

The Development of Side Scroller Application: The Legend of Merong Maha Wangsa

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Abstract

From pixelated pioneers like Mario to modern marvels like Celeste, side scrollers captivate us with their simple controls, pixel-perfect platforming, and captivating journeys across stunning 2D worlds. This timeless genre, spanning playful platformers to gritty metroidvanias, offers a spectrum of stories, challenges, and discoveries, all unfolding beautifully within the confines of a horizontal scroll. The purpose of the project is to take on a journey through history and culture. In this game, the player will travel to a different time period and place, and experience historical events and cultures from all over the world (linked to the Merong Maha Wangsa's story) all while collecting their golds. The aim of the project is create a game where the player can both have fun and learn at the same time. The game is made available on Windows and platform. The software used is Godot while using Agile methodology. The target Audience will be those from age 12 to 75. This application is expected to help those who are interested in learning about the history of Merong Maha Wangsa.

1. Introduction

Side scrolling adventure games are a classic genre of video games, and there are many popular examples, such as Super Mario Bros., Metroid, and Castlevania. These games are known for their challenging gameplay, engaging stories, and memorable characters. One of the key challenges is that it is difficult to balance educational value with entertainment value. If a game is too educational, it may be boring and unappealing to players. If a game is too entertaining, it may not be effective in teaching players anything. Another challenge is that educational video games can be expensive to develop. This is because they require the expertise of both game developers and educational experts.

The genre of side-scroller games encompasses a diverse range of titles, branching into two primary categories: two-dimensional (2D) side-scrollers and three-dimensional (3D) side-scrollers. 2D side-scrollers, characterized by their retro feel and two-dimensional graphics, remain a popular choice among gamers, offering a classic and nostalgic experience. In contrast, 3D side-scrollers leverage three-dimensional graphics while maintaining the side-view perspective, creating a more immersive and visually appealing gaming experience.

Embracing the allure of folklore and the magic of interactivity, this project aims to develop "The Legend of Merong Maha Wangsa," a captivating side-scroller adventure game for Windows and Android users aged

12-60. Beyond the thrill of its five diverse levels, this Godot-powered odyssey weaves rich historical and legendary lore, enriching players' knowledge with every step. Utilizing Pixilr, Adobe Photoshop, and Godot's built-in tools, we will craft stunning 2D environments, animations, and UI elements, while Audacity and external libraries will elevate the immersion with voice recognition and engaging character interactions. The focus is to balance education with the pure joy of gameplay, fostering curiosity and knowledge without sacrificing the thrill of adventure. The result will be a game that not only pushes the boundaries of interactive storytelling, but also leaves players breathless with every historical tidbit and legendary encounter.

The rest of the paper is arranged as follows: Section 2 covers the domain of study, the technology used, and the result of the comparative analysis. Section 3 describes Agile methodology that is chosen to apply in this project, as well as the output of the analysis and design phases of this project. Furthermore, Section 4 stated the result and discussion of the project. Lastly, chapter 5 states the conclusion of the paper.

2. Related Work

This section discusses the topic related to the game in development, which will be the basis for the application development and the technology that will support the installation. In addition, some of the applications that have relevancy and relation to this project are also discussed, for the developer to learn and improve the methodology approach during the Legend of Merong Maha Wangsa development.

2.1 Legend of Merong Maha Wangsa

The legend of Merong Mahawangsa is a key part of Malay heritage, blending myth, history, and cultural stories that capture the essence of Malay identity. It starts with Merong Mahawangsa, a Roman prince sent on a divine mission to build a kingdom in Southeast Asia [1]. His journey, full of divine interventions and mythical creatures, includes dramatic battles with the legendary Garuda. Eventually, he founds the Kedah Sultanate in Langkasuka, symbolizing the coming together of great civilizations and establishing himself as a cultural hero. This story, passed down through oral traditions and classical Malay texts like the Hikayat Merong Mahawangsa, reflects the Malay belief in divinely sanctioned rulers. It also highlights ancient trade routes and cultural exchanges, showing the strategic importance of the Malay Peninsula. Today, Merong Mahawangsa's tale continues to inspire, with its themes of heroism, adventure, and divine right, and is adapted into various forms of media, preserving and celebrating Malay cultural heritage [2].

2.2 Mobile Applications

Mobile apps have revolutionized our lives, from social media integration and convenient access to information to a new era of immersive gaming. These versatile programs transcend mere convenience, fundamentally altering how we connect, play, and learn [1]. It has transformed dull memorization into interactive experiences, nurtured social bonds through multiplayer games, and become indispensable tools for education, healthcare, and communication [2]. As mobile apps evolve, their transformative potential will only deepen, shaping the future of work, learning, and entertainment [3].

2.3 2D Art Style

A kaleidoscope of 2D art styles beckons exploration, each ready to dress the project in visual magic. From pixelated nostalgia to crisp vector lines, choose the perfect outfit to set the tone, shape the mood, and even define the genre. Whether it's retro charm, vibrant comics, sleek icons, or expressive brushstrokes, each style holds a unique power to make your work stand out [4]. Consider the audience, budget, and desired impact, and unleash the visual communication that will truly captivate. Remember, with 2D art's production-friendly nature and platform-specific adaptability, crafting the artistic vision has never been more accessible or efficient.

2.4 Comparison of related application

There are three applications reviewed and analyzed as research to develop The Legend of Merong Maha Wangsa. The applications were compared based on their unique characteristics and advantages.

2.4.1 Skul: The Hero Slayer

Emerging as a captivating roguelike-action platformer in 2021, Skul: The Hero Slayer crafted by SouthPAW Games and published by Neowiz, embarked on its digital journey on January 21, 2021, gracing the desktops of Microsoft Windows, macOS, and Linux users. Subsequently, on October 21, 2021, the game extended its reach to Xbox One, Nintendo Switch, and PlayStation 4 consoles [6]. This game does not contain a main menu. The game interface with the latest progress is the second scene after the start menu. There is a setting button that will pop out a setting panel. In the panel, there are a variety of tabs which users can toggle various settings according to their needs. The setting menu can only be opened via the pause menu. The placement of the buttons is nicely arranged in one line and the buttons are also consistent in size. The overall aesthetic is also consistent across the entire game. The game is an explorative linear game in which there only the default game difficulty but can get progressively harder with certain game mechanics and progression.

2.4.2 HAAK

HAAK [7] is an explorative action-platformer game that blends Metroidvania-style gameplay with retro-inspired pixel art. Developed by Blingame and released for PC and Nintendo Switch on August 24, 2022. There is a main menu interface at the start of the game application. There are five buttons which are the start game button on the furthest top followed by setting, update log, developer and quit button. The pause and setting interface are the one of the same. There are five other buttons which are resume at the top followed by control, video, audio, and others. The way it is set up for every category is amendable, easing the pain of finding certain settings. The looks and feel of the game felt niche and almost melancholic, reflective of its theme.

2.4.3 Worldless

Worldless, a captivating 2D action-platformer game developed by Thunderful and Coatsink, transports players to a newborn universe brimming with conflict and intrigue. Released on October 4, 2023, for PC, Nintendo Switch, PlayStation 4, PlayStation 5, and Xbox One [8]. There is a start menu interface at the start of the game. There are three buttons which are start game, setting and exit game. The settings consist of video, audio, controls, Language, Accessibility, tutorials, achievements, and credit. The Pause menu has three buttons which are resume, settings and back to main menu. Every sequence to prompt up scenes is always followed by an animation, making the game feels fluid and seamless between interfaces. This also translates into the gameplay where the game is simple but elegant in design.

2.4.4 Comparison between Reviewed Applications

Table 1 shows the summarized comparison of reviewed applications. A comparative analysis between existing application and proposed application is performed. The former game listed have their weaknesses such simple storyline, inconsistencies in art style. The proposed project will try to take the good part and improve where it is lacking.

Table 1 Comparison table between reviewed applications

Features	Skul: The Hero Slayer	HAAK	Worldless	Legend of Merong Maha Wangsa, Proposed project
Operating System	Windows, macOS, Linux, Nintendo Switch, PlayStation 4 & Xbox One	Windows & Nintendo Switch	Windows, Nintendo Switch, PlayStation 4, PlayStation 5 & Xbox One.	Windows & Android
Storyline	Simple storyline	Rich storyline	Simple storyline	Rich storyline
Button	Consistent in placement and Style	Inconsistent in Style & consistent in placement	Consistent in placement and style	Consistent in placement and style
Music	Atmospheric music at certain levels only	Atmospheric music	Atmospheric music	Atmospheric music
Purchasing	Purchased	Purchased	Purchased	Free to use

3. Methodology/Framework

This project is developed using Agile methodology. This means we work in short cycles, known as sprints, encompassing tasks like planning, design, development, testing, and feedback analysis.

3.1 Planning Phase

The planning phase laid the groundwork for the project, with the gathered and analyzed crucial information, including the problem statement, hypothesized solution, project objectives, target user, scope, and expected. To ensure efficient time management and smooth development flow, Gantt chart is made. Then, sketched out a flowchart of the proposed application, visualizing the final product. Finally, based on the insights and requirements gleaned throughout the planning stage, we created a comprehensive proposal outlining the project in detail.

Table 2 Software requirements

No.	Component	Function
1	Canva	To design storyboard
2	Pixilart	To create and edit sprites and models
3	Godot	To Develop The legend of Merong Maha Wangsa
4	GDScript	To program and compile codes

As shown in Table 2, Canva is the main tool in designing the storyboard for The Legend of Merong Maha Wangsa. While Pixilart is used for creating the sprites and models and editing it when needed to further suit the application design. Godot is the tool for developing The Legend of Merong Maha Wangsa. The assembly of assets and function was entirely done using Godot. Whereas the GDScript, scripting software for Godot used for the programming and scripting in Godot.

Table 3 Developer hardware requirements

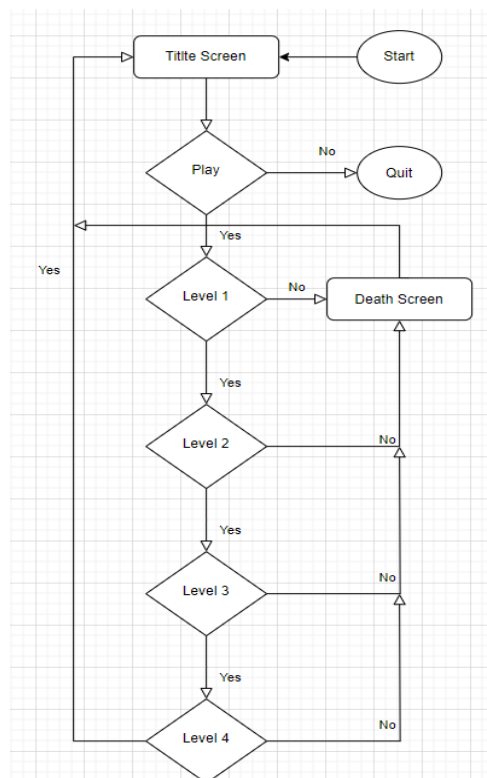
No.	Component	Specification	Function
1	Computer	<ul style="list-style-type: none"> Windows OS 8GB RAM AMD Ryzen 5 5600H with Radeon Graphics 500 GB SSD 	<p>To Develop and design the legend of Merong Maha Wangsa</p> <p>To test functionality</p>

Based on Table 3, a computer is essential for this project. The computer runs the developer software and facilitates testing of 'the Legend of Merong Maha Wangsa, while Windows serves as a test device and platform.

Table 4 User hardware requirements

No.	Specification	Description
1	Operating System	Windows
2	Screen-orientation	Landscape
3	Resolution	1920 x 1080 pixel (16:9)

Referring to Table 4, the Legend of Merong Maha Wangsa is a Windows application. This specification was set based on the prioritization that Windows and Android are more popular and accessible in general. The application was also oriented only for landscape. This specification was made based on content of the application to simulate a vast world design. Therefore, wider screen facilitates the need to see the front of the player where most of things are happening. Lastly, the application uses 1920 x 1080-pixel resolution which is a standard screen size by 16:9 ratio. Figure 1 shows the flowchart of the Legend of Merong Maha Wangsa that dictates the structure of the storyboard. Users will be directed to the home page automatically. User then choose between the button available. Either play, or quit. Choosing play will prompt the user to first level. Stopping at any anytime during a stage will bring back user to the start of level 1. Exiting can be done by clicking Quit.

**Figure 1** Flowchart of the Legend of Merong Maha Wangsa

3.2 Designing Phase

During the designing phase, the project UI and UX were designed. High Fidelity storyboard was created using Canva. The storyboard comprises of all user interfaces (refer to flowchart at Figure 1). The graphic component comprises of natively designed assets in Pixilart and free royalty sources. Some of the graphic components include images (as in sprites) and texts. These graphics then were isolated to export as assets for Godot.

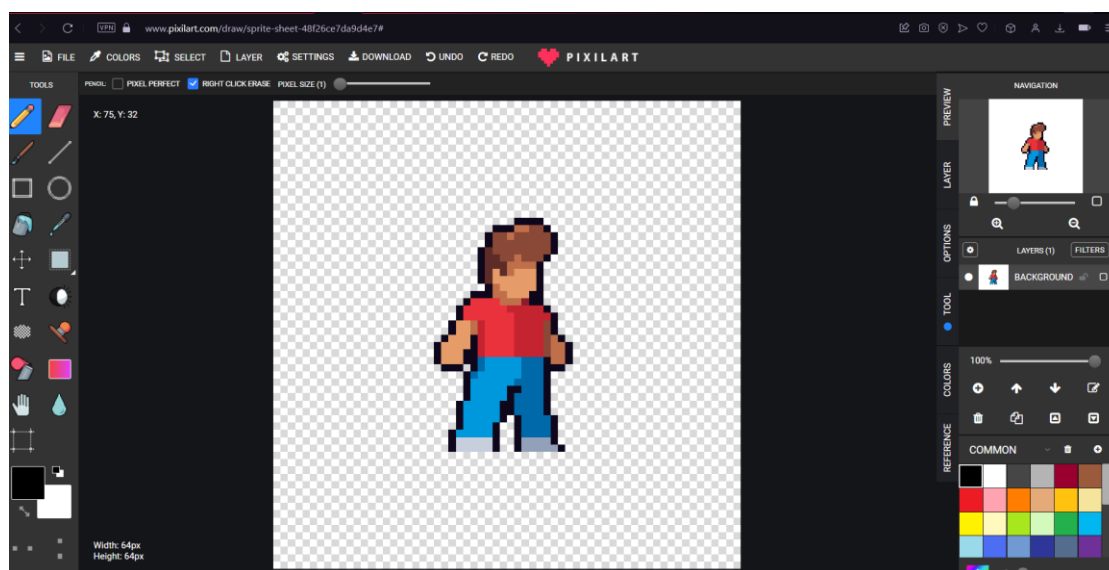


Fig. 2 Creating graphic components using Pixilart



Fig. 3 Exported text components

Figure 4,5,6 and 7 below shows the levels created for the Legend of Merong Maha Wangsa game application, the levels were created loosely based on the history of the character as he travels the world. The levels were created entirely different from one another to created the aesthetic and atmosphere of traveling from one side of the world to the other.

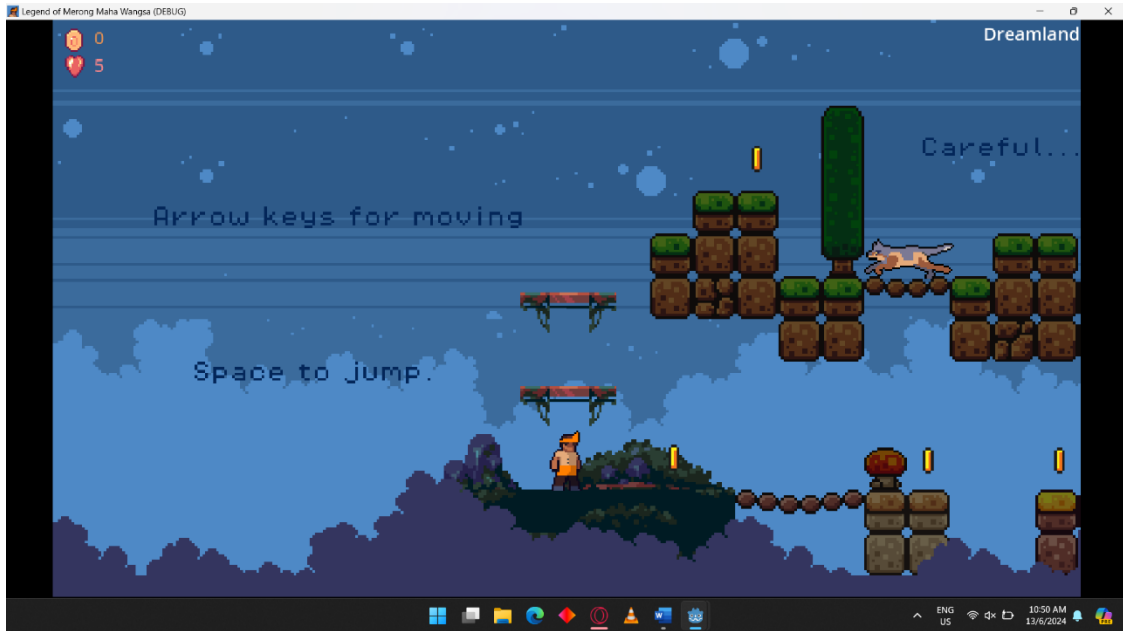


Fig. 4 Level one

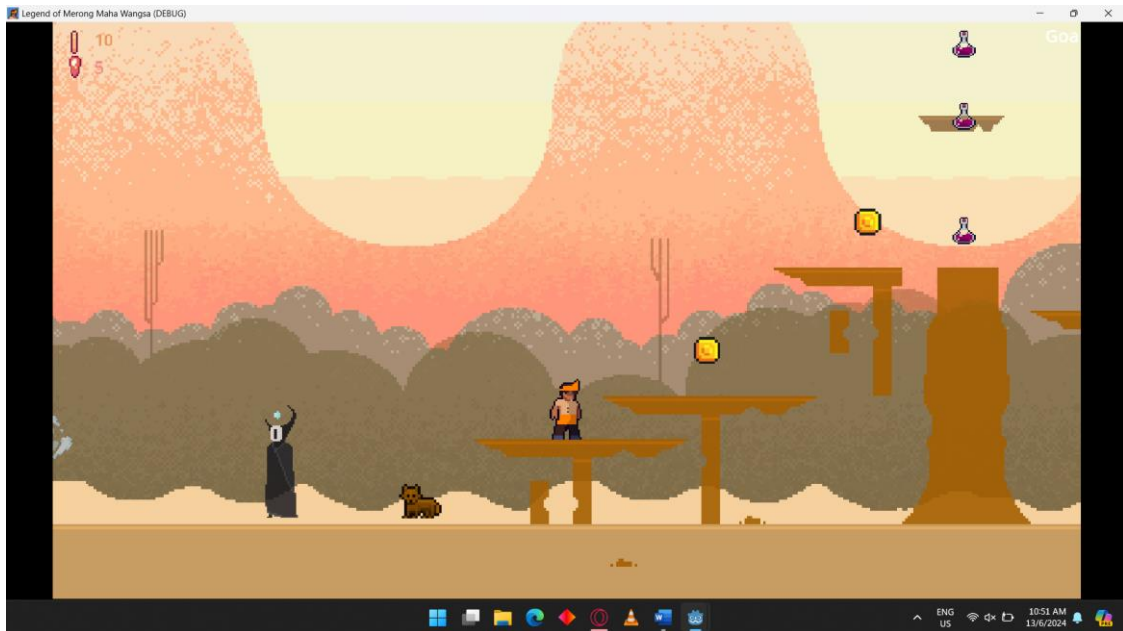


Fig. 5 Level two

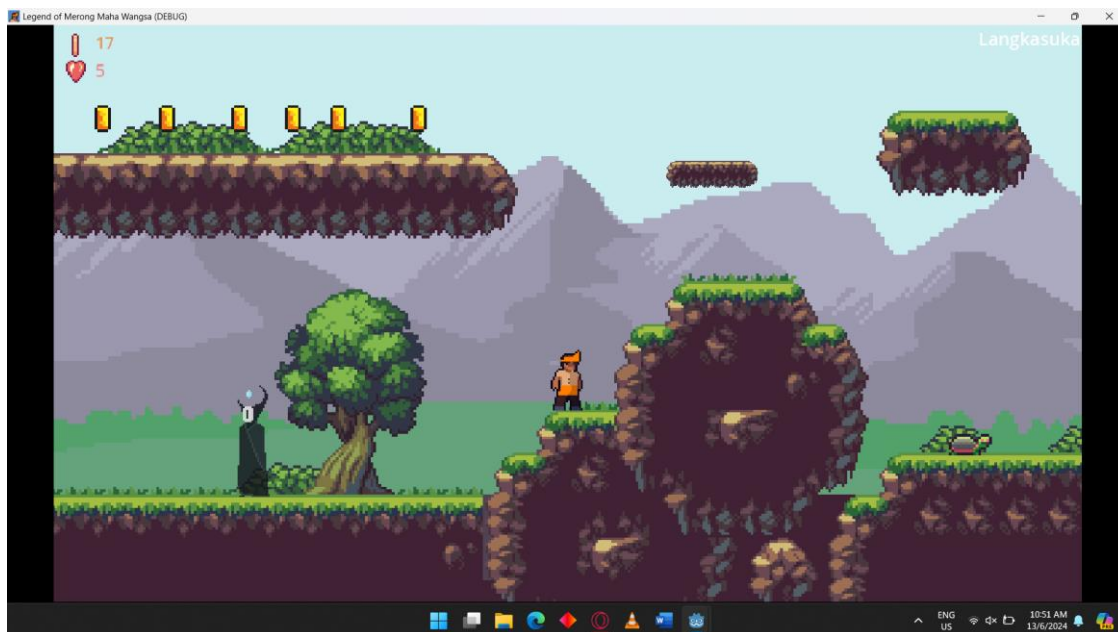


Fig. 6 Level three

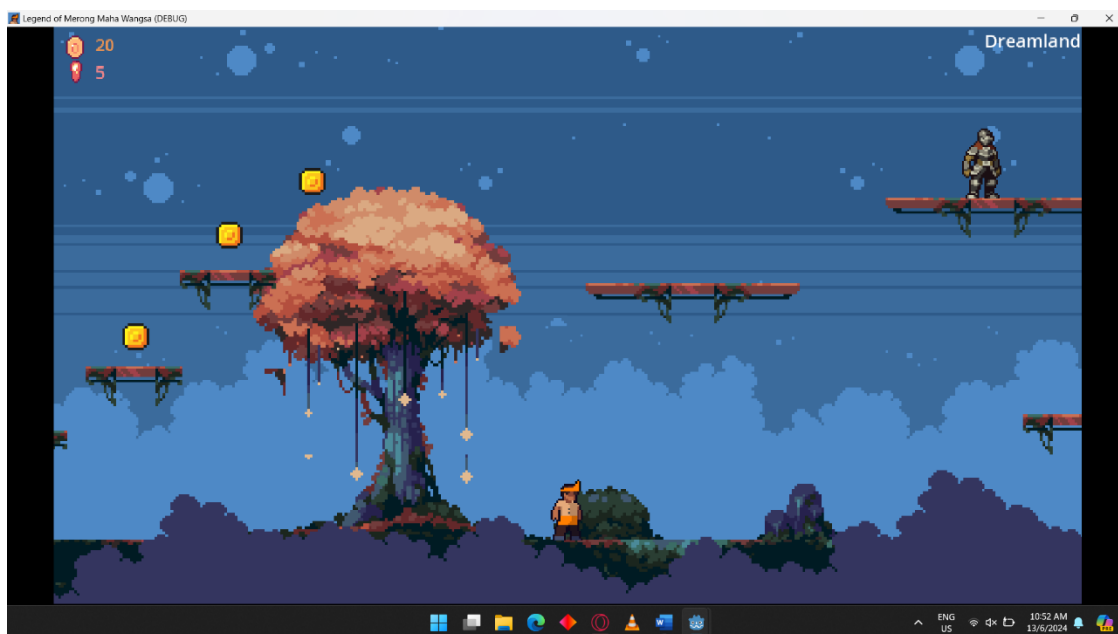


Fig. 7 Level four

3.3 Developing Phase

During the developing phase, the designed assets were assembled in Godot. Godot is a developer software to create games, application and such across many platforms. In this project, Godot was used to assemble the assets from storyboard and programmed to make it functional. Godot also uses GDScript as a programming language. Table 4 shows the specification for the Legend of Merong Maha Wangsa.

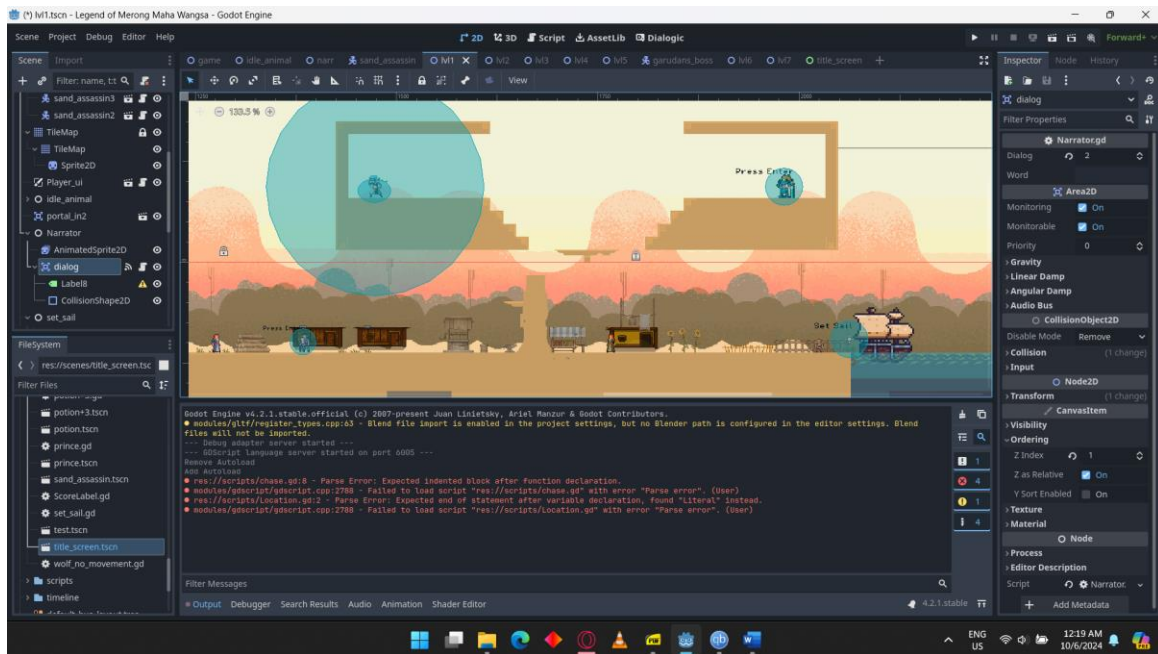


Fig. 8 Assets Assembly in Godot

To create interactive interface in Godot, essential assets were imported, meticulously categorized, and positioned, before GDScripts transformed graphic elements like text into interactive marvels. Figure 5 showcases a prime example of GDScript powering a scene change triggered by a simple button press, illustrating the seamless integration of functionality and visual design.

```

class_name TitleScreen
extends Control

signal start_game

func _process(_delta: float) -> void:

    Global.PlayerHP = 5

    Global.Gold = 0

    if Input.is_action_just_pressed("jump") and !Input.is_action_just_pressed("w"):

        get_tree().change_scene_to_file("res://scenes/game.tscn")

    if Input.is_action_just_pressed("quit"):

        get_tree().quit()

func _on_start_game_button_pressed() -> void:

    get_tree().change_scene_to_file("res://scenes/game.tscn")

```

Fig. 9 Scripting for interactive buttons

Besides writing code, there are also added features to make things work better. Take the "potion" and "gold" objects for example. By giving them a little sound when picked up, like a beep, it is known that object is picked up. Figure 6 shows how this works.

```

extends Area2D

@onready var animation_player = $AnimationPlayer

func _on_body_entered(body):

    Global.Gold += 1

    animation_player.play("pickup")

```

Fig. 10 Audio attachment for picking up objects

3.4 Testing Phase

In the testing phase, the game will be rigorously examined to ensure its performance meets all expectations. This involved a thorough analysis of how the app works (functional testing). The game is tested for things like stability, responsiveness, and reliability, ensuring the app runs smoothly, reacts promptly, and consistently delivers its promises. A detailed breakdown of the specific functional tests conducted is in Table 5.

Table 5 Functional test

No.	Type of Test	Description
1	Alpha	To thoroughly assess functionality and user experience Test was conducted internally by the developer and selected end-user to test its functionality and UX.
2	Beta	Test was conducted externally by limited group of end-users to test its functionality and UX.
3	Acceptance	Test was conducted to end-user with evaluation from developer regarding the game accomplishment in its project objective.

4. Results and Discussion

This section discusses the test that has been conducted to game application. The testing was conducted internally among selected participant to test the application usability and effectiveness. The data of the test was collected through observation.

4.1 Alpha and beta testing results

Based on the test results of the Legend of Merong Maha Wangsa during alpha test, the application is functioning properly and as expected. The button in all interfaces were responsive and able to run its instruction. However, further testing found that some of the program or codes still suffers from lengthy or bugged codes. Table 6 shows the 8 responses of users from using the application during alpha testing. Meanwhile, Table 7 shows the beta testing results were gathered from a number of 18 applicants which is targeted at high schoolers at the age of 13-year-old via Google Form questionnaire. The questions focus on the perceived learning outcomes acquisition (PU), user acceptance level (PEOU), and functionality (AU). Answers of yes, no and maybe were provided. During testing, the teacher assisted in answering the questionnaire to fasten the whole process and to make the students more comfortable. Technology acceptance model (TAM) were used as the measurement model.

Table 6 Alpha testing results

Test	Expected Result	Actual Result	Corrective Action
Enemy interaction	Attack player within range	Failed to attack the player	Increase the radius of attack area
NPCs interaction	Interactable within range	Work as expected	Not needed
Move button	Move the player in x axis		
Jump button	Launch the player upward		
Interact button	Interaction with world		
Platform	Mid-air raised surface		
Health point	Decrease and increase appropriately		
Gold Point	Accumulate gold collected		

In Table 6 shows that there are a few tweaks need to be made. The interaction between player and enemy need to be smoothed out for it to work as expected. Fixing the radius for attack collision will fix the problem and the interaction should work flawlessly.

Table 7 Beta testing results

Constructs	Evaluation variables	Measured Item
Perceived of usefulness (PU)	Learning Outcome Acquisition	PU1: Through this game, I get knowledge about Merong Maha Wangsa life. PU2: Through this game, I've learned new places.
Perceived ease of use (PEOU)	User Acceptable Level	EU1: I think the interface design of the game application is beautiful. EU2: I think the game gives clear instructions. EU3: It's interesting, so I like to play the game.
The attribute of usability (AU)	Functionality	AU1: I understand the function of each button and interaction in the game. AU2: I think everything about "Legend of Merong Maha Wangsa" is good and error-free.

The point of the beta testing is to get feedback from target users based on their experience when they are playing "Legend of Merong Maha Wangsa". The Google Form automatically generated graphs and charts can make data analysis easier and more efficient without human error. The analysis of the beta testing is shown in Figure 11,12 and 13.

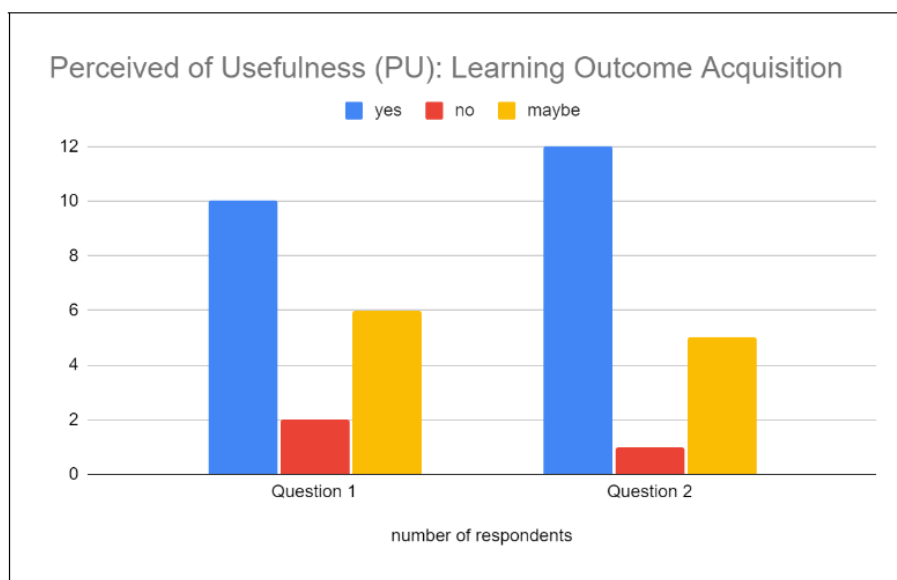


Fig. 11 Analysis of learning outcome acquisition

Figure 11 shows the analysis of learning outcome acquisition. In response to question 1, 10 of respondents replied “Yes”, 2 of respondents replied “No”, and 6 of respondents replied, “Maybe”. In response to question 2, 12 of respondents replied “Yes”, 1 of respondents replied “No”, and 5 of respondents replied, “Maybe”. According to the findings, a large portion of the respondents gave a positive response, meaning that the “Legend of Merong Maha Wangsa” had a good learning result.

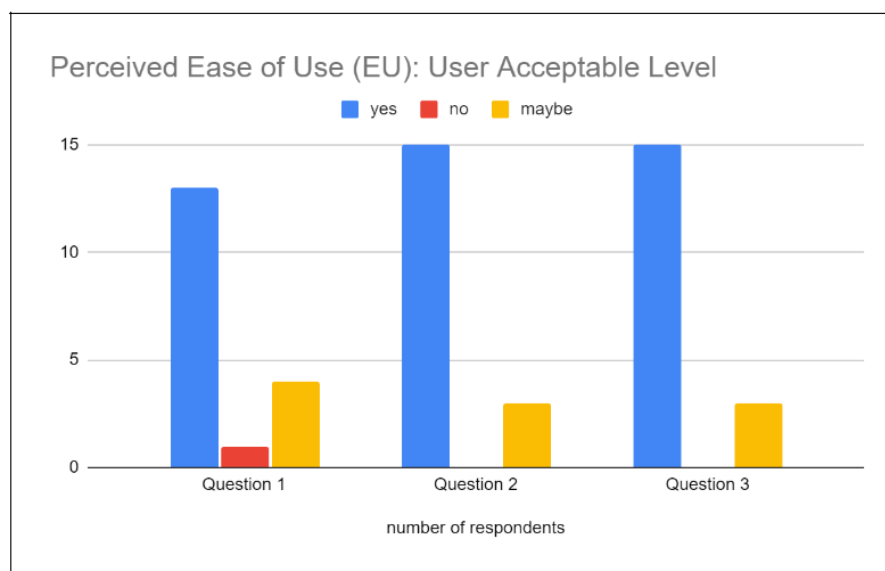


Fig. 12 Perceived Ease of Use (EU): User Acceptance Level

Figure 13 shows the analysis of these acceptable levels. In response to question 1, 13 of respondents replied “Yes”, 1 of respondents replied, “No” and 4 respondents replied “Maybe”. In response to question 2, 15 of respondents replied “Yes”, 0 of respondents replied “No”, and 3 of respondents replied, “Maybe”. In response to question 3, 15 of respondents are replied “Yes”, 0 for “no” and 3 respondents answered “maybe”. According to the findings, most of the respondents agreed that “Legend of Merong Maha Wangsa” provides a beautiful interface, clear instructions, and enjoyed playing the game because it was fun.

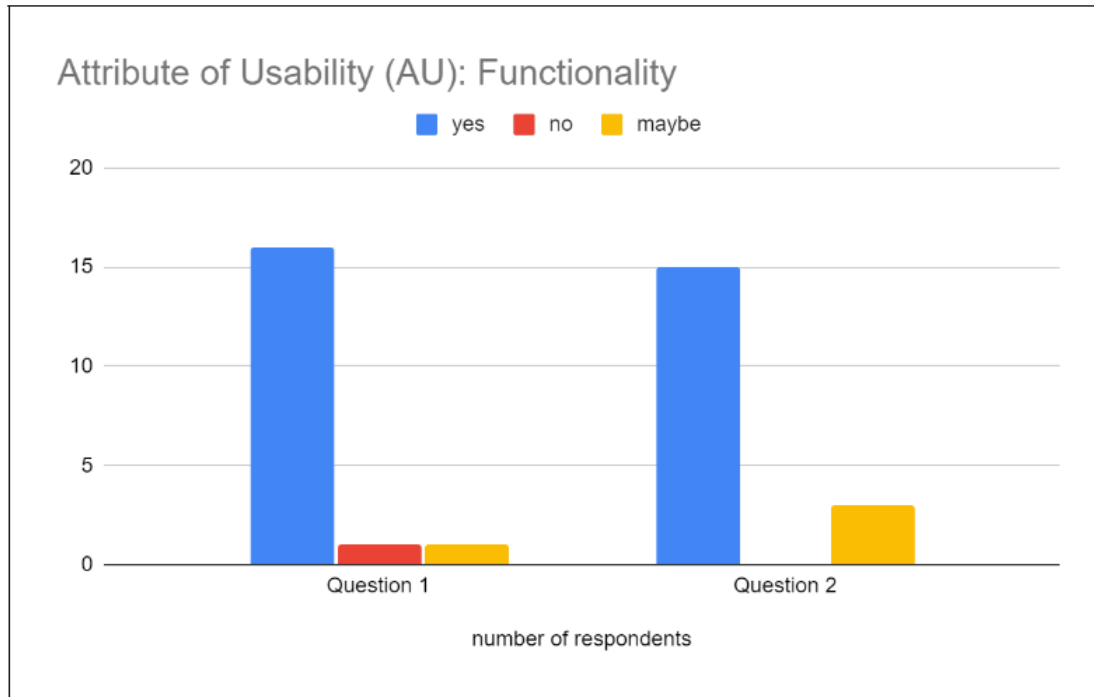


Fig. 13 Attribute of Usability: Functionality

Figure 14 shows the analysis of functionality. In response to question 1, 16 of respondents replied "Yes", and 1 of respondents replied, "Maybe". 1 of respondent replied "No". In response to question 2, 15 of respondents replied "Yes", 0 of respondents replied "No" and 3 of respondents replied, "Maybe". From this result, most of the respondents agreed that they can understand the function of each button and everything about "Legend of Merong Maha Wangsa" is good and error-free

5.0 Conclusion

In conclusion, the Legend of Merong Maha Wangsa development was a success to a certain degree. The result of testing shows that the application is functioning as intended but still require optimization and fix. Although, it accomplished its goal. Users were able to benefit from using the Legend of Merong Maha Wangsa for both education and game purpose. However, there are still countless of room for improvement. Considering there are few similar applications in Google Play Store at the moment. The application can be expanded in terms of its application feature, content and uses in the 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 authors confirm contribution to the paper as follows: **study conception and design:** Nik Aiman Najmi, Norhanifah Murli; **data collection:** Nik Aiman Najmi, Norhanifah Murli; **analysis and interpretation of results:** Nik Aiman Najmi, Norhanifah Murli; **draft manuscript preparation:** Nik Aiman Najmi, Norhanifah Murli. All authors reviewed the results and approved the final version of the manuscript.

Appendix A

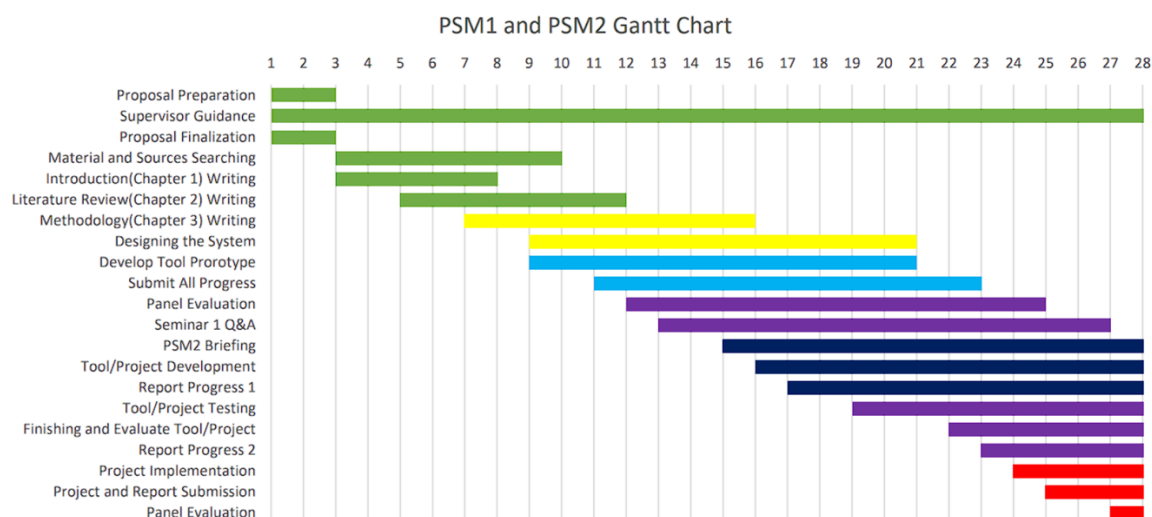


Fig. 6 Project Gantt chart

References

- [1] "Hikayat Merong Mahawangsa - Wikipedia Bahasa Melayu" (last edited January 19, 2024). [ms.wikipedia.org. https://ms.wikipedia.org/wiki/Hikayat_Merong_Mahawangsa](https://ms.wikipedia.org/wiki/Hikayat_Merong_Mahawangsa)
- [2] "Fiction Or Facts: Hikayat Merong Mahawangsa (The Kedah Annals) In The View Of Current Civilization Value" (n.d.). Universiti Teknologi MARA. https://jadinti.uitm.edu.my/images/Volume21_2016/Arbaiyah.pdf
- [3] App Annie. (2023, December 05). State of pix 2023. <https://www.data.ai/en/go/state-of-mobile-2023/>
- [4] Edutopia. (2023, October 24). 10 Reasons Why Educational Games Are Beneficial. <https://gamelearning.co/why-educational-video-games-are-so-helpful-to-parents-teachers-and-students-5-reasons-to-embrace-game-based-learning/>
- [5] Oxford University. (2023, April 02). The Benefits of Mobile Games for Cognitive Development. <https://www.thetimes.co.uk/article/buy-children-video-games-it-could-be-good-for-their-mental-health-wmrmkshl2>
- [6] Cheng, L. (2022, June 22). 10 Different 2D Art Styles You Can Use in Your Game. Twinmotion <https://3d-ace.com/blog/2d-game-art-styles-the-ultimate-guide/>
- [7] Gould, E. (2023, September 20). A Brief Guide to Exploring Different 2D Art Styles. 99designs <https://www.argentics.io/2d-art-styles>
- [8] "Skul: The Hero Slayer Review: Permadeath Platformer Delights with Roguelike Depth and Dark Humor." (2020, September 25). IGN. <https://www.ign.com/games/skul-the-hero-slayer>
- [9] "HAAK: A 2D Platformer With a Heavy Punch and a Lighter Mood" (2023, September 22). Eurogamer. <https://www.youtube.com/watch?v=bxayVHzZY9g>
- [10] "Worldless: A Haunting Puzzle Platformer Where Words Don't Matter" (2023, December 13). Kotaku <https://kotaku.com/the-week-in-games-inglorious-void-bastards-1835036085>