post-Test Quiz. The tester need to follow the test guideline to complete their test and are required to submit their feedback through the UAT based on their personal experience after using the application.

6.2.3 **Test Script and Design**

Test Script is a line-by-line description which contain the information about the system transactions that should be performed to validate the application or system under test. Test script should also list out each step that should be taken with the expected results. First, 30 respondents in the age from 10 years old to 19 years old are needed to test the application. The respondents need to answer the Pre-Test which will take about 10 minutes with their own knowledge and understanding towards COVID-19 restaurant standard operating procedure. Then, the .apk file is release to the respondents to download and experience it for about 20 minutes. After the respondents experience all the stage in the application, the Post-Test and the User Acceptance Test (UAT) are then release to the respondents to fill up and provide feedback. The test is complete when the respondents have submitted the Post-Test and UAT.

Figure 6.1 Test Design

6.2.4 **Test Schedule**

The test schedule managed the possible time table for the testing process to be carried out. Both of the test duration is controlled in a week.

Table 6.1 Test Schedule

Test	Date	Durations
Pre-Test Quiz	23th August 2021 -27th August 2021	5 days

Post-Test Quiz	23th August 2021 -27th August 2021	5 days
User Acceptance Test (UAT)	23th August 2021 -27th August 2021	5 days

6.3 Test Strategy

6.3.1 Pre-Post Test Quiz

Pre-Post Test Quiz is to test the effectiveness of VR in practicing the COVID-19 Restaurant Standard Operating Procedure (SOPs) among teenagers. Comparison between the effectiveness of understanding the COVID-19 Restaurant Standard Operating Procedure through the official website based on Pre-Test Quiz result and the effectiveness of VR in practicing the COVID-19 Restaurant Standard Operating Procedure through restaurant SOPs mobile application based on the Post-Test Quiz result. The result of the pre-post testing will be compare to determine which method is more effective. There are total or two sets of quizzes which is the Pre-Test Quiz and Post-Test Quiz to determine the efficiency of the Restaurant SOPs application. Both set of quizzes will be in same difficulty level but with different questions.

Both quizzes have 7 questions each. The questions are about the COVID-19 Restaurant Standard Operating Procedure (SOPs) such as wear mask, scan QR code using MySejahtera application and social distancing. Below are the two sets of quiz questions list for the respondents. Table 6.2 is the list of question for the pre-test quiz and Table 6.3 is the list of question for the post-test quiz.

Table 6.2 Pre-Test Quiz before Using the Application

Pre-Test Quiz		
No.	Question	Answer Option
1	Do you think wearing mask is a must before enter the restaurant?	a. Yes b. No

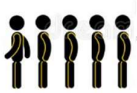
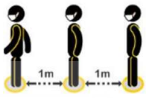
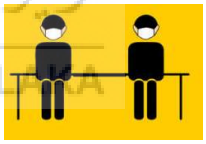
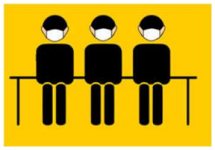
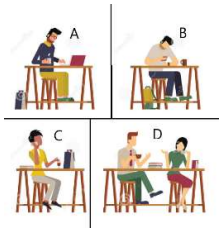
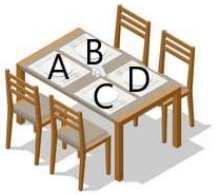
2	Do you know scanning QR code using MySejahtera application is a COVID-19 standard operating procedure?	a. Yes b. No
3	Scan QR code using MySejahtera application before entering the restaurant.	a. True b. False
4	Do you know that it is compulsory to take and record the body temperature before entering the restaurant?	a. Yes b. No
5	When queueing to enter the restaurant, which is correct?	a.  b. 
6	Which pictures follow the social distance COVID-19 SOPs? (multiple choice)	a.  b.  c.  d.  e.  f. 
7	It is necessary to wear back the mask before exit the restaurant?	a. Yes b. No

Table 6.3 The Post-Test Quiz after Using the Application

Post-Test Quiz		
No.	Question	Answer Option
1	Wearing mask is needed before entering the restaurant?	a. Yes b. No
2	When you need to scan the QR-code using MySejahterah application?	a. Before enter the restaurant b. After enter the restaurant c. No need to scan d. Before exit the restaurant
3	When you need to take and record the body temperature?	a. Before enter the restaurant b. After enter the restaurant c. Before exit the restaurant d. No need to scan
4	Which one did not follow the social distance? 	a. A b. B c. C d. D
5	It is necessary to wear back the mask after finished the food?	a. Yes b. No
6	What is the situation can take off the mask?	a. After Ordering b. After food is serve c. After drink is serve

		d. When there is no other customer in the restaurant
7	Which seats can be sit to follow the social distance?  	a. A b. B c. C d. D

6.3.2 **User Acceptance Test (UAT)**

User Acceptance Test (UAT) is a type of testing performed by the target test user to accept and provide feedback for the application before launching the production environment. The UAT will be conducted with the aim to test the Restaurant SOP application whether or not satisfies the acceptance requirements. The test is mainly focused on:

- Effectiveness
- Usability
- Ease of use
- Interface design
- Satisfaction
- Feedback

The Likert Scale is used for the test with the range from 1 to 4 which represent Strongly Disagree, Disagree, Agree and Strongly Agree accordingly.

Table 6.4 Acceptance Requirement Table for User

No.	Acceptance Requirements	Strongly Disagree - 1	Disagree - 2	Agree - 3	Strongly Agree - 4
Effectiveness					
1	The application which combined the restaurant SOPs with VR technology is more interesting then reading by word only.				
2	The application can provide more interactive with user than reading from the official website.				
3	The application can practice the restaurant SOPs in a safe way.				
Usability					
1	The application can let the user immerse in the environment to practice the restaurant SOPs.				
2	The application can check which restaurant				

	SOPs that the user fail to follow.				
3	The use of 3D model help to visualize the restaurant SOPs compare with word.				
Ease of use					
1	The application is easy to use.				
2	The operation of the application is easy to understand.				
3	The animation in the application is understandable.				
Interface design					
1	The interface design of the application is attractive.				
2	The fonts and colors used are readable and recognizable.				
3	The tutorial provided is understandable.				

Satisfaction					
1	Satisfaction towards overall performance of the application.				
2	Supportive toward the application if release to market.				
Feedback					
1	Any feedback/comment?				

6.4 Test Implementation

6.4.1 Test Description

For target test user, total of 30 respondents will be selected. They will undergo the Pre-Post Test based on the two sets of quiz with different questions but same difficulty level. First, the respondents are required to answer the Pre-Test Quiz which took 10 minutes through Google Form. Their score will be consider as the result for understanding COVID-19 restaurant SOPs before using the application. After that, the respondents need to download the .apk file of the Restaurant SOPs application and will be given 20 minutes to interact and experience the COVID-19 restaurant SOPs application. Then, they are required to answers Post-Test Quiz. Their score will be consider as the result for the virtual practising method. All the COVID-19 restaurant SOPs are originally extracted from the official website of the Kementerian Kesihatan Malaysia (KKM). Both quizzes will be conducted through Google Form method due to the COVID-19 pandemic. The result analysis will be the comparison of both Pre and Post-Test Quiz result from the 30 respondents to validate the effectiveness of VR

in practicing the COVID-19 Restaurant SOPs. Afterwards, the target user will be given a questionnaire to collect their opinion and feedback for this project. The question is based on the effectiveness, usability, ease of use, interface design, satisfaction and feedback. The aim of the questionnaire is to test the application is it user-friendly or vice versa.

6.4.2 **Test Data**

The comparative analysis using Pre-Post Testing, 30 respondents are chosen as the target tester who have been shared with the link using WhatsApp application. The aimed tester is teenager with the age of 10 to 19 years-old. The comparative analysis by Pre-Post Testing for end user will be attached. All the data will be in the table form and be further analyze in test results and analysis.

Table 6.5 Test Data from Pre-Post Test Quiz

Respondents	No. of correct answer in quiz	
	Pre-test quiz	Post-test quiz
1	4 / 7	7 / 7
2	5 / 7	5 / 7
3	4 / 7	7 / 7
4	6 / 7	7 / 7
5	4 / 7	7 / 7
6	4 / 7	5 / 7
7	2 / 7	7 / 7
8	5 / 7	7 / 7
9	5 / 7	7 / 7
10	6 / 7	6 / 7
11	4 / 7	7 / 7
12	5 / 7	7 / 7
13	3 / 7	6 / 7
14	2 / 7	4 / 7
15	5 / 7	6 / 7
16	2 / 7	6 / 7

17	5 / 7	6 / 7
18	5 / 7	7 / 7
19	4 / 7	5 / 7
20	6 / 7	6 / 7
21	6 / 7	7 / 7
22	3 / 7	6 / 7
23	6 / 7	6 / 7
24	4 / 7	7 / 7
25	7 / 7	6 / 7
26	7 / 7	7 / 7
27	5 / 7	6 / 7
28	2 / 7	7 / 7
29	6 / 7	6 / 7
30	7 / 7	6 / 7

Table 6.6 Test Data from UAT

No.	Acceptance Requirements	Strongly Disagree - 1	Disagree - 2	Agree - 3	Strongly Agree - 4
Effectiveness					
1	The application which combined the restaurant SOPs with VR technology is more interesting then reading by word only.	0	0	6	24
2	The application can provide more interactive with user than reading from the official website.	0	1	9	20

3	The application can practice the restaurant SOPs in a safe way.	0	0	7	23
Usability					
1	The application can let the user immerse in the environment to practice the restaurant SOPs.	0	3	8	19
2	The application can check which restaurant SOPs that the user fail to follow.	0	1	14	15
3	The use of 3D model help to visualize the restaurant SOPs compare with word.	0	1	12	17
Ease of use					
1	The application is easy to use.	0	2	19	9
2	The operation of the application is easy to understand.	0	1	12	17
3	The animation in the application is understandable.	0	0	15	15
Interface design					
1	The interface design of the application is attractive.	0	0	10	20

2	The fonts and colors used are readable and recognizable.	0	0	4	26
3	The tutorial provided is understandable.	0	1	15	14
Satisfaction					
1	Satisfaction towards overall performance of the application.	0	0	11	19
2	Supportive toward the application if release to market.	0	0	12	18

6.5 Test Result and Analysis

In part of test result and analysis, comparative analysis using the Pre and Post Test Quiz result which represent the before and after using the Restaurant SOPs application. There are total of 30 respondents which are teenagers from age 10 years-old to 19 years-old involved in the testing. The comparative analysis between the Pre-Test Quiz mark and Post-Test Quiz mark which represent the comparison of the effectiveness between the information by words through official website and the practicing through virtual reality method technology. The result will be analyzed and explained clearly with the aid of graph as per below. The graph below represents the marks for each test before and after using the Restaurant SOPs application.

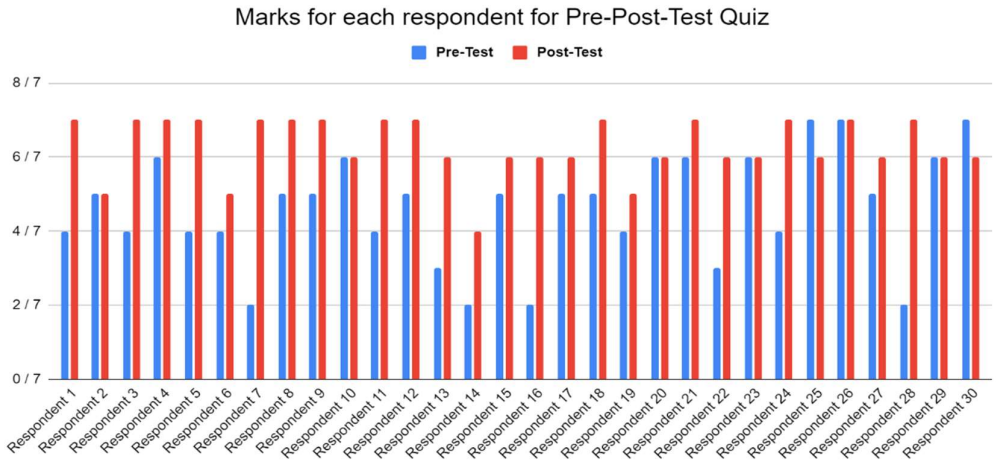


Figure 6.2 Graph of respondents' for Pre-Post Test Quiz Marks

The purpose of conducting the Pre-Post Test is to determine the impact of usage of VR on delivering the Restaurant SOPs to the target user compare to the traditional method which is in wording format at the official website of KKM. With the total of 7 questions in both Pre-Test and Post-Test each. The question in both Pre-Test and Post-Test are not repeated to assure the fairness of the test. A total of 30 respondents answered the Pre-Post Test and the result is tabulated in Table 6.5. The result is also analysis in the form of graph in figure 6.2. Based on the graph, the lowest score for the Pre-Test is 2 out of 7 whereas highest score is full mark which is 7 out of 7. Meanwhile, for the Post-Test, 4 out of 7 is the lowest score while 7 out of 7 is the highest. Furthermore, when viewing in the larger picture, there is significant improvement from Pre-Test to Post-Test.

Table 6.7 Average Pre-Post Test Quiz Mark

	Pre-Test Quiz	**Post-Test Quiz**
Average	66%	90%

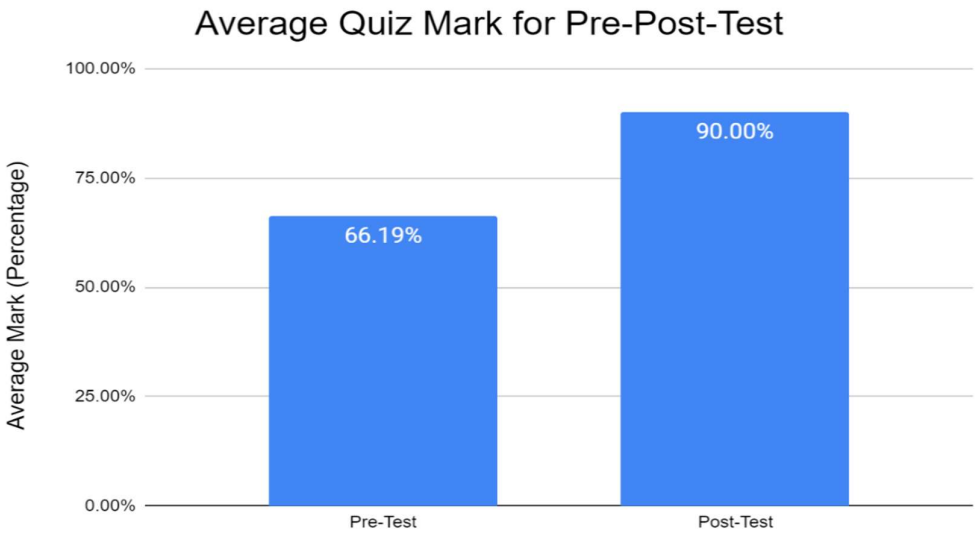


Figure 6.3 Graph of Average Quiz Mark for Pre-Post Test

Based on the result from Pre-Post Test, it can stated there is any improvement from Pre-Test to Post-Test as there is respondent score full mark which is 7 out of 7 questions in both test. There is respondent that score higher score in the Pre-Test compared to their Post-Test accordingly. There is also respondent that score same score in both which indicate no improvement. Hence, it can conclude with such data and further analysis is need to be conducted. The average of the respondents mark is calculated and tabulated in Table 6.7 and is analyze in graph form in Figure 6.3. Based on Figure 6.3, the Post-Test has higher average quiz mark compare to Pre-Test and it is proven that overall the Restaurant SOPs application aid the understanding of the COVID-19 Standard Operating Procedures by the respondents.

Table 6.8 Percentage of Test User Responses for Effectiveness of the Restaurant SOPs Application

Effectiveness	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
Question 1	0%	0%	20%	80%
Question 2	0%	3%	30%	67%
Question 3	0%	0%	23%	77%

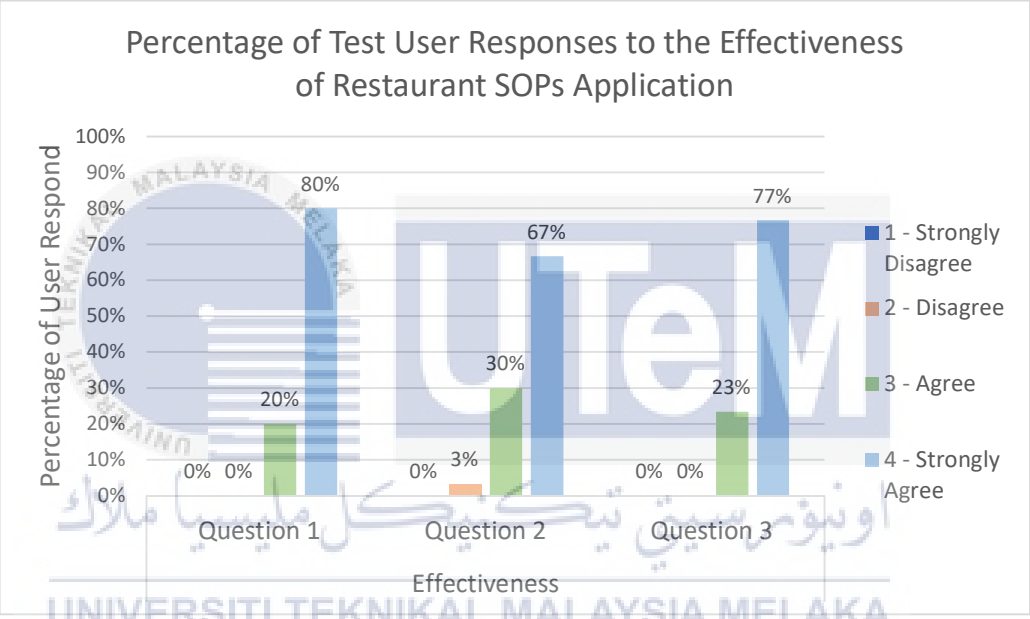


Figure 6.4 Graph of Percentage of Test User Responses for Effectiveness of the Restaurant SOPs Application

Total 30 respondents participate the User Acceptance Test (UAT) which is categories into 5 different criteria which are effectiveness, usability, ease of use, interface design and satisfaction. The criteria effectiveness consist of 3 questions which are "the application which combined the restaurant SOPs with VR technology is more interesting than reading by word only", "the application can provide more interactive with user than reading from the official website" and "the application can practice the restaurant SOPs in a safe way" which is represent by Question 1, Question 2 and Question 3 respectively. The result is tabulated in Table 6.8 and analyzed in the form of graph in Figure 6.4. Based on Figure 6.4, all respondent (100%) shows strongly agree to Question 1as some stated that it is new way to delivery information

and interesting. Next, 67% of the respondent show strong support and 30 % of the respondent agreed on behalf that the application provide more interaction with user than reading from the official website. However, there is 3% of the respondent disagreed the application provide more interaction with user than reading from the official website. Based on the data for Question 3, 30 out of 30 respondents (100%) agreed that the application provide a safe environment to practice the restaurant SOPs as user are experience it in a virtual environment instead of an actual restaurant. Hence, it can be said that the overall effectiveness of the Restaurant SOPs application is satisfied by the target test user.

Table 6.9 Percentage of Test User Responses for Usability of the Restaurant SOPs Application

Usability	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
Question 1	0%	10%	27%	63%
Question 2	0%	3%	47%	50%
Question 3	0%	3%	40%	57%

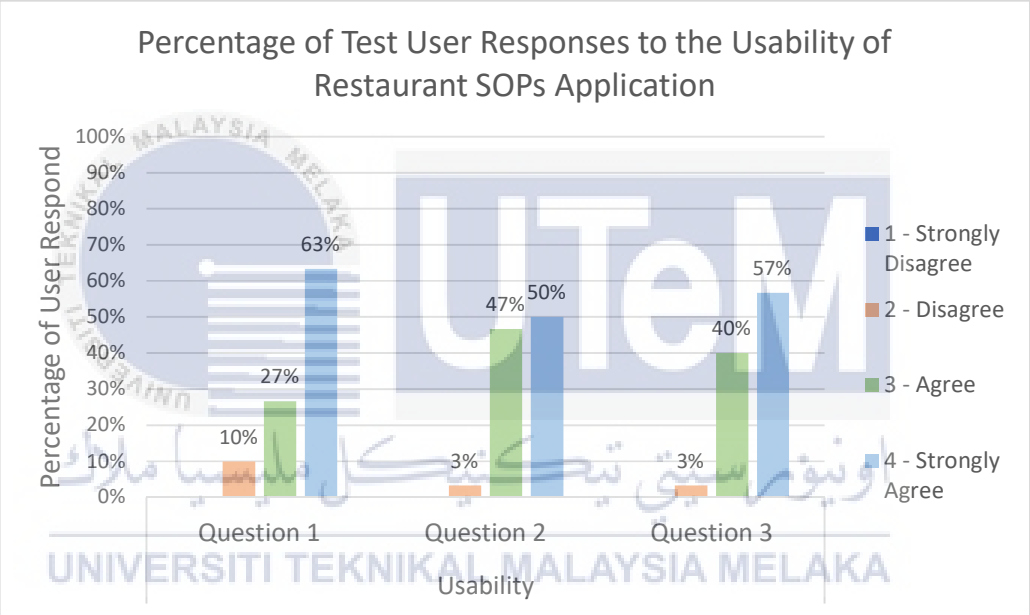


Figure 6.5 Graph of Percentage of Test User Responses for Usability of Restaurant SOPs Application

Usability is a measure of how well a specific user in a specific context can use a product to achieve a defined goal in term of quality. The usability criteria consist of 3 questions which are “the application can let the user immerse in the environment to practice the restaurant SOPs”, “the application can check which restaurant SOPs that the user fail to follow” and “the use of 3D model help to visualize the restaurant SOPs compare with word” which represented by Question 1, Question 2 and Question 3 respectively. Based on the analysis in Figure 6.4, it can clear see that majority of the respondent (90%) agreed that the application thus provide an immersive experience to the user as it virtualizes a restaurant environment for user to practice the restaurant

SOPs. However, 10% of the respondents disagree on behalf of the immersive experience in the environment to practice the restaurant SOPs. Next, Question 2 is questioning on whether this application allow the user to realize which SOPs is correct and which is wrong. Based on the result, we can conclude that most of the respondents (97%) agreed that this application do allow them to understand which SOPs is correct and which is wrong whereas the other 3% of the respondent disagree it. Moreover, 97% of the respondents agreed that the 3D model do provide aid to visualize the restaurant SOPs compare to wording whereas the other 3% disagreed on it. In short, it based on the overall of the data, majority of the respondent are satisfied with the usability of the Restaurant SOPs application.

Table 6.10 Percentage of Test User Responses for Ease of Use of the Restaurant SOPs Application

Ease of Use	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
Question 1	0%	7%	63%	30%
Question 2	0%	3%	40%	57%
Question 3	0%	0%	50%	50%

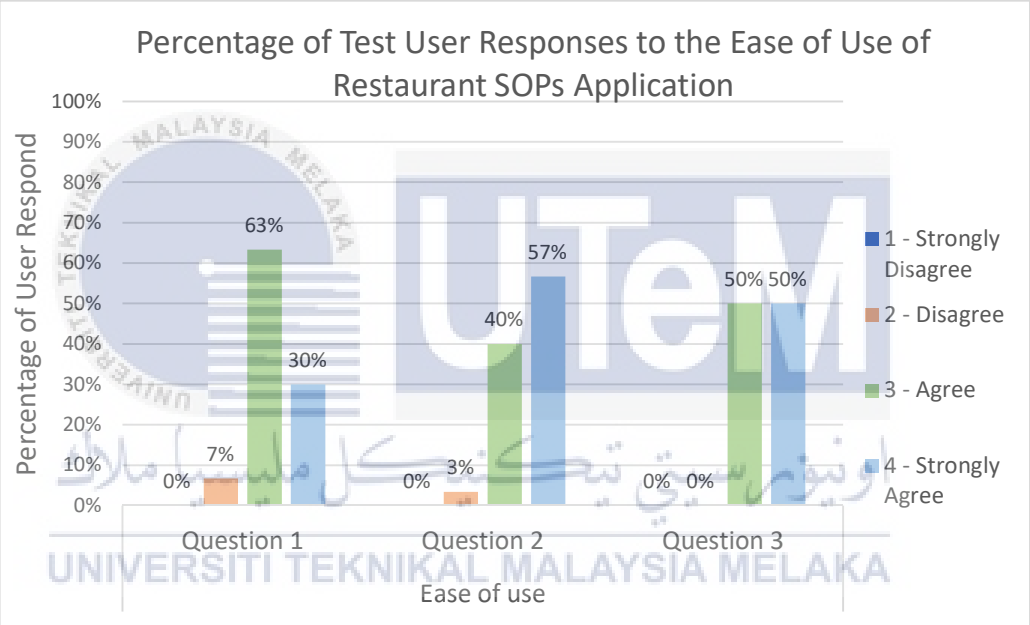


Figure 6.6 Graph of Percentage of Test User Responses for Ease of Use of the Restaurant SOPs Application

Ease of use is the basic concept which describes how easily the user can use a product or application without guideline in details. Thus, ease of use is used as one of the criteria in the UAT for the restaurant SOPs application to obtain feedback from the user on behalf of the difficulty level to operate the application. 28 out of 30 respondents (93%) stated that the application is easy to use whereas the other 2 respondents (7%) disagreed about the application is easy to use. Furthermore, Total of 97% of the respondents agree that the operation of the application is easy to understand as tutorial is provided. However, respondent (3%) also stated that the operation of the application is hard. Next question will be about the animation in the application, 100% of the

respondent which is 30 out of 30 respondents agreed that the animation is easy to understand. The animation of NPC such as scanning QR code and scanning body temperature are understandable. Based on the overall performance in term of the usability, most of the respondents are satisfied with it.

Table 6.11 Percentage of Test User Responses for Interface Design of the Restaurant SOPs Application

Interface Design	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
Question 1	0%	0%	33%	67%
Question 2	0%	0%	13%	87%
Question 3	0%	3%	50%	47%

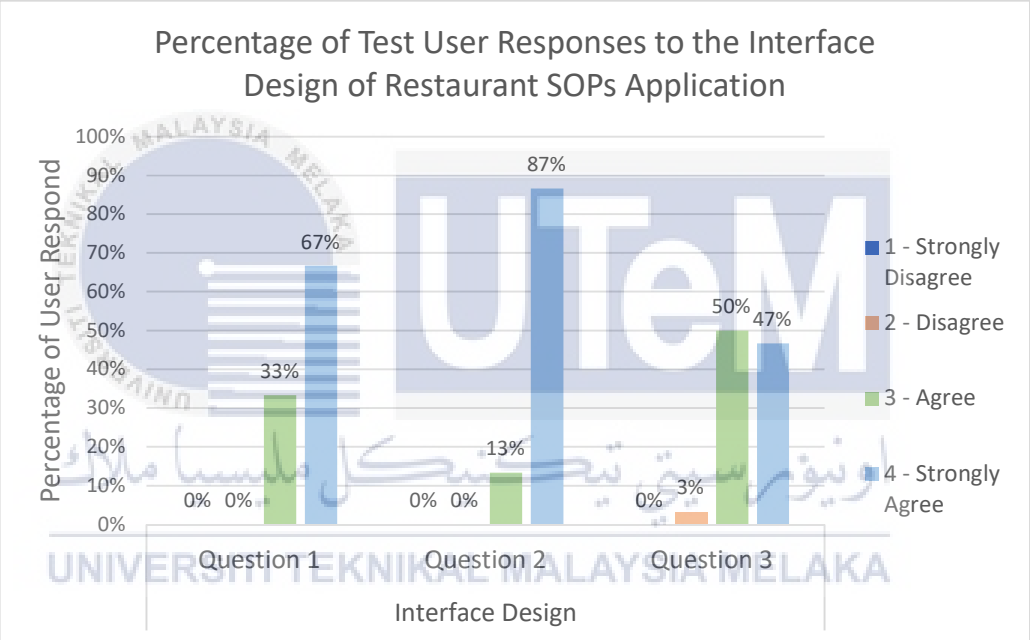


Figure 6.7 Graph of Percentage of Test User Responses for Interface Design of the Restaurant SOPs Application

Interface design is a point where a user interacts with the website or application they're using. A good interface design presents an understandable content and easy to interact with also known as user friendly. Thus, interface design will be classified as one of the criteria of concern for the UAT. All the respondents do agree that the interface design of the application is attractive as the style is suitable to the theme. They also agree and support that the fonts and colors used are readable and recognizable. However, 97% of the respondents agreed that the tutorial provided is understandable but there is also respondent (3%) disagreed about it. Hance, almost all

of the respondent agreed on behalf of the interface design is easy to understand and user-friendly.

Table 6.12 Percentage of Test User Responses for Satisfaction of the Restaurant SOPs Application

Satisfaction	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
Question 1	0%	0%	37%	63%
Question 2	0%	0%	40%	60%

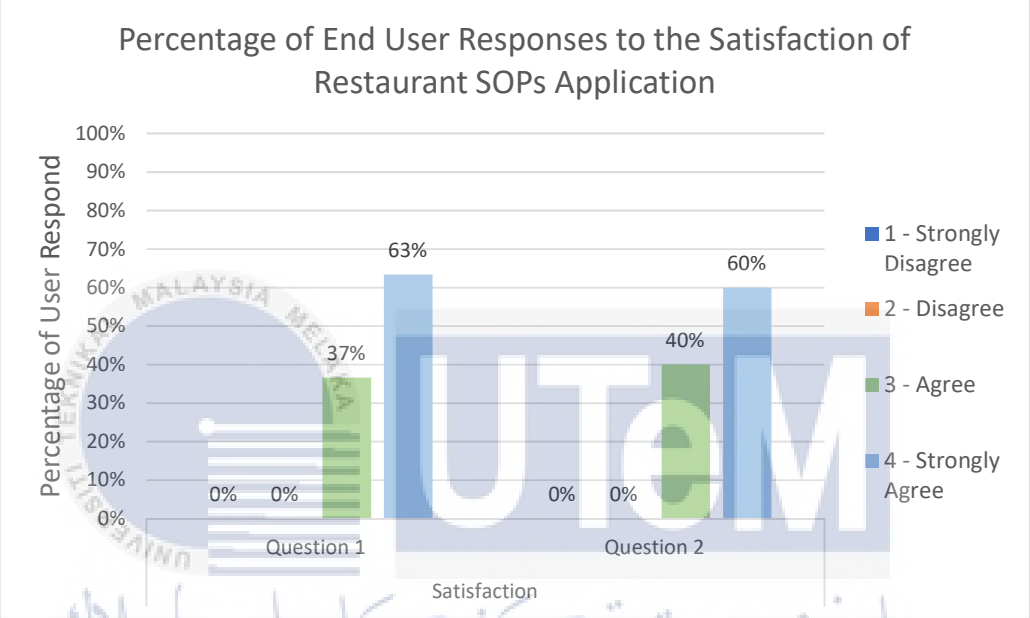


Figure 6.8 Graph of Percentage of Test User Responses for Satisfaction of the Restaurant SOPs Application

In the UAT, overall satisfaction is also a criterion of concern, and the question will be based on a hypothetical question. Overall satisfaction towards the performance of the application is fully satisfied by all the target test user as 30 out of 30 of the respondents (100%) agreed about it without any disagreement. Also, in term of the hypothetical question which is if the application is released to the market in IOS or Android, 30 out of 30 of the respondents (100%) will support it. Thus, can conclude that respondents are satisfied with the application in overall. Hence, based on the questions above, it can say that all of the respondent are satisfied with it.

Figure 6.9 Feedback From Target Test User In UAT For The Restaurant SOPs Application

Figure 6.8 Show the feedback and comments from the target test user on behalf of the Restaurant SOPs application after they have completed the Pre-Post Test and also experienced the application. Most of feedback are positive attitude towards the Restaurant SOPs application and hope there are few adjustments for the application such as tutorial, 3D modelling and language available. This will be further discussed in the following chapter.

In conclusive, 30 out of 30 respondents are satisfied with overall performance in term of the usability, ease of use, interface design and effectiveness of the Restaurant SOPs application. Thus, prove that the Restaurant SOPs application with the implementation of the VR technology able to aid the spread of correct information and attract the attention of the user. There is also respondents which disagree on certain criteria with feedback and comment and will be further discussed and adapted for the improvement of the application. There are some suggestions on the tutorial part which are adding narrative and subtitle for the tutorial for easy understanding and separate the tutorial and add it before the level started for user to have a better understanding on that particular level. Furthermore, some respondents do also suggest that it would better to improve the texture of the 3D model such as the NPC to provide better immersive experience for the user and also to add other control/operate option such as controller for easier control of the character.

6.6 Conclusion

In summary, the test has been carried out successfully. The data collected through the Pre-Post Test and UAT do aid and prove that the Restaurant SOP is useful and effective for the user to understand the restaurant COVID-19 SOPs clearly through virtual reality technology.

Chapter 7: CONCLUSION

7.1 Observation on Weakness and Strength

In this conclude chapter for Restaurant SOPs project, all the contents and elements needed in Restaurant SOPs application are developed completely and have passed the testing phase. However, the weakness and the strength for this project need to be identified to support the proposition for improvement for this project.

7.1.1 Weakness

For this Restaurant SOPs project, there are some weaknesses noticed in the application. Firstly, this application can only be installed into the Android Phone, which support the Android version 4.4 known as KitKat, and above. This is due to the Restaurant SOPs application is build using the Unity Vuforia and its Android based. The installation package for Restaurant SOPs application is 49 MB to install. Therefore, the user needs to clear up the phone memory if there is not enough space to install. User also need to give permission for enable the developer setting to install unknown package for android phone. The user also needs to use this application in a wide and open place to have a better experience.

In addition, the end-user respondents have commented some of the 3D modelling can be more realistic to allow user to have better immerse experience in the environment upon playing the Restaurant SOPs application. They also commented the instruction audio can be added for the Restaurant SOPs to make it more interesting and simpler.

Next, there is also feedback on the tutorial of the Restaurant SOPs application as it is too fast and hard absorb and understand by the user. They also suggest separating the tutorial based on each level and play the tutorial before the level started so to allow the user to have a better understanding before entering the level. Furthermore, some also suggest adding audio explanation and subtitle in the tutorial part to have more better understanding to the game. Besides, having multi language is also one of the feedbacks as Malaysia is multiracial country, thus it would be better to have the application to in different language to allow better understanding of the restaurant SOPs with their own mother tongue language such as Bahasa Melayu, English and also Mandarin.

7.1.2 **Strength**

The Restaurant SOPs project's strength is the implementation of the virtual reality (VR) technology in the application. With the aid of such technology, the user interaction in the purpose of practicing COVID-19 restaurant SOPs become more interesting. For example, users are able to interact with the customer NPC model who did not follow the SOPs by gazing on them. Also, using VR technology and also the implement of gazing motion sensor, It allow the user to explore the surrounding environment without actually moving around. The information also provided when the user failed to detect which SOPs that the customer did not follow in the application.

Besides, users able to use this application to have the correct information about how to follow the COVID-19 restaurant SOPs. It allowed the user to practice how to follow the SOPs in a safer way. This will reduce the spreading of the COVID-19 virus when everyone follows the SOPs. The application also a creative way to attract the teenager's attention and ensure they understand the SOPs through this application. Furthermore, the interface design of the application also considers as one the strength as it is in simplest form which enable user to easily understand it. The colour theme and font of the interface also match each other to prevent the user to fell aversion when operate it.

7.2 Proposition for Improvement

Based on the suggestion and comment from the above, some improvement should be made to boost this project. The Restaurant SOPs application should be available in Play Store in Android and AppStore in IOS. It should not be limited only for the Android phone users but also for the iPhone user to be able to experience this application.

Besides, the 3D model in the application can be improved. The 3D model is one of the major factors in the application which will influence the user to have better understanding to the COVID-19 restaurant SOPs and thus improvement of the 3D model will definitely increase to the user enjoyment and immersive experience in the application. Also, according to testers, audio can be included in the game. This will increase the understanding toward every stage and make the application more interesting. Furthermore, as mentioned by the respondent on behalf of the tutorial part will be taken into the consideration, as it will allow the user to have a better understanding of each level.

The evaluator suggested that for the testing can be done by using the alpha test and the beta test. Alpha testing is carried out by the internal employees of the organization. The main goal is to identify bugs before releasing the product to real users or to the public whereas the beta testing which is performed by the respondent also known as the real user for the application in a real environment. The evaluator also suggested that the beta testing can be done with two different group of respondents with the same questions of the knowledge of COVID-19 restaurant SOPs. First group are required to answer the questions based on their own knowledge and understanding whereas the other group will experience the application before they answer the question.

7.3 Project Contribution

For this Restaurant SOPs project, Restaurant SOPs project will be able to contribute to the teenagers who are confusing about the COVID-19 restaurant SOPs. 30 target test user respondents have sacrificed their time for the pre-post testing and also UAT form. Thanks for those who have involved and contributed for this project.

7.4 Conclusion

In conclusion, the outcome of this project is Restaurant SOPs application, which combined the virtual reality (VR) technology, is an effective tool to make the teenagers to have more understanding about following the correct COVID-19 restaurant SOPs. It able to let the user practicing the SOPs in a safer way. It is also hoped that the application can be further improved and have better contribution to the society. This project is successfully ended and meet all the objectives.

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APPENDIX A

LEARNING COVID-19 STANDARD OPERATING PROCEDURE THROUGH VIRTUAL REALITY GAME BASED LEARNING

Hi everyone, I am Soh Yi Jin, a third-year student from Universiti Teknikal Malaysia Melaka (UTeM). I am surveying for my Bachelor of Computer Science (Interactive Media) final year project. This project is to develop VR game based learning about COVID-19 standard operating procedures (SOPs).

The purpose of this survey is to investigate the effectiveness of VR in learning the COVID-19 Standard Operating Procedure among teenagers and to investigate the VR game application in practicing the COVID-19 Standard Operating Procedures.

This survey consist three part which are personal details, knowledge about virtual reality(VR), and knowledge about COVID-19 standard operating procedures (SOPs).

If you do have any enquiry regarding this survey, please contact me through email (b031810189@student.utem.edu.my). I sincerely appreciate your participation in this survey. Thank you.

*必須

Gender *

- Female
- Male

Do you know what is COVID-19 standard operating procedures (SOPs)? *

- Yes
- No
- Maybe

Do you know what is COVID-19 standard operating procedures (SOPs)? *

- ◯ Yes
- ◯ No
- ◯ Maybe

Do you know why we need to follow COVID-19 standard operating procedures (SOPs) during COVID-19 Pandemic? *

- ◯ Yes
- ◯ No
- ◯ Maybe

Do you think you follow all the COVID-19 standard operating procedures (SOPs)? *

- ◯ Yes
- ◯ No
- ◯ Maybe

What is the reason that you did not follow the COVID-19 standard operating procedures (SOPs)? *

- ◯ Forget
- ◯ Not Clear
- ◯ Troublesome
- ◯ 其他: _____

LEARNING COVID-19 STANDARD OPERATING PROCEDURE THROUGH VIRTUAL REALITY GAME BASED LEARNING

COVID-19 Standard Operating Procedures (SOPs)

This section is to determine the respondent's knowledge about COVID-19 Standard Operating Procedures (SOPs).

All the COVID-19 Standard Operating Procedures (SOPs) are obtain from Malaysia government website which is from Laman Web Rasmi Majlis Keselamatan Negara (MKN). The COVID-19 SOPs referred to are released by the MKN through the website on 15th February 2021.
https://asset.mkn.gov.my/web/wp-content/uploads/sites/3/2021/02/SOP-PERDAGANGAN-PENGEDARAN-PKP-KPDNHEP_15-Februari-2021.pdf

Based on your understanding, please select the COVID-19 SOPs that you know and obey only.

General SOPs in a shop/market/mall

- [ ] All premises are allowed to operate from 6:00 a.m. to 10:00 p.m.
- [ ] All customers must follow the entrance and exit pathway provided by the premises.
- [ ] All customers must obey the shop's customer capacity based on the premise area per time.
- [ ] All customers and workers must scan attendance QR code using MySejahtera application and body temperature checking before entering the premises.
- [ ] All customers must keep their distance at least 1 metre apart from each.
- [ ] All customer must wear face mask

SOP in Clothing Industry

- [ ] All premises must provide gloves for customers.

SOP in Restaurant

- [ ] Only 2 people are allowed with limited time and distance of 2 meter apart.
- [ ] Pre-order or reservation for dine-in/ take away are recommended.

SOP in Laundry shop

- [ ] All the devices must be clean and sanitized 3 times per day when operating and also once after operating.

SOP in Car Wash Shop

- [ ] All customers must remain seated inside the car excluding motorcyclists.
- [ ] Only 3 cars are allowed per time.

SOP in Gas Station

- [ ] All customers must obey the capacity limitation and follow the workers/employee instruction when entering the station.
- [ ] Cashless payments are recommended.
- [ ] Scanning QR code using MySejahtera can be excluded when payment by credit & debit card and online application payment
- [ ] Scanning QR code using MySejahtera can be excluded when payment through car window
- [ ] Scanning QR code using MySejahtera can be excluded when checking and filling car/motorcycle tires.
- [ ] Scanning QR code using MySejahtera can be excluded when using fully automatic car washing facilities.

LEARNING COVID-19 STANDARD OPERATING PROCEDURE THROUGH VIRTUAL REALITY GAME BASED LEARNING

*必填

About Virtual Reality(VR) Game

This section is to determine the respondent's knowledge and understanding about Virtual Reality (VR) game.

Do you know what is Virtual Reality(VR) game? *

- Yes
- No

Did you play VR game before? *

- Yes
- No

What type of game genre you play before in learning game? *

- [ ] Puzzle Games
- [ ] Idle Games
- [ ] Sports Games
- [ ] Strategy Games
- [ ] Simulation Games
- [ ] Role-Playing Games
- [ ] Adventure Games
- [ ] Action-Adventure Games
- [ ] Action Games

Do you think learning COVID-19 standard operating procedures (SOPs) through VR game is more easier and fun than by using words? *

- ◯ Yes
- ◯ No
- ◯ Maybe

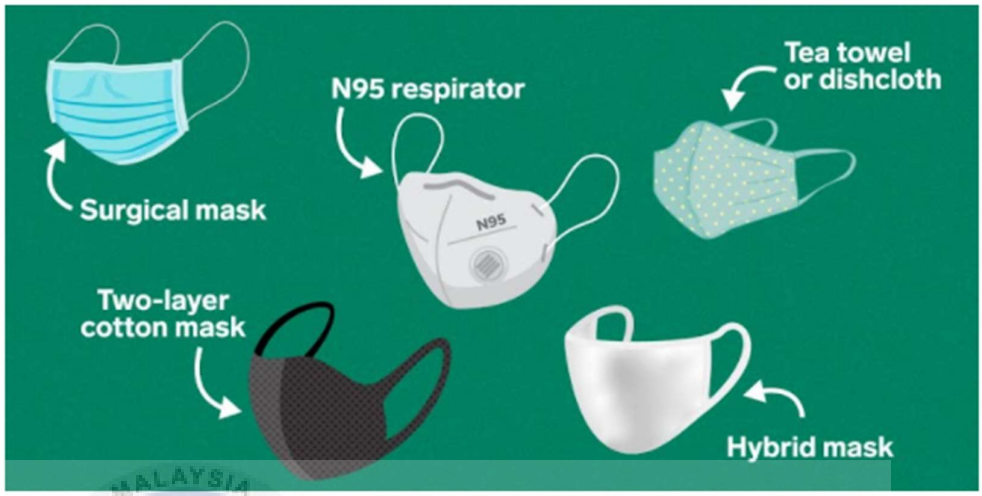
If a Virtual Reality(VR) game is provided to learn about the COVID-19 standard operating procedures (SOPs), will you try it ? *

- ◯ Yes
- ◯ No
- ◯ Maybe

上一页 提交

APPENDIX B

Do you think wearing mask is a must before enter the restaurant? * 1 point



- ◯ Yes
- ◯ No

Do you know scanning QR code using MySejahtera application is a COVID-19 standard operating procedure? * 1 point

- ◯ Yes
- ◯ No

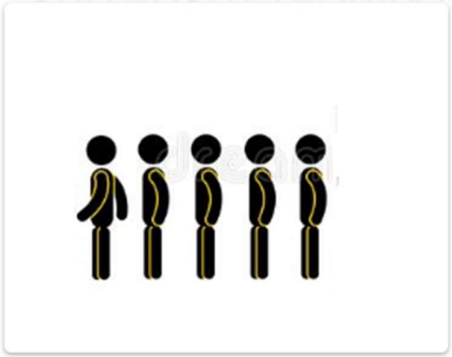
Scan QR code using MySejahtere application before entering the restaurant. * 1 point

- ◯ True
- ◯ False

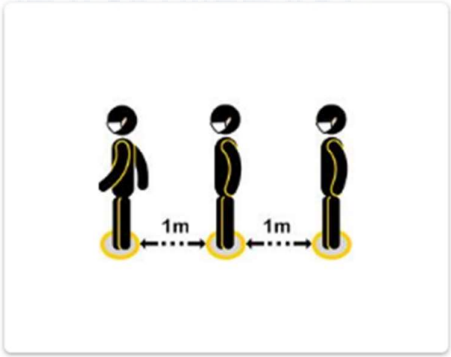
Do you know that it is compulsory to take and record the body temperature before entering the restaurant? * 1 point

- ◯ Yes
- ◯ No

When queueing to enter the restaurant, which is correct? * 1 point



- ☐ A



- ☐ B

Which pictures follow the social distance COVID-19 SOPs? * 1 point

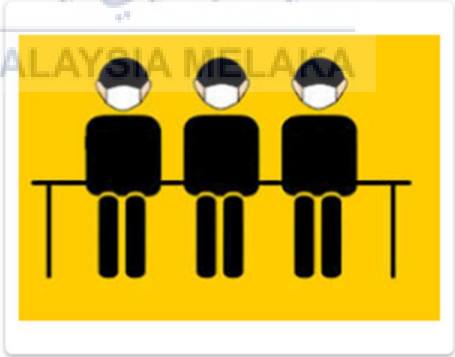
☐ A

☐ B

☐ C

☐ D

☐ E



☐ F

It is necessary to wear back the mask before exit the restaurant? * 1 poi

- ◯ Yes
- ◯ No

Submit

APPENDIX C

Wearing mask is needed before entering the restaurant? * 1 point

- ◯ Yes
- ◯ No

When you need to scan the QR-code using MySejahterah application? * 1 point

- ◯ Before enter the restaurant
- ◯ After enter the restaurant
- ◯ No need to scan
- ◯ Before exit the restaurant

When you need to take and record the body temperature? * 1 point

- ◯ Before enter the restaurant
- ◯ After enter the restaurant
- ◯ Before exit the restaurant
- ◯ No need to scan

Which one did not follow the social distance? *

1 point

- A
- B
- C
- D
- none of above

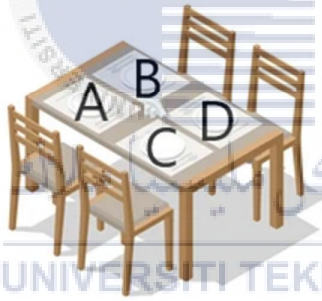
It is necessary to wear back the mask after finished the food? * 1 point

- ◯ Yes
- ◯ No

What is the situation can take off the mask? * 1 point

- ☐ after ordering
- ☐ after food is served
- ☐ after drink is served
- ☐ when there is no other customer in the restaurant

Which seats can be sit to follow the social distance? * 1 point



- ☐ A
- ☐ B
- ☐ C
- ☐ D

Submit

APPENDIX D

User Acceptance Testing Form

* Required

Effectiveness

The application which combined the restaurant SOPs with VR technology is more interesting then reading by word only. *

1	2	3	4
○	○	○	○

The application can provide more interactive with user than reading from the official website. *

1	2	3	4
○	○	○	○

The application can practice the restaurant SOPs in a safe way. *

1	2	3	4
○	○	○	○

Usability

The application can let the user immerse in the environment to practice the restaurant SOPs. *

1	2	3	4
○	○	○	○

The application can check which restaurant SOPs that the user fail to follow. *

1	2	3	4
○	○	○	○

The use of 3D model help to visualize the restaurant SOPs compare with word. *

1	2	3	4
○	○	○	○

Ease of use

The application is easy to use. *

1	2	3	4
○	○	○	○

The operation of the application is easy to understand. *

1	2	3	4
○	○	○	○

The animation in the application is understandable. *

1	2	3	4
○	○	○	○

Interface design

The interface design of the application is attractive. *

1	2	3	4
○	○	○	○

The fonts and colors used are readable and recognizable. *

1	2	3	4
○	○	○	○

The tutorial provided is understandable. *

1	2	3	4
○	○	○	○

Satisfaction

Satisfaction towards overall performance of the application. *

1	2	3	4
○	○	○	○

Supportive toward the application if release to market. *

1	2	3	4
○	○	○	○

Feedback

Any feedback/ comment to improve the application? *

Your answer

Back Submit