

# Baking Master VR: The Development of a Virtual Reality (VR) Learning Application for Catering Students

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## Abstract

The Faculty of Technical and Vocational Education (FPTV) in UTHM offered the Bachelor Degree in Vocational Education (Catering) with Honours. FPTV catering students do not yet have VR-based learning application. The previous Covid-19 pandemic caused the rise of e-learning as they are forced to conduct online classes instead of physical classes. This may lead to inconvenient to learn by lecture slides and imagination only. To assist their e-learning, the application was proposed. Therefore, it is to design "Baking Master VR" based on virtual reality approach, to develop the VR learning application by integrating Unity Game Engine, to perform functionality and usability testing to the target user. The Agile methodology will be used in this project to make certain that the learning application is created as scheduled. According to the Acceptability Ranges score scale, the average score of 70.00 falls within the "acceptable" range of the proposed VR application.

## 1. Introduction

In a virtual reality environment, which is a 3D simulation of reality, users can explore and interact with a virtual environment in a way that simulates reality as it is experienced by their senses. Catering includes food preparation and cookware that are frequently found in the kitchen and are typically composed of durable materials. Cookware is broadly used for food preparation around the globe. Baking is a cooking method where food is cooked using dry heat, usually in an oven.

Online learning applications are programs or devices that can be used through gadgets or computers with the help of the internet to provide additional learning that can be accessed anywhere and anytime [1]. Especially when the epidemic breaks out, many students were forced to study online at home, at which time, software such as classic Zoom burst out one after another, but students are isolated from each other and only face a computer when they have classes at home [2].

However, the issue is the catering students are forced to conduct online classes instead of physical classes in faculty due to MCO and flash floods. In this case, since baking is a hands-on skill, online learning does not offer as much practical experience as traditional classroom instruction. Student may have access to facilities, ovens, and equipment made especially for baking in a physical laboratory. It can be difficult to duplicate the same surroundings and resources at home during online class.

Therefore, it is crucial to develop VR-based learning named 'Baking Master VR' to aid the online classes. The objective of the project is to design 'Baking Master VR' based on the virtual reality approach. The study domain of the application will be the Bakery subject of catering course provided by UTHM and the case study location will be in the catering laboratory of FPTV, UTHM. The content will be created in the English language as it is most often spoken and understood worldwide.

The application is divided into two learning modules which are baking tools learning and making bread learning. At the end of the learning module 1, the students are expected to understand the features and uses of the baking tools on making bread. Then, at the end of the learning module 2, the students are expected to understand the steps on how to make a bread. Additionally, the application includes one practice module. The students are expected to make a bread without having notes, be careful not to having accidents and complete the task in time.

The baking tools and the steps to make a bread using yeast are highlighted in the application. The proposed application is expected to aid the online catering class. Not only is it helpful for students studying FPTV catering, but a broad range of age groups can also use it as a reference. Since teaching in person is becoming less common due to the COVID-19 epidemic, this proposed application can also be used as self-study material.

In this section, the project background, problem statements, objectives, project scope, expected result and project significance have been discussed. In section 2, the literature review discusses the subject domain, the technology utilized in this project, and comparative analyses of the current applications. In section 3, the methodology describes the Agile software development methodology, which has been selected for the entire project. A Gantt chart is used to make sure that every project job is moving along as planned. In section 4, the analysis and design phase of this project covers the entire analysis and design process, including the requirements for hardware and software as well as how the application is produced and user analysis, functional requirements and non-functional requirements. The application's components such as the system flowchart, interface, and navigation design as well as its general structure are shown.

## 2. Related Work

In this section, the study domain, technology used, and result of the comparative analysis are discussed.

### 1.1 Catering

Catering is the process of providing food and drink for many people, typically at a special event or location other than a restaurant. Caterers can provide a wide range of services, from simply preparing and delivering food to setting up and serving meals, and even cleaning up afterwards. There are different types of cookware in terms of composition, including aluminum, copper, stainless steel, cast iron and enameled cast iron, etc [3]. The issue of material migration from cookware to food is one of the main concerns of consumers, and which cookware is suitable for cooking is a challenge [4].

Generally, catering is delivered through culinary schools and institutes. These educational establishments provide degree program, diplomas, or certificates in hotel administration, culinary arts, or catering services. Combining classroom theory learning with real-world actual experience, students gain knowledge in culinary arts, food safety, menu planning, nutrition, and kitchen management. To improve their abilities in particular fields such as pastry arts, food styling, or international cuisine, people may also engage in specialized courses and workshops as the short-term program offer focused training.

### 2.2 Baking

Baking is the art and science of transforming raw ingredients into delicious and often complex baked goods. Baking relies on leavening agents, like yeast or baking powder, to create pockets of gas that cause dough to rise [5]. Different mixing techniques are employed based on the desired outcome [6]. Baking is more than just creating delicious treats. It is a source of comfort, a way to connect with loved ones, and a creative outlet. It allows people to experiment with flavors and techniques, constantly learning and refining the skills. The world of baking offers endless possibilities for exploration and enjoyment.

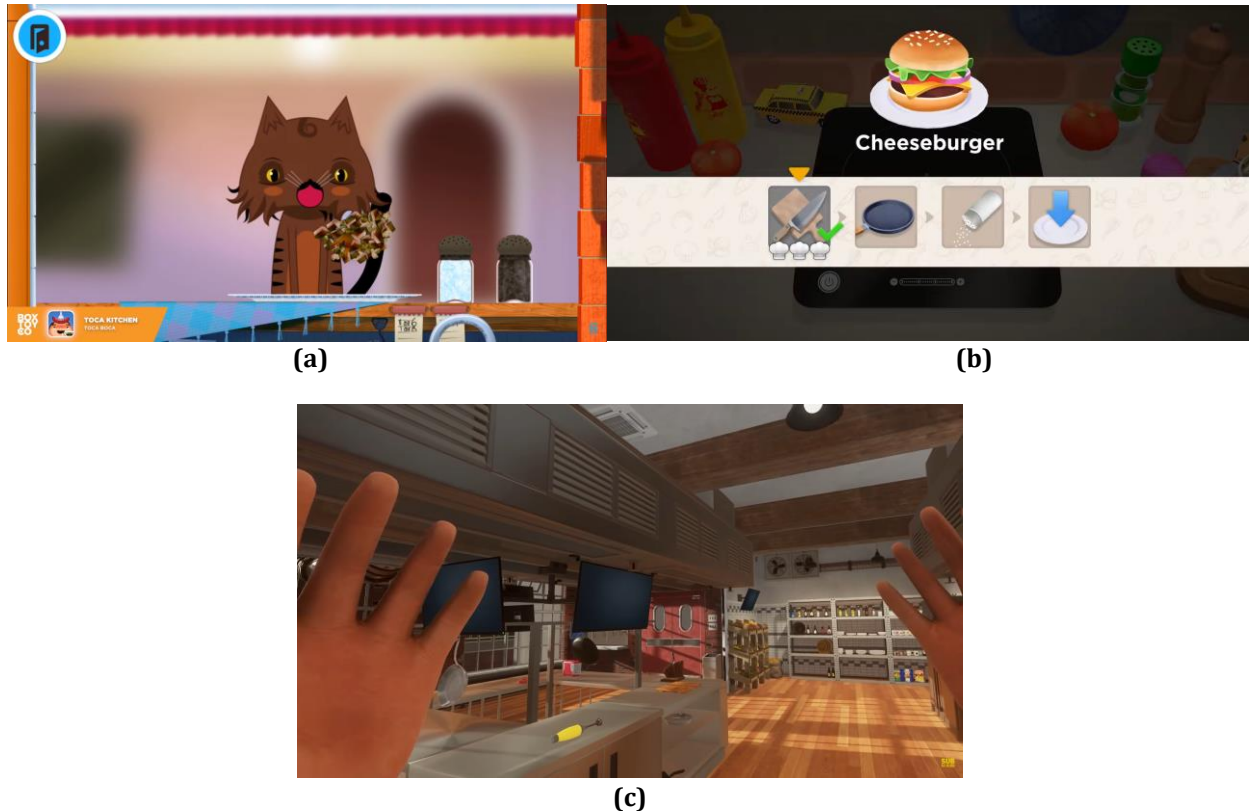
### 2.2 Virtual Reality

Virtual Reality (VR) is a computer-generated environment with scenes and objects that appear to be real, making the user feel they are immersed in their surroundings. This environment is perceived through a device known as a Virtual Reality headset or helmet [7].

Primarily there are three types of VR [8]. They are non-immersive, semi-immersive, and fully immersive. The least immersive kind of VR usually includes watching 3D scenes on a regular computer screen. Keyboards and mice are examples of input devices that users use to interact with the virtual environment. Although it can visualize some 3D content, it cannot match the complete immersion of more sophisticated VR systems. A semi-immersive VR system enables the user to experience a distinct world while maintaining a connection to their physical surroundings. Virtual reality of this kind is frequently utilized in training and education. Immersive VR offers a deeper level of immersion and requires more sophisticated hardware. Usually, this kind of virtual reality is connected to a strong computer or gaming console. VR headsets such as the Oculus Rift, HTC VIVE, and PlayStation VR are a few examples. Users can interact with the virtual environment more intuitively thanks to the motion-tracking sensors and portable controllers that these systems frequently feature.

## 2.3 Comparative Analysis

A competitive study involves locating rivals in the market and looking into different marketing strategies. The company's strengths and weaknesses can be compared to those of each opponent using this data as a standard. A quick and simple method of comparing a product to similar ones on the market is through competitive analysis, which also helps people make improvements to the product by pointing out its shortcomings. This section analyses the 3 applications that are currently available on the Google Play Store and Steam which are Toca Kitchen [9], My Universe – Cooking Star Restaurant [10] and Cooking Simulator VR [11].



**Fig.1** Toca Kitchen (a); My Universe-Cooking Star Restaurant (b); Cooking Simulator VR (c)

Figure 1(a) shows Toca Kitchen. The key feature is feeding character. There are four starving characters in the application, and they will swallow anything player provide. Kids can try making food and observe how the characters respond, each character has distinct likes and tastes. The game's characters respond to the various foods in humorous and occasionally surprising ways.

Figure 1(b) shows My Universe-Cooking Star Restaurant. The key feature is mini-games in preparing cheeseburger. The mini-games add variety to the gameplay. Different dishes have their own mini-games such as slicing veggies and flipping burgers. This feature used various mini-games to simulate the cooking process to deliver knowledge to players, which equivalent to entertainment and learning at the same time.

Figure 1(c) shows Cooking Simulator VR. The key feature is real environment style. The goal of VR cooking simulators is to produce an aesthetically pleasing and believable virtual kitchen environment by using realistic graphics and visual features. The immersive experience is further enhanced with sound effects and background music, which provide the impression that you are in a real kitchen.

**Table 1** Comparison between reviewed applications with the proposed application

Element	Toca Kitchen	My Universe-Cooking Star Restaurant	Cooking Simulator VR	Baking Master VR
Virtual Reality (VR)	Do not provide VR feature to the users.		Provide VR feature to the users.	

**Table 1** Comparison between reviewed applications with the proposed application (continued)

Element	Toca Kitchen	My Universe-Cooking Star Restaurant	Cooking Simulator VR	Baking Master VR
Target audience	Young children	Teenagers	Adults	FPTV catering students
Immersion	Basic 2D	3D environment	VR immersion	
Learning module	No fixed recipe, provide some ingredients and cooking method.	Broad range of dishes including appetizers, main courses, desserts and pastry.		Focus on baking tools learning and baking bread.
Preparation steps and guideline	Do not provide preparation steps and guideline to the users.	Provide preparation steps and guideline to the users.		
Practice module		Provide practice module to the users.		
Platform	Mobile	PC	PC (VR)	
Operating system	Support Android version 5.0 and above	Support Windows version 7.0 and above		
Price	Free of charge	RM 32.99	RM 44.00	Free of charge
Strength	Simple and intuitive interface	Balanced blend of cooking and management	Extensive content and variety	Satisfaction of mastering realistic techniques
Limitation	Minimal educational value	Limited replayability	Potential for motion sickness	Higher system requirements

Table 1 shows comparison between reviewed applications with the proposed application. Generally, the first 2 reviewed applications do not provide VR feature to the users while Cooking Simulator VR and the proposed application, Master Chef VR will provide VR feature to the users. The target audience ranges from young children (Toca Kitchen) to adults (Cooking Simulator VR). The applications also differ in how immersive they are, with Toca Kitchen being a basic 2D interface and Cooking Simulator VR offering a fully virtual reality experience. Toca Kitchen has no fixed recipe while the other two reviewed applications offer broad range of dishes. Meanwhile, the proposed application focuses on baking tools learning and baking bread. Toca Kitchen do not provide preparation steps and guideline to the users while the other 3 applications perform this. Then, both the 3 reviewed applications and proposed application provide practice module to the users.

The platform of Toca Kitchen is mobile, My Universe – Star Cooking Restaurant is PC, Cooking Simulator VR and Master Chef VR are also PC, but VR is required. Toca Kitchen support Android version 5.0 and above while the other 2 reviewed applications and proposed application support Windows version 7.0 and above. Then, Toca Kitchen is free of charge in Google Play Store, My Universe – Star Cooking Restaurant priced RM 32.99 in Steam, Cooking Simulator VR priced RM 44.00 in Steam and the proposed application is free of charge.

The strength of Toca Kitchen is its simple and intuitive interface. Playing and learning the game is made simple by its child-friendly controls and design. Next, the strength of My Universe – Star Cooking Restaurant is balanced blend of cooking and management. The game offers a more complete experience by integrating elements of restaurant management with cooking difficulties. Third, the strength of Cooking Simulator VR is extensive content and variety. To satisfy the needs of both seasoned chefs and food fans, the game provides an extensive selection of ingredients, cooking methods, recipes, and challenges. Lastly, the strength of proposed application, Master Chef

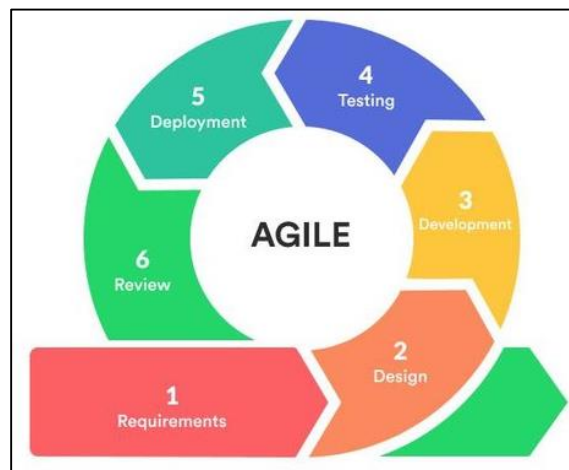
VR is satisfaction of mastering realistic techniques. Players who create dishes that resemble their real-world equivalents in both appearance and flavor are rewarded in the game.

The limitation of Toca Kitchen is its minimal educational value. Although the game covers fundamental cooking ideas, it does not go into great length on specific methods or culinary expertise. Next, the limitation of My Universe – Star Cooking Restaurant is limited replayability. Compared to open-ended culinary games, the game's progression-based structure could not provide as much replay value. Third, the limitation of Cooking Simulator VR is potential for motion sickness. The immersive quality of the game and the simulated movements in the virtual kitchen may cause motion sickness in certain VR users. Lastly, the limitation of proposed application, Master Chef VR is higher system requirements. The VR experience is only available to players with certain hardware configurations because it requires a powerful PC and VR headset.

### 3. Methodology

Agile methodology is an approach to project management that includes breaking the project into aspects and foregrounding continuous improvement and collaboration [12]. Agile methodology is well-suited for projects that are complex, have changing requirements, or involve a high degree of uncertainty [13]. It is an umbrella term for a variety of frameworks, including Scrum, Kanban, Extreme Programming (XP), and the Adaptive Project Framework (APF) [14].

The Agile methodology has been more popular in recent years due to its ability to handle software development projects in a flexible and adaptive way. Additionally, it is an incremental and iterative software development method where requirements and solutions are established through cooperative efforts between self-organizing, cross-functional teams. As a result, implementing the Agile technique can aid software development projects in producing high-caliber software that satisfies client requests and adapting more quickly to changing requirements [15].



**Fig. 2** Agile Methodology Model Diagram [16]

Figure 2 shows Agile methodology model diagram. Based on the resources, Agile methodology consists of 6 phases namely requirement analysis, design, development, testing, deployment and review.

#### 3.1 Requirement Analysis

In this stage, first need to determine the proposed application's preliminary needs. This involves brainstorming the core functionalities like thinking about the learning goals. Next, consider how VR enhances learning and additional features like multiple recipes or user progress tracking. Then, conducting user analysis is crucial. Understanding the target audience's needs helps to tailor the application to them. Finally, examining comparable VR and non-VR cooking applications provides valuable insights to analyze their strengths and weaknesses.

#### 3.2 Design

In this stage, first define the system's needs. This includes choosing compatible VR platforms and determining how to create 3D content. Next, identify the software and hardware requirements. Specify the programming languages and development tools needed and determine the minimum and recommended VR headset and computer specifications to run the application smoothly. Finally, create a general overview of the system's flow. Outline the main menu options, structure learning modules for different techniques, detail how users will interact with the VR environment, and consider how to provide feedback on their virtual actions. Developing a storyboard that includes scenes, user interface elements like buttons and menus, and annotations can further solidify the user experience and identify areas for refinement before coding begins.

### 3.3 Development

In this stage, development begins with building the core functionalities and user interface. The application's logic, a user-friendly VR interface with clear menus and buttons optimized for VR controllers were done. Next comes constructing the 3D world. This involves crafting models of ingredients, tools, and the virtual kitchen itself. Animations like rising dough and baking further enhance the learning experience. Finally, the VR system is set up. Using a VR development platform, the programmed functionalities are integrated with the 3D models and animations within the VR environment.

### 3.4 Testing

In this stage, bugs or glitches that may hinder the application's functionality will actively search for and fix. Through questionnaire, users can provide their perspectives on the application's usability (ease of use and navigation) and functionality (effectiveness in teaching bread baking). Their level of satisfaction with the application's performance is also assessed.

### 3.5 Deployment

The deployment phase of the Agile approach consists of putting the produced features and functions into production. This marks the end of the iterative development process and the point at which customers can benefit from the product. Agile encourages a continuous and incremental delivery strategy in which product increments that may be shipped are made accessible at the completion of each iteration.

### 3.6 Review

Within Agile techniques, the "Review" or "Demo" meeting that takes place at the finish line of every iteration is commonly referred to as the "review phase." As an integral component of the Agile development process, this meeting gives the development team a chance to present the work that has been performed during the iteration to stakeholders, such as customers and other interested parties. Every process ends with this meeting, which is a key opportunity to assess progress, get input, and formulate plans for the subsequent one.

### 3.7 Application Development Workflow

When using the Agile technique, application development is done through a systematic workflow that prioritizes continuous delivery, iteration, and collaboration. The main phases are broken down as follows.

**Table 2** Task and output of each phase

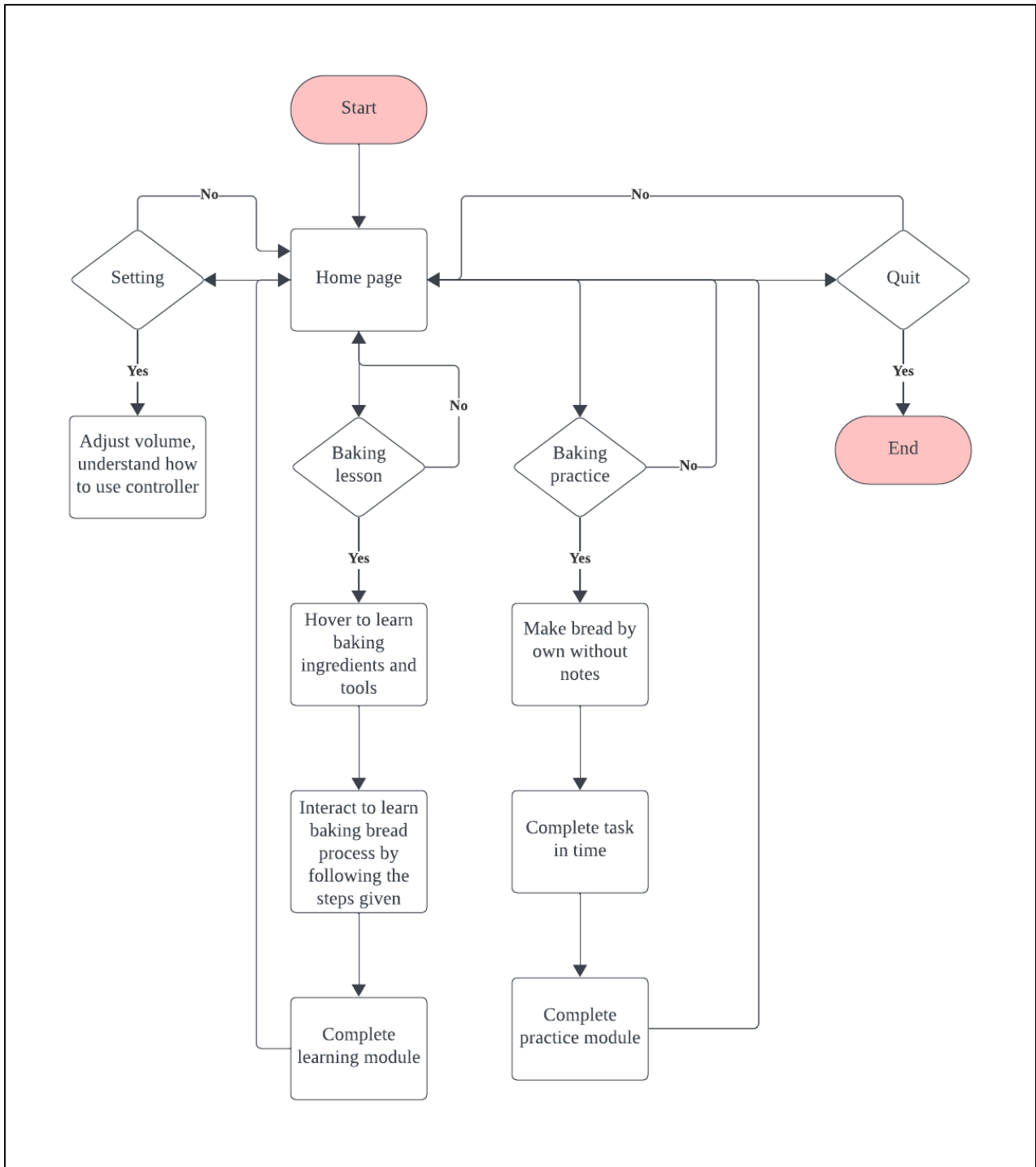
Phase	Task	Output
Requirement Analysis	i. Determine the preliminary needs for the suggested application.	i. The problem statement, goals, project significance, scope, and expected outcome.
	ii. Determine the need for user analysis.	ii. The answers from the interview.
	iii. Examine comparable current apps.	iii. The comparison table that compares the proposed application with similar applications that are already in use.
Design	i. Determine the system's needs.	i. Both functional and non-functional requirements must be met.
	ii. Determine the software and hardware requirements.	ii. Requirements for hardware and software.
	iii. Provide a general overview of the system and its flow.	iii. Content structure and system flowchart.
	iv. Create a storyboard that includes buttons and a UI.	iv. A storyboard including user interface.

**Table 2** Task and output of each phase (continued)

Phase	Task	Output
Development	<ul style="list-style-type: none"> <li>i. Development of system functions and interfaces.</li> <li>ii. Construct 3D models.</li> <li>iii. Set up an VR system.</li> </ul>	<ul style="list-style-type: none"> <li>i. System functionality and user interface.</li> <li>ii. Navigation between scenes.</li> <li>iii. 3D models.</li> <li>iv. How the VR engine operates.</li> <li>v. The environment that is seen virtually.</li> </ul>
Testing	The user's evaluation of progress.	<ul style="list-style-type: none"> <li>i. The developer discovered the application's current issue.</li> <li>ii. Small errors and issues were found and fixed.</li> <li>iii. Enhancement of the program.</li> <li>iv. User satisfaction with the application's usability.</li> <li>v. User satisfaction with the application's functionality.</li> <li>vi. Questionnaire.</li> </ul>
Deployment	Install for the user.	<ul style="list-style-type: none"> <li>i. Application gets accessed by the user.</li> </ul>
Review	<ul style="list-style-type: none"> <li>i. Conduct functional checks on the developer.</li> <li>ii. Assist target users in fulfilling their needs by conducting user acceptance testing.</li> </ul>	<ul style="list-style-type: none"> <li>i. App ratings from users.</li> </ul>

**Table 3** User analysis

Participant	Role in Product	User Requirement
Dr. Siti Hajar Binti Zakariah	Senior lecturer of catering course in FPTV	<ul style="list-style-type: none"> <li>i. Design a large pastry kitchen.</li> <li>ii. Design the learning module on using yeast to make bread.</li> <li>iii. Design the learning module to introduce the tools needed to make bread.</li> <li>iv. Design and create the virtual environment space of the pastry kitchen laboratory on own.</li> </ul>



**Fig.3 Application Flowchart**

Figure 3 shows system flowchart. When the students enter the VR learning application, the students are brought to the home page. There are 'baking lesson', 'baking practice', 'settings' and 'quit' buttons in the home page. The students can navigate to the settings to adjust the volume and read the user manual on controller to understand how to use controller in the VR scene. The students may start from the 'baking lesson'. The students shall learn the uses of baking ingredients and tools to make bread first and followed by the steps of how to make bread. After both learning module are done, the students will be redirected back to the home page. From the home page, the student may continue to the 'baking practice'. The students shall make a bread by themselves without having the notes and complete the task in time. Lastly, the students will also be redirected back to the home page. After completing both baking lesson and practice, the students may quit the application.

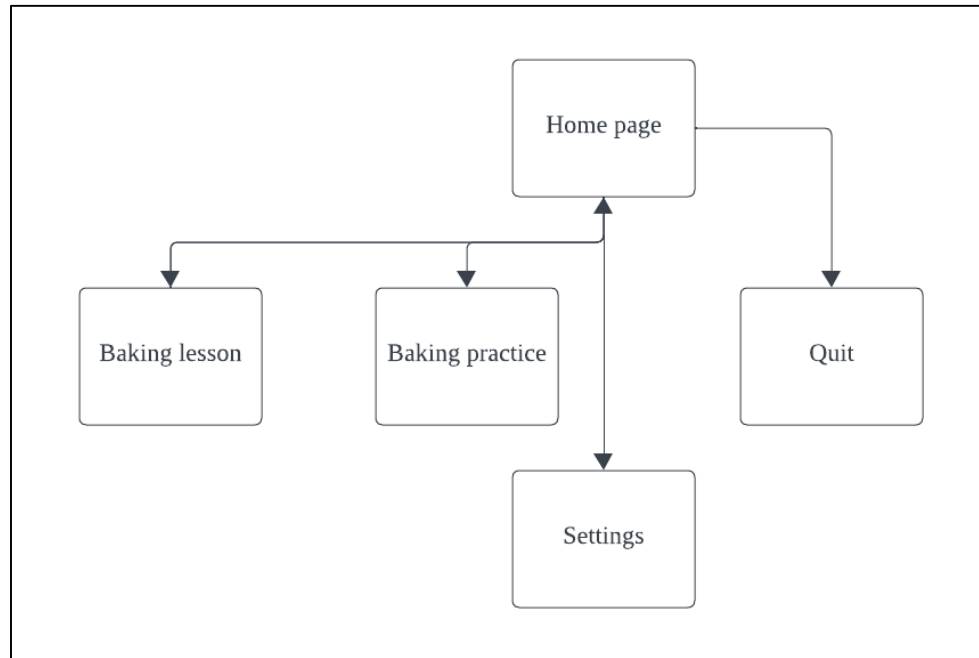


Fig. 4 Navigation Structure

Figure 4 shows navigation structure. Basically, when the user starts the application, the user can navigate to all four buttons which are baking lesson, baking practice, settings and quit. Baking lesson, baking practice and settings are reversible that they can navigate back to the home page.

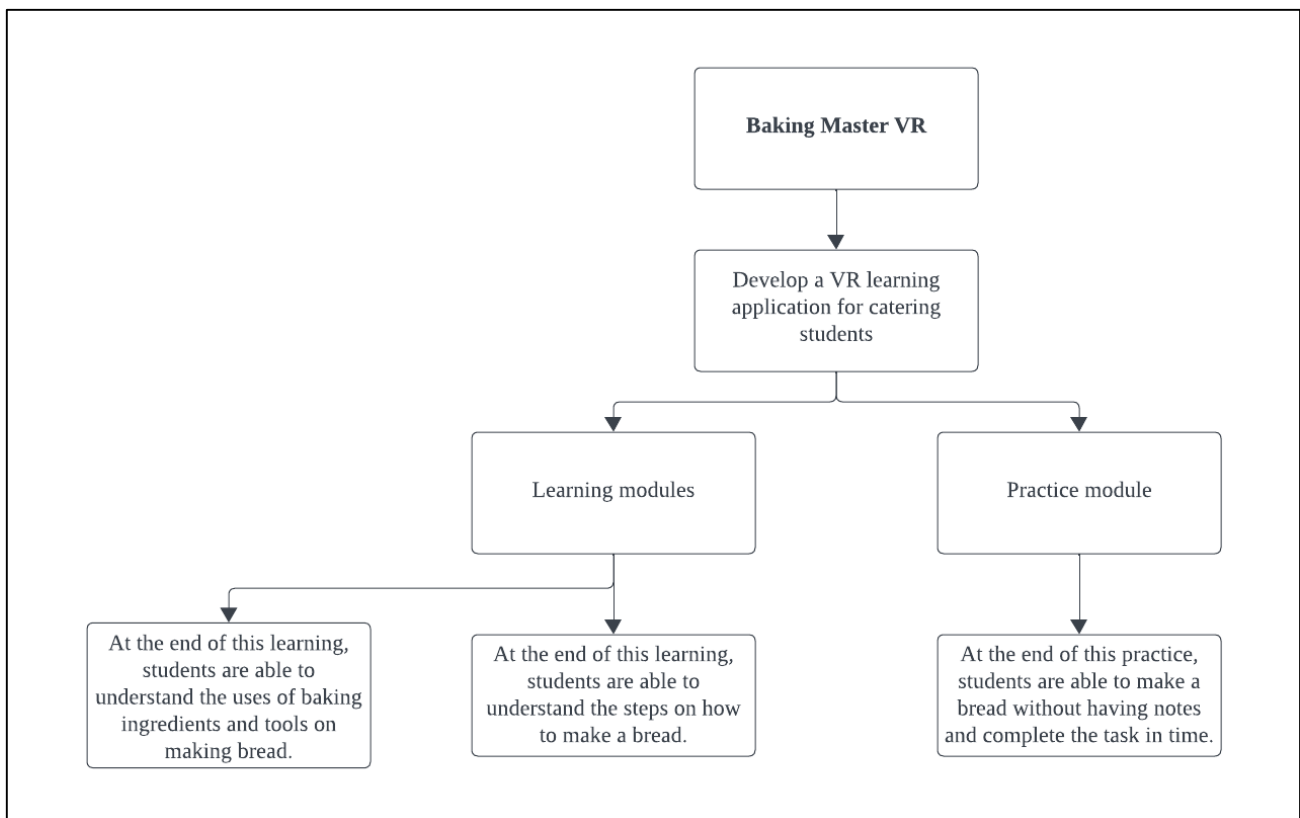


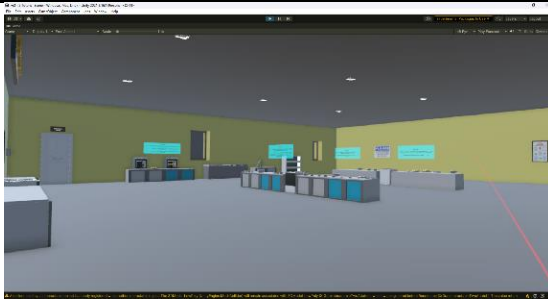




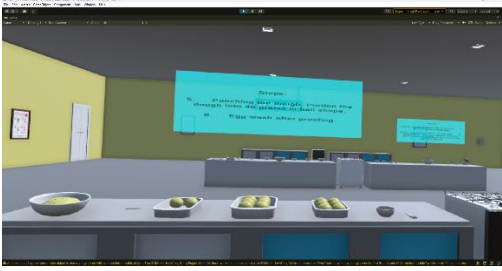
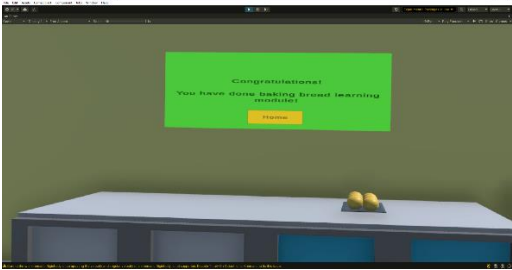

Fig.5 Content Structure

Figure 5 shows content structure. Baking Master VR is aimed to develop a VR learning application for catering students. There are both learning and practice modules in the application. At the end of the learning module 1, the students can understand the uses of the baking ingredients and tools on making bread. Then, at the end of the learning module 2, the students can understand the steps on how to make a bread. Lastly, at the end of the practice module, the students are able to make a bread without having notes and complete the task in time.

**Table 4** Interface design

Interface	Description
	<p>The home page of the application. There are 4 buttons for baking lesson, baking practice, settings and quit. All the buttons can be accessed.</p>
	<p>The setting page allows the students to adjust volume and see how to control the application using VR controller.</p>
	<p>The overall look of the virtual pastry laboratory environment.</p>
	<p>There are baking ingredients and tools on the table with the labels to let students recognize and interact with.</p>
	<p>When the students hover on the baking ingredients and tools using the controller, the uses of the particular object will appear.</p>

**Table 4** Interface design (continued)

Interface	Description
	In the learning bread session, there will be instructions hanging in the air. There are the steps (instructions) of making bread above the table to guide the students on how to make bread.
	Once the bread is done and place at serving area, there will be a panel that provide 'Home' button to redirect the students back to the home page.
	In the practice module, there is a countdown timer, and the students should complete the task in time without having the guidelines (steps of making bread).

## 4. Results and Discussion

### 4.1 Alpha Testing

**Table 5** Test plan

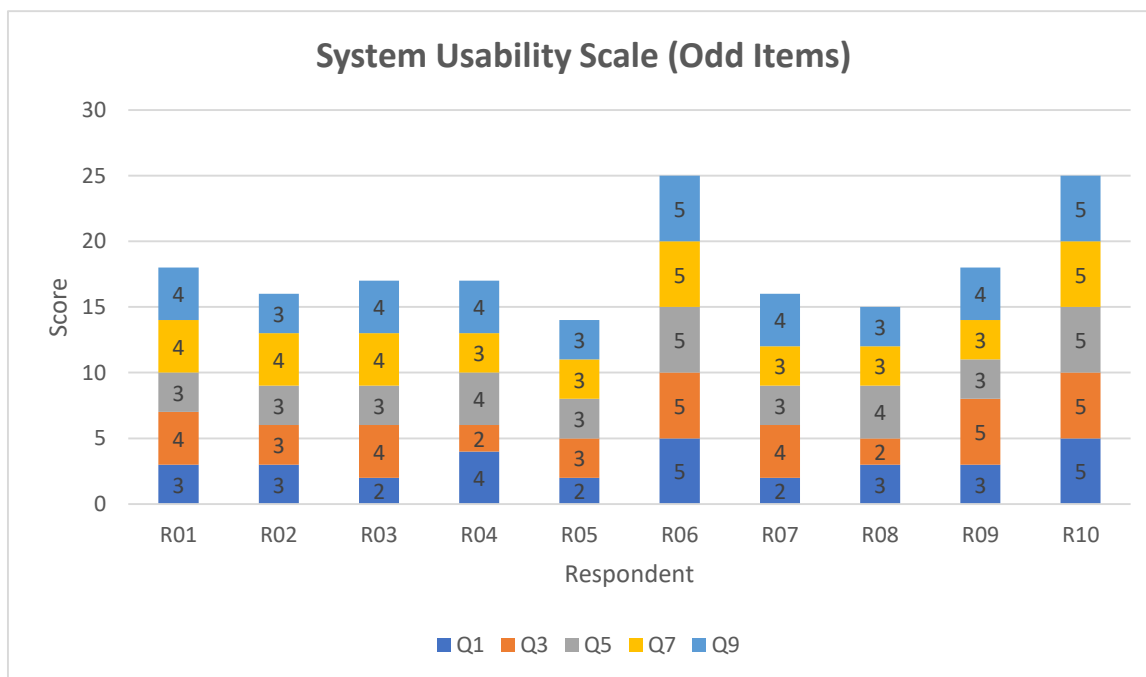
Section	Test Input	Expected Result	Actual Result	Comment
Home page	All option buttons	All option buttons function well	Correct	-
Virtual environment	Camera movement	Camera moves with users' head movement while using Oculus	Correct	-
	Virtual hands	Controller is used to control virtual hands	Correct	-
	Grab function	Grab ray occurs to grab objects	Correct	-
	Teleportation	Able to teleport to somewhere else	Yes, but there is another extra laser occur	-
	Collider	Collide with objects and not passing through them	Correct	-
	Movement and rotation	Control moving and turning around	Correct	-

**Table 5** Test plan (continued)

Section	Test Input	Expected Result	Actual Result	Comment
Learning module	Display ingredients and tools' information	Hover to display	Correct	-
	Particle system	Trigger particle system after certain action	Nothing happen after certain action	Assign a button on controller to manually activate the particle (fixed)
	Animation	Activate specific animation after certain action	Fail to achieve, the animation plays itself	-
	UI	Occur when the learning module is done	Correct	-
Practice module	Countdown timer	Able to countdown	Correct	-
	Locate timer	Fixed position on middle top or follow user's camera	No timer in the scene	Place the timer on the wall in the scene (fixed)

Table 5 shows test plan. The alpha testing is done based on the test input available in the Baking Master VR. The corrections have been made to some of the parts that are not working well. Each correction made has been specified in the table.

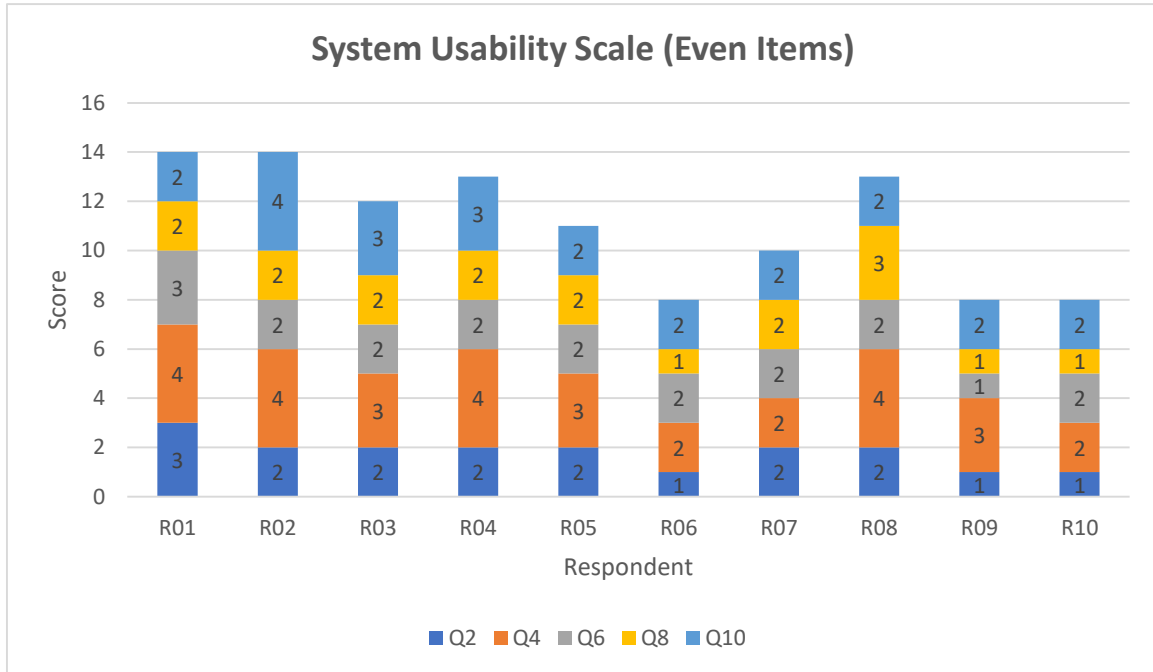
**4.2 Beta Testing**



Question 1: I think that I would like to use this VR learning application frequently.  
 Question 3: I thought this VR learning application was easy to use.  
 Question 5: I found the various functions in this VR learning application were well integrated.  
 Question 7: I would imagine that most people would learn to use this VR learning application very quickly.  
 Question 9: I felt very confident using this VR learning application.

**Fig. 6** SUS Positive Questions Result

Students from Catering course of FPTV, UTHM make up the target user base. The target users receive a collection of questionnaires created using Google Form. The test was administered by inviting 10 Catering students for input using the survey form. Based on Figure 6, the respondents' ratings ranged from 2 to 5, which most of them agrees to the positive statement in questionnaires. The analysis shows that most people found the VR learning application easy to use and well-integrated. The respondents were also confident using the application and believe that most people would learn to use it very quickly.



Question 2: I found this VR learning application unnecessarily complex.  
 Question 4: I think that I would need the support of a technical person to be able to use this VR learning application.  
 Question 6: I thought there was too much inconsistency in this VR learning application.  
 Question 8: I found this VR learning application very cumbersome to use.  
 Question 10: I needed to learn a lot of things before I could get going with this VR learning application.

**Fig. 7** SUS Negative Questions Result

Based on Figure 7, the analysis suggests that the VR learning application has some room for improvement in terms of usability, but that it is generally perceived as being easy to use. Generally, the figure shows individual user responses about disagree to complexity, agree to technical support needs, disagree to inconsistency, disagree to cumbersome of use, and disagree to high learning curve. Thus, the main shortage of the application is the high technical support needs. The total scores for each question from the user tests were shown in Table 6 in detail, followed by calculating the average score by using the SUS formula.

**Table 6** Respondent's score

Respondent	Item Score										Total Score
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
R01	3	3	4	4	3	3	4	2	4	2	62.50
R02	3	2	3	4	3	2	4	2	3	4	57.50
R03	2	2	4	3	3	2	4	2	4	3	65.00
R04	4	2	2	4	4	2	3	2	4	3	62.50
R05	2	2	3	3	3	2	3	2	3	2	60.00
R06	5	1	5	2	5	2	5	1	5	2	95.00
R07	2	2	4	2	3	2	3	2	4	2	67.50
R08	3	2	2	4	4	2	3	3	3	2	57.50
R09	3	1	5	3	3	1	3	1	4	2	77.50
R10	5	1	5	2	5	2	5	1	5	2	95.00
<b>Average Score</b>											<b>70.00</b>

The formula used to obtain usability results based on the SUS are:

$$\text{Total score} = (\text{odd items} + \text{even items}) \times 2.5$$

$$\text{Average score} = \frac{\text{Total score}}{\text{Total respondents}}$$

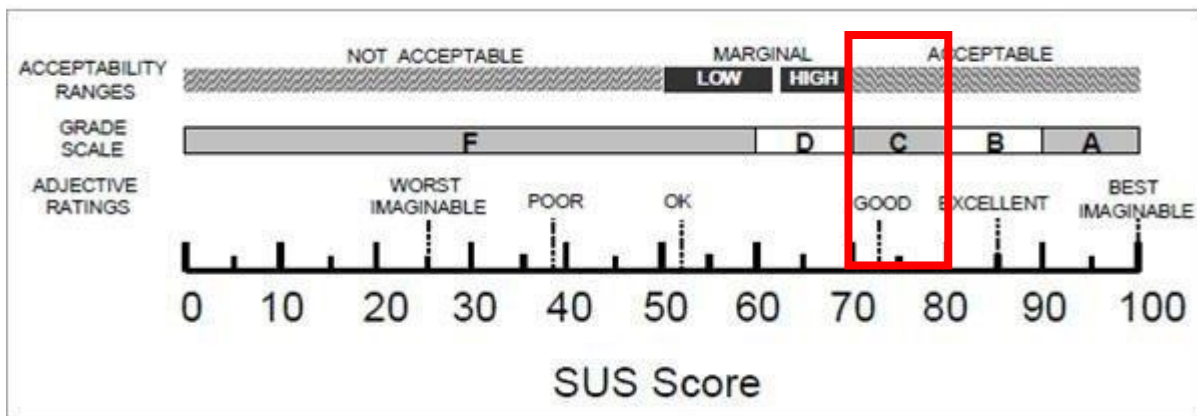
Where:

Odd items (Q1, Q3, Q5, Q7, Q9) = contribution - 1

Even items (Q2, Q4, Q6, Q8, Q10) = 5 - contribution

Therefore,

$$\text{Average score} = \frac{62.50+57.50+65.00+62.50+60.00+95.00+67.50+57.50+77.50+95.00}{10} = 70.00$$



**Fig. 8** System Usability Scale (SUS) [17]

The System Usability Scale (SUS) formula was utilized to get the average score for each question in the user tests, resulting in the total scores for each question. According to the Acceptability Ranges score scale, the average score of 70.00 falls within the "acceptable" range. Ok is the adjective rating, and a "C" is on the grade scale. All things considered, the application is functional and usable, which is good. However, it may not reach the level of facilitate learning as there are some room for improvement in terms of being realistic.

## 5. Conclusion

In conclusion, the two primary modules of Baking Master VR—the practice and learning modules for bread were produced effectively.

The initiative has succeeded in achieving all three of its initial goals. This project's three goals were completely achieved by using a virtual reality method to build the Baking Master VR. The design phase includes interface design, storyboarding, flowcharts, navigational organization, and 3D model creation to accomplish this purpose. Second, integrating Unity Game Engine with Baking Master VR to successfully construct a VR learning application for catering students. The process of utilizing Unity to create a VR learning application for catering students includes configuring the development environment, designing the VR experience, and integrating interactive components that impart baking knowledge. Lastly, following the completion of the development phase, carrying out the functional and usability testing. Based on the System Usability Scale (SUS), the usability testing produced a SUS score of 70.00, falling into the "acceptable" range on the Acceptability Ranges score scale. "C" is the grade scale, and "Ok" is the adjective rating.

Baking Master VR has a few advantages such as remote learning. This is because the VR program is accessible from any location, it is perfect for circumstances when in-person instruction is not possible or for distant learning. Its flexible scheduling also allows students to study on their own time and at their own speed, which might be more practical than set class periods.

However, apart from the benefits, Baking Master VR also has a few flaws that were discovered during testing. The main shortage is the animation is not good enough, lack of details and not smooth. It even cannot only trigger after specific action. This limitation hinders the realism of the application. Therefore, the future improvements will focus on optimizing animation and making it look as real as possible. By doing this, the user experience will be better. Secondly, the application is very simple and there is limited learning content. It is hoped that future improvements can add more learning content to enrich the exploration and practicality of the application to the users.

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## Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

## Author Contribution

This journal requires that all authors take public responsibility for the content of the work submitted for review. The contributions of all authors must be described in the following manner:

The authors confirm contribution to the paper as follows: **study conception and design:** Lau Qian Wen, Mohd Norasri; **data collection:** Lau Qian Wen; **analysis and interpretation of results:** Lau Qian Wen, Mohd Norasri; **draft manuscript preparation:** Lau Qian Wen, Mohd Norasri. All authors reviewed the results and approved the final version of the manuscript.

*The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.*

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