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S.T.O.P SURVIVAL SKILLS: Gaining knowledge on survival skills through games

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Abstract: Survival skills are techniques that can be used to sustain life in any type of environment or natural disaster. The ignorance of people on the importance of survival skill is a main factor in the development of this game application. The game was developed as a mobile game application based on real life survival skills and was tested by target user between age of 15 years old and above. The game development life cycle model was chosen as the methodology because the game development process requires a repetitive process of trial and error in building features and functionalities that fulfils the requirements of target user. The game was developed using Unity and Photoshop and using C# as the programming language with Visual Studio software. This game was able to bring the user through the real wild nature and emergency and guide them what they should do to survive the wilderness. Indirectly, users were able to gain knowledge of basic survival skills while playing the game.

Keywords: Survival Skills, 2D Platformer, Android, Unity

1. Introduction

Survival skills are techniques that can be used to sustain life in any type of environment or natural disaster. Survival skills are needed to make sure someone has a higher chance of surviving in nature without using any modern equipment. The survival skills are meant to provide only basic needs in human daily life such as water, food, and shelter. Proper knowledge and good interactions with all living and materials in the environment will be able to promote the sustaining of life over a period. Survival skills are often basic ideas and abilities that some people in the past invented and used to survive in any dire situation either natural environment or disaster. Outdoor activities such as hiking, hunting, and backpacking are examples of activities that require basic survival skills, especially when facing an emergency.

When it comes to survival, the knowledge in survival skills and ability in crafting can determine whether people able to survive or not during the emergency. Somehow, people nowadays tend to ignore the importance of knowing these survival skills. Also, the lack of efficient mobile applications regarding basic survival skills indirectly putting a barrier between mobile-phone users and this useful knowledge.

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According to Caroline [1], the most basic knowledge about surviving is S.T.O.P routine action which stands for Stop, Think, Observe and Plan. Acting calmly and objectively are crucial during any emergency because every decision a person makes during that time is critical. Knowing about survival skills and tips will help a person to remain calm and think-rationally even in crucial times, so that the best decision can be made.

This game was developed to expose the user with knowledge of basic survival skills. This game should be able to brief the user with useful information while enjoying the game. This game focuses on improving the lack of animation content to avoid users from getting bored while playing it.

The main factor of the development of this game is the ignorance of people on the importance of survival skills. Dan [2] concluded that situational awareness is the process of knowing what is going on around you at all times and having a tentative plan to respond to an abnormal occurrence. There are few objectives that lead to the development of the application. The application is about mobile-based games that tested the user what they need to do as they were involved in the emergency. This game consists of three levels or modules. The first module took place at the wild jungle, an uninhabited island for the second module while the scorched desert for the third module. This game was developed for the Android platform and testing it to the target user which is people within age range 15 years old and above.

The remaining of this paper is organized as follows. Section 2 reviews all information research that had been conducted on related topic. Section 3 specified the Game Development Life Cycle (GDLC) methodology used for the game development. Section 4 presents the results and discussion of the project. Section 5 concludes the project with suggestions for future improvement.

2. Related Work

According to Burton [3], there were thousands of people who got lost while hiking or any outdoors activities in jungles, deserts, and mountains areas. Most of these people get rescued but also some of them were never found and died due to dehydration, starvation, exposure and else. Proper knowledge and good interactions with all living and materials in the environment will be able to promote the sustaining of life over a period. Survival skills are often basic ideas and abilities that some people invented and used to survive in any disaster situation.

2.1 Basic Survival Skills

There are numerous knowledges on survival skill that had been passed on since the old days. These knowledges were different given on various type of circumstances possibly arise at different places. An event that occurs at different place needed a different survival skillset, fitting the situation a person was in. But the basic things someone can use whenever they got into the unexpected situation no matter what places they are, is the basic of survival skill which is the S.T.O.P routine which stands for stop, think, observe and plan. This routine must be the first thing someone should do in case they get into the unexpected situation.

This basic routine should be able to help someone to act calmly and make the right decision to overcome the situation they were faced. Its purpose is to make sure someone can calmly analyze their situation before moving onto the next action. During the survival situation, each decision, and things someone did are crucial because any small mistake can make things worse. The basic components someone should have to survive in nature are attitude, shelter, water, fire, food, and naturalist skills [4]. Survival situations usually involving the direct exposure of the elements such as heat, bacteria and more. Among the other task of survival, finding shelter, water and food would be the top priorities tasks for someone to do above the others.

If someone is stranded or lost in nature without any gear, then they need to know how to stay alive and comfortable by building or searching for a shelter. Making survival shelters is an especially important skill in cold and wet places [5]. According to Macwelch [6], whether the unexpected situation is unfolding in the jungle or the desert, human body normally can only last for about three days without drinking water at all. People need to know how to locate water source and disinfected it before it can

be safely drink. For the food, it is essential to understand where to find survival food, even food is the least pressing wilderness survival need. With plenty of water and a comfortable resting place, most of us can live many weeks without food [7].

2.2 2D Platformer

2D platformer is one of the genres available for a video game that took place on a single screen at the earlier stage of launching. In the platformer game, player must overcome the certain obstacles to pass the level on a single or scrolling game screen. According to Hosch [8], the first genuine platform game was Nintendo Company Ltd.'s Donkey Kong (created in 1981), an arcade game in which a man climbed up and down ladders and jumped from platform to platform while eluding a giant ape (Donkey Kong) on his way to rescuing a woman. There are two types or 2D platformer which is single screen platformer and side or vertical screen platformer.

Single screen platformer is a game that is played on a single game screen and usually have obstacles that the player needs to avoid or the objectives that must be completed. All elements of the game such as the player, enemies and obstacles are visible in the whole screen. Once the objective of the game has been completed, the player was navigated to a different screen or sometimes the same screen but with the different obstacles and that tends to be more challenging.

Side or vertical scrolling platformer is a game whereby the game screen moves together along the background whenever the player move towards one edge of the game screen. Scrolling platformer are usually developed with multiple different levels. Player must travel across the level collecting items, avoiding obstacles, defeating enemies, and completing the objective of the current level. The next level is usually more challenging and normally involving a boss fight at the end of the top level.

2.3 Study of Existing Applications

Analyzing the existing application is an essential aspect in developing the application. It was used as a guiding principle for developers to understand the framework of existing systems when developing their own application. Three similar existing applications were analyzed for their functionality and features which includes SAS Survival Guide, Wild Edible Forage and Survival Game: Lost Island 3D. Figures 1 to 3 shows the interface of these similar applications.

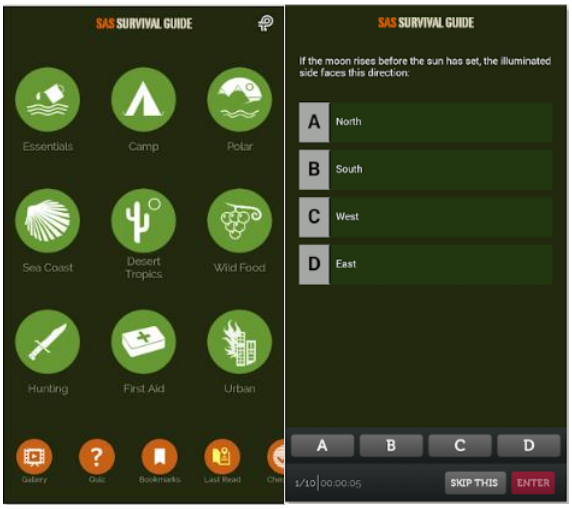


Figure 1: Screenshot of SAS Survival Guide [9]

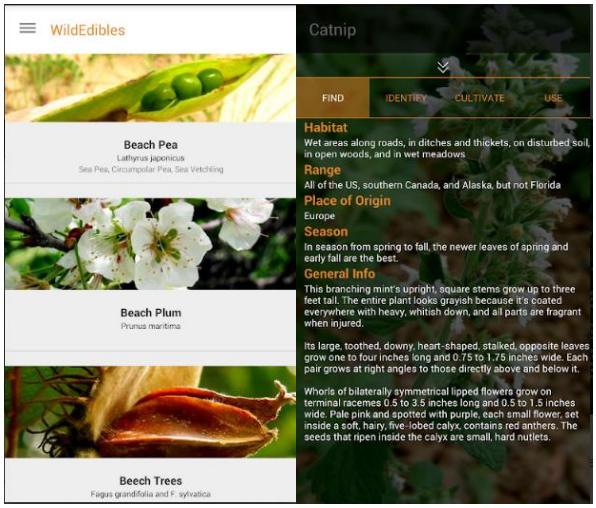


Figure 2: Screenshot of Wild Edible Forage [10]

Figure 3: Screenshot of Survival Game: Lost Island 3D [11]

Based on the related applications above, comparison analysis was made to differentiate the features and characteristics between the existing applications and the developed application. This is to foster a better understanding on the existing applications with the developed application. Table 1 shows the comparison of three existing applications that have been chosen with the developed application based on its features. The users do not have to purchase the developed game as it free open source. The proposed game would be available for Android mobile based as its operating system. The developed game would provide the crafting guide in the form of animated graphic element. The developed game also provides the user with survival guide in the form of text and animated graphic element.

Table 1: Comparison between existing applications and developed game.

Application &Features	SAS Survival Guide	Wild Edible Forage	Survival Game: Lost Island 3D	S.T.O.P Survival Skills
Free open source	X	X	Free download	Free download
Operating System	iOS & Android based	iOS & Android based	Android based	Android based
Crafting Guide	Text, video	X	X	Animated graphic
Survival Guide	Text, video	X	X	Text, animated graphic
Screen Orientation	Vertical	Vertical	Landscape	Landscape

*Label 'X' = not available

3. Methodology

The methodology used for developing the game is Game Development Life Cycle model. This model was chosen because the game development required a repetitive process of trial and error in building

features and functionalities of the game elements fitting the target user standard. The product of the model was for entertainment to engage people to have fun, learn and have a good time [12]. The developer had more control over the progress of the task during the game development. The task was done in a rapid cycle with the regular testing to ensure the functionality of the developed game. In figure 4, there are six phases in game development life cycle methodology which includes initiation, pre-production, production, testing, beta version development, and release.

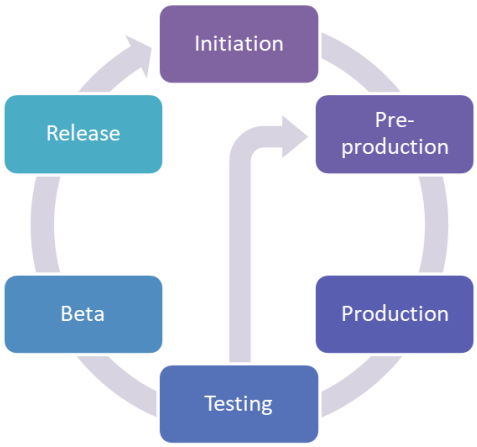


Figure 4: Game Development Life Cycle (GDLC)

3.1 Initiation Phase

A study on the online articles and journals was made to have a better view and understandings on how the survival skill can be important aspect for people nowadays. The available survival games and applications were tested to properly understand the basic concept needed in a survival game. At the end, the requirements were identified and the features and style of the game was proposed.

3.2 Pre-production Phase

During pre-production phase, all the possible requirements of the system needed were identified, analyzed, and validated so the development of the game can be started. The pros and cons of the available survival games and application were reviewed and highlighted to develop the game structure according to the user's preferences. The information gained from the research on online articles and journals were used as the main references for the content development of the game. This phase mainly to specify the functional behaviors of the game developed and deciding the suitable content to the survival theme. By the end of this phase, the storyboard, flowchart and content structure of the game were decided.

3.2.1 System Requirement analysis

System requirement analysis used to identify the needs or conditions required for the new product. The requirement analysis is major element to the success of the development project. During the project development process, it contains user requirements, functional requirements, and non-functional requirements.

Functional requirement relates directly to a process of the system must perform as a part of supporting a user task and how it supports the user in completing task. It describes what system should do. The examples of functional requirements decided for this game were user interaction, autonomous, and more. Non-functional requirement describes how the system should work. It specifies the criteria that can be used to judge the operation of the system. The examples of the non-functional requirements decided for this game were operational, performance, usability, and cultural aspect.

3.2.2 System Design

System design used to define the flow of the game in terms of modules, interfaces, architecture, and data. In other words, it was used to generate user manual or guideline which eased the design of technical architecture.

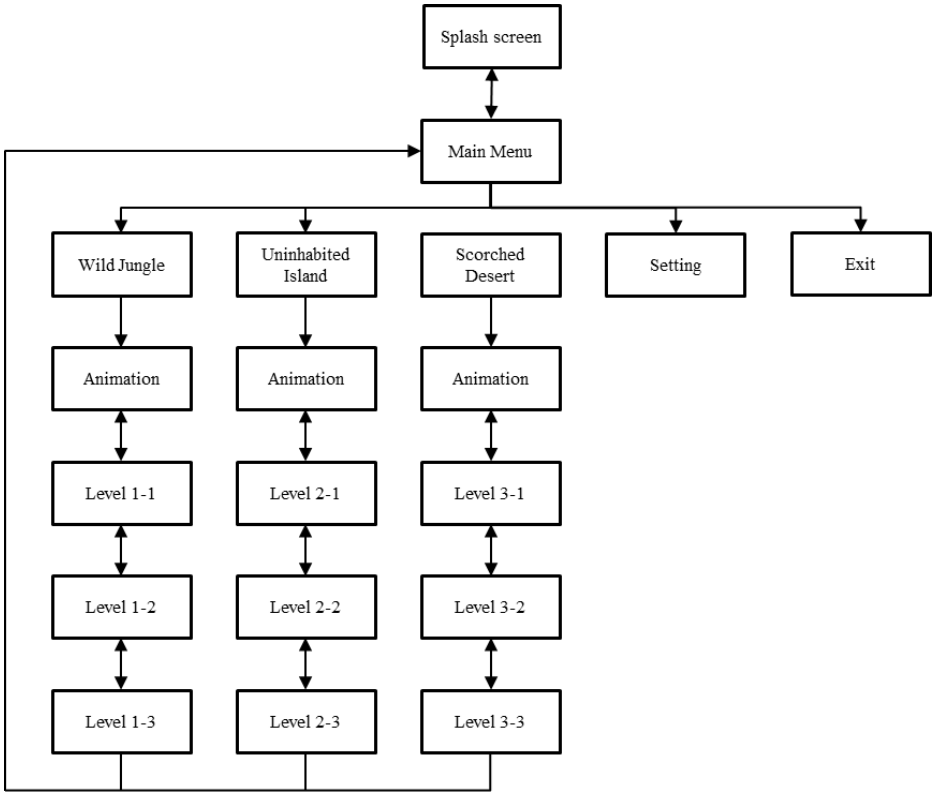


Figure 5: Navigational Structure of 'S.T.O.P Survival Skills'

Navigational structure mainly used to guide the user about through the application. Figure 5 shows the navigational structure of the 'S.T.O.P Survival Skills' game. Content structure discusses about main goal of the game toward target user. It also explaining about what user can gain through the modules and lesson prepared. The content structure of 'S.T.O.P Survival Skills' game can be referred to in Appendix A. Flowchart is a diagram used to show the flow and sequence of the action by the user or system. Figure 6 shows the flowchart of the 'S.T.O.P Survival Skills' game. Please refer to Appendix B for a detailed flowchart.

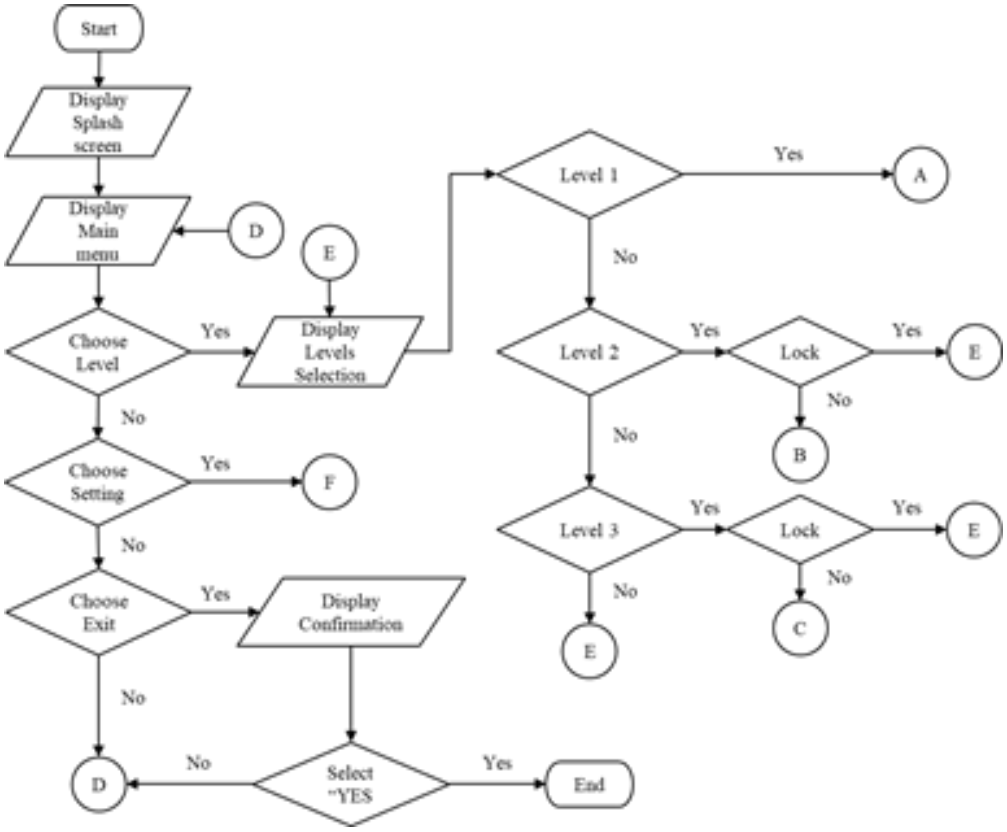


Figure 6: Flowchart of 'S.T.O.P Survival Skills'

3.3 Production Phase

On the system production phase, the information gained was translated into a refined workflow to give the developer a better vision on the outcome of the developed game. Each feature and components required in the game firstly was drafted and designed to clearly understand the workflow of the game development. There were several designing tasks finished such as character design, background design, storyboard, navigational structure, flowchart and more. The features and requirements that had been required from the previous phase were implemented into this game by using Unity 2021.1.5f1 and had been built for the android platform. Unity is open software that able to import any file from various resources and using the C# as its programming language. The C# programming language can be coded through Microsoft Visual Studio Community 2019 which had been included alongside Unity as one of its additional modules to design the game navigational system and functionality.

Part of the developments during this phase was the main character implementation into the game. The character was implemented with basic movement script to enable the user to control the character and roaming around the level during the gameplay. Figure 7 shows the part of coding script used to move the character.

```
18      // Update is called once per frame
19      void Update()
20      {
21          if (joystick.Horizontal >= .2f)
22          {
23              horizontalMove = runSpeed;
24          } else if (joystick.Horizontal <= -.2f)
25          {
26              horizontalMove = -runSpeed;
27          } else
28          {
29              horizontalMove = 0f;
30          }
31
32          float verticalMove = joystick.Vertical;
33
34          animator.SetFloat("Speed", Mathf.Abs(horizontalMove));
```

Figure 7: Coding script for character movement (running)

Figure 8 shows the sprite sheet animation method that was used to animate the movement of the character. The smoothness of the animation was depended on total sprite sheets used in the animation timeline. Since this method required single image per keyframe, it can cost a lot of times to draw the all the sprite sheets needed to make a longer animation.

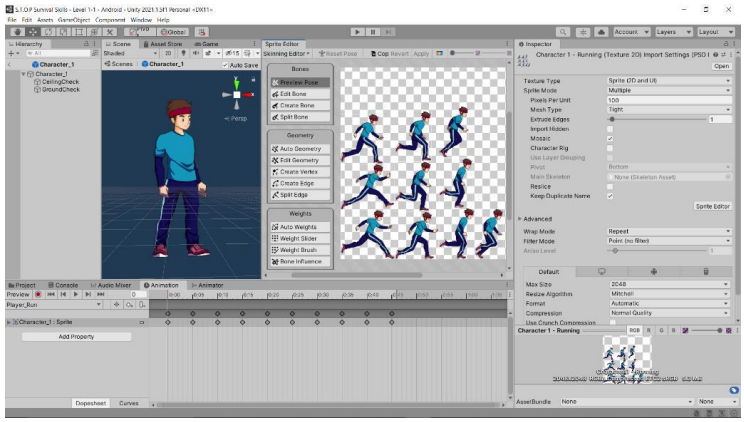


Figure 8: Sprite sheet animation process

Since the game was built for the android platform, the joystick controller asset was implemented into the game to enable user to control the player through the screen input from the phone screen. The asset was prepared by Unity for free to any game developer. Figure 9 shows the screen view of the joystick controller that had been implemented into the game.

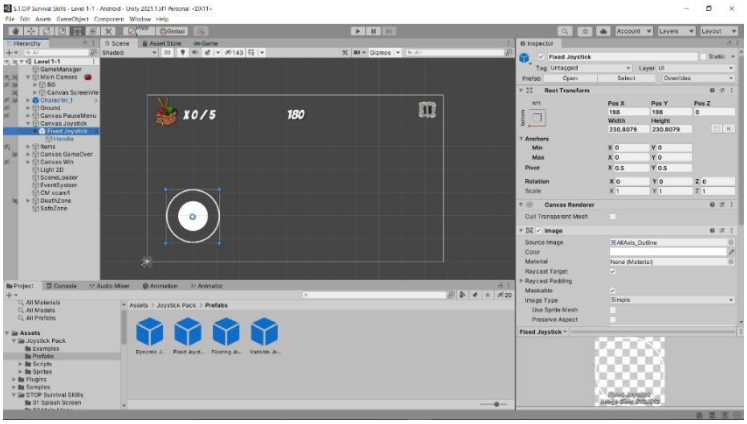


Figure 9: Screen view of joystick controller asset

Figure 10 shows the line of the coding script that enable the joystick controller to access the character movement coding script.

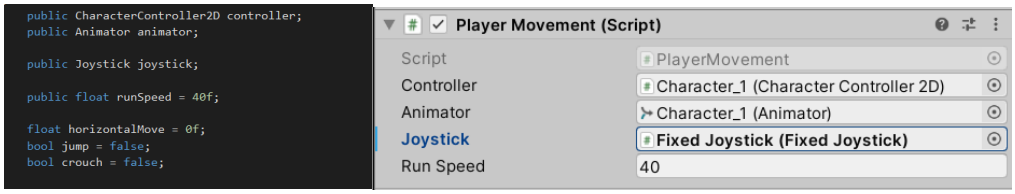


Figure 10: Line of coding script for enabling movement by joystick controller

3.3.1 Interface Design

Interface design is the early drawing, sketch or diagram that used to show the look or functionality of the developed project. It should be designed to meet user demands and other requirements. The interface design also should be able to impress the user with the design in term of colors, fonts, metaphor, and theme used and suitable with characteristics and age range of target user. Figure 11 below shows one of the examples of interface design of S.T.O.P Survival Skills.

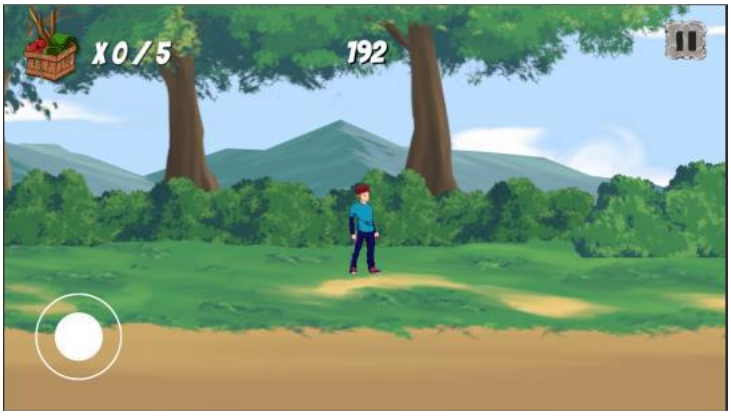


Figure 11: Gameplay interface

Navigation button allows user to interact with the game. The system need execute command based on the button user had tapped and giving the right output as the user want. Figure 12 below shows the button collections that had been designed.

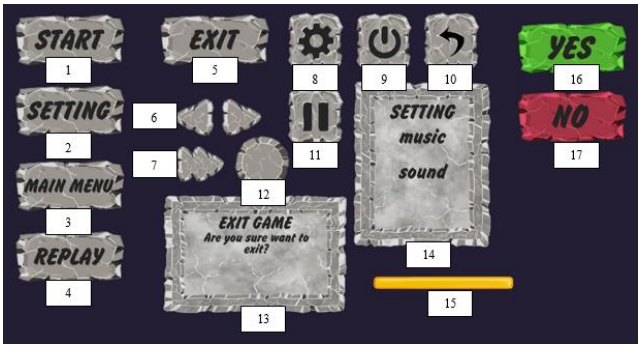


Figure 12: Navigation Buttons Collection Design

3.4 Testing Phase

During this phase, the alpha version of the game developed in the production phase was tested. The purpose of this phase mainly to find out whether the develop game is able to meet user's requirements or not. It also to search for any bugs and errors in the game system before it can be repaired and upgraded to become a better system without any problems. The testing process was always being conducted regularly after the new development had been made into the game. The user acceptance can be determined by conducting game to the users to play it and decide whether the system able to satisfies

them or not. The testing would be conducted by sharing the link to game to the tester. The feedback information was collected by asking the tester to answer the questionnaire right after trying the game. The feedback from 21 respondents were used to identify the pros and cons of the game.

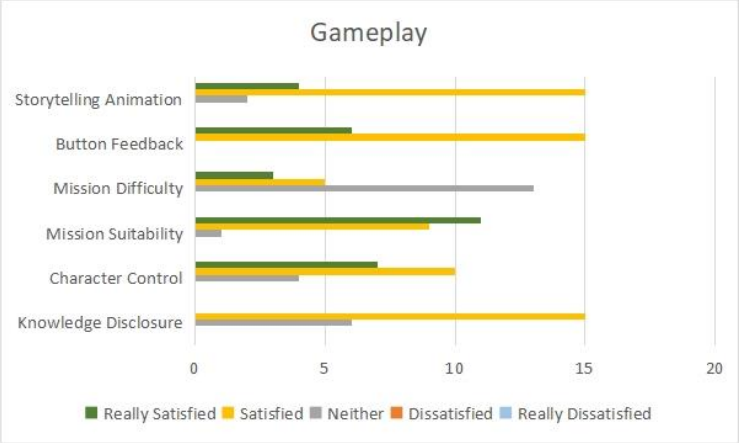


Figure 13: The gameplay feedback

Figure 13 shows the assessment of the gameplay quality from the user. From the feedback, it can be concluded that the content of the game was not fully satisfied the user and still lacking in knowledge disclosure and immersive and proper storytelling for the user to understand the storyline and gaining some new knowledge. The gameplay also turns out to be a bit difficult for the first time user.

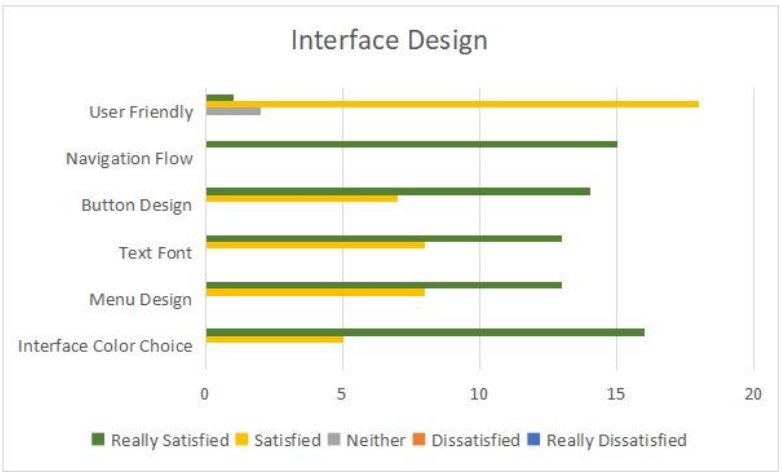


Figure 14: Interface design feedback

Figure 14 shows the feedback on the interface design and layout of the game. From it, it can be said that mostly of the design was good enough to be accept by the users.

The respondents also proposed several suggestions that would be useful in improving the game. For the gameplay, most the suggestion was to prepare a guideline for the first time user and designing enemy as obstacles during the gameplay. As for interface design, one of the respondents was suggesting to do some research on the trending interface layout or design to make the main menu of the game more interesting.

3.5 Beta Phase

For the beta phase, the feedback information regarding the functionalities and features of the alpha version of the game was implemented into the game, thus creating the beta version of the game. Improvement process was made based on feedback from the tester during the testing phase of the alpha version. The improvement process was an important step during this game development to produce a better version of the game. The developer was focusing more on fixing the bugs and errors of the game

before the final release phase. After the fixing and improvement process was done, the game should be able to be developed completely and release it final product.

3.6 Release Phase

The release phase was the last step of the game development. The game developed should be able to meet the target user satisfaction after going through several phase of the testing and improvement of the game features and functionalities until it reaches the point of the final release. The final version of the developed game must be free from any bugs and errors.

4. Result and Discussion

The developed game was tested and feedback from the target user was used to improve the functionalities and features of the game. Any result from the testing phase was documented and analyzed for a solution and a better output.

4.1 Testing Result

The important elements of the developed game were tested for its functionality to ensure it can be executed properly. Table 2 below shows the result of the element testing of the S.T.O.P Survival Skills.

Table 2: Result of testing S.T.O.P Survival Skills

Button	Expected Output	Final Result
Start	Navigate user from splash screen to the main menu of the game	The game was viewing the main menu after the start button was tapped
Setting	Navigate user to the popup setting board	The game was viewing the setting board after setting button was tapped
Scrollbar	Side scrolling to view the levels	The game was viewing the all the levels available when user swipe the screen
Quit	Navigate user to the confirmation board to exit the game	The game was viewing the confirmation board and able to quit the game
Return	Navigate user to the previous interface	The game was viewing the previous interface when back button was tapped
Level	Navigate user to the selected level and start the gameplay	The game was viewing the right level and can be played.
Joystick controller	User able to move the game character around during the gameplay	The game character able to move correctly and displaying the right animation for the right movement
Death zone	The player should die the moment they entered the zone	The player died and game over message was displayed
Countdown timer	The player should not be able to complete the level	The player movement was disable and the game over message was displayed
Collecting items	The item should trigger the safe zone when certain number of items collected	The safe zone was enabled, and the level completed message was displayed after player reach the safe zone

5. Conclusion

As for the conclusion, the “S.T.O.P Survival Skills” game successfully developed based on the goal and objective from this chapter, it gives a benefit for those who always involve with outdoor activities and wild nature. With the accidents can happen anytime, an early measurement will always come in handy. Knowing basic survival skills will produce different result in handling emergency. In the wild

nature, even slightly different may determine between life and death. This game brings the user through the real wild nature and emergency and guide them what they should do to survive the wilderness. The user indirectly able to gain the information of basic survival skills while enjoying the game.

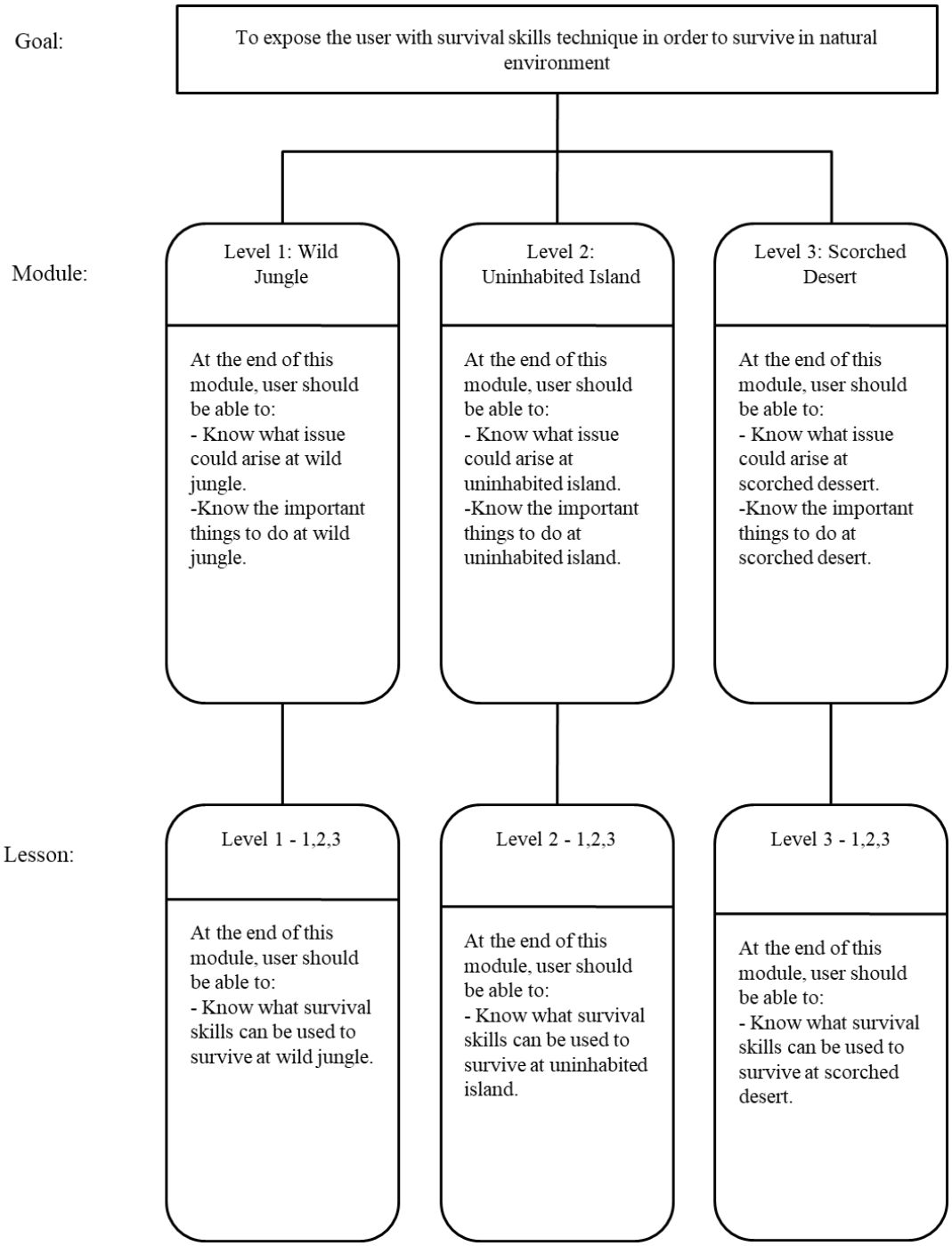
S.T.O.P Survival Skills mobile game still an amateur version game that had been developed and there would so much improvement that can be made to make this game far better. The desire improvements and some new ideas that can be used to develop a better version of this game are the usage of the shader element provide by Unity to add more depth and life to the game. The addition of the game element will make the game environment more alive. There also should be more obstacles and enemies to challenge the user during the gameplay. The game should also provide a scoreboard function to record the user achievement in the game. Then, developer also should use more animation element during user interaction. The usage of the sound effect and music also can be improved and making the user immerse with the game environment. Lastly, the usage of proper grammar of the language used for the game and providing user with proper guideline about the flow of the game.

Acknowledgement

The authors would like to thank the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its supports.

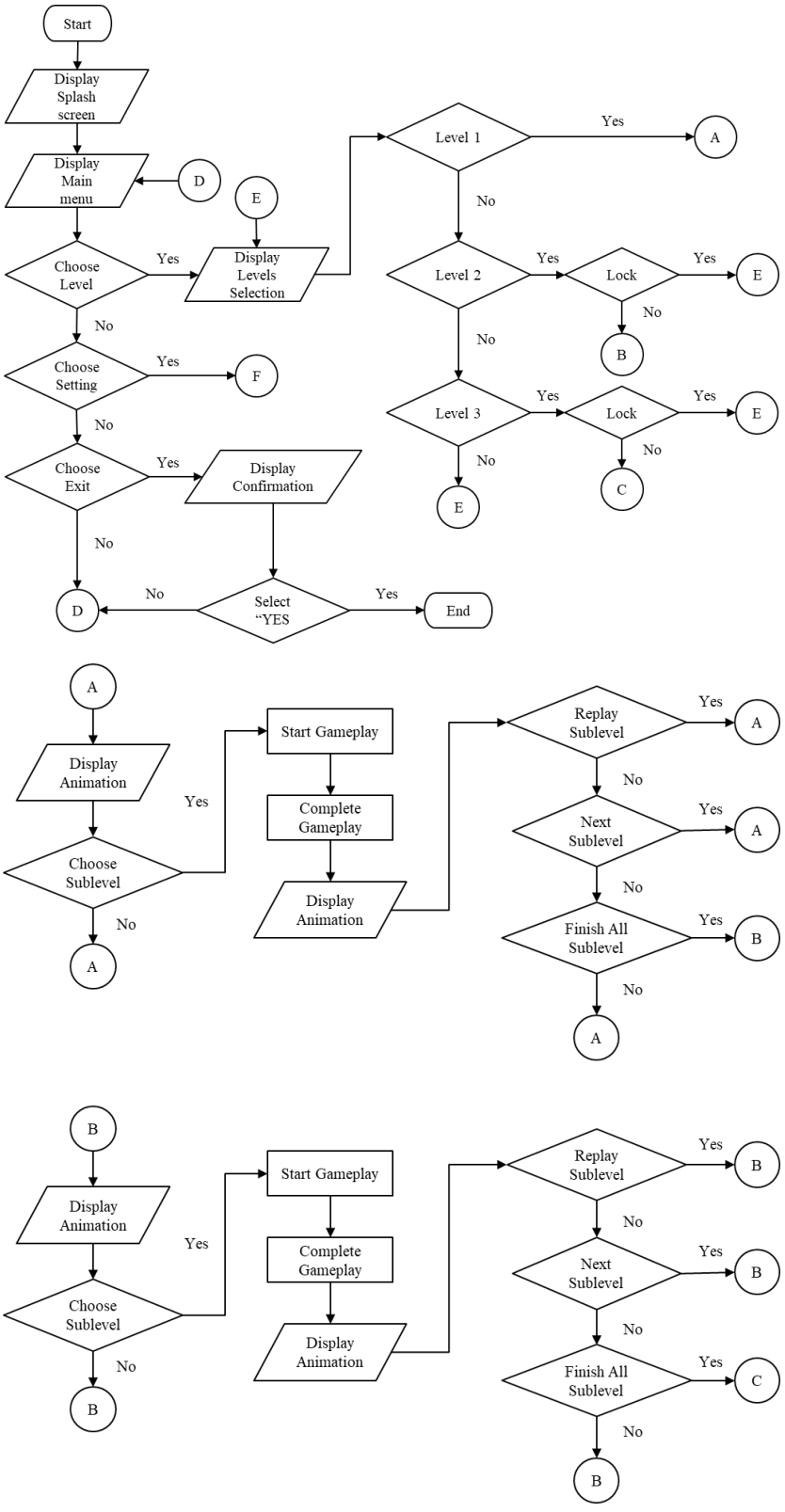
Appendix A

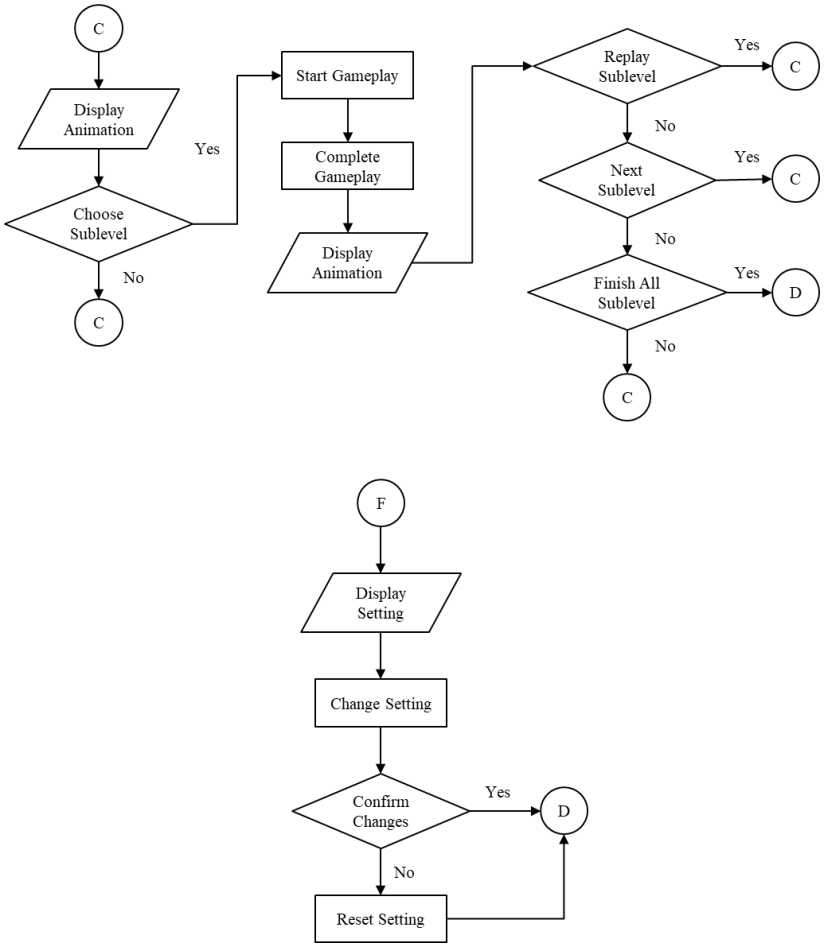
Content Structure of 'S.T.O.P Survival Skills'



Appendix B

Flowchart of S.T.O.P Survival Skills





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