

Malaysian Chef: The Development of a 2D Malaysian Food Mobile Game

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Abstract

Malaysian has many unique aspects that identifies us as a country that has independently grown and thrive in this modern era. Amongst its diverse cultures, one aspect that unites all of Malaysian most passionately is our food. However, the online gaming market lacks such local content, overshadowed by foreign cuisine. Thus, a kids-friendly 2D mobile game, 'Malaysian Chef', is proposed. The objective of this project is to design the application using a gaming approach, to develop the application by implementing an interactive food preparation gameplay mechanics on the Android platform and to implement alpha and beta testing on the developed application to the target user. Agile methodology was used in developing the application, before applying System Usability Scale (SUS) to evaluate the functionality of the developed application. The application achieved a SUS score of 90.21, which is considered excellent in terms of usability.. By implementing an interactive food preparation gameplay, the game hopes to raise awareness and appreciation for the country's culinary diversity amongst the dominating feature of foreign food in the online game market.

1. Introduction

Like any country's cultural heritage, Malaysian cuisine reflects the country's uniqueness and recounts its historical roots. Due to its diverse population, Malaysian's cuisine draws its inspirational dishes from various ethnic groups, creating fusion blends that define its dishes [1]. The predominant Malay, Chinese and Indian food groups contribute to the wide variety of recipes with their own unique flavors [2]. Nowadays, two-dimensional (2D) games continue to thrive in the gaming industry [3]. According to Unity [4], 2D games utilize flat graphics known as sprites, lacking three-dimensional geometry in development. In this modern era, a mobile game is playable on a handheld device that can function online or offline [5]. Such mobile games can be preloaded and downloaded by users from platforms such as the Google Play Store [6].

Yusoff [7] emphasizes the limitations of conventional learning methods of the younger generation, highlighting the need for innovative approaches within the educational field. Therefore, a game application can be developed by incorporating non-game context into its game features, promoting an engaging and motivating way to learn, that is what the technique of gamification that is to be used in this project hopes to achieve [8].

Furthermore, there is lack of local content development for game applications, with an overwhelming focus on foreign foods such as pizza or sushi. Consequently, online audience are more familiar with foreign cuisines, diminishing their knowledge on Malaysian cuisine. Therefore, the mobile game application, 'Malaysian Chef' is proposed to be developed to solve this problem.

The objectives for this project are to design the Malaysian Chef game application using a game approach, to develop the Malaysian Chef game application by implementing an interactive food preparation gameplay mechanics on the Android platform, and to implement alpha and beta testing on the developed application to the target user. The proposed application is developed for primary school students that are above the age of 7. The subject matter expert (SME) is Miss Seow Yim Ho, who has 20 years of experience in teaching primary school students English at Avenue Creative Learning, Ipoh. Furthermore, simple operations and step-by-step instructions would be incorporated to help players cook each dish.

The “Malaysian Chef” application contains one activity module, where players can learn how to cook different dishes. As the player progresses with completing the first few dishes, players would be able to unlock the rest of the dishes available to encourage a sense of achievement. Besides that, the content will be based in the English language to accommodate users from a variety of ethnic backgrounds. Furthermore, the application should be able to showcase 2D graphics in a clear and visually appealing manner. Working navigation buttons should be able to let users navigate through each interface smoothly. ‘Malaysian Chef’ can be used as a teaching and learning aid about Malaysian food, while also being used for self-entertainment purposes as well.

The following paper shall elaborate on 4 other sections. Section 2 covers the domain of study, the technology used, and the result of the comparative analysis. Section 3 describes the agile methodology applied in this project, accompanied by the description, and output of each methodology phase. Lastly, Section 4 documents the implementation and testing progress, followed by the conclusion in Section 5.

2. Related Work

This section would discuss the study domain, technology used, and result of the comparative analysis.

2.1 Malaysian Food

Jaafar’s insights [9] highlights that Malaysia’s authentic cuisine reflects its rich cultural history, shaped by the various ethnic groups and nationalities, including influences from India, Chinese, and Thailand. As such, the mixture of cultures has evolved into the Malaysian food known today. For simplicity, the current project will focus on the major of Malaysians which are Malay, Chinese and Indian [10]. In this modern era, information about Malaysian food is accessed through hands-on experiences, physical materials like cookbooks [11], online materials such as websites [12], documentaries [13], as well as vlogs [14].

2.2 Technology Used

The technology that has been utilized in this project is a mobile game application. Mobile games can be described as online video games that utilize the internet to function and are applied to mobile devices as their main platform for users. Yamini [15] traces the surge in mobile gaming’s popularity to emerging technologies such as 5G technology, augmented reality and virtual reality and distributed cloud. The history of mobile gaming is evident from the evolution of the simple Nokia Snake game to sophisticated 3D and virtual reality games since 1994. Advanced mobile specifications like dedicated GPUs, reliable RAM, and high screen resolutions, have overcome past limitations, allowing mobile gaming to dominate the gaming industry on a global scale [16].

While catering mainly to entertainment, mobile gaming has also aided in E-learning, allowing the technology to be referred to as educational games. Godoy Jr., C. findings [17] reveal that such usage contributes to language study, disability learnings, vocational training, and enhancing overall learning experiences. Fancy Fruits is an application that achieves the goal of learning through games by implementing augmented reality technology to help students with disabilities learn about fruits and vegetables, gaining positive user feedback in field studies [18].

2.3 Comparative Analysis



Fig. 1 Gameplay interfaces of existing applications (a) Little Panda’s Chinese Recipes; (b) Sushi Maker Kids Cooking Games (c) Cooking Games Chef

Table 1 Comparison between existing application and proposed application

Elements	Little Panda's Chinese Recipes	Sushi Maker Kids Cooking Games	Cooking Games Chef	Malaysian Chef
Interface and game settings design	Attractive interface and suitable game settings design.		Interface contain jarring colours and unsuitable game settings design.	Attractive interface and suitable game settings design.
Inclusive of local content		Non-inclusive of Malaysian content.		Inclusive of Malaysian content.
Accuracy of content	Accurate in terms of cooking ingredients and cooking methods.	Accurate cooking methods but includes unconventional cooking ingredients.	Accurate in cooking methods but includes unclear cooking ingredients.	Accurate in terms of cooking ingredients and cooking methods.
Voice-over	Contains voiceover throughout the gaming experience that provides guidance to the player.	Does not contain voice-over throughout the gaming experience.		Contains voice-over throughout the gaming experience that provides guidance to the player.
Prompts or hints	Contain non-intrusive prompts or hints for players.	Does not contain prompts nor hints for players.	Contain intrusive prompts or hints that disrupts player's experience.	Contain nonintrusive prompts or hints for players.
In-app purchases and advertisements	Contains in-app purchases and advertisements.	Contains in-app purchases but no advertisements.	Contains advertisements but no in-app purchases.	Does not contain in-app purchases nor advertisements.

For this section, a comparison has been made existing application, such as Little Panda's Chinese Recipes [19], Sushi Maker Kids Cooking Games [20], Cooking Games Chef [21] and the proposed application. Figure 1 shows the gameplay interfaces of the three existing applications. Meanwhile, Table 1 shows the result of the comparative analysis. Based on Table 1, the comparison between the existing applications and the proposed application can be concluded. The proposed application would mainly differ from the three existing applications would be its inclusiveness of local content, as well as the elimination of advertisements and in-app purchases. Beyond this uniqueness, Malaysian Chef combines the best features of existing applications. It incorporates attractive interfaces and game settings design, accurate content, accompanied by voice-over guidance for players. The app also provides non-intrusive hints or prompts, enhancing the overall gaming experience. However, the limitation for this proposed application is that it only focuses on a 2D design for all the interfaces.

3. Methodology

**Fig. 2** Agile methodology

Agile methodology is used to create the proposed application, 'Malaysian Chef'. This is due to the project being in a change-driven environment and requires a methodology that can adapt to the risks and feedback [22]. In figure 2, there are 6 phases in the Agile methodology. The phases are requirement analysis phase, design phase, develop phase, testing phase, deployment phase, and review phase. Each phase would be elaborated in their respective subsections.

Table 2 *User analysis*

Stakeholder category	Role in product	Design implication	Action needed
General User (children from 7 to 12 years old)	End-user of the proposed application.	Based on the questionnaire, the user preferences	<ul style="list-style-type: none"> • Have access to a mobile device. • Need to develop a casual cooking simulation game involving Malaysian dishes. • Lack of knowledge on Malaysian cuisine. • Importance of accurate cooking ingredients and methods for each Malaysian dish. • Importance of attractive 2D interface and suitable game settings design. • Importance of voice-over. • Importance of non-intrusive prompts or hints. • Importance of absence of in-app purchases and advertisements. • Importance of creation of the proposed game application.
Subject Matter Expert (SME)	Content consultant expert in related field	Based on the interview, Improve user interface design Additional text Challenges Content Change	<ul style="list-style-type: none"> • Avoid categorization the food selections available based on ethnicity. • Suggested a change in design to a few interfaces. • Addition of more text to encourage reading habits. • Include slight challenges in the cooking simulation process. • Include not-well-known dishes from various cultural backgrounds.

3.2 Design Phase

This phase focuses on developing the system design and visuals of the proposed application. The activities conducted include designing system overview, overall system flow, storyboard, prototyping, game system, creating game design document and assets preparation. The output is the proposed application's navigation structure, content structure, process flow, a low-fidelity storyboard, high-fidelity prototyping, as well as the aforementioned documents and assets. Functional and non-functional requirements will be shown in table 3 and table 4 respectively. The design of the navigation structure, content structure, and flow chart can be viewed in appendix figure 3, figure 4 and figure 5 respectively. Table 5 will tabulate the button designs while table 6 will showcase interface designs.

Table 3 *Functional requirements*

Functional requirements	Module	Description
User interaction	Main interface	<ul style="list-style-type: none"> • The system shall provide players with the ability to start the application. • The system shall provide players with the ability to exit the application.
	Main menu	<ul style="list-style-type: none"> • The system shall provide players with the ability to select the type of food to cook.

Table 3 *Functional requirements (continued)*

Functional requirements	Module	Description
User interaction	Settings	<ul style="list-style-type: none"> The system shall provide players with the ability to toggle music volume. The system shall provide players with the ability to toggle sound effects volume.
	Activity Module Pause menu	<ul style="list-style-type: none"> The system shall provide players with the ability to play the gameplay. The system shall provide players with the ability to pause the game. The system shall provide players with the ability to restart the current gameplay. The system shall provide players with the ability to resume the current gameplay. The system shall provide players with the ability to return to the main menu.
Autonomous System Activities	Activity Module	<ul style="list-style-type: none"> The system shall display the next following interfaces of the gameplay when players continue the gameplay. The system shall display the hints that will provide guidance to the players throughout the gameplay interfaces.
	Loading screen	<ul style="list-style-type: none"> The system shall display a loading screen when players choose the dish to proceed into the gameplay.

Table 4 *Non-functional requirements*

Non-functional requirements	Description
Performance	<ul style="list-style-type: none"> The game application shall be able to operate offline without the need for internet connection. User and system interaction should not exceed three seconds. The time to display the interfaces should not be more than three seconds.
Operational	<ul style="list-style-type: none"> The game application shall be able to operate on Android mobile devices that are of version 5.0 and above.
Cultural	<ul style="list-style-type: none"> The language used in the game application shall be in English.
Legal	<ul style="list-style-type: none"> Users are not able to modify the information displayed in the game application.
Usability	<ul style="list-style-type: none"> The game application shall be user-friendly and easy to use.

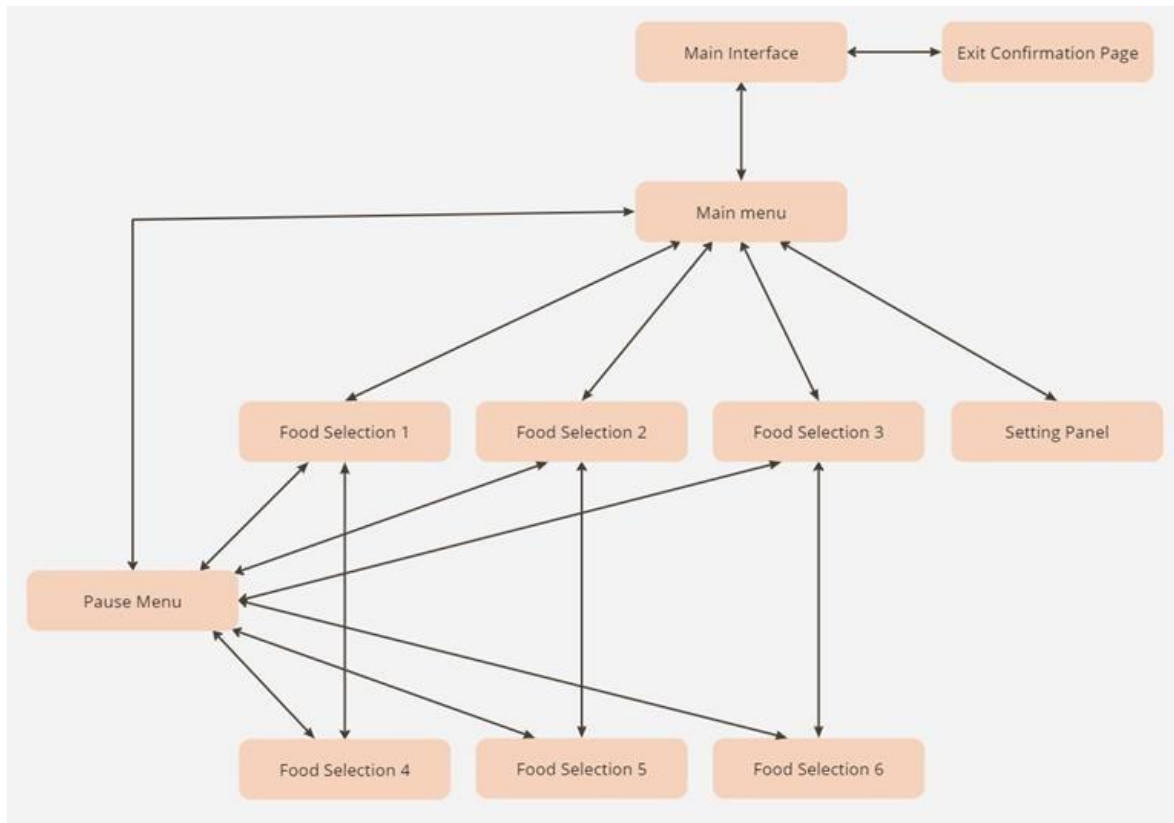


Fig. 3 Navigation Structure

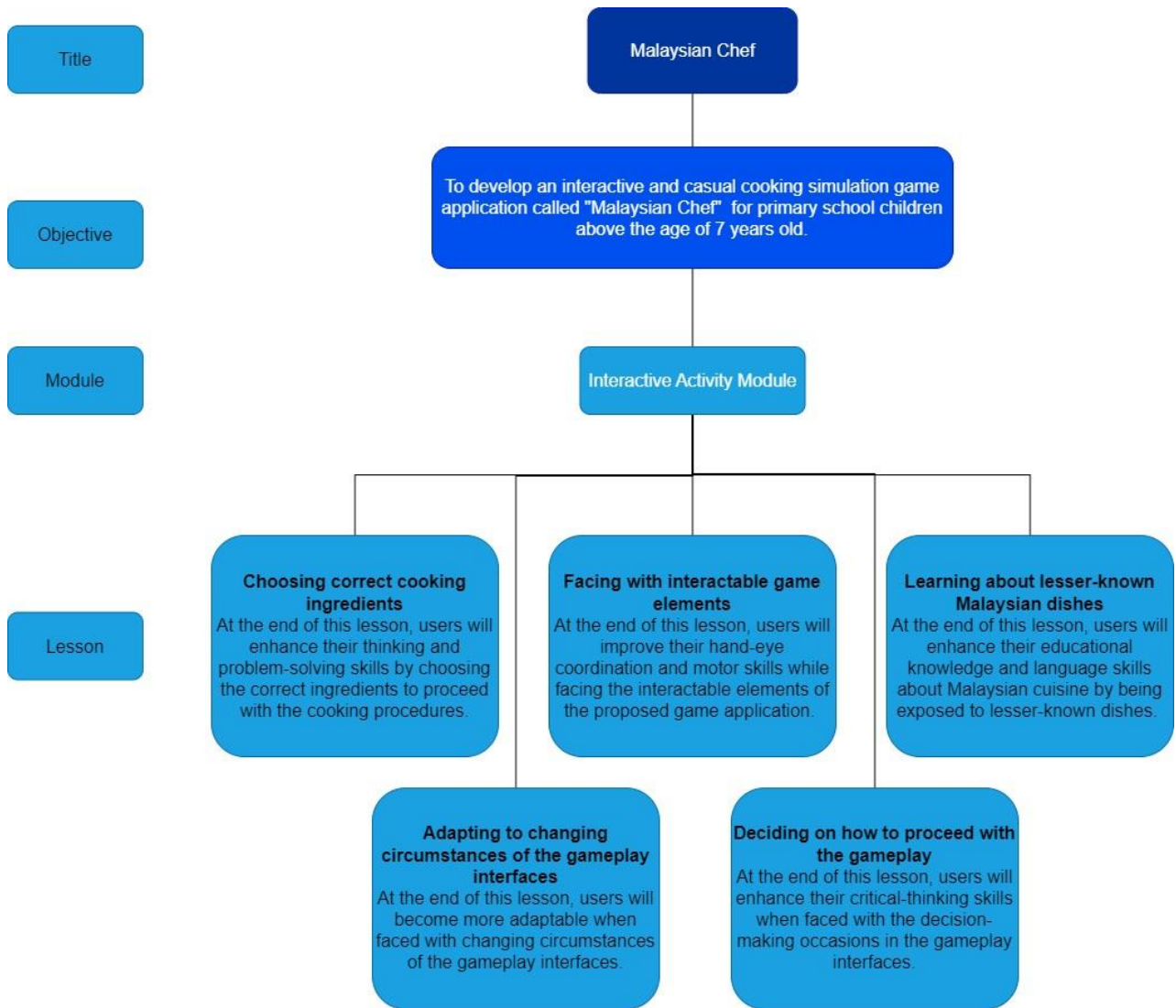


Fig. 5 Content Structure

Table 5 Button design














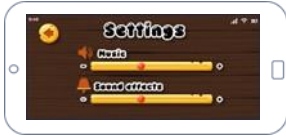


Button	Description	Button	Description
	This is a play button.		This is a settings button.
	This is an exit button.		This is a pause button.
	This is a confirm button.		This is a main menu button.
	This is a reject button.		This is a resume button.
	This is a back button.		This is a retry button.

Table 6 Interface design

Interface	Description	Button	Description
	This is the main interface of the proposed application. The user clicks the play button to go to the main menu interface, while the exit button directs the user to the exit confirmation interface.		The main menu interface allows user to choose the dishes that are available to be played, dishes that are darkened are locked. Users can choose the back button to return to the main interface, or the settings button.
	This is the exit confirmation interface where user can choose the confirm button to exit the application, while the reject button will direct user back to the main interface.		The settings interface allows the user to toggle the volume of the music and sound effects of the proposed application. User can select the back button to return to the main menu interface.
	The first gameplay interface shows the user the prompt of the interface, the setting, the utensils and the ingredients used in the first step. User can select pause button to go to the pause menu interface.		This is the pause menu interface. Users can choose to direct back to the main menu interface, to resume the current gameplay interface they are on, or restart the current gameplay from the beginning.

3.3 Develop Phase

This phase focuses on technical development of the proposed application. The activities conducted include developing the 2D interfaces, system function and integrating the audio as well as the music into the proposed application. The output is the proposed application’s main menu, activity module, 2D interfaces, scene navigation, audio and music integration, and system functionality.

3.4 Testing Phase

This phase focuses on testing the developed application. The activity conducted includes letting users review the project progress. The output is the conduction of alpha and beta testing, performance of user acceptance level testing, and implementing suggested improvements.

3.5 Review Phase

This phase focuses on the review of the developed application. The activity conducted includes final functional testing before the application is finalized. The output is a final testing performance and product finalization.

3.6 Application Development Workflow

This sub-section elaborates on the application development workflow for the agile methodology in the form of table 7, covering requirement analysis phase, design phase, development phase, testing phase, deployment phase as well as the review phase. Each phase would include its specialized tasks as well as the expected output of such tasks.

Table 7 *Application development workflow*

Phase	Task	Output
User Interaction	<ul style="list-style-type: none"> Identify the initial requirements for the proposed application Conduct user research Identify the user analysis and requirement Carry out competitive analysis 	<ul style="list-style-type: none"> The project title, problem statement, objectives, and scope Comparison table between similar existing applications and proposed applications
Design	<ul style="list-style-type: none"> Design system overview and overall system flow Design low-fidelity storyboard Design high-fidelity prototype Design Game System Identify details for game design document Prepare assets 	<ul style="list-style-type: none"> Navigation structure, Content Structure, process flow (flowchart) Low-fidelity storyboard with user interface and buttons High-fidelity prototyping that involves UI and UX elements Game design documents Background game interface, navigation buttons design, audio resource location, 2D art creation, and 2D animation creation
Develop	<ul style="list-style-type: none"> Develop 2D interfaces System function development Integrate audio and music 	<ul style="list-style-type: none"> Main menu and activity module 2D interfaces Scene to scene navigation Audio and music integration System function
Testing	<ul style="list-style-type: none"> Progress reviewed by user 	<ul style="list-style-type: none"> Alpha testing Beta testing User acceptance level on the usability of the game application User acceptance level on the functionality of the game application User acceptance level on the performance of the game application Improvement on the game application
Deployment	<ul style="list-style-type: none"> Display to the user 	<ul style="list-style-type: none"> Compile and deploy application to user
Review	<ul style="list-style-type: none"> Perform final functional testing Perform finalization of product 	<ul style="list-style-type: none"> Final testing performance Finalize final product

4. Results and Discussion

This section shall be discussing the results obtained from the implementation and testing phase of the project. The implementation phase involves the elaboration of the type of assets developed in Unity, and the various functionality integration that involves scripting, as well as the development of the Android Application Package (APK). Following that, the testing phase would involve displaying the results for the functional test and the user acceptance test that depicts the improvements made on the game application.

4.1 Implementation phase

This phase shall elaborate on the development of assets made in Unity, the integration of the game application’s functionality that involves scripting, as well as the development of the APK file. Firstly, three main types of assets have been integrated that includes the audio, graphics as well as 2D animation. ‘Malaysian Chef’ has utilized under a 100 different audio files to cover features such as the background music, sound effects, as well as the voice-overs that are sourced royalty-free. As for the graphics, the interfaces, ingredients, utensils, buttons and icons are sourced from platforms such as Canva, Freepik, and Flaticon to obtain the desired results. Lastly, the 2D animation for some of the cooking scenes is created on Unity software.

Next, a total of five main functionalities are integrated into the ‘Malaysian Chef’ with their scripting, including interaction functionality, pause menu functionality, scene transition functionality, unlocking functionality, and exit functionality. The first functionality that involves interaction, involves creating scripts that allows the player to be able to perform actions such as swiping, dragging, making circular motions, and holding during the gameplay. This interaction is used to mimic cooking skills such as chopping, folding and mixing ingredients. Besides that, the pause menu functionality is a core aspect that allows players to have full control of the system, whereby they can resume or pause their progress when cooking a dish, restart their progress from the first cooking step, and returning to the main menu interface. As for the scene transition functionality, this aspect controls the overall flow of the gameplay interfaces. A few methods are applied such as completing the initial step of a dish to continue to the next step, or by detecting an input from the player. The fourth functionality involves the unlocking of new dishes once the player completes the first three dishes available, encouraging a sense of achievement amongst the players. Finally, the exit functionality allows the players to manage their progress and avoid accidental loss. This is achieved by ensuring that the game resets its progress if the player exits via the designated exit button, otherwise the game remains saved and uninterrupted.

The final step of the development process includes building the APK file in Unity. After ensuring that the Player settings contain the accurate product name, version and icon, all scenes for ‘Malaysian Chef’ are added into the Built settings before the APK file is produced.

4.2 Testing phase

The testing phase involves functionality testing and user acceptance testing. The functionality testing is performed by the developer of ‘Malaysian Chef’ to fix bugs and errors that occur throughout the development process. Meanwhile, the user acceptance test is done by the distribution of a questionnaire based on the System Usability Scale (SUS) that lets the game application’s targeted users evaluate the usability of the product.

To begin, the functionality testing is performed on game application’s buttons, sliders, and the aforementioned assets and various functionalities to ensure that they are working well. The result of the testing is tabulated in table 8 in terms of their expected output, actual output and the corrective action taken.

Table 8 Result of functional testing

Function	Test Case	Expected Output	Actual Output	Corrective Action
Buttons	Exit	Navigate player to exit confirmation interface.	Works well as expected.	Not needed.
	Exit confirmation	Navigate player out of game application.	Works well as expected.	Not needed.
	Exit denial	Navigate player to main interface.	Works well as expected.	Not needed.
	Play	Navigate player to main menu interface.	Works well as expected.	Not needed.
	Back	Navigate player to main interface.	Works well as expected.	Not needed.
	Settings	Navigate player to settings interface.	Works well as expected.	Not needed.
	Murukku	Navigate player to first gameplay interface for Murukku.	Works well as expected.	Not needed.

Table 8 *Result of functional testing (continued)*

Function	Test Case	Expected Output	Actual Output	Corrective Action
Buttons	Murtabak	Navigate player to first gameplay interface for Murtabak.	Works well as expected.	Not needed.
	Lemang	Navigate player to first gameplay interface for Lemang.	Works well as expected.	Not needed.
	Otak-otak	Navigate player to first gameplay interface for Otak-otak.	Works well as expected.	Not needed.
	Dumplings	Navigate player to first gameplay interface for Dumplings.	Works well as expected.	Not needed.
	Chee cheong fun	Navigate player to first gameplay interface for Chee cheong fun.	Works well as expected.	Not needed.
	Pause	Directs player to the pause interface during gameplay.	Works well as expected.	Not needed.
	Resume	Returns player to the gameplay interface that they were on.	Works well as expected.	Not needed.
	Retry	Returns player to the first gameplay interface of each dish.	Works well as expected.	Not needed.
	Resume	Returns player to the gameplay interface that they were on.	Returns player to the first gameplay interface of Lemang dish.	Amended the script to retry at the first gameplay interface for each respective dish
	Main menu	Direct player to the main menu interface during gameplay.	Works well as expected.	Not needed.
Sliders	Music	Toggles the background music of the game application	Does not change the music volume of the background music.	Review the script so that the music volume can be toggled via the slider.
	Sound effects	Toggles the volume of the sound effects for the buttons of the game application.	Does not change the music volume of the sound effects for the buttons.	Review the script so that the volume for the sound effects can be toggled via the slider.
Audio	Background music	Plays throughout the application.	Stops after player transitions away from main interface.	Adjusted the script so that the background music play throughout the game application and added a sound manager to each scene.
	Sound effects	Plays when prompted throughout gameplay interfaces.	Works well as expected.	Not needed.

Table 8 Result of functional testing (continued)

Function	Test Case	Expected Output	Actual Output	Corrective Action	
Audio	Voice-overs	Plays when prompted throughout gameplay interfaces.	Works well as expected.	Not needed.	
Graphics	Interfaces	Displays appropriately as game application interfaces.	The size is not suitable for a mobile interface.	Adjusted the width and height of the interfaces so that it is optimized for most mobile interfaces.	
	Ingredients	Responsive to player interactions.	Non-responsive upon player interaction in mobile version.	Added scripts so that ingredients can be responsive upon interaction from both mouse and finger input.	
	Utensils	Responsive to player interactions and perform designated function.	Does not render desired output results for different utensils.	Created specific scripts for each utensil so that they perform designated function.	
	Buttons	Responsive as game application buttons.	Works well as expected.	Not needed.	
2D animation	Icons	Provide visual guidance to player for specific actions.	Static on gameplay interfaces and causes interference on player interaction.	Added scripts to provide animation to icons for increased visual engagement and adjusted position on scene hierarchy.	
	Object animations	Play out as designed on gameplay interfaces.	Works well as expected.	Not needed.	
	Scripting	Interaction	Allows players to swipe, drag, perform circular motions, and hold in the game application.	Some interactions do not behave as intended.	Amended the scripts to be more specific in terms of interaction boundaries and requirements.
	Pause menu	Allows players to resume, restart and return to the main menu.	Retry button returns player to the first gameplay interface of Lemang dish.	Amended the script to retry at the first gameplay interface for each respective dish.	
Scripting	Scene transition	Transitions from one interface to another smoothly.	Abrupt transition upon player interaction.	Added delay duration to scene transition script to improve user experience.	
	Unlocking	Allows last three dishes to be unlocked only after player completes first three dishes.	All dishes are available on first playthrough.	Added gameObjects to end of each dish's scene as indicators to unlock the subsequent dish.	
	Exit	Resets the progress of player of the game application.	Works well as expected.	Not needed.	

Table 9 Respondents' score (User Acceptance Test)

Respondent	Item Score										Odd and Even items	SUS Score (/100)
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		
R01	4	1	5	2	4	2	5	1	5	2	35	87.5
R02	4	2	5	1	5	1	5	2	5	3	35	87.5
R03	4	1	5	1	5	1	5	1	5	1	39	97.5
R04	5	1	3	1	5	3	5	1	4	1	35	87.5
R05	4	2	5	1	4	2	5	1	5	1	36	90
R06	4	1	4	1	4	2	5	1	5	1	36	90
R07	5	1	5	1	5	1	5	1	5	1	40	100
R08	3	1	5	1	3	2	5	2	4	2	32	80
R09	4	1	4	1	4	3	5	1	5	1	35	87.5
R10	5	1	5	1	5	1	5	1	5	1	40	100
R11	4	1	4	3	4	2	5	1	5	2	33	82.5
R12	4	1	4	2	5	1	5	1	5	1	37	92.5
Average Score											90.21	

As for the user acceptance testing, the process is done by distributing a questionnaire that evaluates the game application's usability with the System Usability Scale (SUS). This tool is created by John Brooke in 1986 in measuring how user-friendly a product is [23]. A total of 10 standard SUS questions have been included in an online Google Form and distributed with the APK file through Google Drive to each respondent. Each question is given a rating based on the 5-point Likert scale, ranging from "strongly Disagree" to "Strongly Agree". After 12 respondents have filled out the form, their scores are obtained to perform summation for odd and even items, before the result of the summation undergoes normalization to obtain the SUS score. Table 9 displays the tabulated User Acceptance Test, with an average score of 90.21 that shows an excellent score in terms of respondents' opinion on the game application's usability. The results of the user acceptance test are attached in appendix B.

5. Conclusion

In conclusion, the project has been completed and 'Malaysian Chef' has obtained positive feedback so far from the targeted users. Furthermore, the agile methodology has contributed to the project to be able to be completed on time. Besides that, the initially set objectives for the project have all been successfully met. The first objective, which is to design 'Malaysian Chef' game application using a gaming approach, was achieved by integrating the educational content of Malaysian content in a fun and interactive way, as well as to ensure that it is user-friendly enough for primary school students to navigate through with minimized confusion. The second objective, that is to develop the 'Malaysian Chef' application by implementing an interactive food preparation gameplay mechanics on the Android platform, had been achieved by developing responsive gameplay mechanics such as dragging and clicking, along with ensuring that the game application is able to run smoothly on the Android platform with no significant bugs or performance issues. The third objective, which is to implement alpha and beta tasting on the developed application to the target user, was achieved by having 'Malaysian Chef' undergo functionality testing and user acceptance testing to fix major bugs and evaluate its usability.

Suggestions would also be applied to the application to overcome mentioned limitations. To overcome the limitation that the game application is currently only available on Android platform only, it can be developed to be accessible on iOS devices in the future. As for the second limitation which is 'Malaysian Chef' is currently available on mobile platform only, it can be optimized for tablets and computers afterwards. As for the last limitation which is that the content may result in inaccuracies and misconceptions due to the game application being simplified greatly for a younger audience, further time can be invested to develop the content to have more details of the cooking process while maintaining the simplicity for the targeted users. In short, 'Malaysian Chef' is completed with successfully meeting the initial objectives, but further improvements can be made to allow the game application to be more widely accessible and improve in terms of its content in the near future.

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Conflict of Interest

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

Author Contribution

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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Appendix A: Results of questionnaire

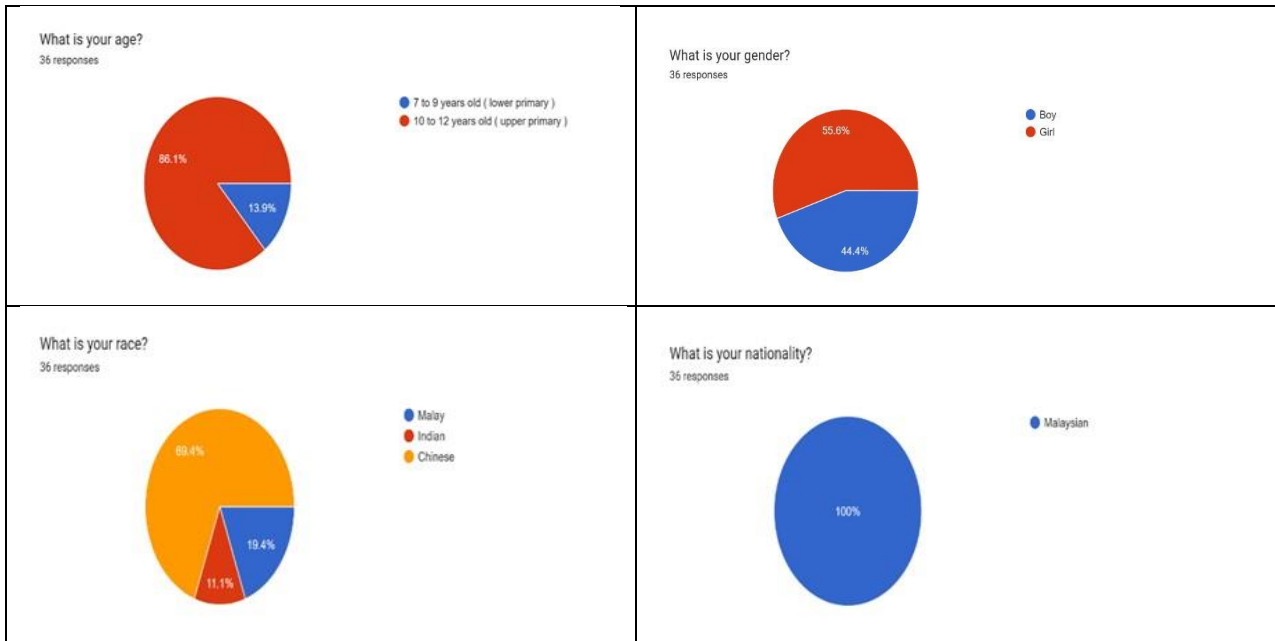


Fig. 6 Results of respondents' demographic

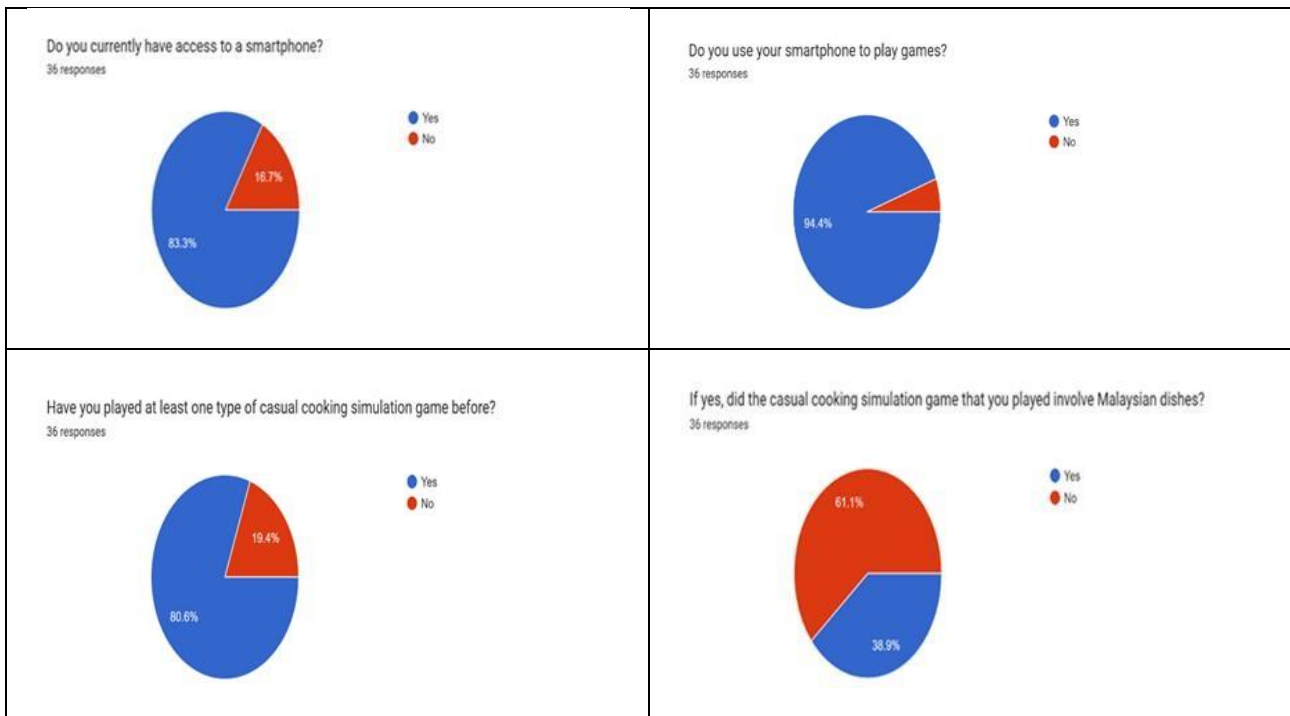


Fig. 7 Results of respondents' technology usage habits

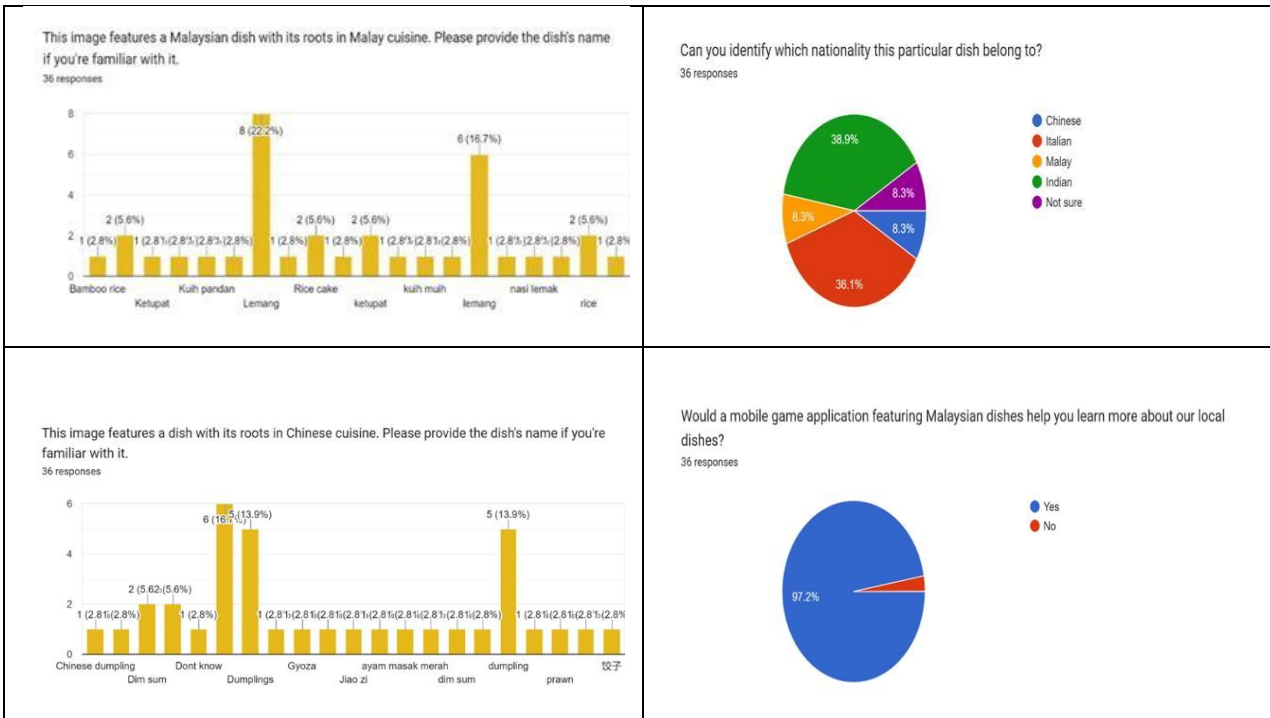


Fig. 8 Results of respondents' knowledge on Malaysian cuisine

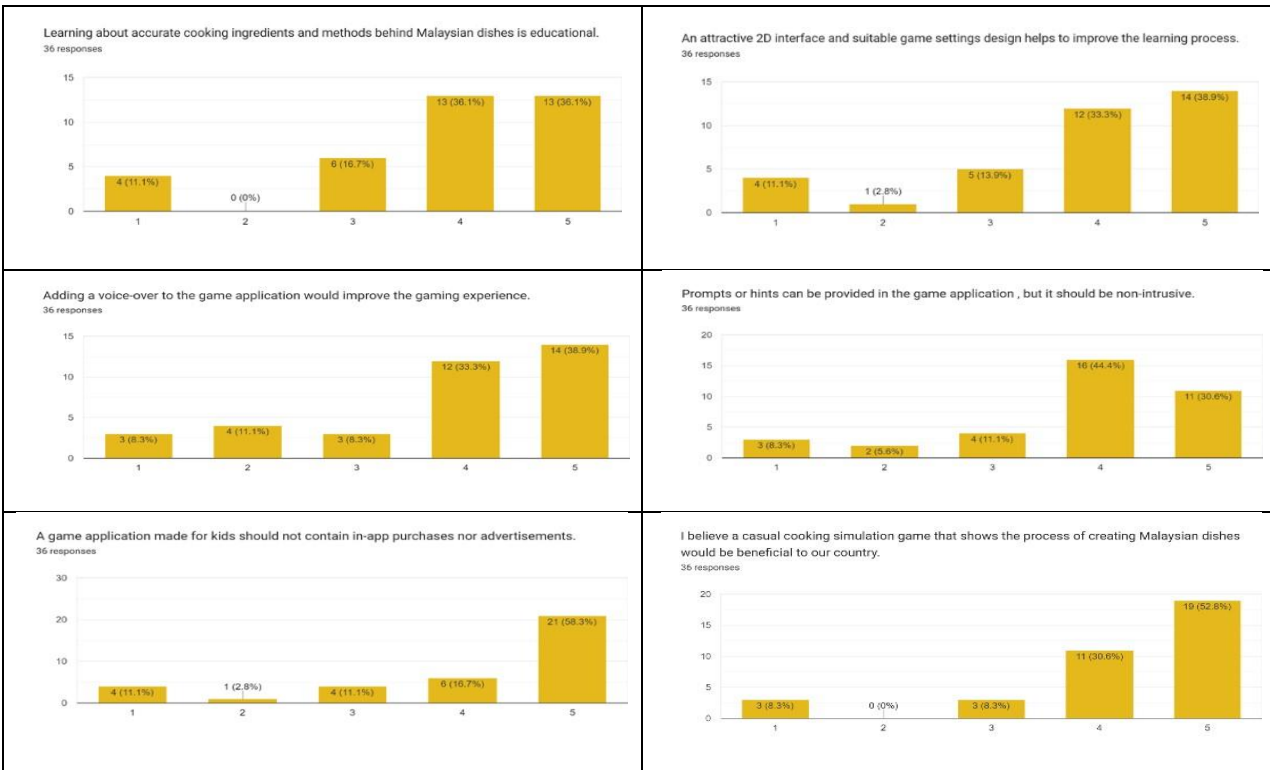


Fig. 9 Results of user requirements

Appendix B: User Acceptance Test

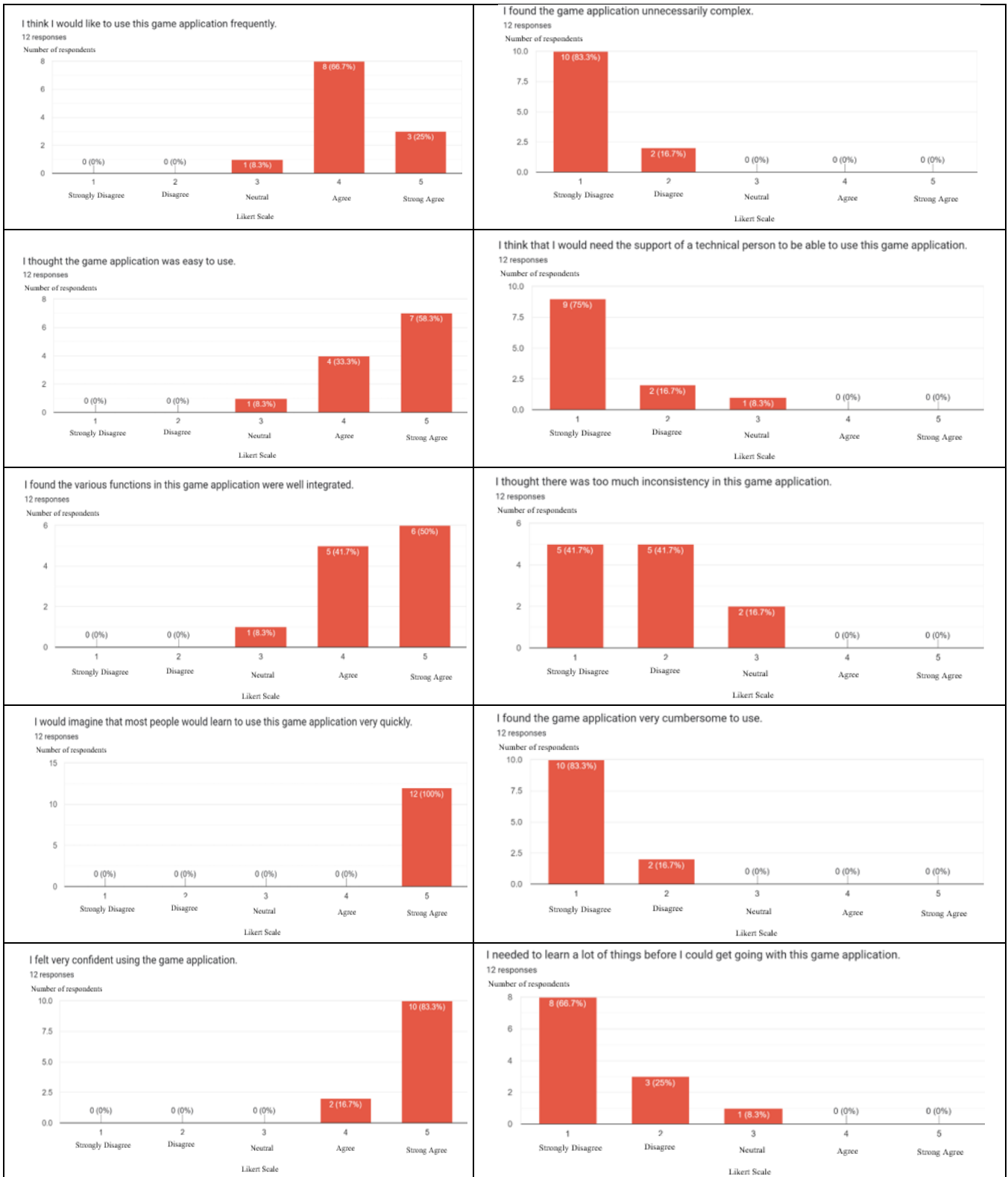


Fig. 10 Responses to the ten System Usability Scale (SUS) questions