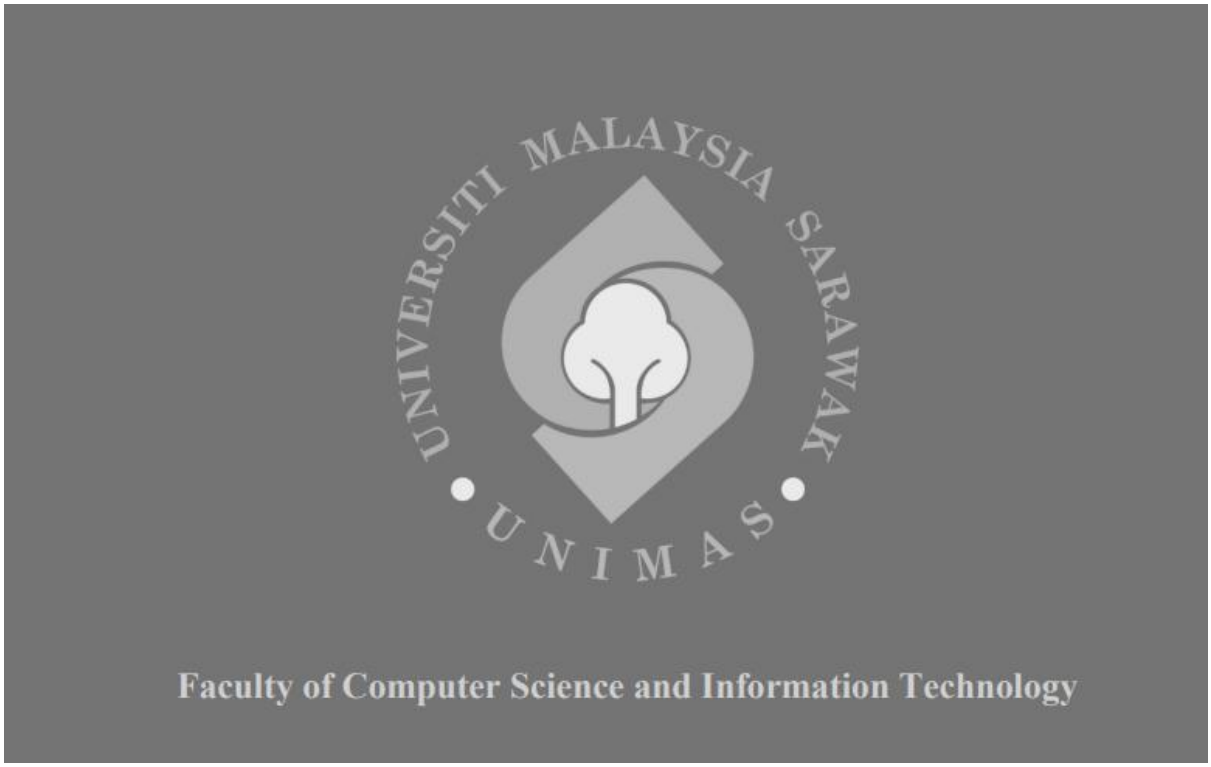

LEARN YOUR CODE!

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Bachelor's in Computer Science (Multimedia Computing) with Honours

2025

DECLARATION

I hereby declare that this project is my original work, except where quotations and citations have been duly acknowledged. I also declare that no portion of the work referred to in this report has been submitted in support of an application for another degree at Universiti Malaysia Sarawak (UNIMAS).

MUHAMMAD HAIKAL HAKIMI BIN TOWFFEK 14th July 2025

Faculty of Computer Science and Information Technology

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ABSTRACT

Educational games have emerged as a dynamic tool for combining learning and entertainment, yet there remains a scarcity of engaging coding education games on mainstream platforms like Steam. *LEARN YOUR CODE!* addresses this gap by merging coding education with the popular genre of visual novels, creating an anime-inspired game that appeals to a younger audience. The game immerses players in a story-driven experience where they navigate character interactions and solve coding-based puzzles, thereby enhancing their programming skills in a fun and interactive way. Developed using Unity, the project seeks to create a visually captivating environment that not only entertains but also educates. Through the integration of coding challenges, the game progressively teaches coding concepts, making them accessible and enjoyable for players of varying skill levels. The branching narrative and anime-themed artwork serve to increase engagement, ensuring players remain invested in both the story and the educational content. The outcomes of the project include a fully functional visual novel game that promotes learning through problem-solving, interactive gameplay, and character-driven narratives. This unique combination of education and entertainment aims to encourage young players to develop coding skills while enjoying a narrative experience that reflects their interests. *LEARN YOUR CODE!* stands as an innovative solution to the challenges faced in creating educational games that are both instructive and engaging.

ABSTRAK

Permainan video yang berpendidikan telah hadir sebagai alat dinamik yang menggabungkan pembelajaran dan hiburan, akan tetapi belum ada lagi permainan video yang berpendidikan mengajar pengekodan di platform seperti Steam. *LEARN YOUR CODE!* dicipta untuk menanangi isu ini dengan menggabungkan pengekodan pendidikan dan genre yang terkenal iaitu novel visual, menciptakan anime inspirasi permainan video yang menarik minat penonton muda. Permainan video ini menunjukkan pemain dalam pengalaman penceritaan di mana mereka mengalami interaksi di antara watak dan menyelesaikan teka teki pengekodan justeru meningkatkan kemahiran pemprogramman dengan seronok dan cara berinteraksi. Dibangunkan dengan menggunakan Unity, projek ini menyelidik untuk mencipta visual persekitaran yang menarik yang bukan sahaja untuk hiburan tetapi untuk pendidikan sekali. Melalui masalah pengekodan, pemainan video tersebut mengajar konsep pengekodan, membuatkan ia berakses dan menyeronokan untuk pemain mengikut tahap. Kepelbagaian naratif dan lukisan bertema anime bertujuan untuk menaikkan perhatian, memastikan pemain sentiasa menumpukan perhatian dalam kedua dua cerita dan konten pendidikan. Hasil projek ini adalah permainan video visual novel yang mempromosikan pelajaran dengan penyelesaian masalah, permainan interaksi dan naratif watak. Gabungan unik antara pendidikan dan hiburan bertujuan untuk mendorong para belia mempelajari pengkodan sambil meneroka perkara yang menarik. LEARN YOUR CODE! merupakan penyelesaian inovatif kepada cabaran untuk mencipta permainan video yang berpendidikan, sekaligus memberikan pengajaran dan menarik minat.

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CHAPTER 1: INTRODUCTION

1.1 Background

In recent years, educational games have struggled to capture the attention of casual gamers. While the potential for video games to offer a fun and engaging way to learn is widely acknowledged, many players do not gravitate toward educational content, particularly on major platforms like Steam. These games often fail to strike a balance between providing educational value and maintaining the entertainment factor, leading to a lack of widespread appeal.

LEARN YOUR CODE! addresses a gap in coding education by combining the engaging genre of visual novels with a focus on teaching C# programming. Built with the Unity engine, this game places players within a story-driven, high school-themed environment where they navigate character interactions, storyline progression, and coding challenges designed to progressively enhance programming knowledge. Players engage with relatable characters and scenarios, building coding skills through C# puzzles and interactive educational content embedded within gameplay. This innovative blend of education and entertainment transforms coding into an accessible and enjoyable experience. The programming language chosen for LEARN YOUR CODE! is C#, a powerful and widely used language in game development. By teaching C# through interactive, 2D game-based learning, the game addresses the limitations of traditional coding education, which often lacks engagement. Research supports that game-based learning enhances student motivation and retention over conventional methods, making learning more enjoyable and impactful.

1.2 Problem Statement

Browsing Steam, the world's largest digital distribution service for video games, reveals a limited selection of games that successfully combine two critical elements: coding education and engaging gameplay. Despite a rising demand for educational games, few manage to balance delivering educational content with maintaining player engagement, particularly in coding. Many available coding games lean heavily on one aspect, either becoming overly educational, which often results in reduced gameplay enjoyment, or focusing too much on entertainment while neglecting learning aspects. A 2021 study at the

University of Cape Town found that first-person puzzle games showed promise for teaching programming concepts but noted that most existing coding games use less immersive perspectives (e.g., isometric/text-based), limiting engagement potential.

This challenge aligns with a broader issue in education, which is decreased interest in STEM subjects. Recent studies and news reports indicate a significant drop in students enrolling in STEM disciplines, attributed to a lack of engaging learning experiences and motivation. For example, Malaysia has seen a decline in science stream students at the secondary level, further complicating efforts to meet the target of a 60% ratio of science graduates (Wei & Maat, 2020). This trend has raised concerns, with reports that many students do not receive a strong enough foundation in Mathematics and basic sciences during their early education. (The Sun, 2024).

In response to these gaps, *LEARN YOUR CODE!* was developed to merge the storytelling-rich visual novel genre with coding education, offering players a narrative-driven experience filled with coding puzzles and challenges. This game is designed to attract those interested in visual novels while simultaneously providing an educational foundation in programming, thus supporting efforts to re-engage younger audiences with STEM content.

1.3 Aim and Objectives

LEARN YOUR CODE! aims to create an educational game that combines coding education with the engaging narrative format of a visual novel. It aspires to offer a meaningful learning experience by embedding coding lessons into the gameplay, ensuring that players are not only entertained but also gain valuable programming skills. The main goal is to design a game that appeals to younger audiences, particularly those with a passion for anime, storytelling, and interactive puzzles.

i. To design a visually appealing anime-themed game that captivates players through a strong narrative and interesting characters, encouraging progression through the storyline.
ii. To develop an educational tool that integrates coding puzzles and challenges in a progressive, engaging manner, making coding concepts accessible and enjoyable.

iii. To evaluate the game's effectiveness and functionality through usability testing and feedback from the target audience, ensuring the game's educational and entertainment goals are met.

1.4 Scope

The sample for the study opens to participants aged 16 and older, coinciding with the age when Malaysian students select their science stream. The game will cover fundamental concepts of C# programming. The data analysed will measure the students' knowledge of C# before and after playing the game.

1.5 Brief Methodology

This project utilizes agile methodology.

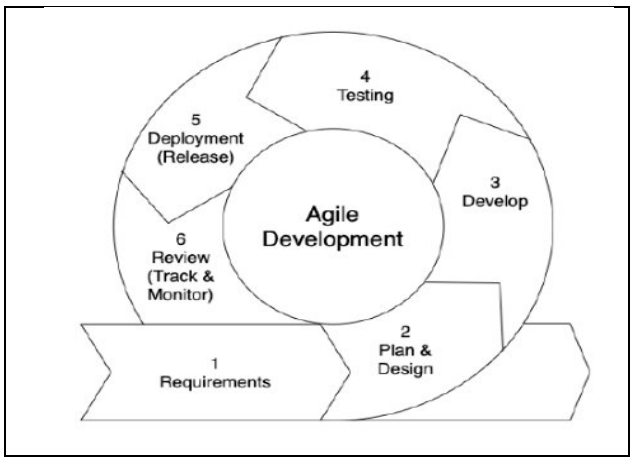

Figure 1.1: *Agile Methodology (Omonije, 2024).*

Based on Figure 1.1, Agile enables flexible, iterative development, allowing for continuous feedback and refinement. Below is a detailed overview of each phase in the Agile approach, tailored specifically for creating *LEARN YOUR CODE!*

1. **Analyse & Plan**
    - Set user goals and plan the game.
    - Understand the target audience, define objectives, and outline the overall vision.
2. **Design**
    - Outline game mechanics, create visuals, story maps, and coding challenges.
    - Conceptualize the game's structure and aesthetic elements.

3. **Build**
    - Construct the game using UNITY.
    - Implement game design, puzzle making, story making, and features like settings, title screen, save/load game, exit game, credits, and scoreboard.
4. **Test**
    - Ensure everything works as planned.
    - Identify and fix mistakes and bugs.
5. **Launch**
    - Release the game to the public.
    - Notify all involved parties about the release.
6. **Review**
    - Have the target audience play the game and provide feedback.
    - Ensure the game meets user expectations and identify any remaining issues.

1.6 Significance of Project

The significance of *LEARN YOUR CODE!* lies in its innovative approach to combining education and entertainment. By embedding coding lessons within a visual novel format, the game seeks to make programming more accessible and enjoyable for a younger audience. Many educational games struggle to maintain player engagement, but by using an interactive narrative and compelling characters, this project offers a unique solution to that problem. Players will not only enjoy the storyline but will also develop important coding skills in a stress-free environment.

The project also has the potential to stand out in a market where educational games often fail to captivate users for long periods. By offering a blend of story, choice, and coding challenges, *LEARN YOUR CODE!* promises to keep players engaged while gradually improving their programming abilities. As such, the game could play an important role in introducing more young people to coding, potentially inspiring future careers in technology.

1.7 Project Schedule

The project is planned to be completed within a year, which is split into two stages: (1) FYP 1, and (2) FYP 2. With each stage's spans over a semester, which is approximately 14 weeks each. FYP 1 will be carried out in the first semester (9th October 2023-18th February 2024) while FYP 2 will be carried out in the second semester (18th March 2024-30th June 2024). Both the Gantt charts for FYP 1 and FYP 2 are shown in Appendix A.

1.8 Expected Outcomes

By the end of the project, *LEARN YOUR CODE!* will be a fully functional visual-novel genre that teaches coding in an engaging and interactive way. Players will be able to solve coding puzzles that gradually become more challenging, helping them improve their programming skills. The game's anime-inspired art style and narrative-driven structure will make it appealing to younger audiences, offering an experience that is both entertaining and educational.

The main outcome of this project is a game that blends storytelling and coding education in a way that motivates players to keep learning. By the end of the game, players will not only have enjoyed a compelling narrative but also gained valuable coding skills through progressively challenging puzzles. This combination of fun and education will make *LEARN YOUR CODE!* a unique offering in both the educational and gaming markets.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Steam has many games that offer immersive storytelling experiences, often characterized by player choices, rich character development, and, in some cases, unique puzzles. While there are over 2,000 games with education tags on Steam, very few effectively combine engaging narratives with coding education. Educational games, especially those designed with thoughtful mechanics and engaging content, can play a pivotal role in helping students grasp challenging concepts in an interactive and enjoyable way. When students see their progress, earn points, or compete with their peers, they are more inclined to invest time and effort into the learning process (Cambridge, 2023). By transforming traditional learning methods into a game-based experience, educational games have the potential to enhance motivation, improve retention, and cater to diverse learning styles. This chapter will explore the current landscape of visual novel games, comparing four popular titles with the proposed game, *LEARN YOUR CODE!* This comparison aims to highlight the distinctive elements of the game and demonstrate its potential to fill the gap between entertainment and education in the gaming world.

2.2 Review on Existing Games

Unlike studying, games are primarily designed to be enjoyable and to encourage players to continue playing. The principal structure of many games is based on interchanging disappointment and victory. For this reason, game-based learning can represent a practical tool for developing a growth mindset. (Adipat, S. et al, 2021). Clearly, there are reasons that makes a game addicting and fun to play.

One of the key elements is the storyline, which often serves as the backbone of the game. A captivating narrative draws players in, creating an emotional investment that enhances their overall experience. When creating an educational game however, the educational aspects must also be carefully integrated without hindering the game's playability. Creative puzzles are another important component, making the game memorable and adding an element of challenge that players find rewarding. Character interaction is equally essential, as it helps build an immersive world and emotional connection, ensuring the player feels involved in the game's universe. Additionally, stylized art style can be the deciding factor in whether someone chooses to play the game or not.

In developing *LEARN YOUR CODE!,* these five elements, storytelling, puzzles, character interaction, art style, and educational content will be prioritised to create a game that is both engaging and informative. The goal is to design an experience where players can enjoy learning, encouraging them to explore coding concepts while having fun.

2.3 Comparison on Existing Games and The Proposed Game

To establish the unique position of *LEARN YOUR CODE!*, a detailed comparison has been conducted between four well-regarded visual novel games: *Doki Doki Literature Club! (2017)*, *Needy Streamer Overload (2022), C Serenity (2024)* and *Bitburner (2021)*. These games are highly rated by players, and some have achieved cult classic status. The comparison is based on five key features: storyline, educational content, puzzles, character interaction, and stylized art style. While all four games excel in their own ways, they fall short in specific areas when compared to the proposed game.

2.3.1 Doki Doki Literature Club!

"Doki Doki Literature Club!" was developed by Team Salvato, an independent studio based in the United States, over approximately two years. Released in 2017, The project was led by Dan Salvato, known for his modding work on Project M. The idea for the game came from Salvato's mixed feelings towards anime and his interest in creating unsettling, surreal experiences. Initially released for free on Linux, macOS, and Windows via itch.io, the game was later made available on Steam.

The story revolves around a student who hesitantly becomes a member of his high school's literature club at the urging of his friend Sayori. As the narrative unfolds, he can develop romantic connections with Sayori, Yuri, or Natsuki. The club president, Monika, also plays a significant role in the storyline. The game adopts an unconventional narrative format, offering multiple endings and unlockable cutscenes that delve deeper into the experiences of each main character.

The game initially presents itself as a typical dating simulator but quickly evolves into a psychological horror, with a metafictional narrative that breaks the fourth wall. Players make choices that influence the story's direction, leading to multiple endings, and the game's structure deliberately misleads players to enhance the horror aspect.

In 2021, an expanded version called "Doki Doki Literature Club Plus!" was released for various platforms, including the Nintendo Switch, PlayStation, Xbox, and PC. This version

introduced additional content, such as side stories and enhanced gameplay, though it didn't significantly change the core experience of the original game.

“Doki Doki Literature Club!” is praised for its thought-provoking storyline, exploring themes of mental health and using narrative techniques that challenge players’ expectations. Its anime aesthetic and strong character interactions have also contributed to its popularity. However, it lacks any educational content, focusing purely on entertainment.

Figure 2.1: Screenshot of puzzles from “Doki Doki Literature Club!”

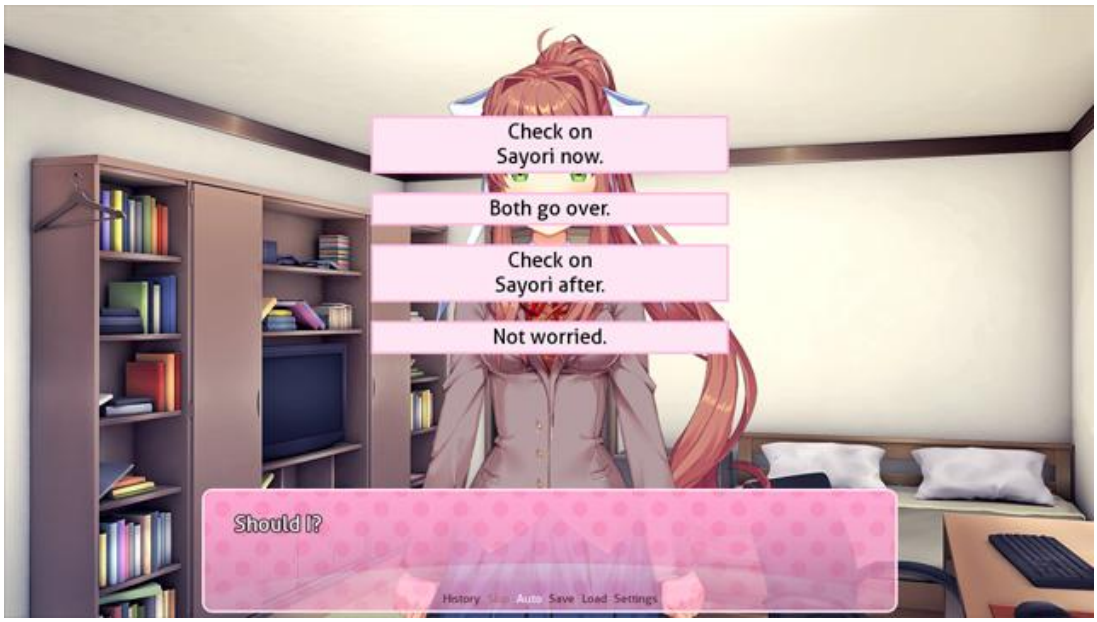

Figure 2.1: Screenshot of character interaction from “Doki Doki Literature Club!”

Figure 2.2: Screenshot of Stylized Art Style from "Doki Doki Literature Club!"

Figure 2.3: Screenshot of storyline from "Doki Doki Literature Club!"

LEARN YOUR CODE! draws inspiration from the interactive and branching narrative structure of *"Doki Doki Literature Club!"*, integrating it seamlessly with engaging gameplay and educational objectives. Like *"Doki Doki Literature Club!"*, *LEARN YOUR CODE!* offers players multiple endings, allowing them to influence the game's outcome based on their decisions. This feature provides players with a sense of agency, as their choices regarding both the direction of the story and the completion of puzzles directly impact the ending, they

achieve. By combining meaningful decision-making with educational challenges, *LEARN YOUR CODE!* creates an immersive experience where players feel that their actions shape the narrative, making the game more engaging and dynamic.

In addition to solving puzzles that introduce and reinforce concepts of the C# programming language, players must also navigate complex relationships and interactions between characters. These interactions contribute significantly to the development of the storyline, adding layers of depth and emotional engagement. By requiring players to balance puzzle-solving with character interactions, *LEARN YOUR CODE!* fosters a rich narrative experience that complements its educational goals. This design ensures that the game's world feels vibrant and lived-in, avoiding the sense of emptiness that can often plague educational games. Instead, the world-building in *LEARN YOUR CODE!* is robust, giving players a greater sense of connection to the environment and its characters.

The stylised art style of *"Doki Doki Literature Club!"* serves as a significant influence on the visual design of *LEARN YOUR CODE!*. The anime-inspired aesthetic, combined with a high school setting and multi-character interaction, aligns perfectly with the vision for *LEARN YOUR CODE!*. These elements resonate strongly with a younger audience, particularly fans of anime and visual novels, making the game visually appealing and culturally relevant. The vibrant and expressive art style not only enhances the storytelling but also establishes a connection with players who are familiar with or drawn to anime's distinctive artistic elements.

While *"Doki Doki Literature Club!"* has successfully captivated players with its compelling storyline and interactive choices, it lacks an educational component that provides tangible learning outcomes. The puzzles in *"Doki Doki Literature Club!"* primarily focus on selecting keywords that reflect the personalities of characters, which, while entertaining, do not contribute to skill development. In contrast, *LEARN YOUR CODE!* builds upon this concept by incorporating puzzles designed specifically to teach the fundamentals of the C# programming language. These puzzles are crafted in a creative and engaging manner, ensuring that players learn coding concepts while being entertained. By merging educational content with interactive storytelling, *LEARN YOUR CODE!* offers a unique experience that distinguishes itself from traditional educational tools and conventional visual novels.

Ultimately, *LEARN YOUR CODE!* seeks to bridge the gap between entertainment and education. By blending the narrative richness and stylistic elements of *"Doki Doki Literature*

Club!" with an innovative approach to teaching programming, the game aims to create an environment where players can enjoy a compelling story while gaining valuable technical skills.

2.3.2 Needy Streamer Overload

"*Needy Streamer Overload*" is a visually striking and emotionally intense game that offers a deep dive into the darker side of internet culture and the mental health challenges associated with it. Developed by the Japanese studio Xemono and released in 2022, it places players in the role of a manager for a female live streamer named Ame, whose goal is to reach one million followers in just one month. The game explores the impact of social media fame, with players making decisions that influence Ame's mental well-being and emotional state. The narrative is rich and complex, driven by character interactions that evolve as the story progresses, offering a unique and thought-provoking experience.

The game's distinct visual style, inspired by anime and a retro Windows 95 interface, draws players into its world, making the experience both visually captivating and immersive. Through a series of interactions, players must manage Ame's daily tasks, monitor her stress and affection levels, and keep her mental health in check as she deals with the pressures of fame. The combination of these elements creates a deeply emotional journey, where decisions can have significant consequences on Ame's well-being.

One of the most compelling aspects of "*Needy Streamer Overload"* is the way it portrays mental health struggles, showcasing how the relentless pursuit of social media success can take a toll on an individual. The game's dark and often unsettling themes are balanced by its engaging and interactive nature, drawing players into the narrative and making them feel directly responsible for Ame's fate. However, the game focuses primarily on its storytelling and character development, lacking puzzles or educational features commonly found in other games. Instead, it prioritises emotional and psychological immersion, making it an experience centred around narrative rather than gameplay mechanics.

Figure 2.5: Screenshot of Stylized Art Style from

"NEEDY STREAMER OVERLOAD"

Figure 2.6: Screenshot of character interaction from

"NEEDY STREAMER OVERLOAD"

Figure 2.7: Screenshot of storyline from "NEEDY STREAMER OVERLOAD"

The visual style of *"Needy Streamer Overload"* is intentionally designed to amplify its dark and unsettling atmosphere, enhancing the game's horror elements. In contrast, *LEARN YOUR CODE!* adopts a tone that is far more vibrant and cheerful, with a bright colour palette and characters exuding positive and fun energy. This choice reflects the educational focus of *LEARN YOUR CODE!*, as incorporating horror visuals would be inconsistent with its primary objective of teaching coding in an approachable and engaging manner. The vibrant aesthetic aims to create a welcoming environment that encourages learning, making it suitable for a wide range of players, especially younger audiences.

While *"Needy Streamer Overload"* provides a meaningful exploration of mental health challenges and the psychological toll of internet fame, *LEARN YOUR CODE!* has a distinctly different purpose. Its core focus is on teaching the fundamentals of the C# programming language in a creative and interactive way. This divergence in objectives is reflected in the gameplay mechanics. In *LEARN YOUR CODE!*, puzzles are designed to teach coding concepts while also advancing the storyline, ensuring a seamless integration of educational content and narrative progression.

Ultimately, both games address important themes, but they do so through vastly different approaches. *"Needy Streamer Overload"* uses its dark tone and emotional depth to

raise awareness about mental health, while *LEARN YOUR CODE!* takes a lighter, more optimistic path to make programming accessible and enjoyable. This contrast in tone and purpose underscores the unique identities of each game, catering to their respective audiences and goals.

2.3.3 C Serenity

The game *C Serenity* is a 2D educational game tailored for first-year students from the Faculty of Computer Science and Information Technology at Universiti Malaysia Sarawak (UNIMAS). Developed by Faris Haziq Bin Sarif using Visual Novel Maker, the game is a Final Year Project (FYP) in 2024 designed to run on Windows, leveraging the platform's extensive user base to ensure accessibility to a broad audience. The choice of English as the primary language aligns with its widespread use in educational institutions, particularly in the teaching of programming and computer science.

The gameplay involves players navigating scenarios where they respond to questions by making selections from given options. After each choice, the game provides feedback, confirming whether the action was correct and explaining the reasoning behind it. This immediate feedback mechanism aims to reinforce learning and encourage players to engage actively. Successful responses allow players to advance to the next scene, promoting a sense of progression and accomplishment.

The research associated with the game, titled *"C Serenity: Nurturing C Programming Skills Using a Game-Based Learning Approach,"* explores the potential of game-based learning to enhance programming skills. The focus is on using interactive gameplay to help students develop a strong foundation in C programming. Through this approach, *C Serenity* seeks to combine education with engagement, making it a valuable resource for computer science students.

Figure 2.8: Screenshot of stylised art style from "C Serenity"

Figure 2.9: Screenshot of character interaction from "C Serenity"

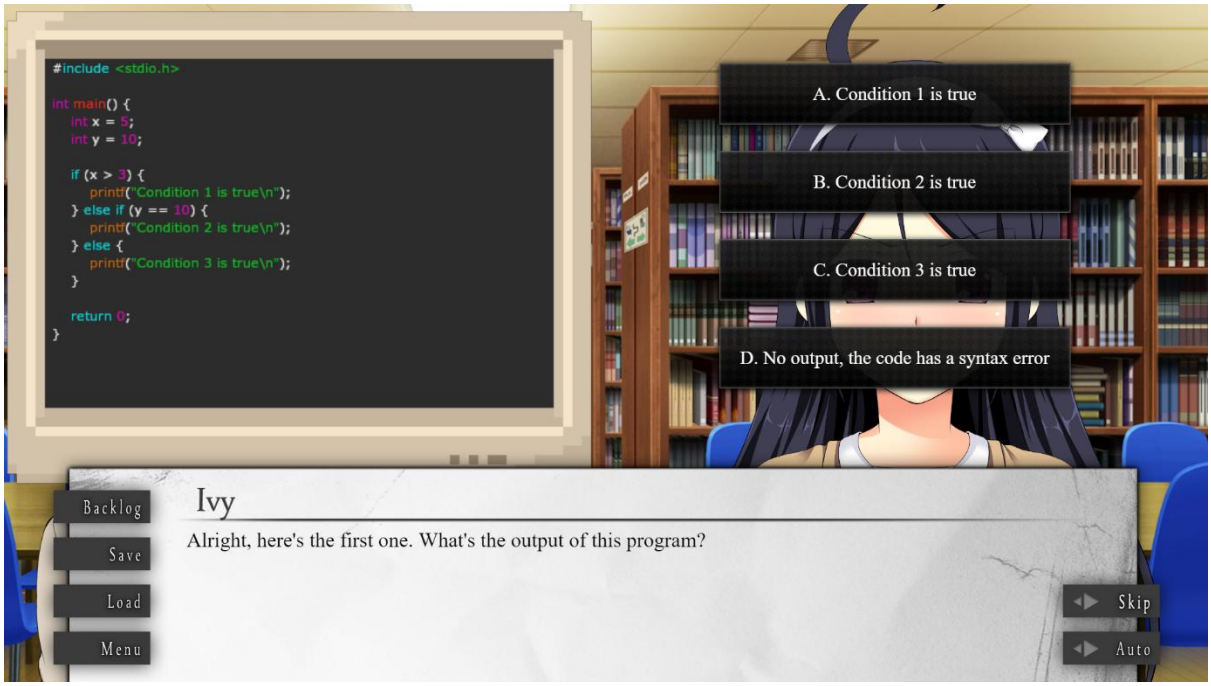

Figure 2.10: Screenshot of educational puzzle from "C Serenity"

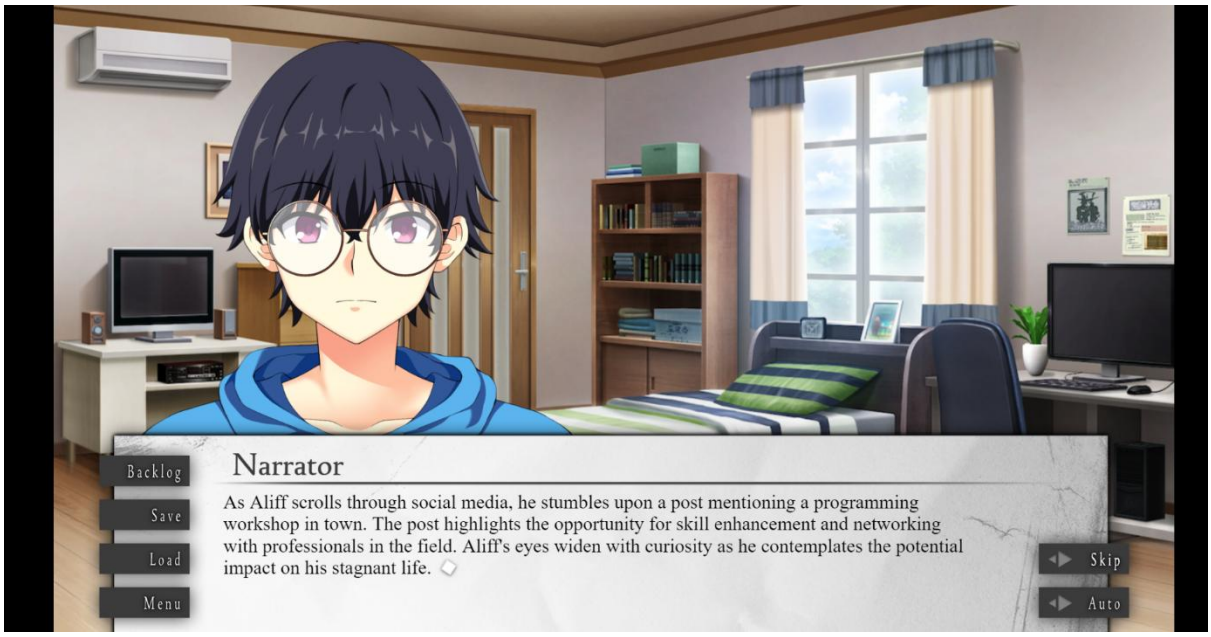

Figure 2.11: Screenshot of storyline from "C Serenity"

"C Serenity" serves as a fitting comparison to *LEARN YOUR CODE!*, as both games share many similar features, with the key difference being the programming languages they teach C and C#, respectively. While *"C Serenity"* offers a solid foundation for learning programming, *LEARN YOUR CODE!* will increase the game content. Notably, *LEARN YOUR CODE!* will feature more endings and a broader range of characters, providing greater depth and variety in the gameplay experience.

In addition to its expanded narrative elements, *LEARN YOUR CODE!* will place a stronger emphasis on storytelling, using it as a central driving force to keep players engaged. This focus on narrative will encourage players to continue progressing through the game, as the unfolding story offers both personal and educational rewards. The story will be carefully crafted to provide a compelling, emotionally resonant experience, ensuring that players are motivated not only by the desire to learn but also by the desire to uncover the outcomes of their choices.

Another area where *LEARN YOUR CODE!* will distinguish itself is in its character design and overall aesthetic. While *"C Serenity"* may employ a more straightforward visual style, *LEARN YOUR CODE!* will prioritise vibrant, colourful characters that are designed to capture the attention of players, particularly younger audiences. This focus on engaging, lively visuals is intended to enhance the overall gaming experience, making it more enjoyable and approachable. By combining an engaging narrative with appealing character design and a focus on player-driven choices, *LEARN YOUR CODE!* aims to offer a more dynamic and immersive experience compared to *"C Serenity"*.

2.3.4 Bitburner

Bitburner is an incremental game that integrates programming elements into its core gameplay. Developed by Fulcrum Games and Hydroflame, and released on Steam for Microsoft Windows in December 2021, Bitburner offers players a unique experience where they can write scripts in JavaScript to automate various aspects of the game. Set in a cyberpunk world, the game combines text-based RPG elements with programming tasks, allowing players to learn coding skills while solving puzzles, playing minigames, and advancing through the game. By writing and improving scripts, players can automate processes, unlock new abilities, and progress further in the game, making it an educational yet entertaining experience that encourages players to engage with programming in a practical and interactive way.

Figure 2.12: Screenshot of stylised art style from "Bitburner"

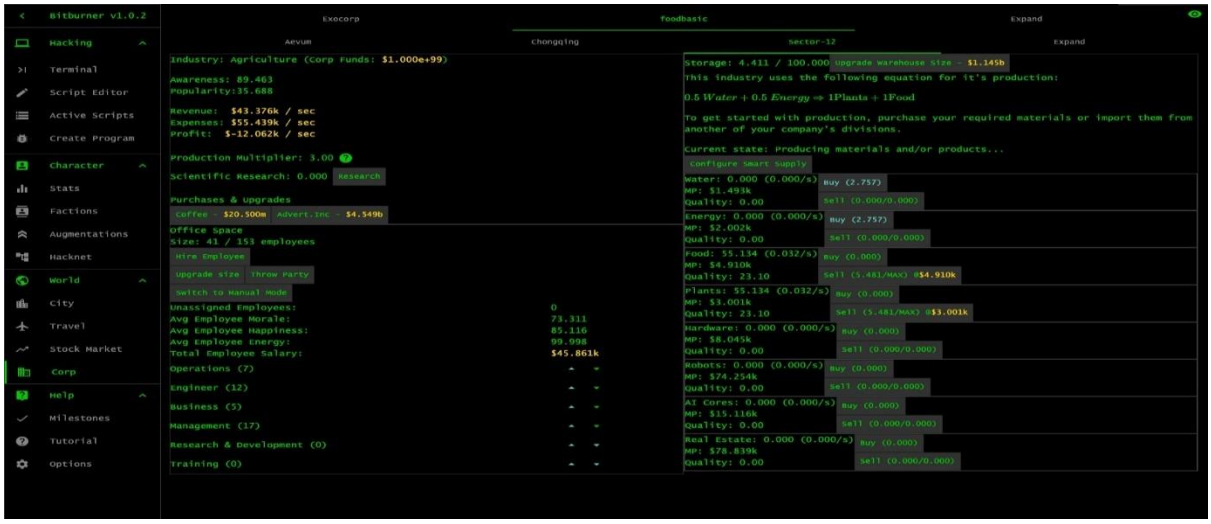

Figure 2.13: Screenshot of educational puzzles from "Bitburner"

"Bitburner" is undoubtedly a more complex and advanced game, making it less suitable for casual players, particularly those who are just beginning to explore programming. In contrast, *LEARN YOUR CODE!* is designed with high school students in mind, ensuring accessibility and engagement by keeping the puzzles relatively simple and focused solely on fundamental programming concepts. The game's approach makes it easier for beginners to grasp the basics of coding without feeling overwhelmed by more advanced techniques or complex gameplay mechanics.

Furthermore, *"Bitburner"* lacks a structured storyline, which can significantly reduce player motivation and engagement. The absence of a narrative makes the game feel repetitive, as players primarily engage in idle gameplay, focusing on automation and coding tasks without a compelling story to drive their actions. This is a crucial difference, as *LEARN YOUR CODE!* places a strong emphasis on its storyline, ensuring that players are not only learning coding but also progressing through a rich, engaging plot. The narrative in *LEARN YOUR CODE!* serves as a powerful motivator, encouraging players to continue playing as they uncover new story elements and develop a connection to the characters.

In addition to its focus on story, *LEARN YOUR CODE!* ensures a visually appealing experience, which *"Bitburner"* lacks. While *"Bitburner"* follows a more minimalistic, text-based design with little attention to stylised art, *LEARN YOUR CODE!* adopts a consistent anime-inspired art style. This choice not only makes the game more visually engaging but also helps establish a unique identity that appeals to its target audience. The vibrant and dynamic characters in *LEARN YOUR CODE!* contribute to an immersive experience, making the game more fun and inviting for players, especially those in high school. This emphasis on both storytelling and visual aesthetics ensures that *LEARN YOUR CODE!* is not only educational but also enjoyable, encouraging sustained interest and participation.

Table 2.1: Comparison Table of Existing Game and Proposed Game

Game Title / Key features	*Doki Doki Literature Club!*	*NEEDY STREAMER OVERLOAD*	*C Serenity*	*Bitburner*	*LEARN YOUR CODE!!*
Storyline	✓	✓	✓	✗	✓
Educational	✗	✗	✓	✓	✓
Puzzle	✓	✗	✓	✓	✓
Character Interaction	✓	✓	✓	✗	✓
Stylized Art Style	✓	✓	✓	✓	✓

In conclusion, *LEARN YOUR CODE!* aims to integrate all five key features, offering a balanced and enjoying gaming experience. By combining a captivating, story-driven narrative with coding challenges, the game provides both entertainment and educational value. The interactive puzzles not only engage players but also enhance their learning experience, while meaningful character interactions deepen the storyline and player investment. Additionally, the anime-inspired aesthetic ensures that the game remains visually appealing, particularly for fans of this art style. Ultimately, *LEARN YOUR CODE!* bridges the gap between entertainment and education, delivering a unique and enjoyable experience that combines the best of both worlds.

2.4 Brief overview of the proposed game

LEARN YOUR CODE! is designed to be a visual novel game that appeals to players through a combination of story-driven gameplay and coding education. The game places the player in the shoes of a high school student who must learn coding to compete in a tournament. The storyline is engaging, with multiple characters to interact with, choices to make, and various puzzles that teach coding concepts. Unlike traditional visual novel games, the educational component of LEARN YOUR CODE! is integrated seamlessly into the gameplay, ensuring that players are learning coding skills while still being entertained. The game also features an anime aesthetic, which appeals to a younger audience and fans of the genre, making coding education accessible in a fun and interactive way.

2.5 Summary

The comparison of existing visual novels with the proposed game LEARN YOUR CODE! illustrates the unique combination of features that the game offers. While the four cult classic games analysed each excel in their own aspects, none of them manage to incorporate both entertainment and education effectively. *LEARN YOUR CODE!!* fills this gap by offering an experience that blends an engaging narrative with coding education, puzzles, character interactions, and anime aesthetics. This positions the game as a fresh and innovative title, with the potential to appeal to casual gamers, visual novel enthusiasts, and those interested in learning coding skills.

CHAPTER 3: REQUIREMENT ANALYSIS AND DESIGN

3.1 Introduction

In this chapter, we delve into the research methodology employed to develop the proposed project, focusing on the systematic approach that guided our investigation and implementation. The choice of methodology is crucial as it lays the foundation for the project's design, execution, and evaluation. Among various methodologies available, Agile methodology is selected as it is the most appropriate approach for this project.

3.2 Agile Methodology

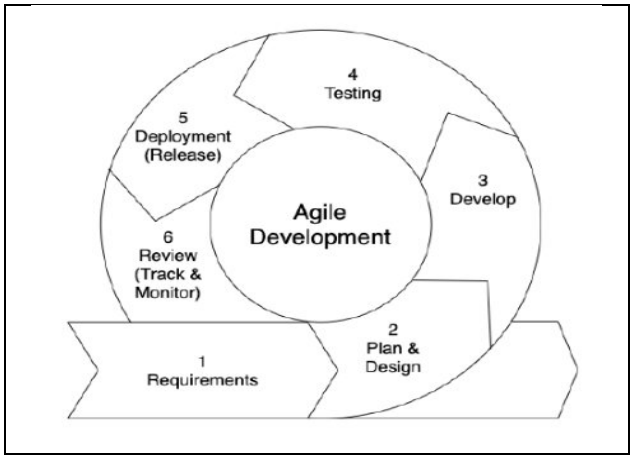

Figure 3.1: *Agile Methodology (Omonije, 2024).*

Agile methodology, as outlined by Omonije (2024), is a dynamic and iterative approach to project management that is particularly effective in the realm of game development. This methodology promotes flexibility, collaboration, and continuous improvement, allowing teams to adapt to changing requirements and enhance productivity throughout the development process.

3.2.1 Analyse & Plan

Set user goals and plan the game. This initial phase involves understanding the target audience, defining objectives, and outlining the overall vision for the game.

3.2.1.1 Survey

A survey is conducted using Google Forms to gain insights and gather information regarding my final year project from respondents. A total of 35 respondents participated in the survey. The survey is divided into three sections. These sections are Section 1: Demographic, Section 2: Gaming Habits, and Section 3: Game Preferences. The survey is attached in Appendix B.

Section 1: Demographic

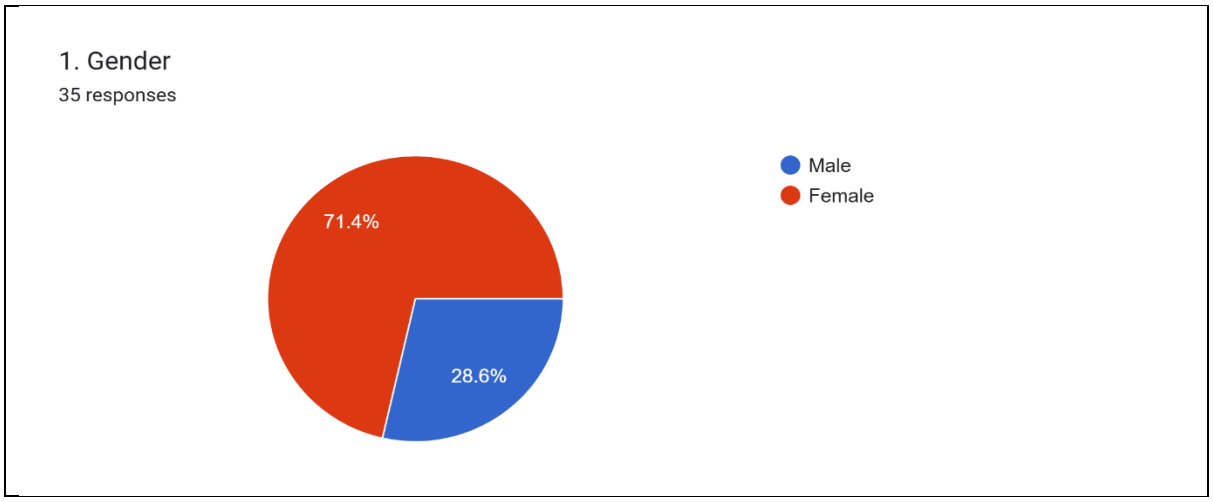

Figure 3.2: Gender

This figure above shows that the demographic are mostly females.

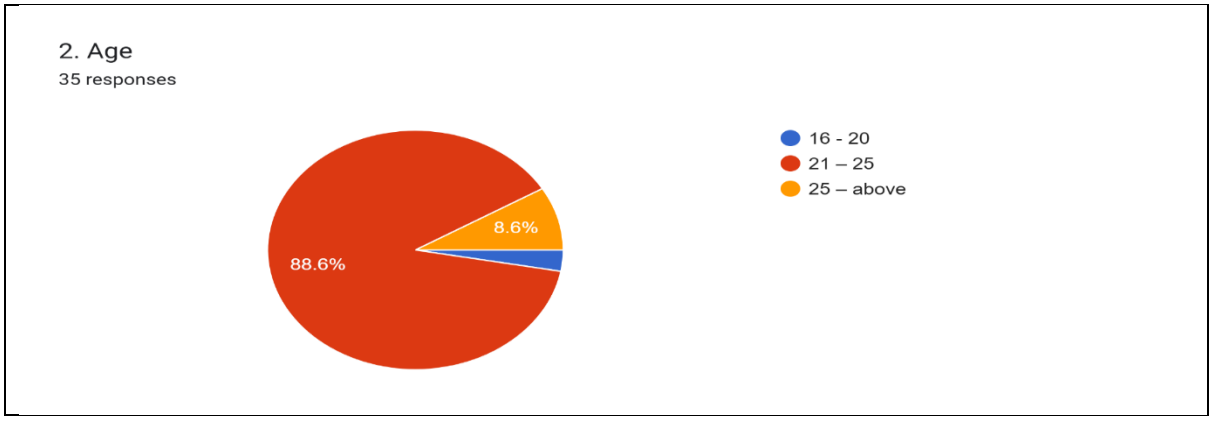

Figure 3.3: Age

This figure above shows 88.6% of respondents are young adults.

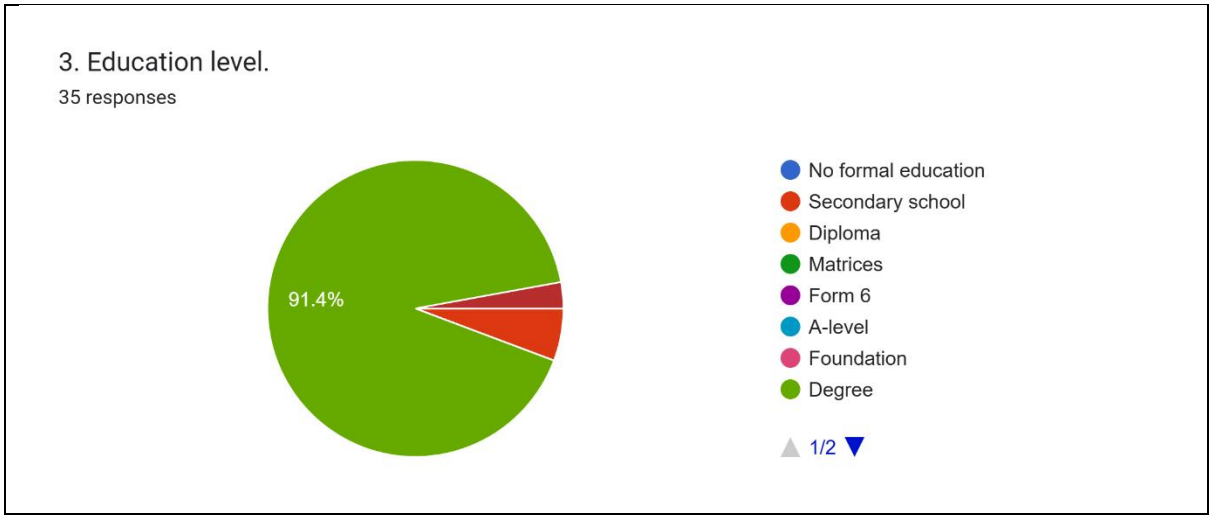

Figure 3.4: Education level

This figure above shows 91.4% of respondents are degree level. This can help in understanding the game proposed can help university students to learn how to code.

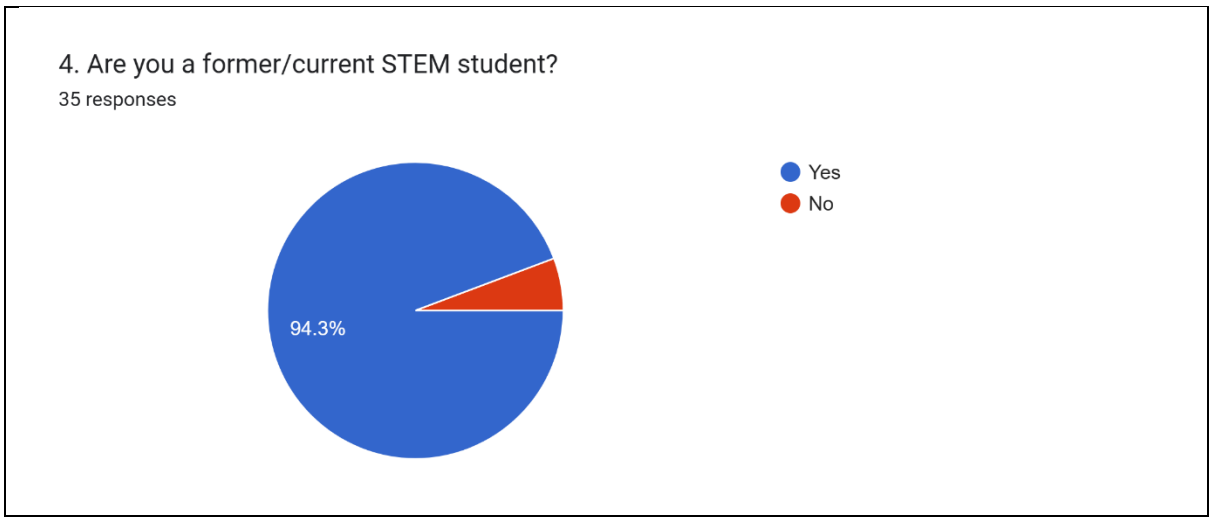

Figure 3.5: Are you a former/current STEM student?

This figure above shows 94.3% of respondents are STEM students. With this many STEM students as respondents, it can help to have accurate answer on what to implement in the proposed game. This coincides with the problem statement in Chapter 1 about increasing more STEM students in Malaysia.

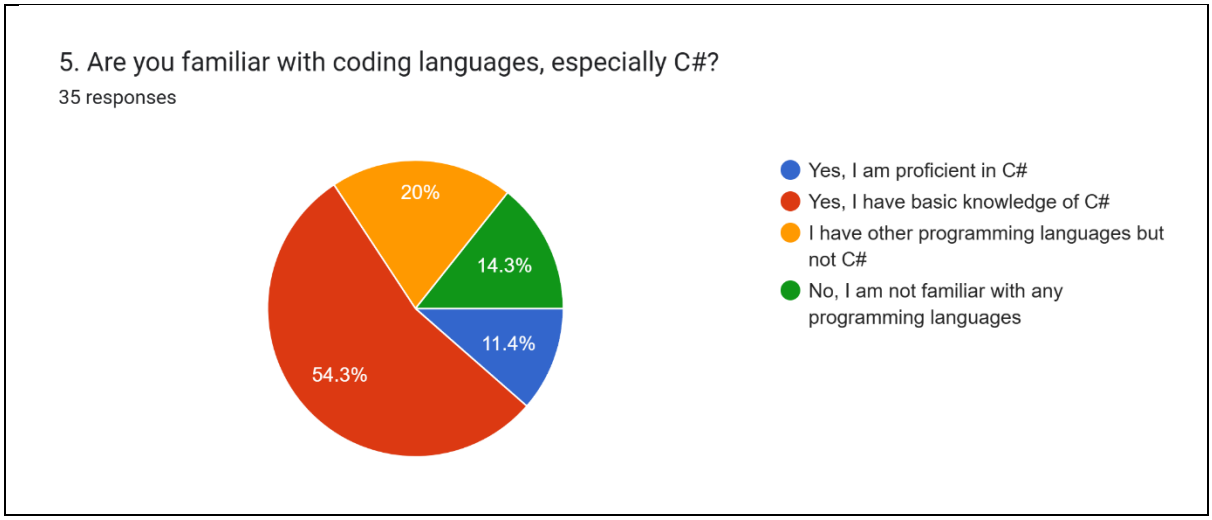

Figure 3.6: Are you familiar with coding languages, especially C#?

This figure above shows 85.7% of respondents have at least general knowledge of coding. But, only 65.7% of respondents have knowledge of C# programming languages and only 11.4% of respondents are proficient. This proves that the proposed game are needed.

Section 2: Gaming Habits

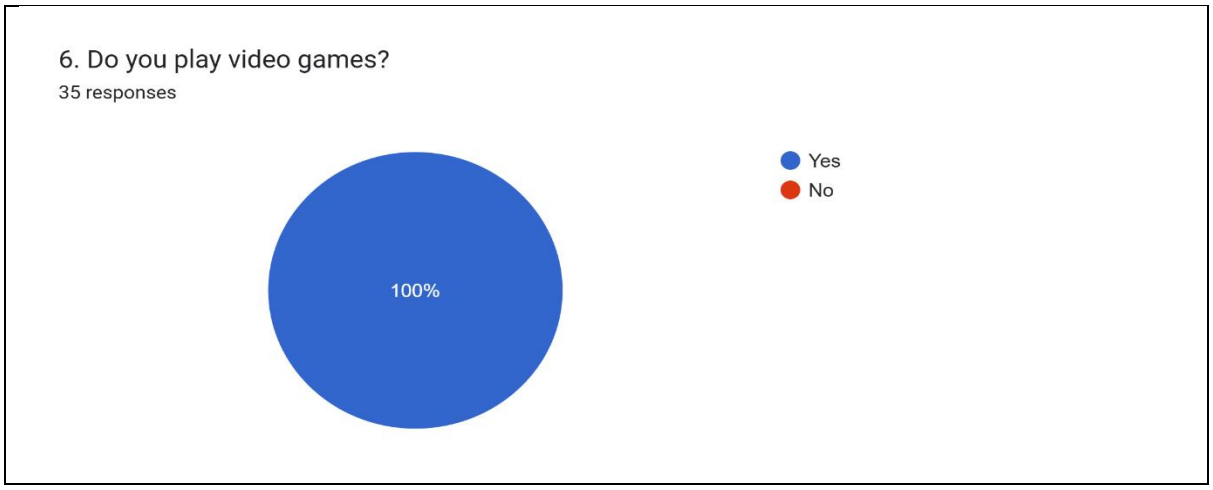

Figure 3.7: Do you play video games?

This figure above shows 100% of respondents plays video games. This ensures that the proposed game has a potential to be played by ALL respondents.

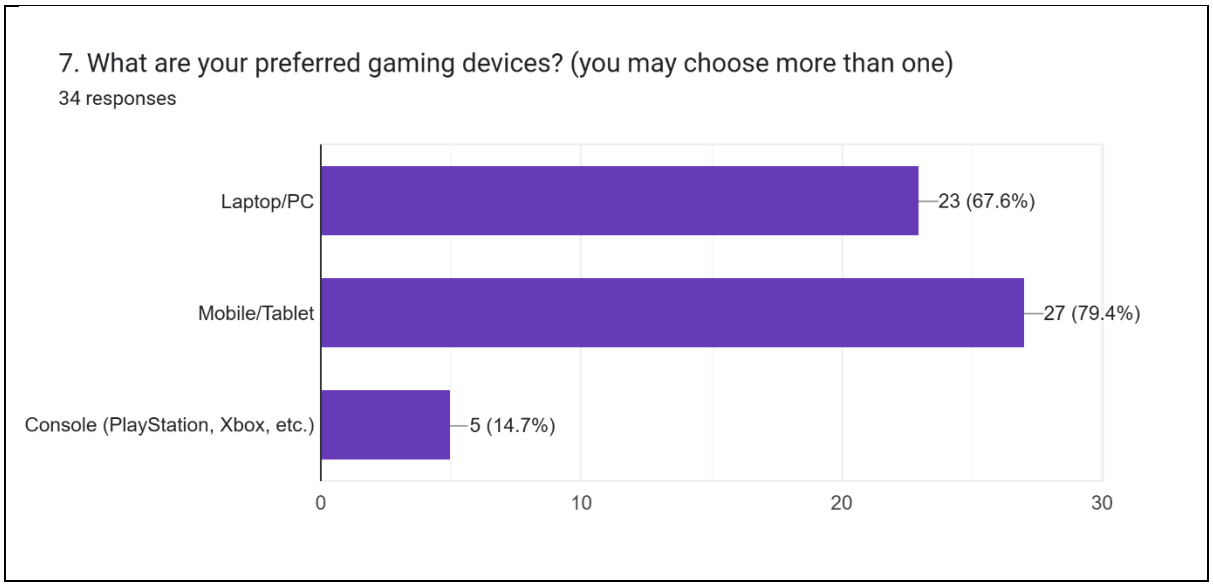

Figure 3.8: What are your preferred gaming devices?

This figure above shows 79.4% of respondents prefer mobile phone as gaming device. Since laptop/PC percentage are also high (67.6%), the proposed game aims to be compatible with both mobile/tablet and laptop/PC in order to reach as much audience as possible.

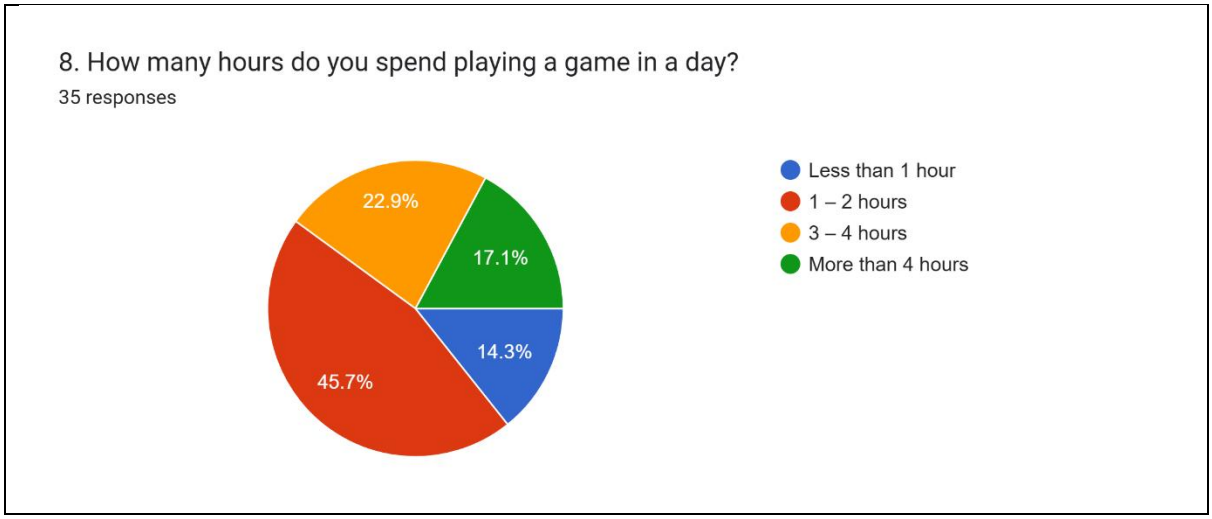

Figure 3.9: How many hours do you spend playing a game in a day?

This figure above shows 45.7% of respondents to spend about 1-2 hours of gaming in a day. This indicates that respondents do not prefer long game duration. This is also an acceptable margin as research in *Royal Society Open Science* (2022) found moderate gaming (1-3 hours daily) showed neutral-to-positive effects on emotional state and no measurable negative impacts on life satisfaction. In response, the proposed game will not have long game duration.

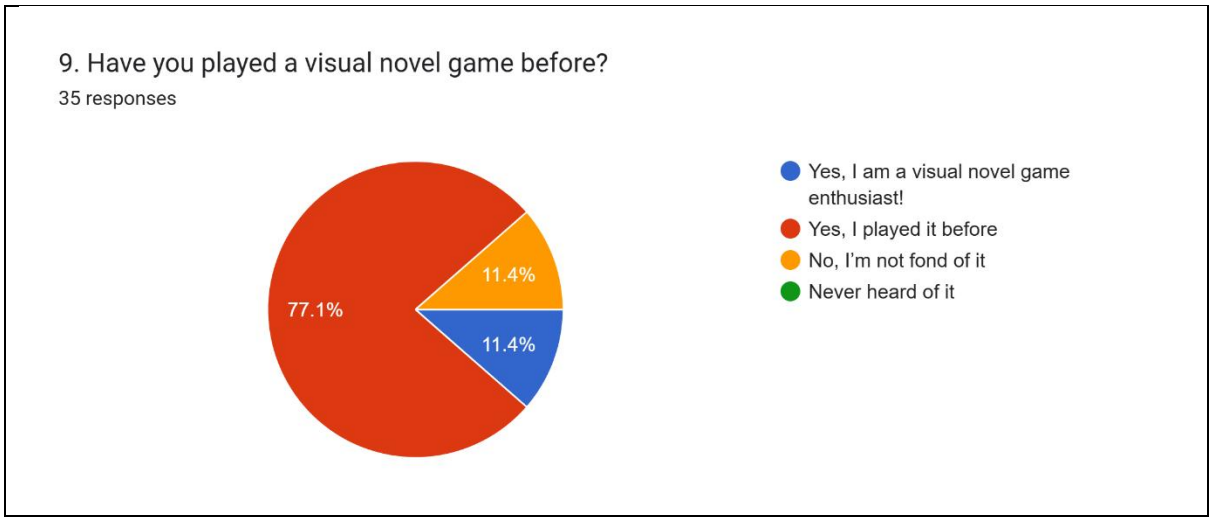

Figure 3.10: Have you played a visual novel game before?

This figure above shows 88.5% of respondents are aware visual novel games. This ensures that the proposed game would not be too alien for respondents as they had played games with similar genre.

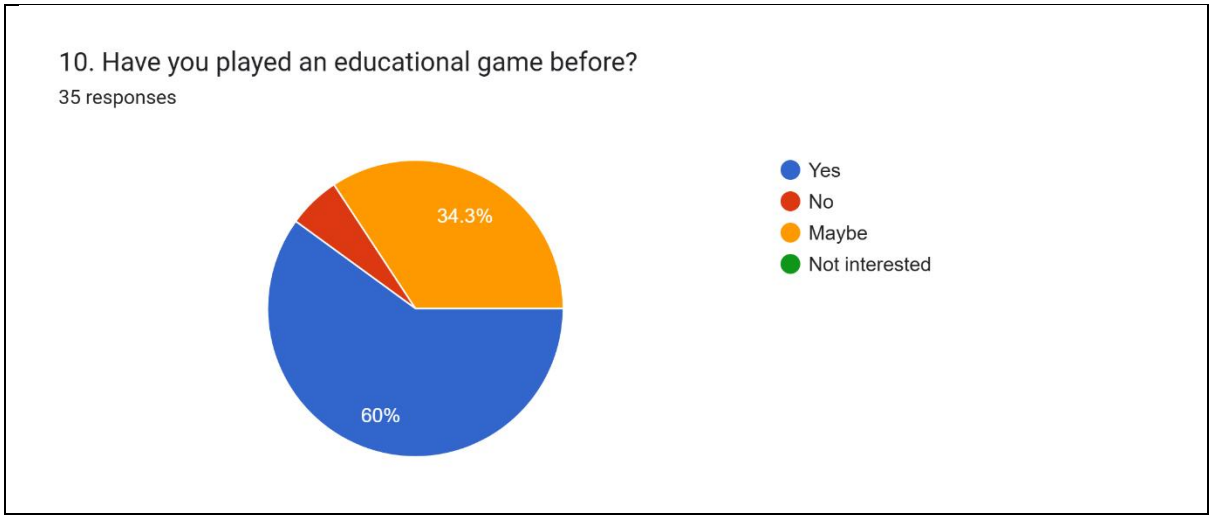

Figure 3.11: Have you played an educational game before?

This figure above shows only 60% of respondents confidently claims to have played education games. This indicates that there has not been many educational games that are actually playable.

Section 3: Game Preferences

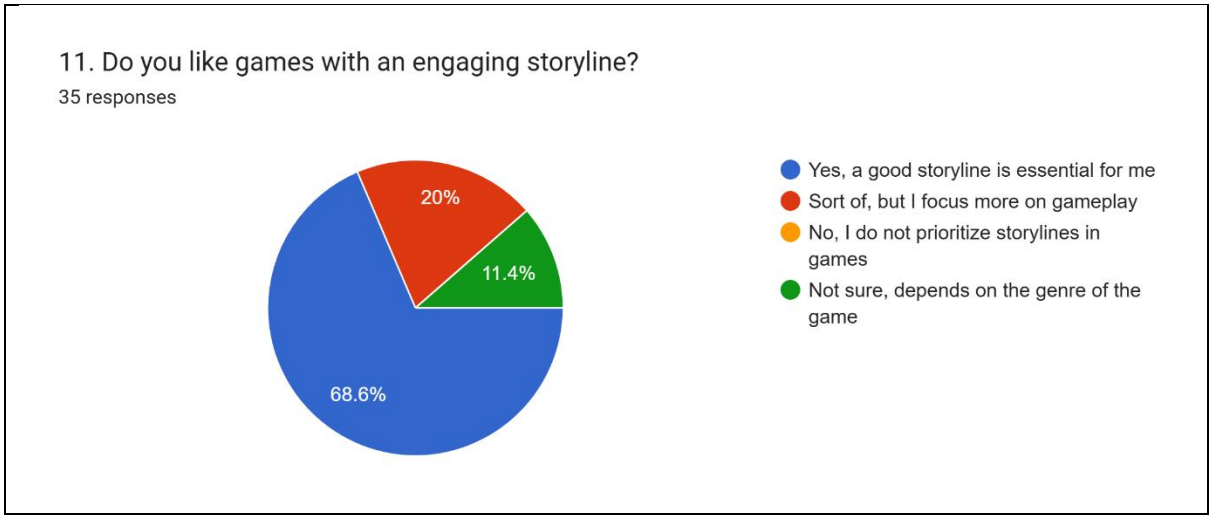

Figure 3.12: Do you like games with an engaging storyline?

The figure above shows 68.6% of respondents care about the game storyline. This proves that a good storyline makes a good game and in order to make a good game, the proposed game must have good storyline.

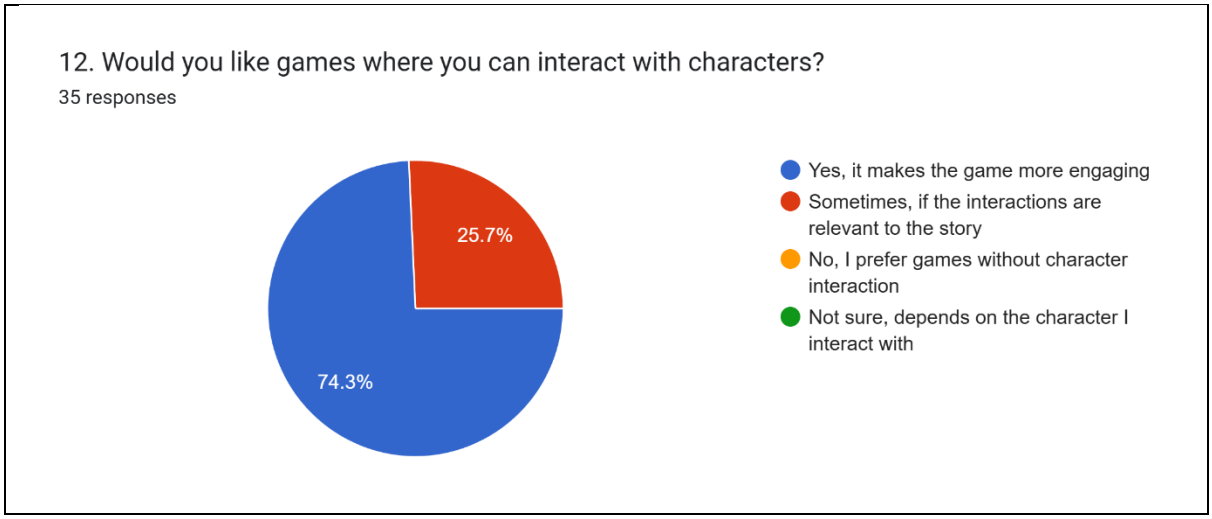

Figure 3.13: Would you like games where you can interact with characters?

The figure above shows 74.3% of respondents like to interact with characters. This indicates that character interaction makes game enjoyable to play.

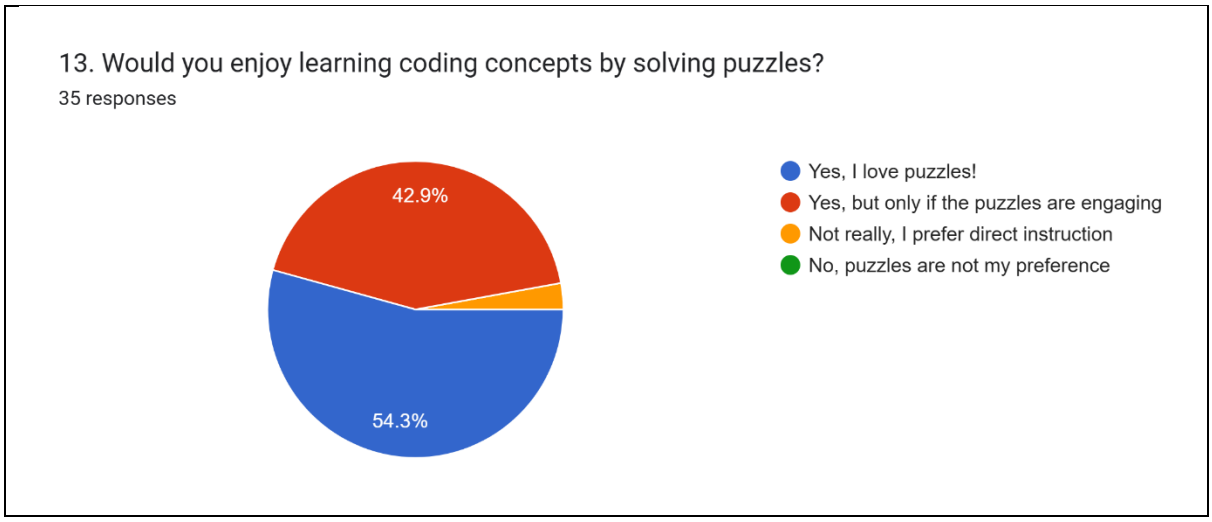

Figure 3.14: Would you enjoy learning coding concepts by solving puzzles

This figure above shows 54.3% of respondents love puzzles. This shows that respondents love solving puzzles. This love of puzzles can be intergrated into the proposed game which helps the game to become enjoyable and educational too.

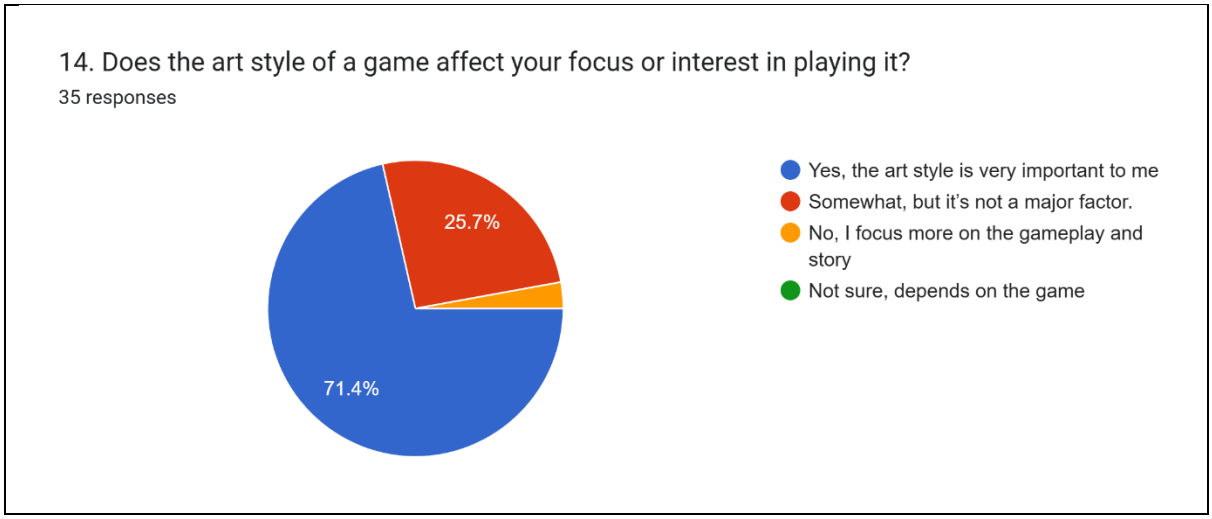

Figure 3.15: Does the art style of a game affect your focus or interest in playing it?

This figure above shows 71.4% of respondents likes game with good art style. This shows that a stylized art style is important in making a game.

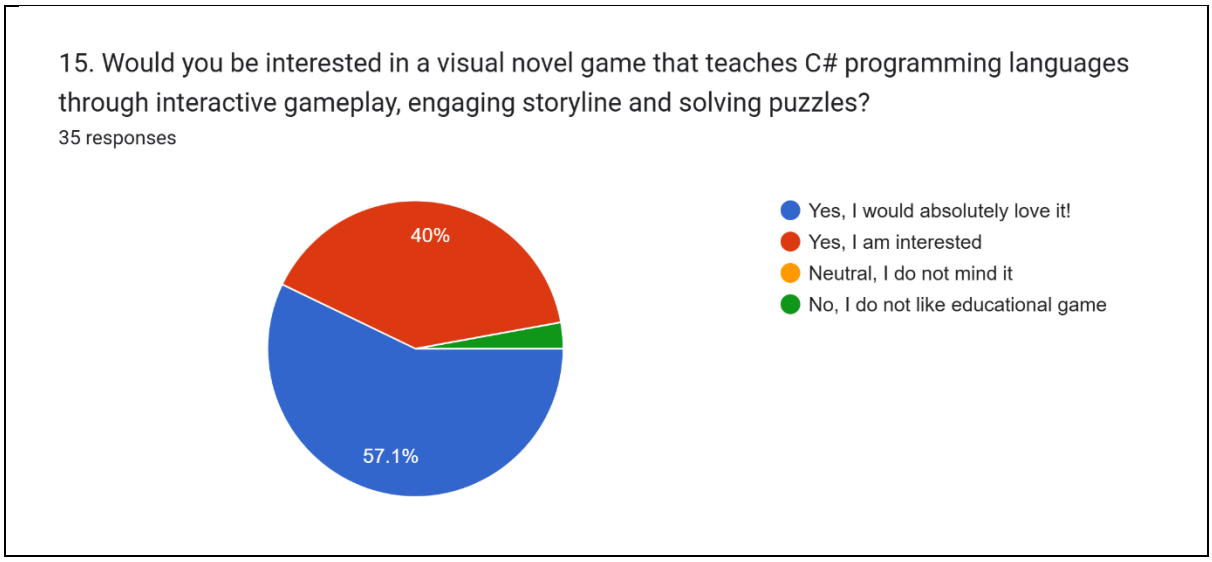

Figure 3.16: Would you be interested in a visual novel game that teaches C# programming languages through interactive gameplay, engaging storyline and solving puzzles?

This figure above shows 97.1% of respondents would like to play the proposed game. This shows that *LEARN YOUR CODE!* has potential to reach its goal as to become educational game that is both educational and fun to play.

16. Do you have any suggestions on what you would like to see in this game?

27 responses

No

Have difficulty level

Make it fun

Add music and sound effects

I would love to see features such as syncing GitHub/Git or Replit with the gameplay. This could indirectly teach users the related platforms and make it more fun for sandbox coding.

Good luck!

Anime girls teaching coding

More endings

Easy game play mode

make it engaging throughout the game

I want husbando >.<

The game style

Reward functin

No DLC pls

N/A

AI that can generate coding

I want good looking character

Figure 3.17: Do you have any suggestions on what you would like to see in this game?

The figure above shows an open suggestion on what *LEARN YOUR CODE!* could improve or add on to by the respondents. These remarks will be considered when making this game.

3.2.1.2 Functional Requirement

1. The game must have a title screen where player can choose to start game.
2. The game must have a load game so player can load progress
3. The game must have storyline so player can enjoy the game.
4. The game must have quiz/puzzle to solve by player.

5. The game must have settings to edit volume sound and music.

3.2.1.3 Non-functional Requirement

1. User interface must be easy to understand

2. The game performance must be smooth.

3. The game controls must be compatible for PC/laptop.

3.2.1.4 Software Requirements Specification

Table 3.1: Software Requirements

Software	Requirement	Description
Operating System	Microsoft Windows 11	Windows 11 for up-to-date operating system.
Game Engine	UNITY	Open-source game engine that supports 2D and 3D
Scripting Language	C#	Programming language chosen to write scripts

3.2.1.5 Hardware Requirements Specification

Table 3.2: Hardware Requirements

Hardware	Requirement	Description
Processor	AMD Ryzen 7 3750H	a quad-core processor with eight threads, operating at a base frequency of 2.3 GHz and boosting up to 4.0 GHz.
Storage	500 GB	ample space for storing games, applications, and data
Graphic card	GeForce GTX 1660 Ti	mid-range GPU suitable for gaming and graphics-intensive tasks
RAM	8GB	sufficient memory for multitasking and smooth performance in most applications.
Laptop	Asus TUF Gaming FX505DV	robust build quality and gaming capabilities.

3.2.2 Design

Outline mechanics, create visuals, story maps, and coding challenges. This step focuses on conceptualizing the game's structure and aesthetic elements while preparing the technical challenges that will be integrated into gameplay.

3.2.2.1 Premise of The Game

The game follows a high school student, a 16-year-old student in high school, class 4-B. the protagonist has a crush on Hiragi Mayumi, who is the same age but in a different class (4-A). Mayumi is a perfect girl with a beautiful smile and a kind heart. She is everyone's dream girl. One day, while talking with his classmates, he accidentally bumps into Hiragi. They talked and she mentions a competition that she joins in which she asks Tatsuki to join as well. Unable to resist her smiles, Tatsuki reluctantly agrees not knowing that he joined a C# programming language competition. With no knowledge of coding, he now must find ways to study C# programming language including meeting with his seniors or study with himself or his friends.

3.2.2.2 Activity Diagram

As presented in figure 3.18, the activity diagram depicted the storyline of the proposed game, *LEARN YOUR CODE!*. The player began the game by selecting “Start Game” on the title screen. The story commenced soon after the player started playing the game. The room stage was set, acting as checkpoints in the game and allowing players to review notes. At the end of every puzzle stage, the room stage triggers. Additionally, at the end of most puzzles, an explanation stage was set to teach the player about the lessons learned from the puzzle. The game reached its conclusion once the player reached one of the four endings of the game.

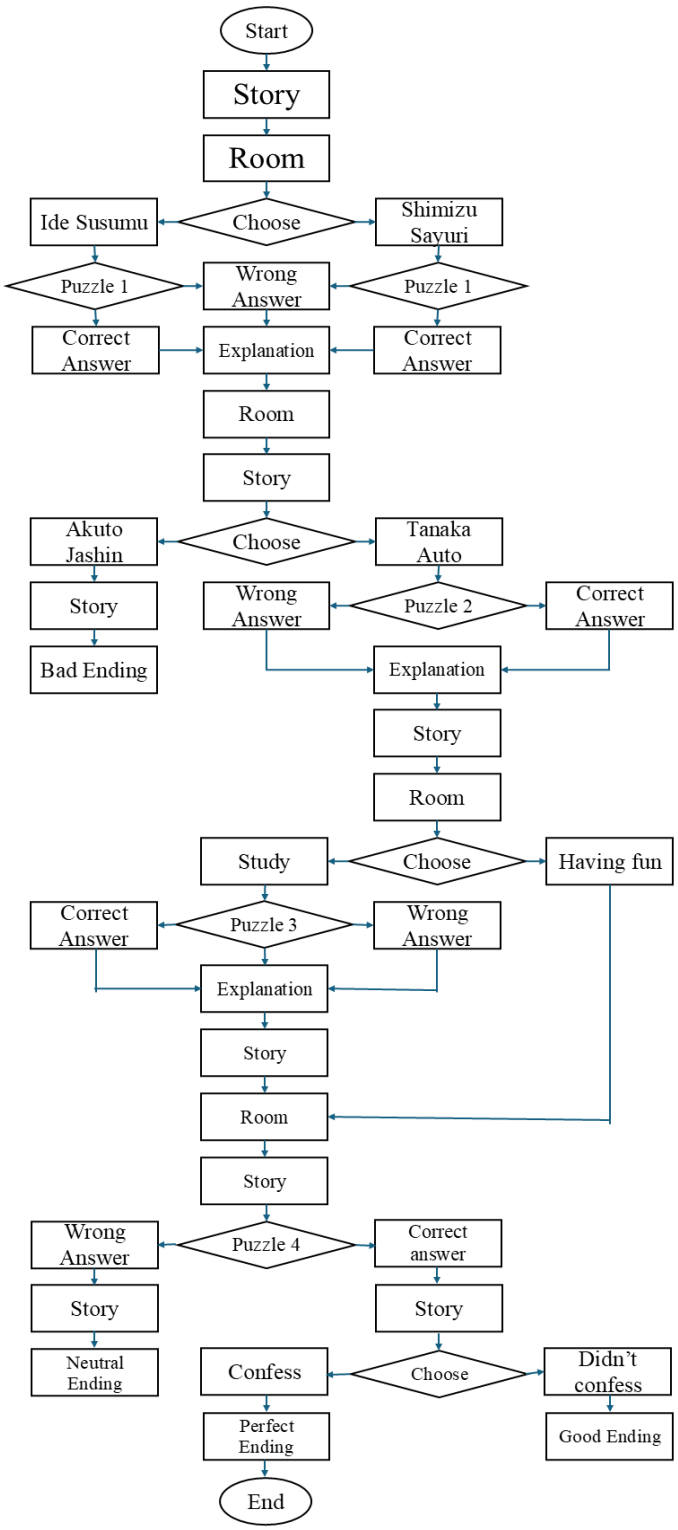

Figure 3.18: Activity Diagram

3.2.2.3 Use Case Diagram

Figure 3.19 presents the use case diagram for *LEARN YOUR CODE!*. The use case diagram visualises how different actors, such as users or external systems, interact with a system. It highlights the methods through which these actors engage with the system to accomplish specific objectives or utilise its functionalities.

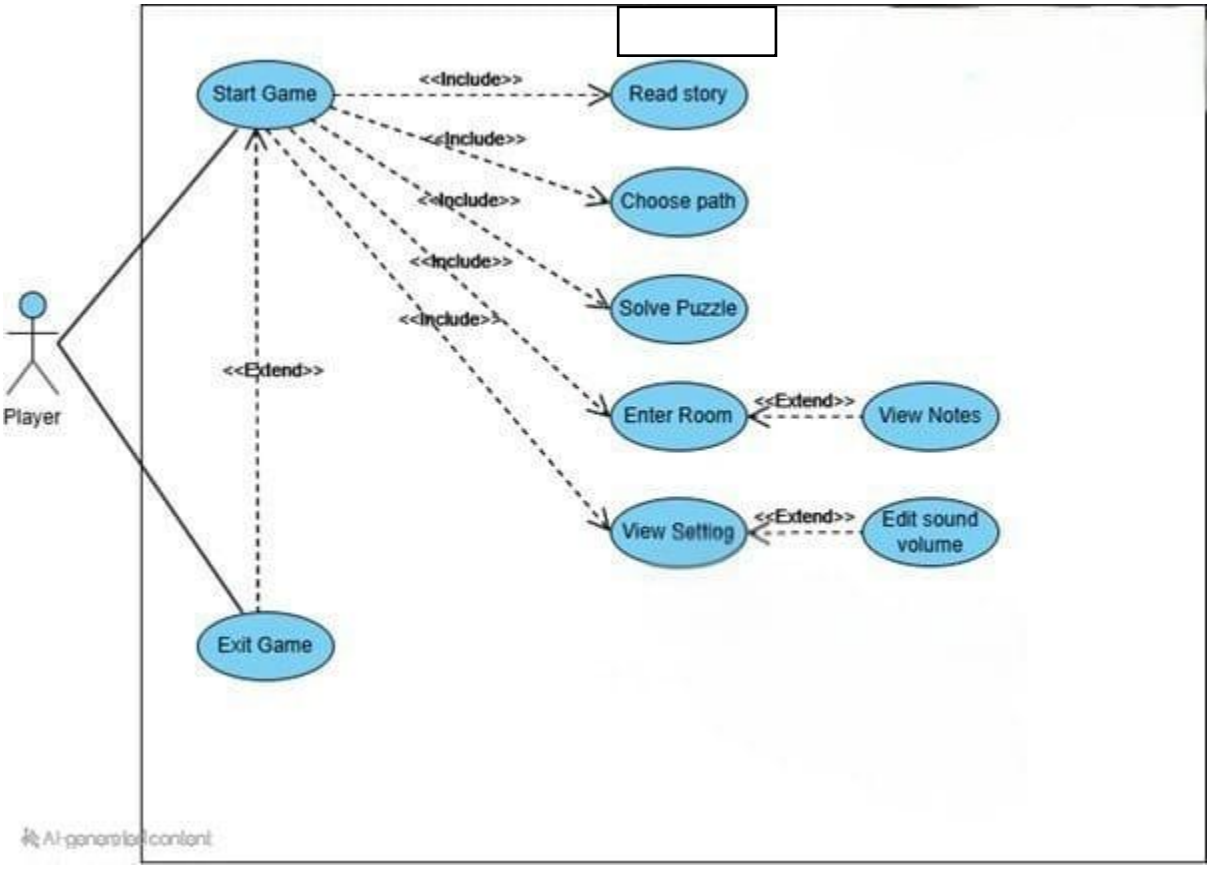

Figure 3.19: Use Case Diagram

3.2.2.4 Use Case Description

Table 3.3: Use Case Description Start Game

Use Case Name	Start Game
Description	Player starts game.
Actor	Player
Precondition	None
Postcondition	Player starts playing the game.
Trigger	Game starts

Table 3.4: Use Case Description Exit Game

Use Case Name	Exit Game
Description	Player exits the game
Actor	Player
Precondition	None
Postcondition	Player ends the game
Trigger	Game ends

Table 3.5: Use Case Description View Settings

Use Case Name	View Setting
Description	Player views settings
Actor	Actor
Precondition	None
Postcondition	Player opens settings menu
Trigger	Settings menu opens

Table 3.6: Use Case Description Read Story

Use Case Name	Read Story
Description	Player reads story
Actor	Player
Precondition	None
Postcondition	Player starts reading the story
Trigger	Story starts

Table 3.7: Use Case Description Choose path

Use Case Name	Choose Path
Description	Player chooses path
Actor	Player
Precondition	Player must be in game story
Postcondition	Player is choosing path
Trigger	Path is chosen

Table 3.8: Use Case Description Solve Puzzle

Use Case Name	Solve Puzzle
Description	Player solves puzzle
Actor	Player
Precondition	Player must be in game story
Postcondition	Player is solving a puzzle
Trigger	Puzzle solves

Table 3.9: Use Case Description Enter Room

Use Case Name	Enter Room
Description	Player enters room
Actor	Player
Precondition	Player must be in game story
Postcondition	Player is entering the room
Trigger	Room opens

Table 3.10: Use Case Description View Notes

Use Case Name	View Notes
Description	Player views notes
Actor	Player
Precondition	Player must be in game room
Postcondition	Player is viewing notes
Trigger	Notes open

Table 3.11: Use Case Description Edit Sound Volume

Use Case Name	Edit Sound Volume
Description	Player edits sound volume
Actor	Player
Precondition	Player must be in game settings
Postcondition	Player is editing sound volume
Trigger	Sound volume is edited

3.2.2.5 Sequence Diagram

a) Sequence Diagram 1

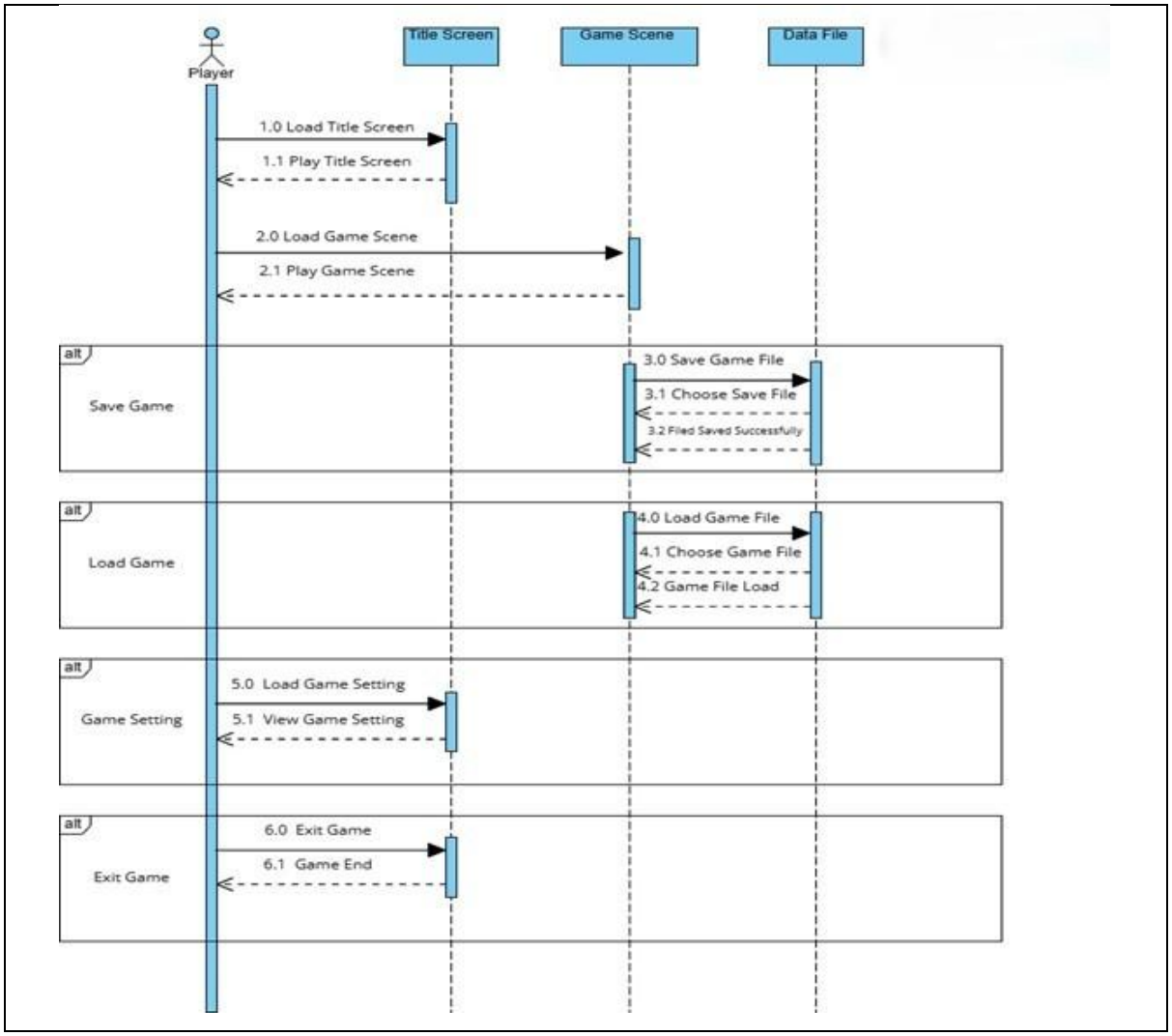

Figure 3.20: Sequence Diagram 1

Figure 3.20 represents sequence diagram for “Start Game”, “Save Game”. “Load Game”, “Game Setting” and “Exit Game”.

Start Game

1. Player enters title screen
2. Player chooses start game
3. Player loads to game scene

Save Game

1. Player chooses save game
2. Player chooses save game file
3. Game saved successfully

Load Game

1. Player chooses load game
2. Players chooses load game file
3. Game file loads

Game Setting

1. Player chooses game setting
2. Player enters game setting

Exit Game

1. Player chooses exit game
2. Game ends

b) Sequence Diagram 2

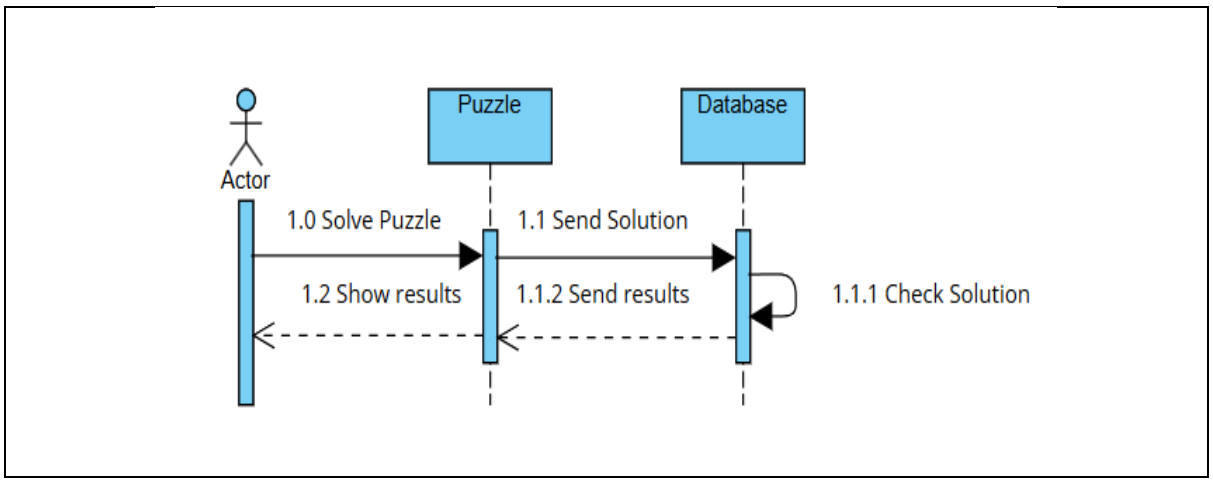

Figure 3.21: Sequence Diagram 2

Figure 3.21 represents sequence diagram for "Puzzle".

Puzzle

1. Player solves puzzle
2. Database check solution
3. Player gets results

c) Sequence Diagram 3

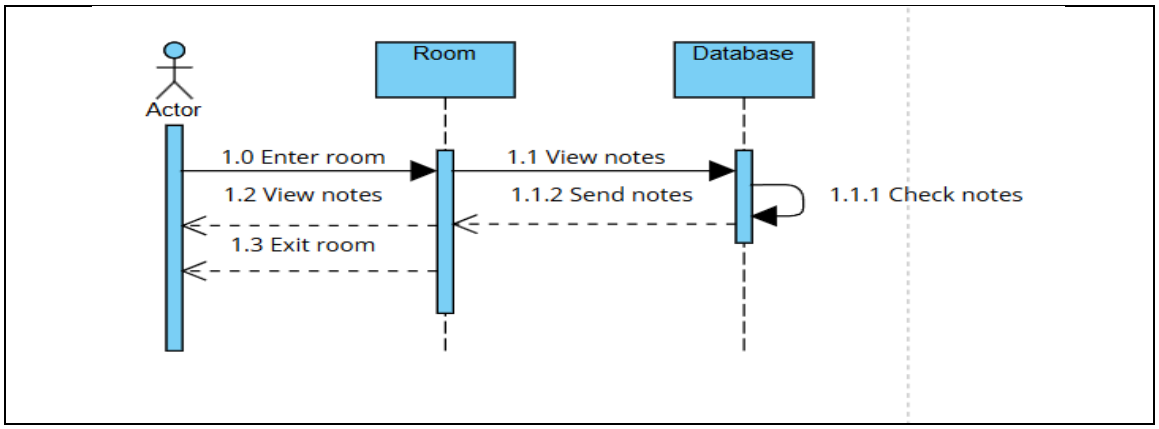

Figure 3.22: Sequence Diagram 3

Figure 3.22 represents sequence diagram for "Room".

Room

1. Player enters room
2. Player checks notes
3. Player views notes
4. Player exit room

3.2.2.6 Class Diagram

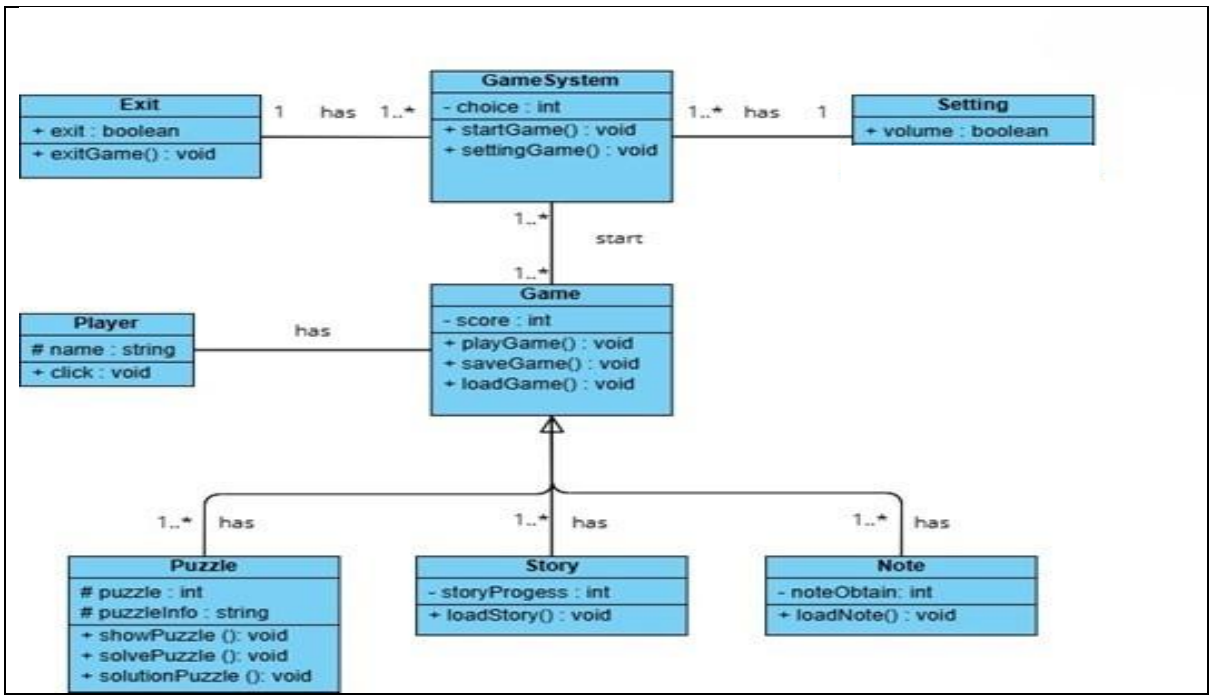

Figure 3.23: Class Diagram

Figure 3.23 shows class diagram for *LEARN YOUR CODE!*. The class diagram provides a visual representation of the structure of and relationship between classes in the system.

Storyline and Storyboard

LEARN YOUR CODE! follows Tatsuki Daiki, a 16-year-old secondary school student class 4B. A regular boy who crushes on Hiragi Mayumi, a female student with the same age, but different class of 4A. She is the talk of the crowd, hailed as the prettiest girl in school. One day, while talking to his friend, he accidentally bumps into Hiragi. They talked and she mentions a competition that she joins in which she asks Tatsuki to join as well. Unable to resist her smiles, Tatsuki then learns from Tanaka Auto that he just joined a C# programming language competition. He shocked, as he has no knowledge of coding.

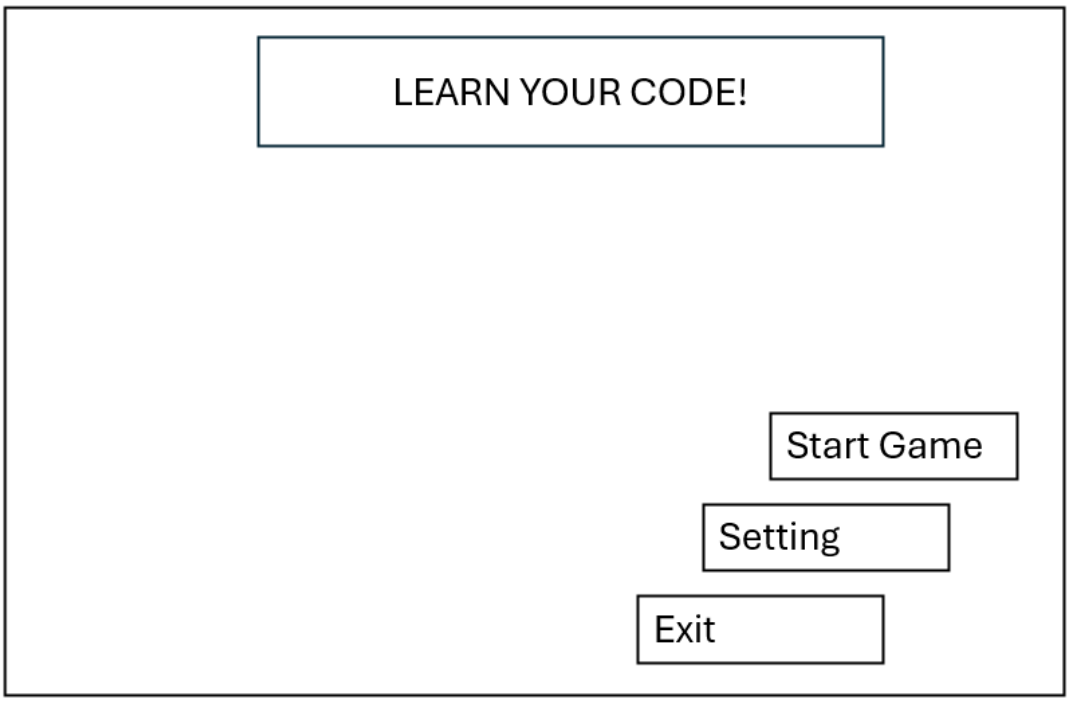

Figure 3.24: Title Screen

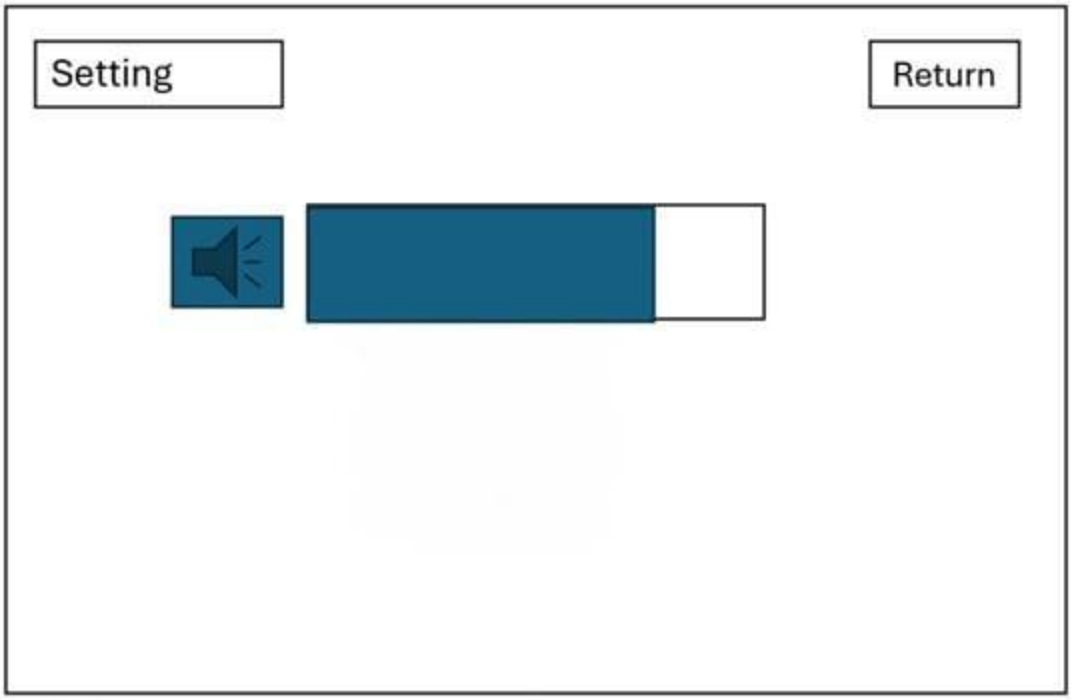

Figure 3.25: Setting phase

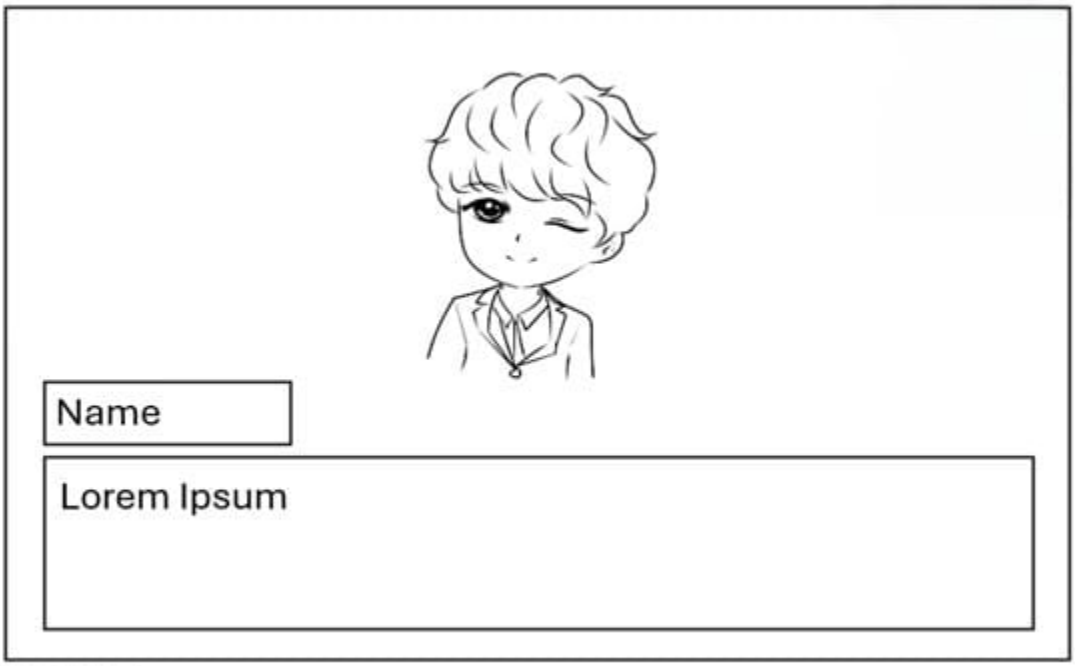

Figure 3.26: Interaction phase

Quartz High School C# Coding Competition 20XX, a coding competition held every year as part of government attempt to increase local IT (Information Technology) specialist.

This competition is students' way to exhibit their IT knowledge for a chance to win good prizes along with certificate that is highly regarded by the local universities. It is competitive with many students already studying the programming language before the competition even starts. Safe to say, Tatsuki did not see this coming.

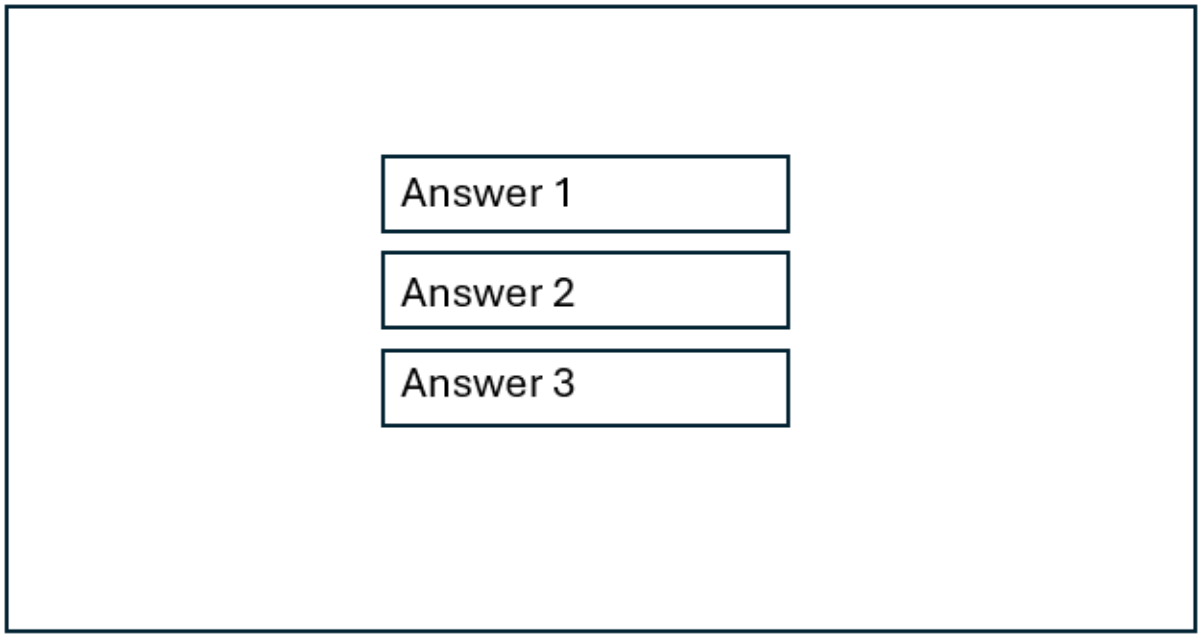

Figure 3.27: Quiz/Puzzle phase

It's night, Tatsuki is at home sitting in his room, staring in the mirror pondering about what happened in school. Flustered and helpless as he questions himself on how he could master a programming language. On his left hand, holding a phone with Tanaka in the chat laughing about it. He claims he knew a couple of people that could help teach C# programming language and states their effectiveness in teaching. Since there are not many choices for Tatsuki, he decided to follow through with Tanaka's suggestions and reach out with these people tomorrow. As he lay in bed, resting for the next day is a day he embarks on his journey to learn to code. "It's time to *LEARN YOUR CODE!*!" (Game starts here).

Figure 3.28: Room Phase

It's the next day, Tatsuki is walking around the hallway looking for said students. As he passes by his senior class, he met Ide Susumu and standing beside him, Shimizu Sayuri. Ide Susumu is a 17-year-old male student from 5C, and Shimizu is a female student and Ide's classmate. Tatsuki greeted them politely, but his formality is soon shrugged by Ide as he feels no need to be address as such. He then asks the reason for Tatsuki being in this area in which he responded with him looking for someone recommended by Tanaka. Tatsuki then explained his situation and how he unknowingly joined a coding competition without any knowledge of coding. Ide laughed, saying how stupid can Tatsuki be. However, Ide insists that he could help Tatsuki and teach him a thing or two about coding. Shimizu intervenes as she claims Tatsuki is too laid back to teach someone coding and offers herself as help. Tatsuki now must choose whether he wants Shimizu as his teacher (some of the choices may affect the ending of the game).

Choice 1: Ide Susumu

Ide smiles proudly, feeling boastful that Tatsuki chooses him. Shimizu pouts, as she feels like Tatsuki is not seriously considering his choices. Without wasting time, Tatsuki immediately invites Tatsuki to come inside the class and start the lesson (this is where quiz 1 begins).

Choice 2: Shimizu Sayuri

Shimizu smirks while doing a little dance to tease Ide who looks a little upset. Soon as Ide finishes his little rant, Shimizu invites Tatsuki to come inside the class and start the lesson (this is where quiz 1 begins).

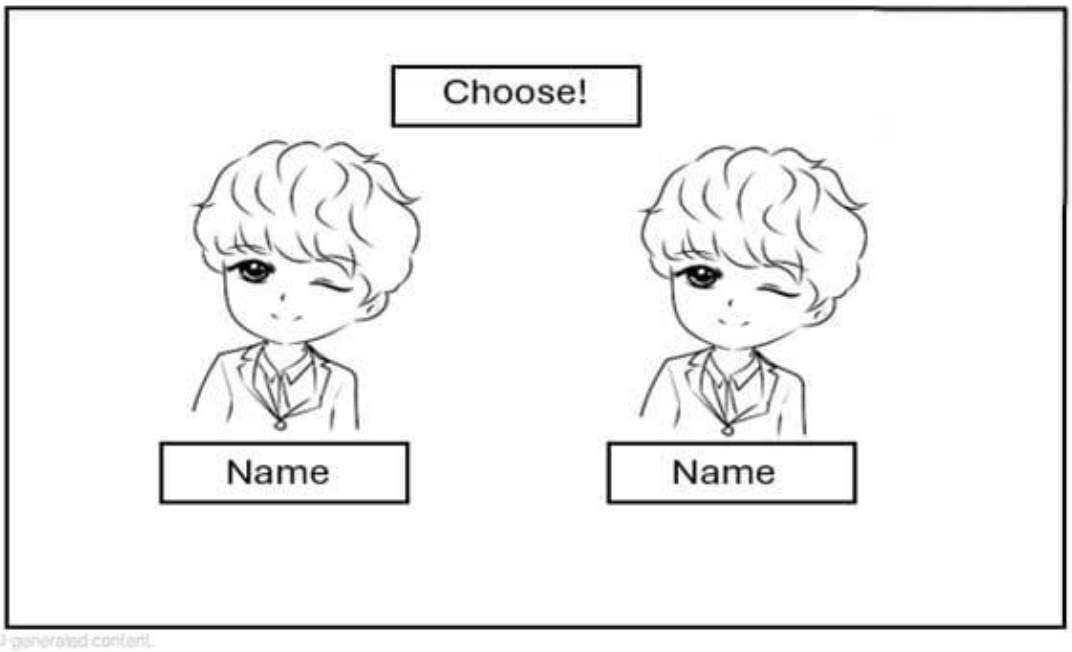

Figure 3.29: Choose character phase

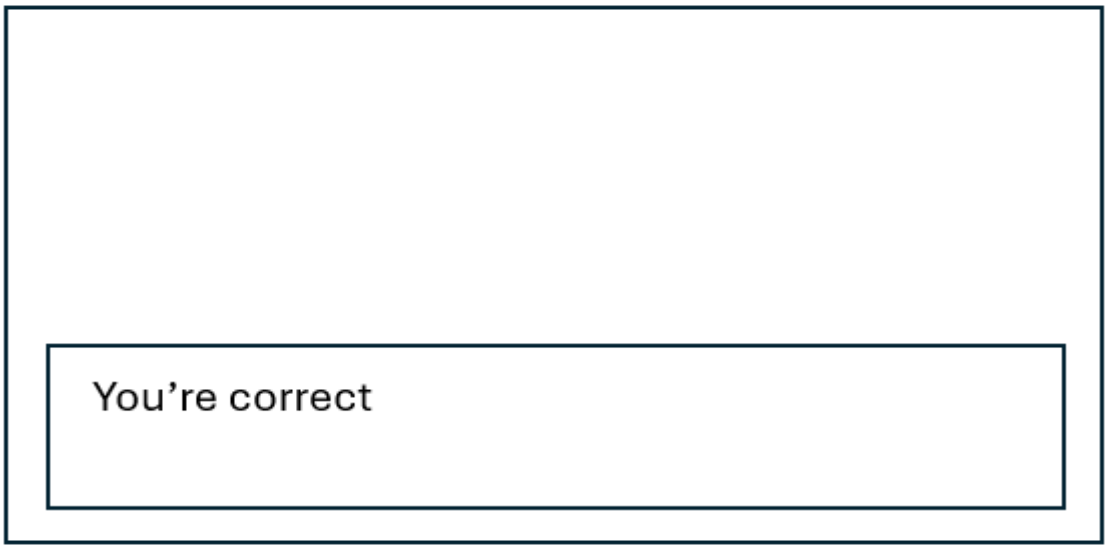

Figure 3.30: Correct Screen

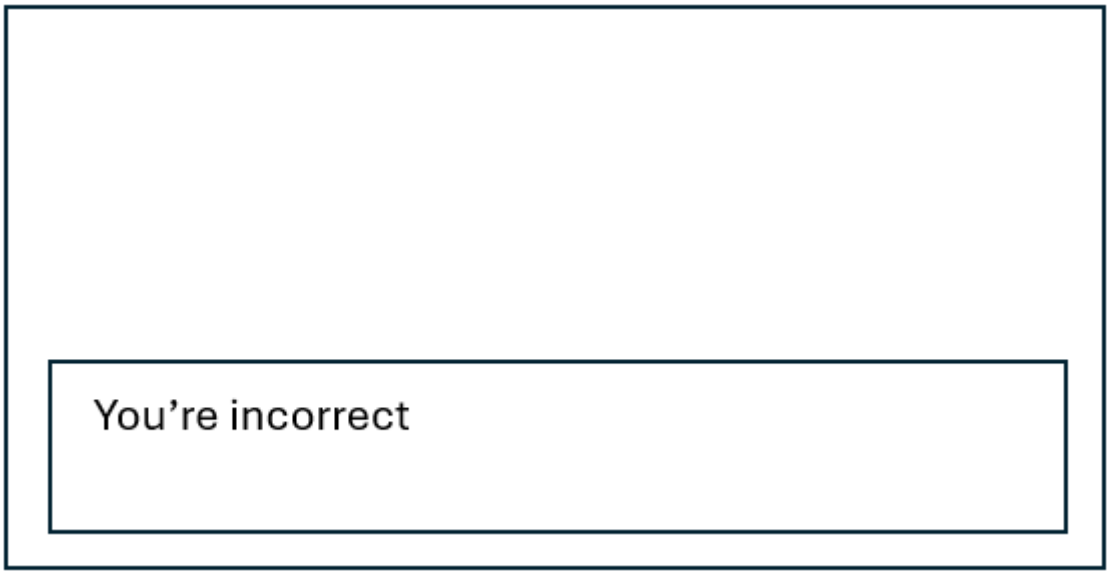

Figure 3.31: Wrong Screen

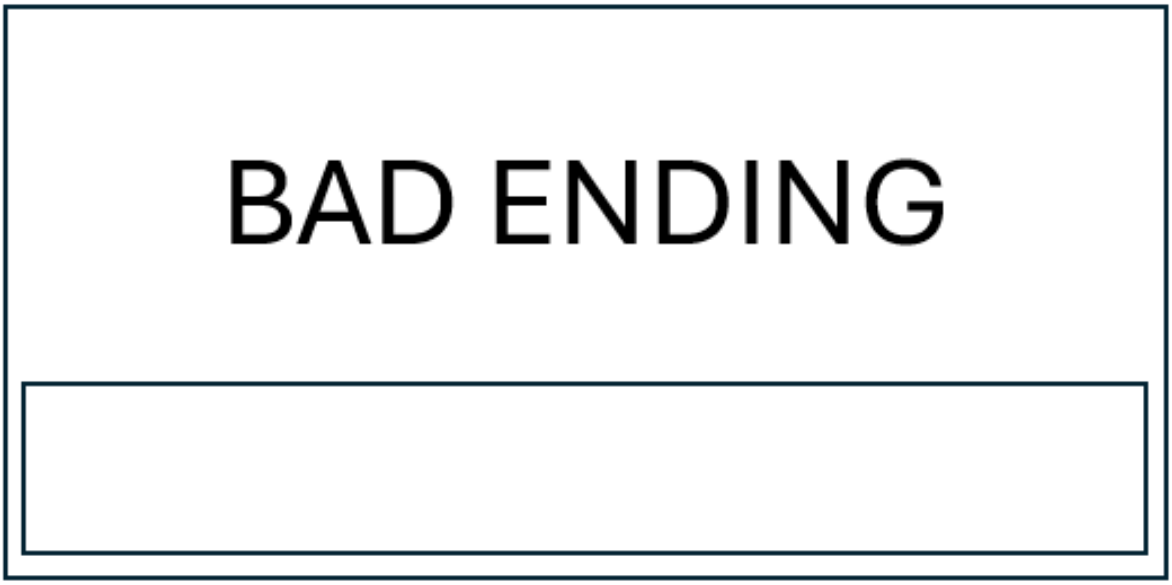

Figure 3.32: Bad Ending

Bad Ending

Influenced by a bad friend, Tatsuki ignored his studies. Days passed and the competition draws near, but Tatsuki still insist on helping Akuto and follow his mischievous ways. In the end, Tatsuki ignored the competition and did not participate.

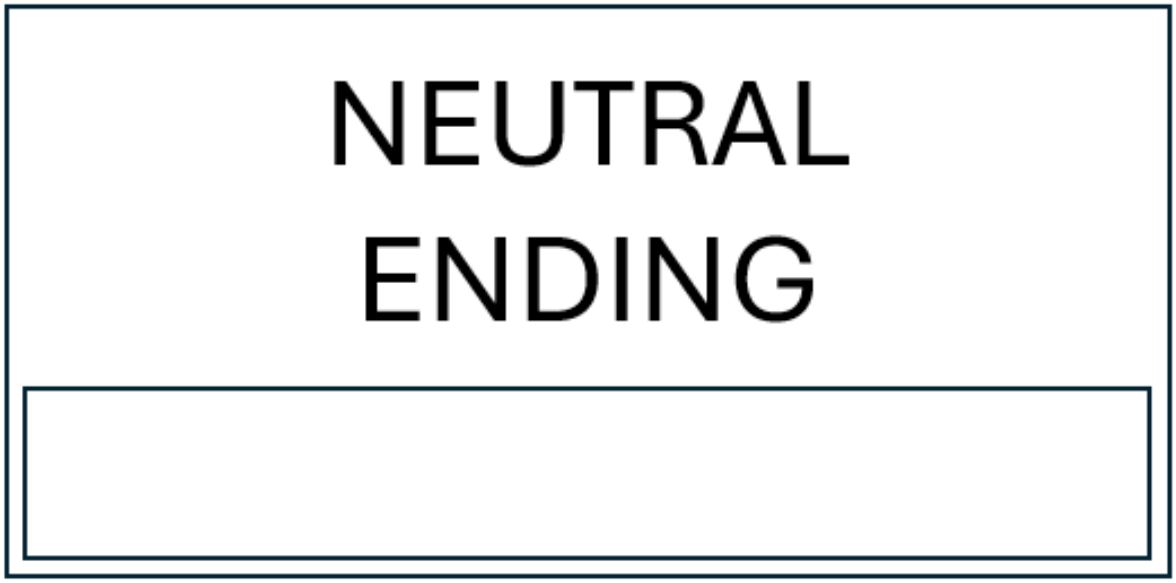

Figure 3.33: Neural Ending

Neutral Ending

Although Tatsuki did not aced the competition, his willingness to learn proved his worthiness. Instead of feeling shame, Tatsuki instead feels proud that he at least step outside his comfort zone and tried something he never done before.

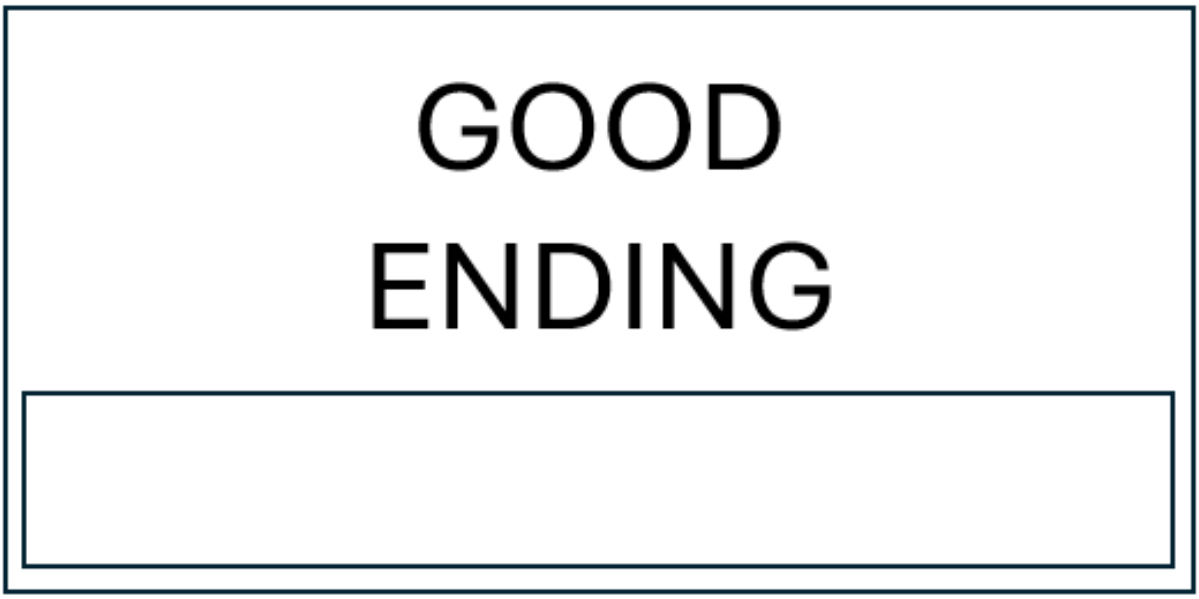

Figure 3.34: Good Ending

Good Ending

Tatsuki stole the spotlight, as he is the one of the five winners of Quartz High School C# Coding Competition 20XX. He is then noticed by his crush, as Hiragi asks congratulates

on his success. Tatsuki intends to confess but ultimately did not as he is not brave enough to do so. Alas, he finds his journey of learning to be rewarding enough.

Figure 3.35: Perfect Ending

Perfect Ending

Tatsuki stole the spotlight, as he is the winner of Quartz High School C# Coding Competition 20XX. He is then noticed by his crush, as Hiragi asks congratulates on his success. Tatsuki intends to confess, and he did. Surprisingly, she accepts his confession noting that she always has feelings towards Tatsuki, but he is too oblivious to notice. Filled with smiles and warmth, as they both walk together side to side in a sunset while friends Tatsuki interact with throughout the journey all happily enjoying themselves as they are on their way home. Tatsuki finds his joy through overcoming his problem he selfishly creates, but luck favours the bold and Tatsuki reaps his benefits.

3.2.3 Build

Game is then build using UNITY. Everything that is proposed in the game will be created and formed as accurate as the proposition as possible. Game design will also take place along with the puzzle making and story making. Game features are also implemented here as well such as setting, title screen, safe game, load game and exit game will be added. Lastly, credits and scoreboard will be added along the way.

3.2.4 Test

After the game slowly progresses, testing is implemented to ensure that everything is as planned. Should there be any mistakes occurs, this phase helps to rebuild the game step by step. This phase is also where any debug will be fixed.

3.2.6 Launch

Once the game has been fully developed, the game is then launched for everyone to play. Anyone that is involved in the process of making this game will be notified of its release through contacts.

3.2.5 Review

The review phase is a very important phase where the target audience plays the game and provides feedback. This phase is essential for ensuring that the game meets the expectations.

3.3 Summary

In summary, this chapter has laid a solid foundation for the subsequent phases of our project by clearly outlining the methodologies employed and justifying the choice of Agile as an appropriate approach. The insights gained from this chapter through survey via Google Form will contribute on the ongoing development efforts and contribute to the successful execution of the proposed project. UML diagrams such as activity diagram, use case diagram, sequence diagram and class diagram are also shown to understand the construction of *LEARN YOUR CODE!*. These diagrams helped in visualizing the game's workflow, user interactions, and system architecture, thereby supporting the project's overall design and implementation.

CHAPTER 4: IMPLEMENTATION

4.0 Introduction

Chapter 4 covers detailed implementation of the proposed game, Learn Your Code! Aligns with the user requirements analysis and designs from Chapter 3, this chapter also outlines the software or tools used in developing this game along with the game flow and functionalities.

4.1. Installation and Configuration of the Software/ Tools Used

Learn Your Code! is an educational game developed using the Unity engine, designed to make programming fun and accessible for beginners. The game features interactive lessons, puzzles, and challenges that teach fundamental coding concepts in an engaging way.

All background images and sound effects used in the game are sourced from free-use libraries, ensuring that the project remains open and accessible. The character designs are also derived from free-use assets, which were then customised using Photopea, a powerful free online photo editor. This allowed for unique and creative modifications while keeping development costs low.

Figure 4.1: Unity Project

Figure 4.2: Photopea

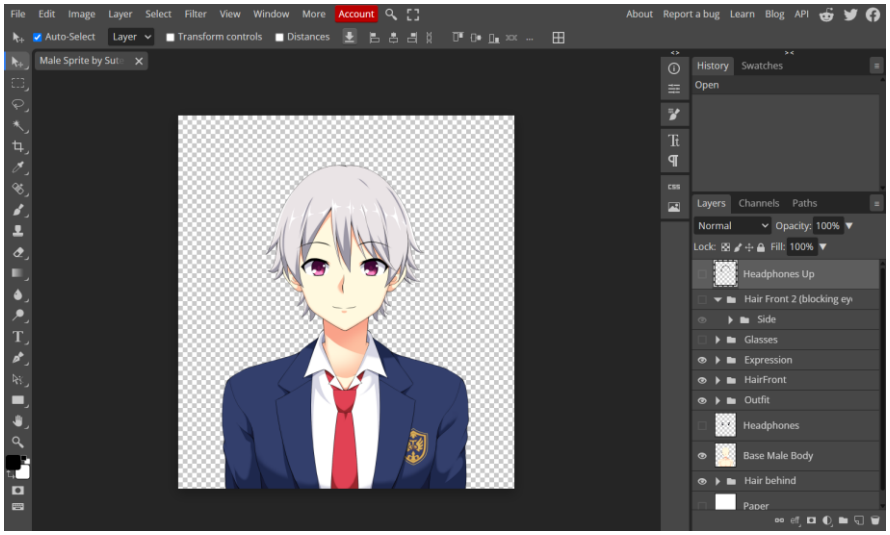

Figure 4.3: Character customisation

In Photopea, character customization is achieved by modifying various visual attributes such as outfits, hairstyles, facial expressions, and other aesthetic elements, allowing for personalized and dynamic character designs.

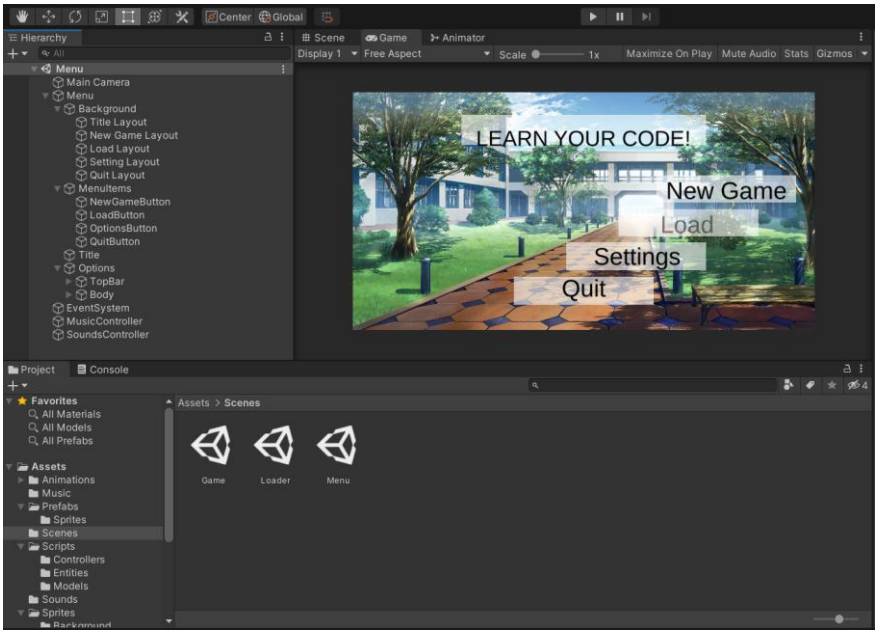

Figure 4.4: Game Scene

In Unity, all core game elements are implemented including scene design, dialogue systems, character naming, sound effects, and background music creating a cohesive and interactive gameplay experience.

4.2: Game Implementation

The game flow has its following components:

1. Title Scene
2. Settings Scene
3. Story Scene
4. Choose Scene
5. Quiz Scene
6. Room Scene
7. Choose Scene
8. Bad Ending
9. Neutral Ending
10. Good Ending
11. Perfect Ending

4.2.1: Title Scene

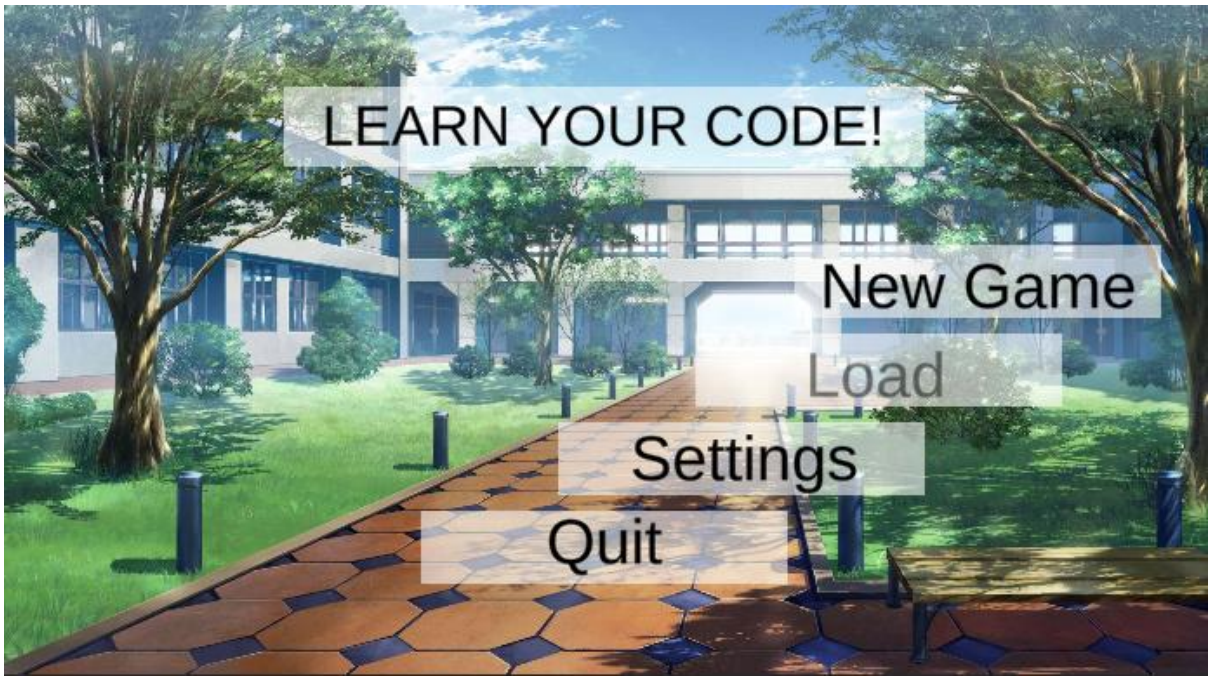

Figure 4.5: Title Scene

This is the first thing players will see as he/she starts the game. In the title screen, players are given options to play the game (by clicking the new game button), load the game (by clicking the load button), check settings (by clicking settings button) and quit the game by clicking the quit button)

4.2.2: Settings Scene

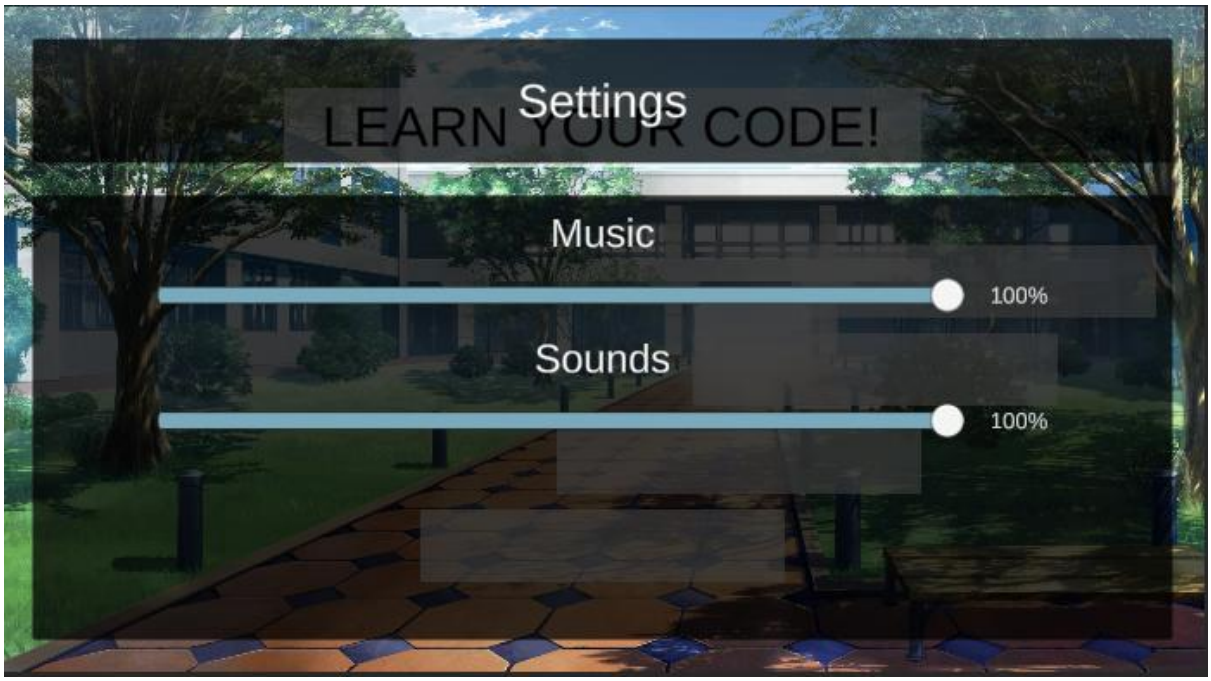

Figure 4.6: Settings Scene

In settings scene, players can adjust music and sounds volume of this game. Press ESC button to exit settings scene.

4.2.3: Story Scene

Figure 4.7: Story Scene

In Story Scene, a black box is present below the screen. This is where the character name (represented by their respective font colour) and their dialog will be shown.

4.2.4: Quiz Scene

Figure 4.8: Quiz Scene Question

Figure 4.9: Quiz Scene Answer

In Quiz scene, the question will be presented first then followed by the answers on the next scene. Player now must choose the correct answer between the answers given.

4.2.5: Room Scene

Figure 4.10: Room Scene

Figure 4.11: Note Scene

In room scene, player can choose either to read notes obtained by progressing through the game or starts the next chapter.

4.2.6: Choose Scene

Figure 4.12: Choose Scene

In choose scene, player decides Tatsuki's choice of character or decision. Some of the decision Tatsuki chooses affects the endings of the game.

4.2.7: Bad Ending

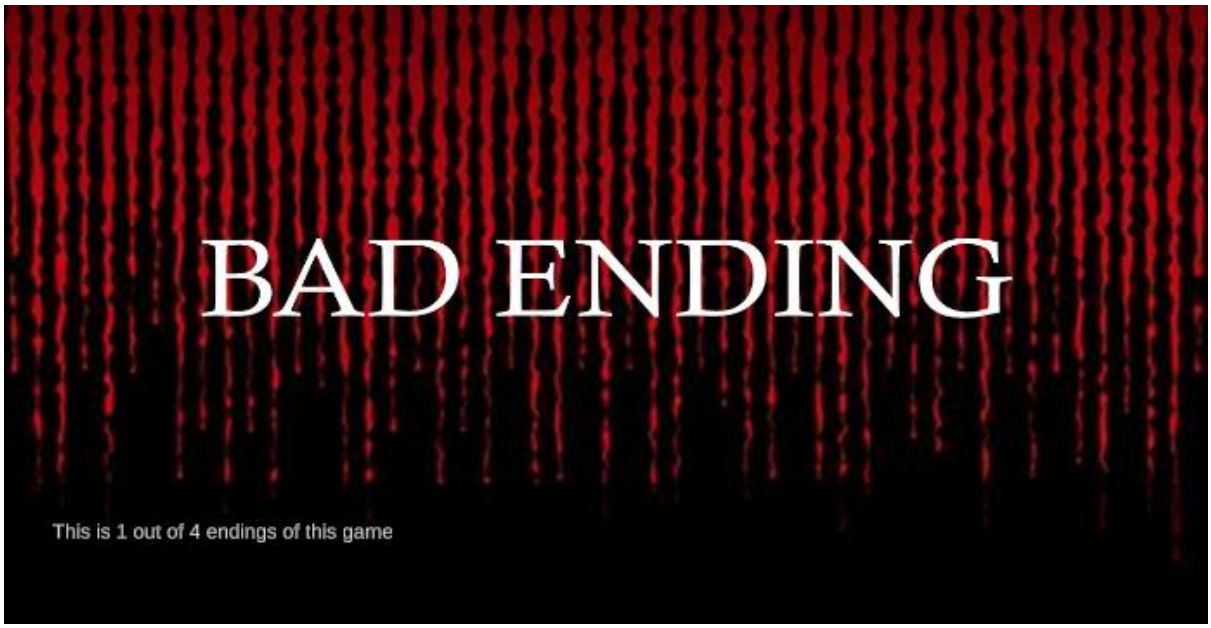

Figure 4.13: Bad Ending

Bad ending is 1 out of 4 endings of the game. This is achieved in chapter 2 if player decides to have Tatsuki Daiki follows Akuto Jashin and his mischievous ways.

4.2.8: Neutral Ending

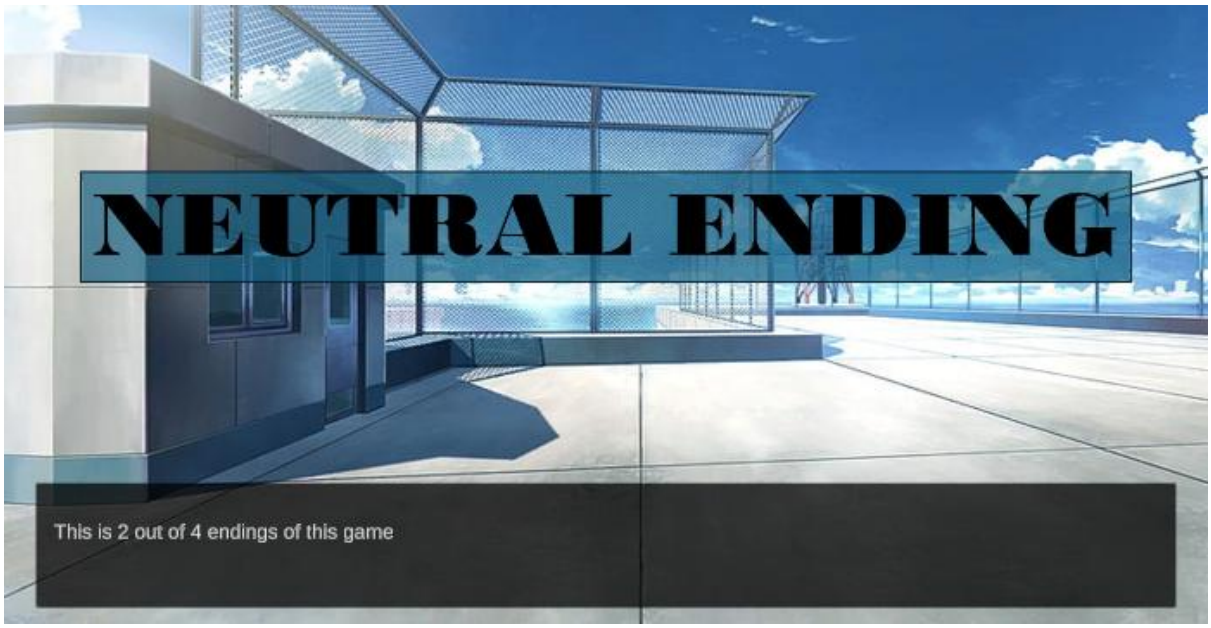

Figure 4.14: Neutral Ending

Neutral ending is 2 out of 4 endings of the game. This is achieved if the player gets incorrect answer on the final question. Tatsuki reflects on his journey and is relieved that despite not winning the competition, he at least tried.

4.2.9: Good Ending

Figure 4.15: Good Ending

Good ending is 3 out of 4 endings of the game. This is achieved if the player gets correct answer on the final question. Player then decides whether to have Tatsuki confesses his love to Hiragi. If the player does not, good ending occurs.

4.2.10: Perfect Ending

Figure 4.16: Perfect Ending

Good ending is 4 out of 4 endings of the game. This is achieved if the player gets correct answer on the final question. Player then decides whether to have Tatsuki confesses his love to Hiragi. If the player does, perfect ending occurs.

4.3: Summary

This chapter explored the implementation stage of Learn Your Code! outlining the process of installing and configuring the essential development tools required to build the game. It also presents a comprehensive breakdown and visualization of the game's flow and features, offering deeper insight into how Learn Your Code! operates.

CHAPTER 5: TESTING

5.0 Introduction

The testing phase of the proposed game is discussed in this chapter. Testing is important to make sure the game works well, meets user needs, and reaches its goals. It also helps find and fix any problems, so players get a good-quality game.

5.1 In-house Testing

Table 5.1: Test case for Title Screen

No.	Test Case	Expected Outcome	Results (Pass/Fail)
1	Main Menu	Main menu displays when open game	Pass
2	New Game button	Game starts when clicked	Pass
3	Load button	Game load to saved scene	Pass
4	Settings button	Settings display when clicked	Pass
5	Quit button	Game closes when clicked	Pass

Table 5.2: Test Case for Story Scene

No.	Test Case	Expected Outcome	Results (Pass/Fail)
1	Character appears	Character appears as desired	Pass
2	Name appears	Name is shown correctly	Pass
3	Dialogue appears	Dialogue appears as desired	Pass

Table 5.3: Test Case for Choose Scene

No.	Test Case	Expected Outcome	Results (Pass/Fail)
1	Choose X	X scene loads	Pass
2	Choose Y	Y scene loads	Pass

Table 5.4: Test Case for Quiz/Puzzle Scene

No.	Test Case	Expected Outcome	Results (Pass/Fail)
1	Correct answer	Correct scene loads	Pass
2	Wrong answer	Wrong scene loads	Pass

5.2. Outsource Testing

Outsourced testing was conducted through a Google Form questionnaire with open ended question and close ended questions. Divided in 3 sections were used to determine the playability of this proposed game. Respondents were required to play the prototype before answering the questionnaire, they will be referred to as players henceforth. A total of 32 players provided their experiences of the prototype.

5.2.1 Demographics

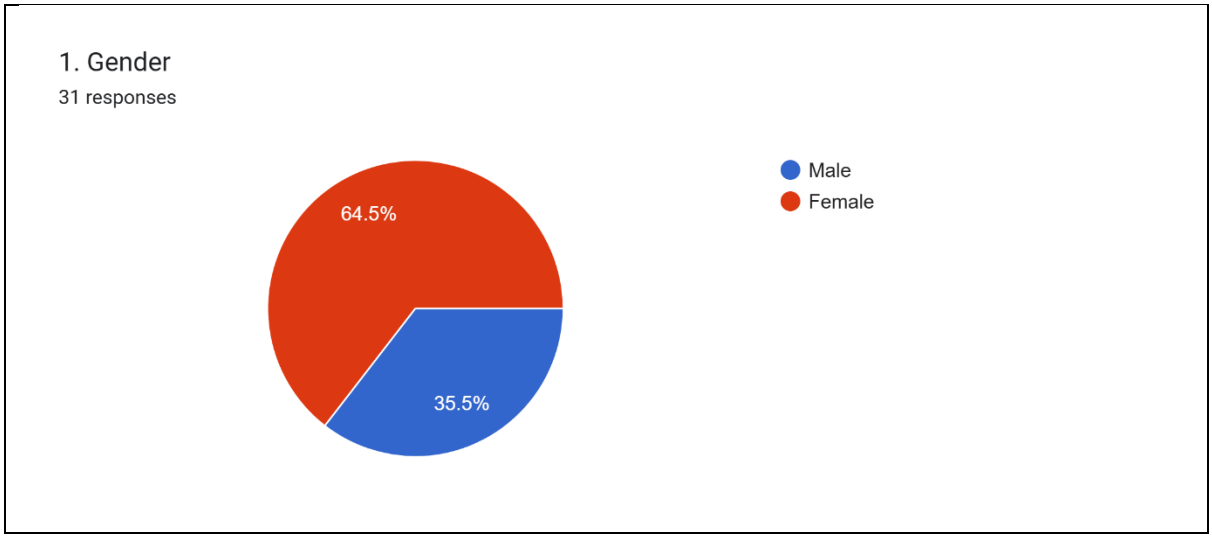

Figure 5.1: Gender

This figure shows most players that playtest this game prototype is a female, sitting at 71.4%. This helps in showcasing the gender appeal of this game. This indicates that narrative-driven, character-focused approach is effective for female audiences, offering potential for broader educational outreach.

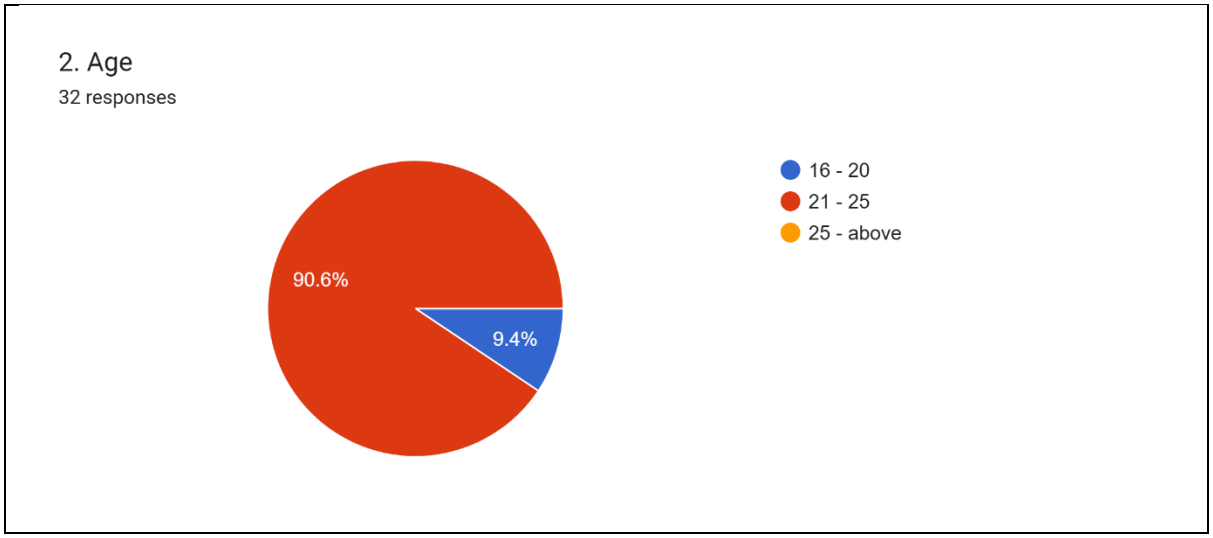

Figure 5.2: Age

This figure shows 90.6% of players are above the age of 20. This could be to bias in figuring out the difficulty of the game.

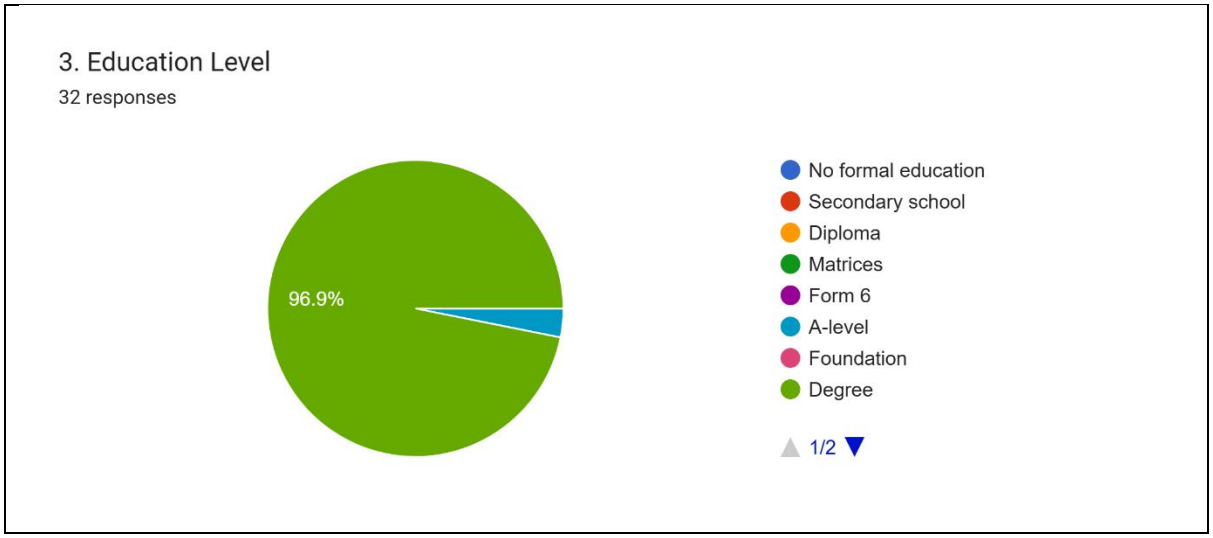

Figure 5.3: Education Level

This figure shows 96.9% of players are degree students.

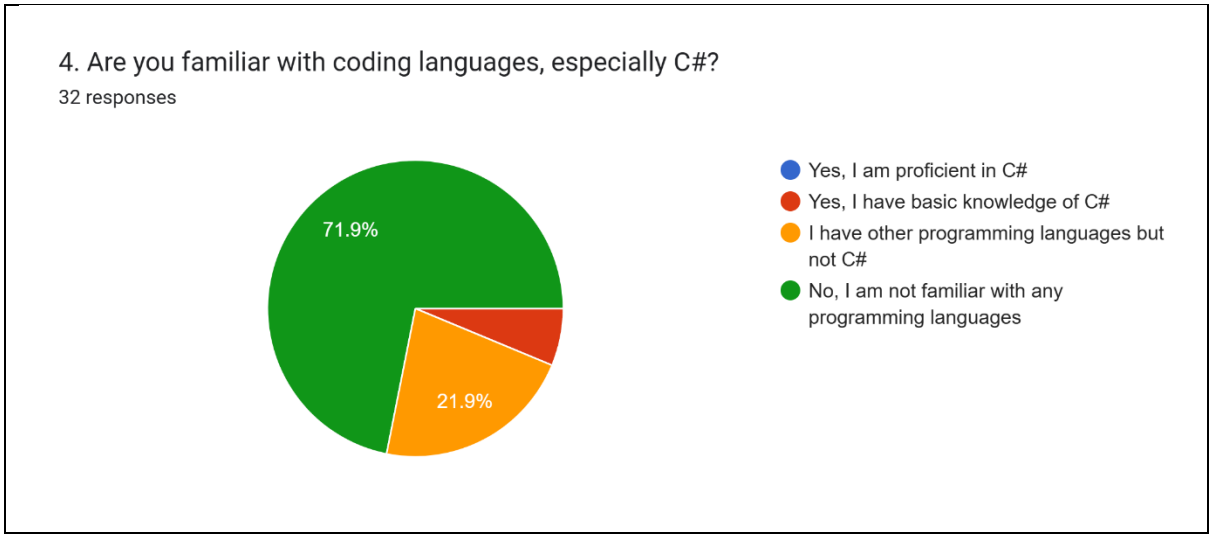

Figure 5.4: Are you familiar with coding language, especially C#?

This figure shows 71.9% of players has 0 knowledge of coding language, proving that *Learn Your Code!* is accessible and appealing even to those new to programming. This validates the core design goal of making coding approachable through visual novel storytelling, as most players were able to dive in without prior knowledge.

5.2.2 User Interface & User Experience

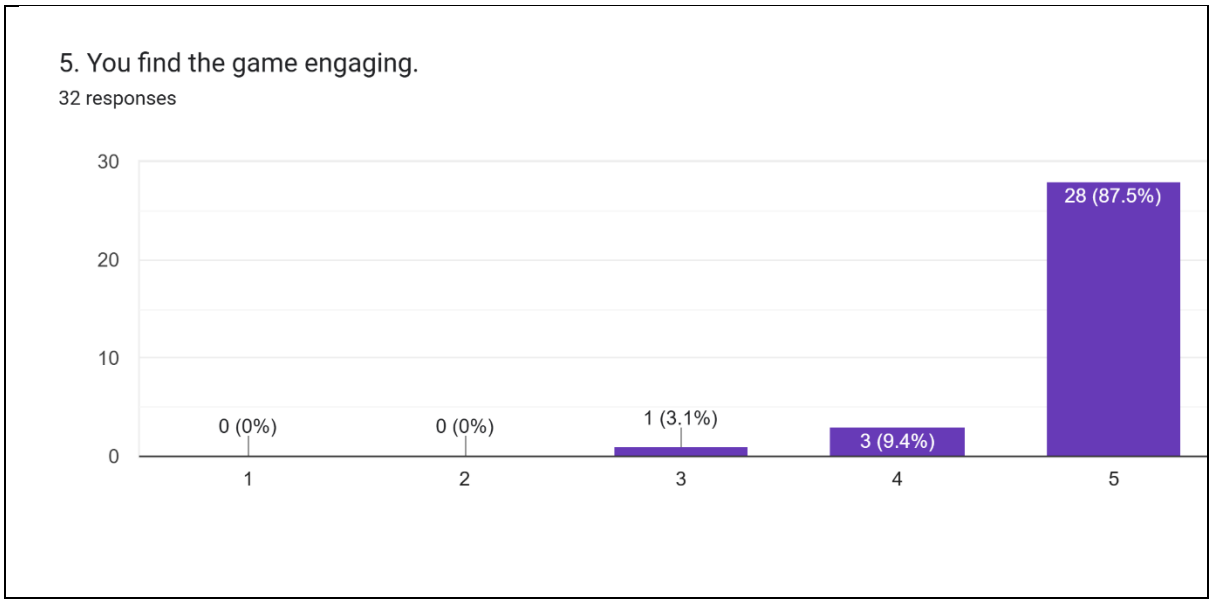

Figure 5.5: You find this game engaging

This figure shows 87.5% of participants find this game engaging. This highlights the goal of this proposed game being fun to play while still provides educational content. The

overwhelming positive response reinforces the visual novel approach, with its narrative depth and anime-inspired design, effectively captures players' interest while delivering meaningful learning.

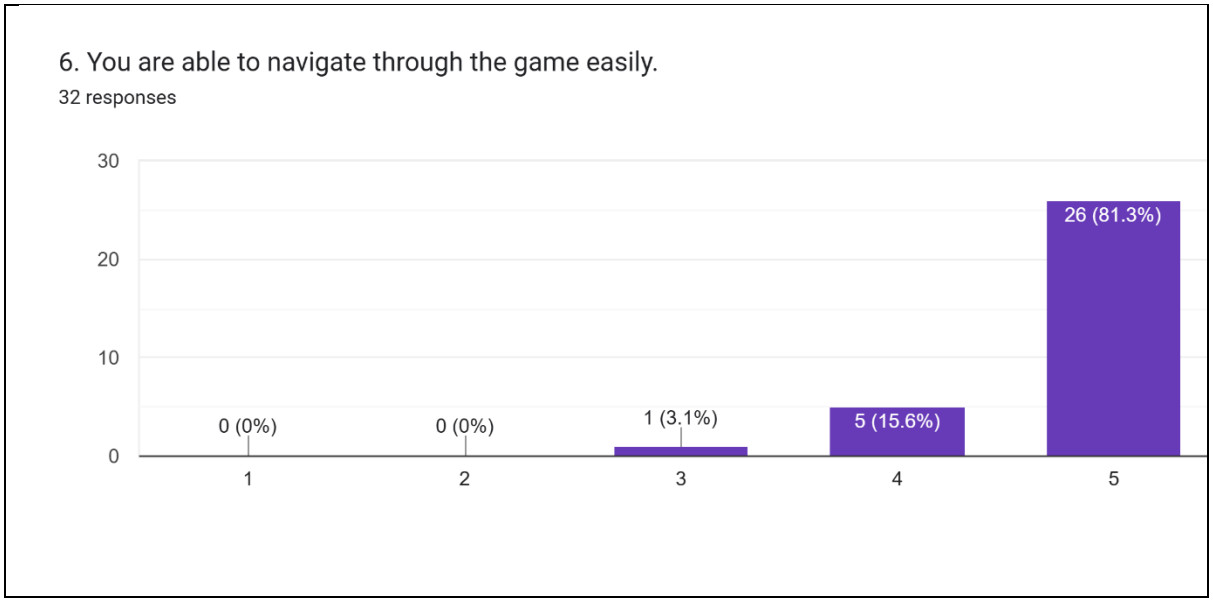

Figure 5.6: You are able to navigate through the game easily

This figure shows 81.3% of players can navigate through the game with ease, meaning this game by majority are easy navigate and does not need help from experts. This also demonstrates the proposed game's intuitive design and clear onboarding.

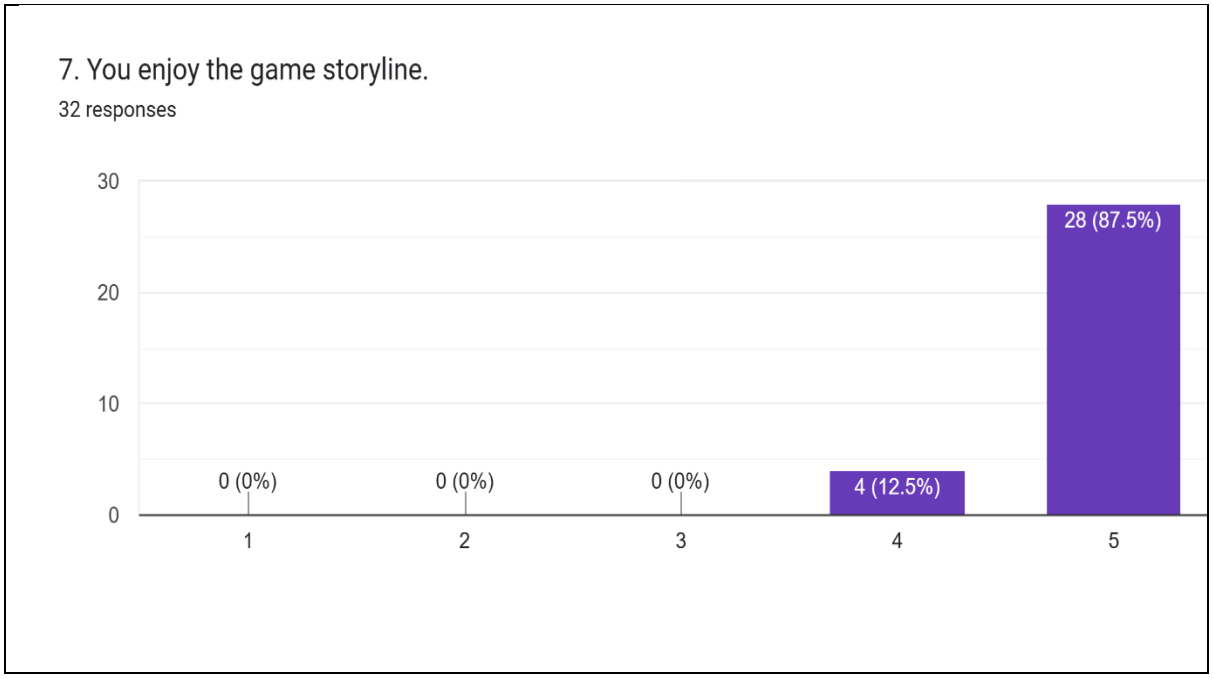

Figure 5.7: You enjoy the game storyline.

This figure shows 87.5% of players strongly believe that they enjoy the game storyline. Such overwhelmingly positive reception of your storyline demonstrates powerful immersion, confirming that your anime-inspired characters, plot development and visual novel format create the perfect vehicle for delivering coding concepts.

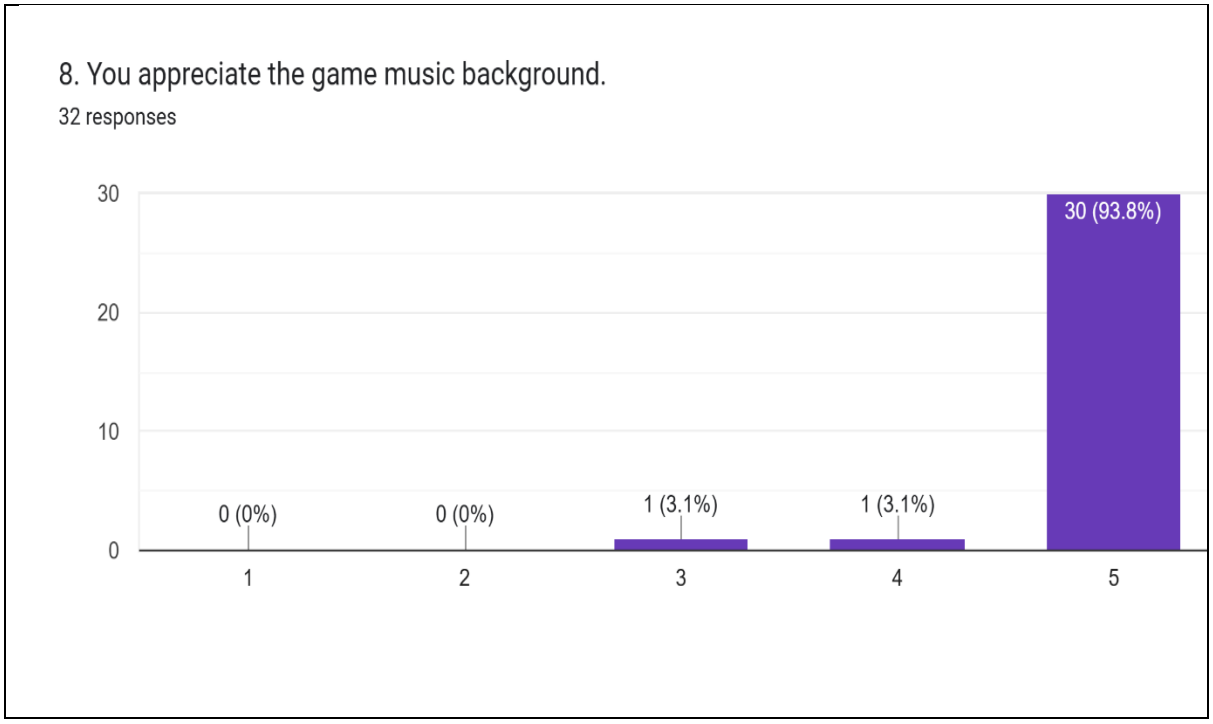

Figure 5.8: You appreciate the game music background

This figure shows 86.7% of players strongly agree and appreciate the game music background. This highlights the importance of immersion when making a game as these results confirm that music doesn't just accompany the gameplay, but it actively elevates the entire game experience

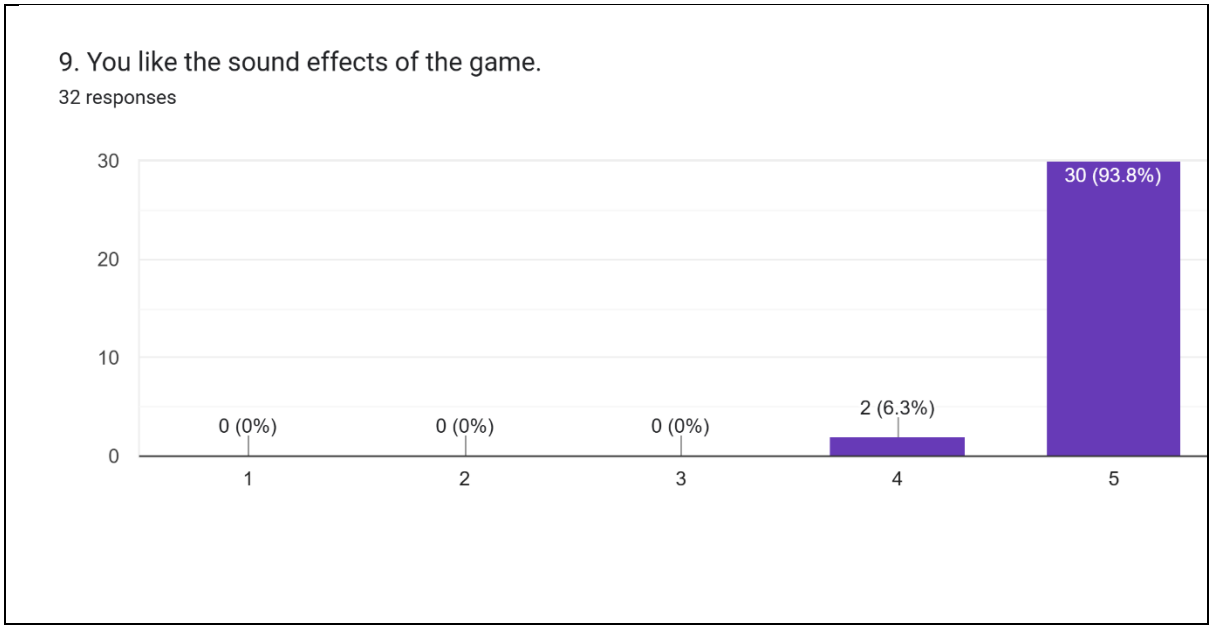

Figure 5.9: You like sound effects of the game

This figure shows 93.8% of participants enjoy the sound effects of the game. This also highlights the importance of immersion not only being exclusive to visual but audio as well to create a deeply engaging learning environment.

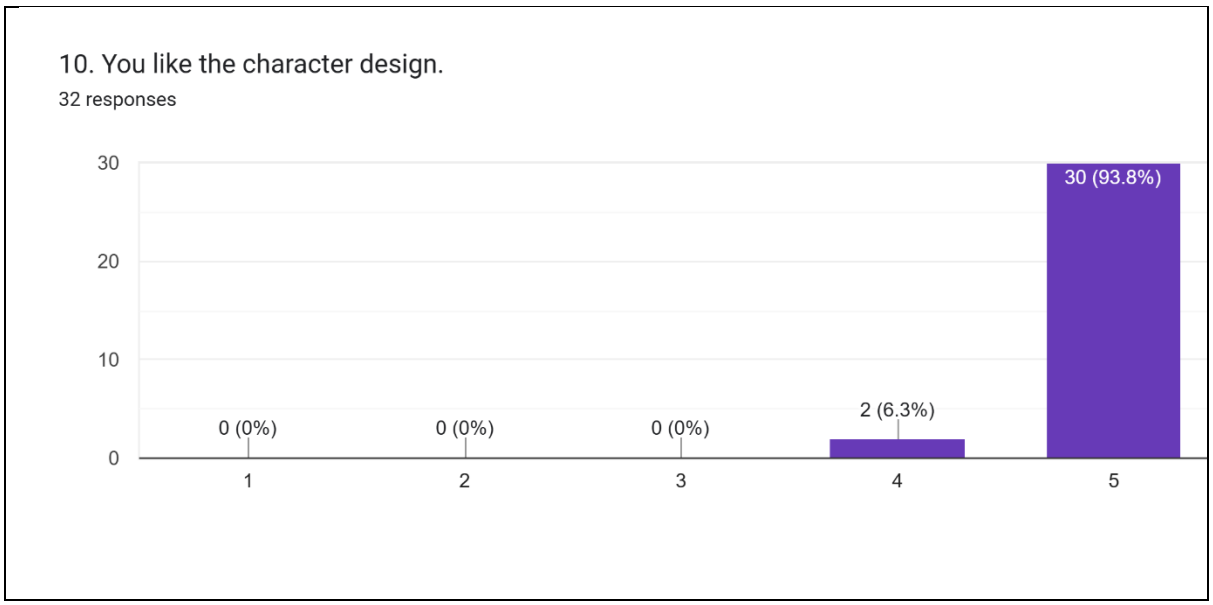

Figure 5.10: You like the character design.

This figure shows 93.8% of players like the character design. This confirms a strong sign anime-based visual storytelling resonates with the players. This also represents the forging emotional connections that keep players invested in both the story *and* the coding journey.

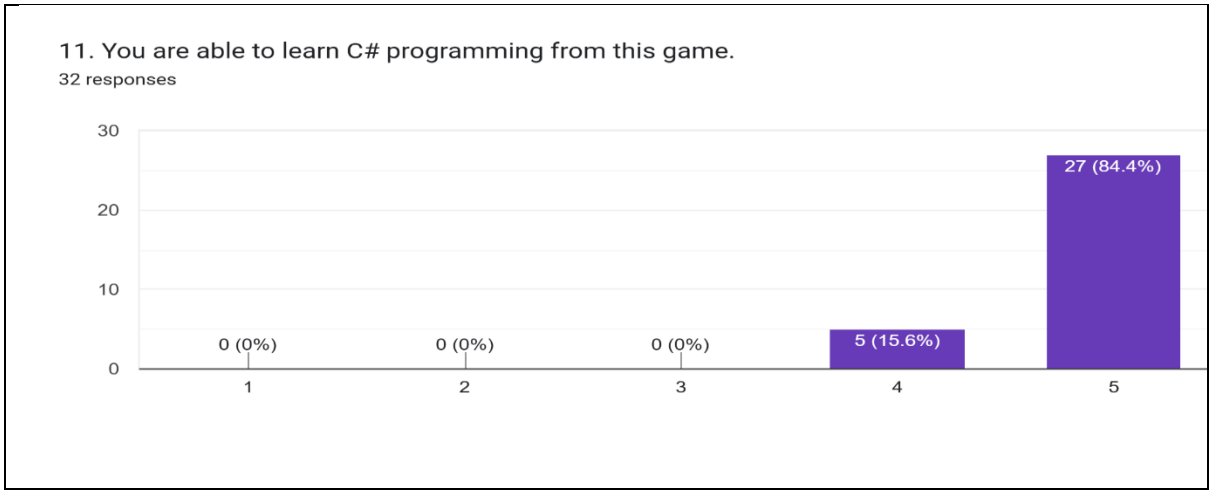

Figure 5.11: You are able to learn C# programming from this game.

This figure shows 84.4% of players can learn C# programming from this game. This demonstrates that the proposed game delivers on its core educational mission which is by blending visual novel storytelling with coding challenges.

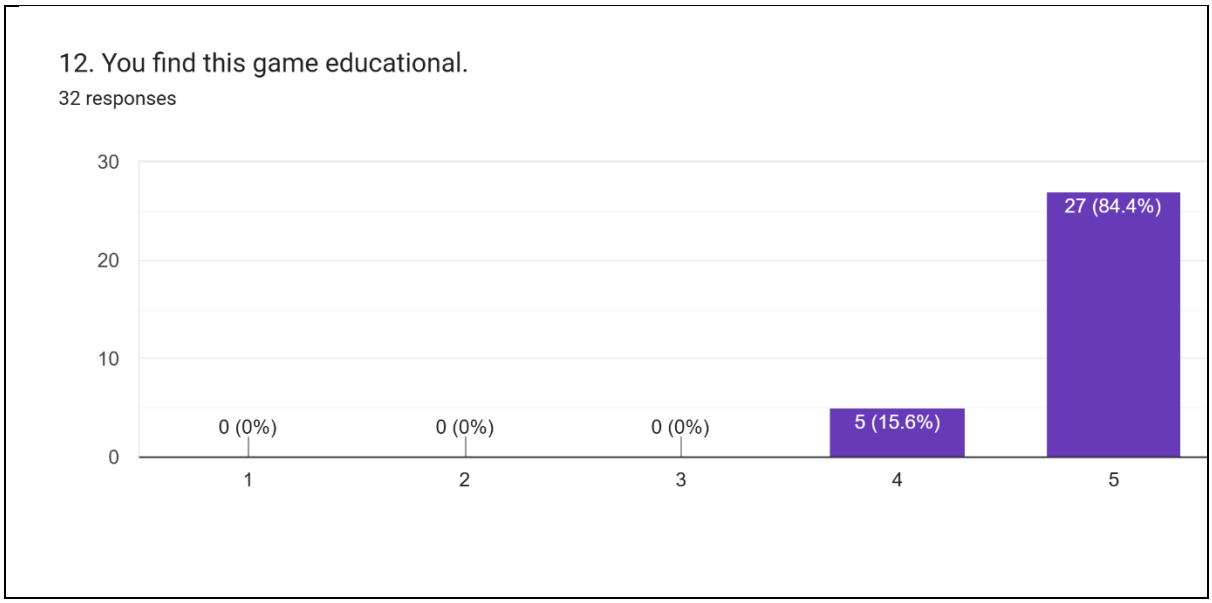

Figure 5.12: You find this game educational.

This figure shows 84.4% of players find this game educational. These results validate the visual novel format, combined with well-integrated coding challenges, creates a meaningful way for players to absorb C# concepts. Given that most players had no prior coding experience, this strong positive response suggests the proposed game's approach makes programming accessible without sacrificing engagement.

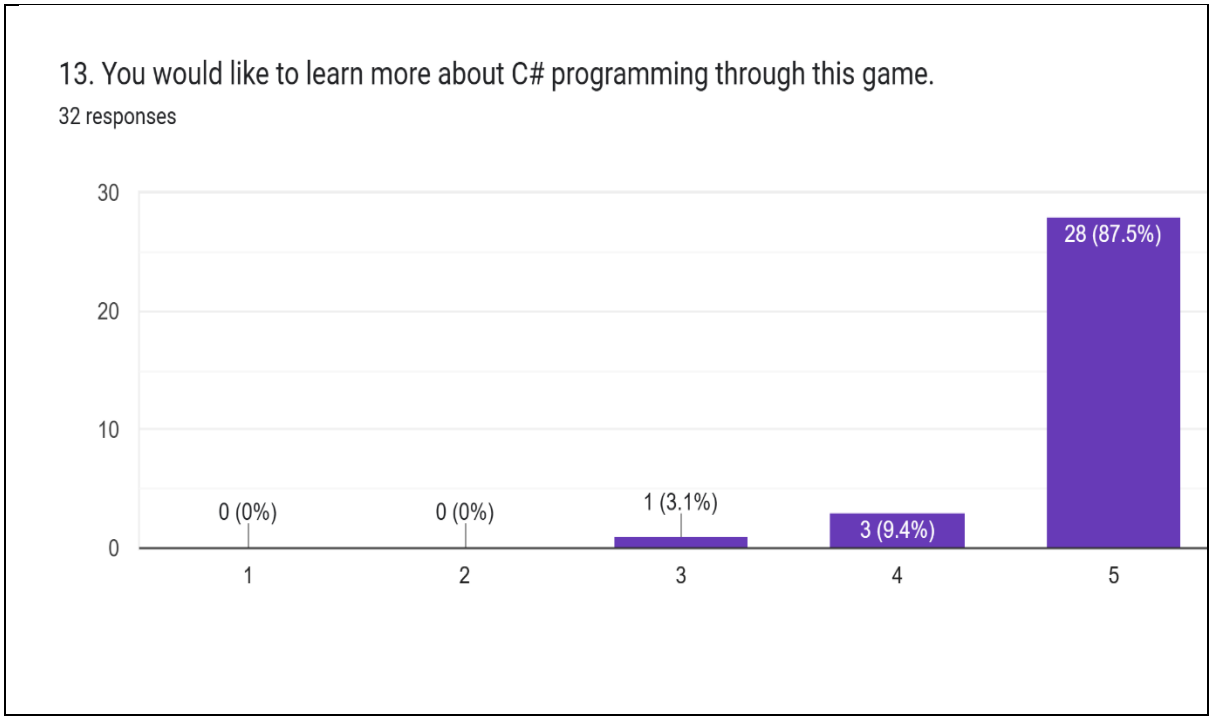

Figure 5.13: You would like to learn more about C# programming through this game.

This figure shows 87.5% of players would like to learn more about C# programming through this game. These results prove visual novel format doesn't just educate temporarily, but motivates sustained engagement, turning casual players into eager learners

14. Any feedback and suggestion on what would you like to see be included in the game in the future. (i.e. more characters, more endings, more choices, et cetera)

29 responses

more good looking character pls

more background music

character very beautiful

i would like to see more characters and more chapters!!

More male characters

more quiz

anime is cool!

character so cute!

ok

Figure 5.14: Any feedback and suggestion on what would you like to see be included in the game in the future

This figure shows feedback and suggestion players would like to see be included in the game in the future. This highlights strong enthusiasm for the proposed game's character designs, with many suggesting they'd love to see even more development or additional characters in future updates.

5.2.3 System Usability Scale

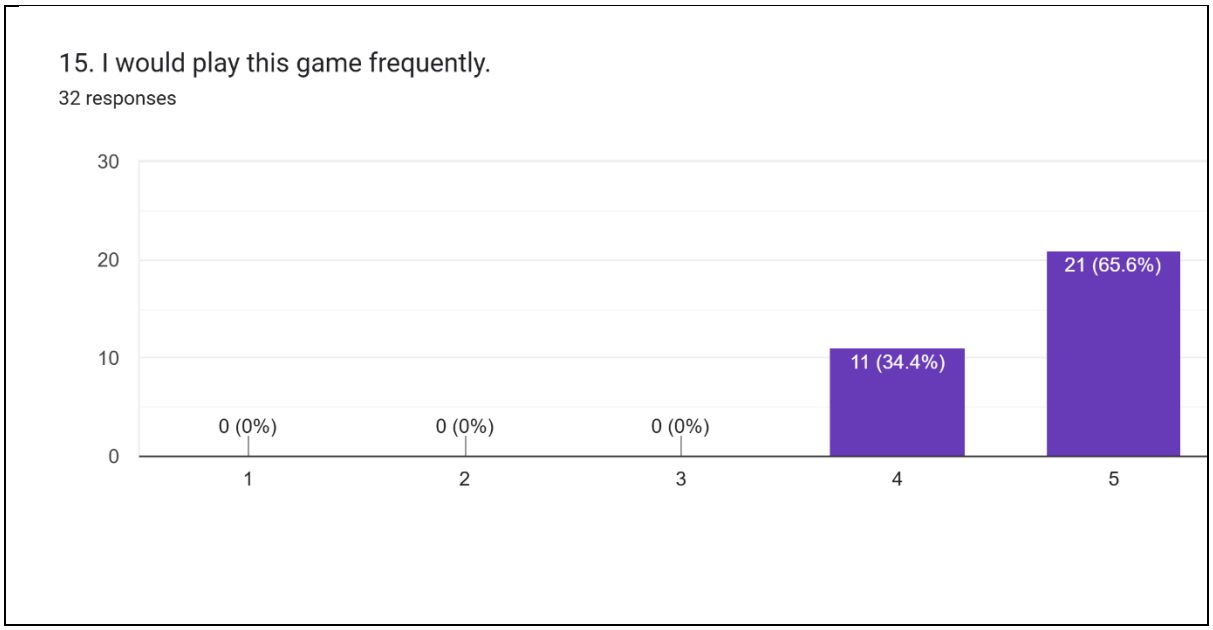

Figure 5.15: I would play this game frequently.

This figure shows 65.6% of players would play this game frequently. This means a clear majority of players see lasting value in proposed game beyond a one-time experience. This also suggests the blend of storytelling and coding challenges doesn't just teach but motivates repeat engagement.

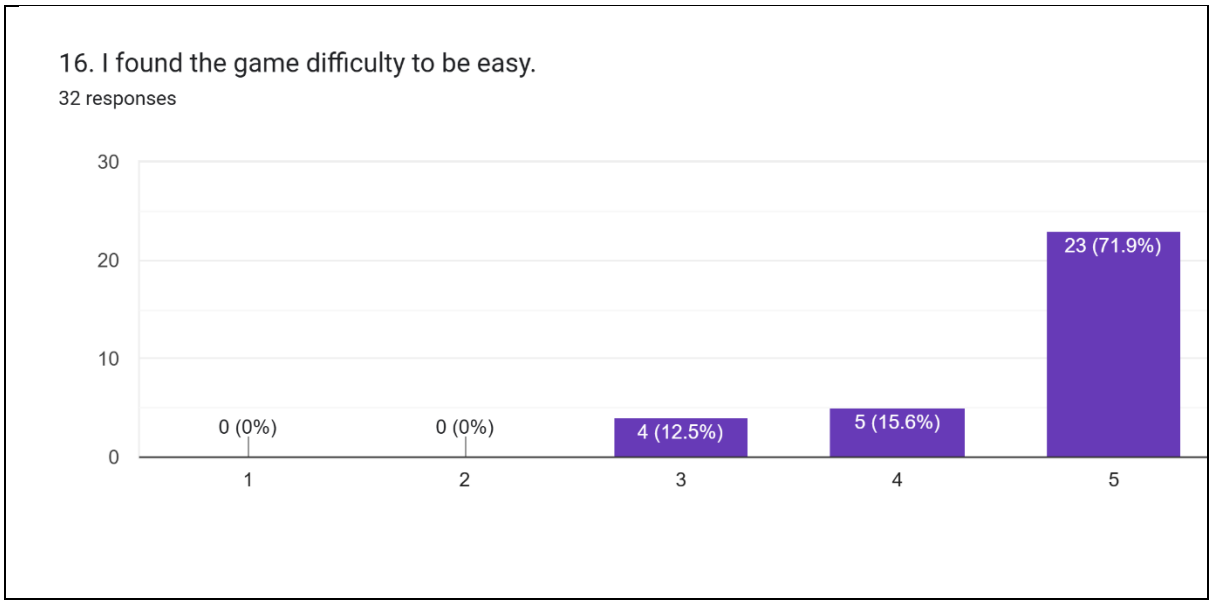

Figure 5.16: I found the game difficulty to be easy.

This figure shows 71.9% of players found the game difficulty to be easy. This confirms the proposed game excels at accessibility, a core goal for beginner-friendly coding education.

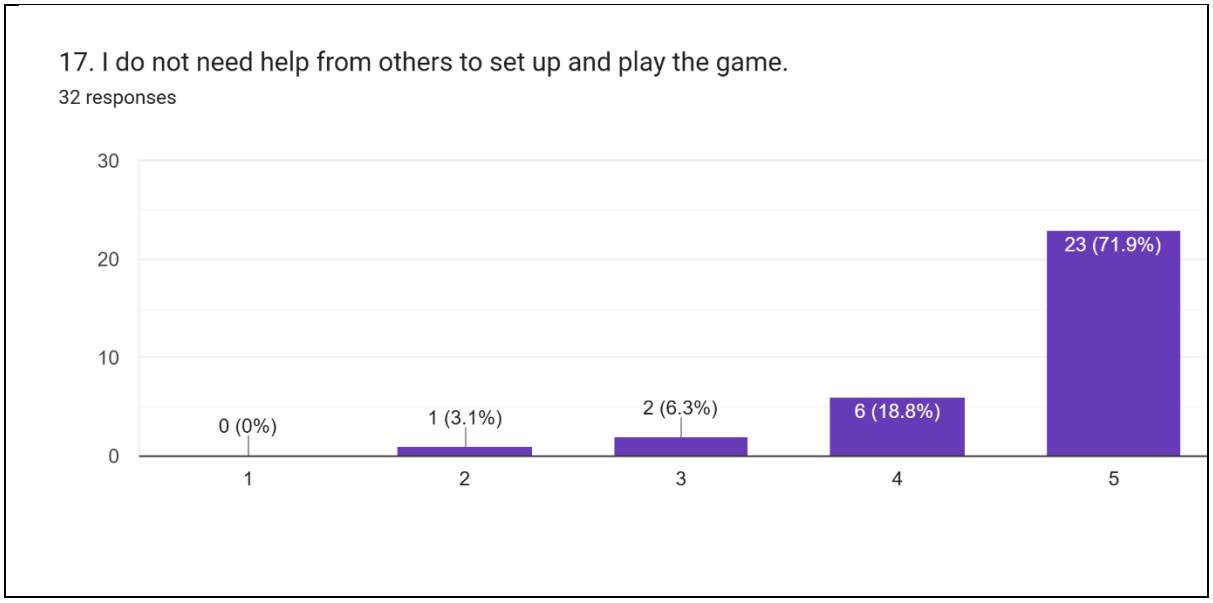

Figure 5.17: I do not need help from others to set up and play the game.

This figure shows 71.9% of players do not need help from others to set up and play the game. This smooth onboarding experience means most players can immediately engage with the content, reinforcing the success of removing technical barriers for new learners.

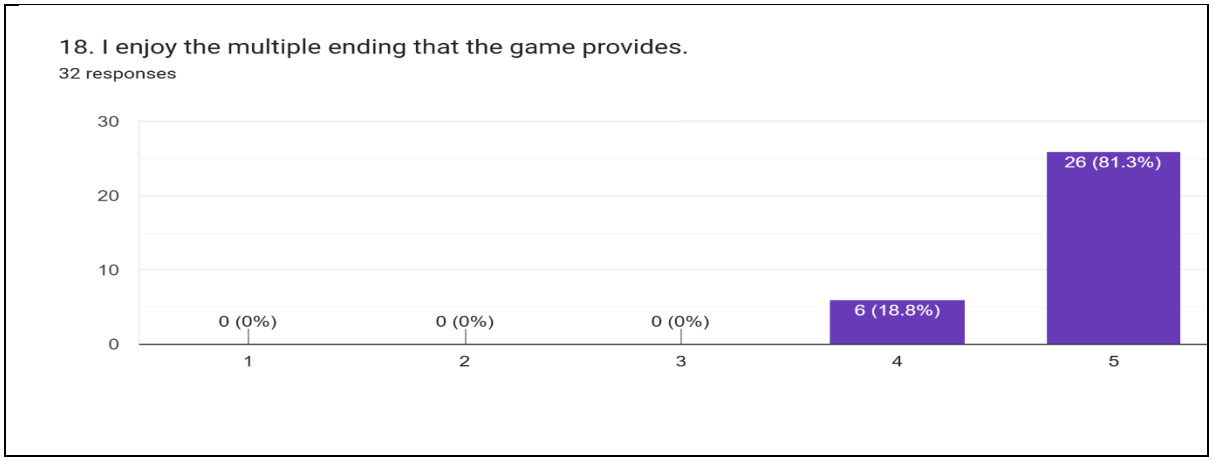

Figure 5.18: I enjoy the multiple ending that the game provides.

This figure shows 81.3% of players enjoy the multiples ending of the game. This feature successfully taps into the visual novel genre's strengths, encouraging experimentation with different coding choices while making the learning experience feel more dynamic and personalized.

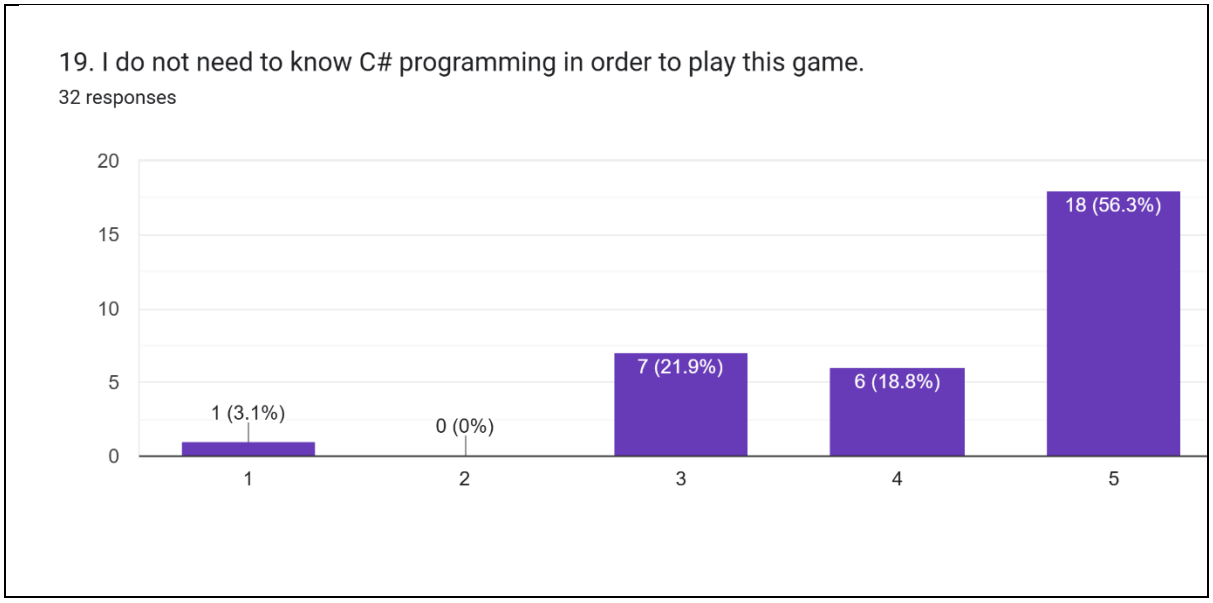

Figure 5.19: I do not need to know C# programming in order to play this game.

This figure shows 56.3% of players believed that they don't need to know C# programming in order to play the game. This aligns perfectly with the goal of creating an inclusive, narrative-driven introduction to programming. The data suggests quiz integration and learning curve effectively welcome newcomers while still delivering educational value.

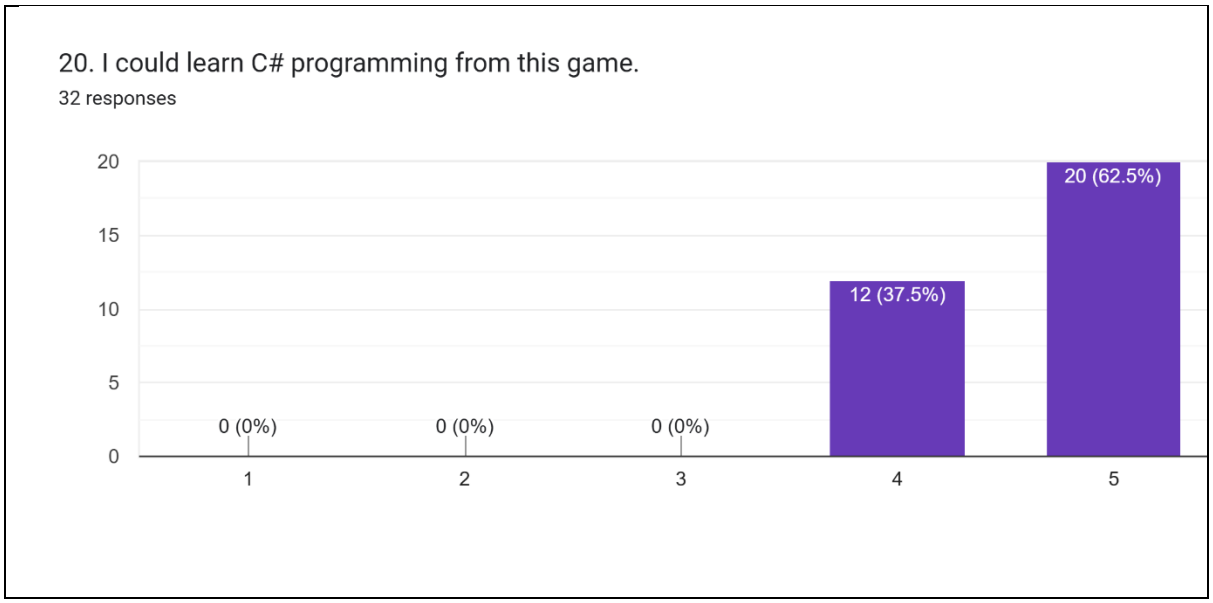

Figure 5.20: I could learn C# programming from this game.

This figure shows 62.5% of players could learn C# programming from this game. The results validate the blend of storytelling and hands-on coding challenges could create a tangible learning impact, particularly for beginners.

.

21. Provide any other feedback or comments about your experience with the game *LEARN YOUR CODE!* (i.e. Any additional features you like to see? How would you like the game improved?)

23 responses

I like it

More background music

very nice

i learn how to pronounce C# as C - Sharp!

Okayy

good

is okay

character customization

I enjoy it

Figure 5.21: Provide any other feedback or comments about your experience with the game LEARN YOUR CODE!

This figure provides any other feedback or comments about the player's experience with the game. Their enthusiasm validates the visual novel format, character-driven storytelling, and well-paced puzzles don't just teach C#, but turn learning into a genuinely delightful experience.

5.3 Summary

This chapter covered the different types of testing that were used to test *Learn Your Code!*

CHAPTER 6: IMPLEMENTATION

6.0 Introduction

Chapter 6 reviews the outcome of the proposed project. It also outlines potential improvements planned for the game in the future. Moreover, the achievements of the developed game were examined to see if the intended objectives were reached. The chapter also highlights the game's weaknesses to identify opportunities for further enhancement.

6.1 Objectives Achievements

Table 6.1: Objectives Achievements

Objectives	Achievement
To design a visually appealing anime-themed game that captivates players through a strong narrative and interesting characters, encouraging progression through the storyline.	Players are satisfied by the game theme, strong storyline and character's design.
To develop an educational tool that integrates coding puzzles and challenges in a progressive, engaging manner, making coding concepts accessible and enjoyable.	Players can learn C# programming through this game despite having prior knowledge.
To evaluate the game's effectiveness and functionality through usability testing and feedback from the target audience, ensuring the game's educational and entertainment goals are met.	*LEARN YOUR CODE!* received positive feedback from players and conclude that it is indeed an educational game that is enjoyable.

6.2 Project Limitations & Constraints

1. Limited resources prevented further refinement of the character sprites, including improvements to their resolution and overall aesthetic quality.

2. Unable to have save/load button on every scene due to time constraints.

3. Time limitations restricted the ability to implement game leaderboard

6.3 Future Works

The project's potential depends on future developments, which will consider player feedback gathered from the questionnaire.

For instance, most user feedback is to have more characters in the game. The idea to have more characters is highly considered, but this also means to expand the game storyline. Perhaps in the future, the game would have longer storyline which helps to introduce more characters and more educational contents allowing for more gameplay hours.

Lastly, if provided with capitals, the game would have more character's expression and character voice over. This helps increases the game immersion even more making the game more interesting to play.

6.4 Conclusion

This chapter has discussed the successes, limitations, and upcoming improvements for the proposed game. To make the game more helpful and effective for users, its features can be upgraded and added upon.

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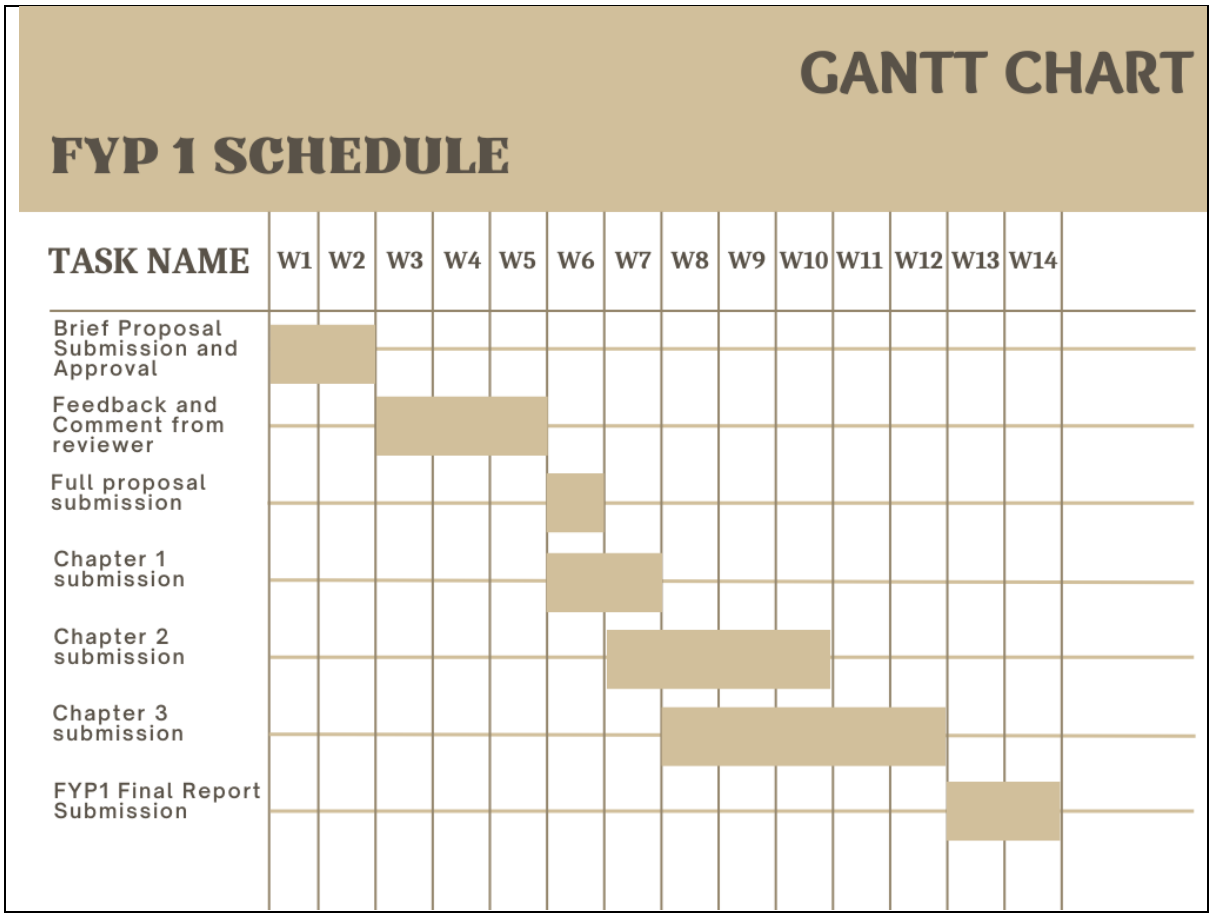
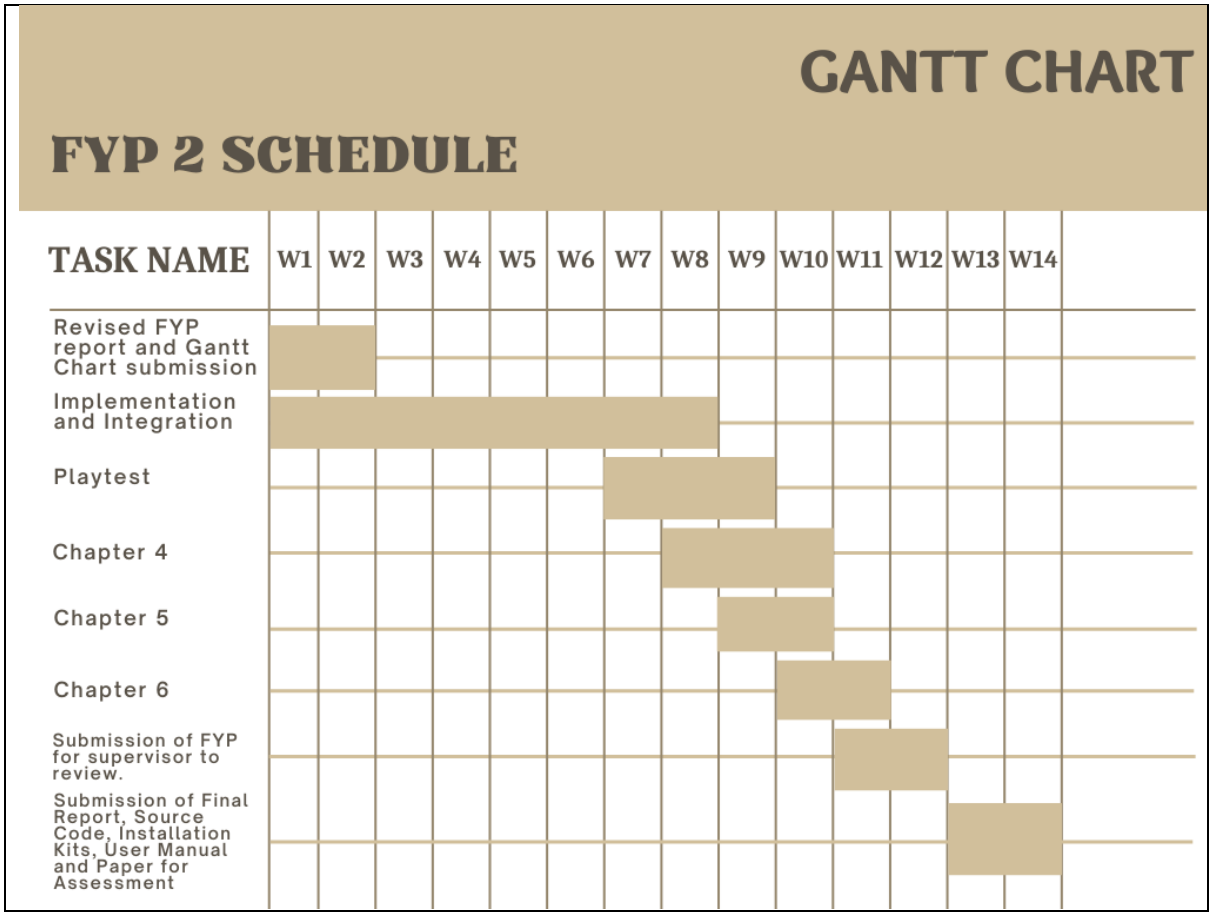
APPENDICES

Appendix A FYP Schedule

Gantt chart of FYP 1 schedule



Gantt chart of FYP 2 schedule



Appendix B: Official Letter for FYP 1 Data Collection

UNIMAS/NC-19.03/04-32 Jld. 2 (36)

6 Disember 2024

Kepada Sesiapa Yang Berkenaan

Tuan/Puan

Kerja Lapangan Pelajar Tahun Akhir dari Universiti Malaysia Sarawak
- Muhammad Haikal Hakimi bin Towffek

Dengan segala hormatnya perkara di atas adalah dirujuk.

Sukacita dimaklumkan bahawa pelajar berikut akan mengumpul maklumat untuk projek beliau.

Berikut adalah butir-butir pelajar:

Nama Penuh	:	Muhammad Haikal Hakimi bin Towffek
No. Matrik	:	80236
No. Kad Pengenalan	:	010828-13-0593
Program	:	Pengkomputeran Multimedia
Tahun Pengajian	:	4
Tajuk Projek	:	*Learn Your Code*
Penyelia	:	Ts. Dr Suriati Khartini binti Jali
Emel	:	jskhartini@unimas.my
Telefon	:	082 – 592647

Sehubungan itu, sukacita kiranya pihak tuan/puan dapat memberikan kerjasama kepada pelajar berkenaan untuk menyalurkan maklumat yang diperlukan bagi memenuhi syarat kursus. Segala maklumat yang diperolehi akan hanya digunakan untuk tujuan akademik semata-mata dan akan dijamin kerahsiaannya.

Ini adalah sebagai makluman kepada pihak tuan dan sekiranya ada sebarang pertanyaan, sila hubungi penyelia pelajar tersebut.

Sekian, terima kasih.

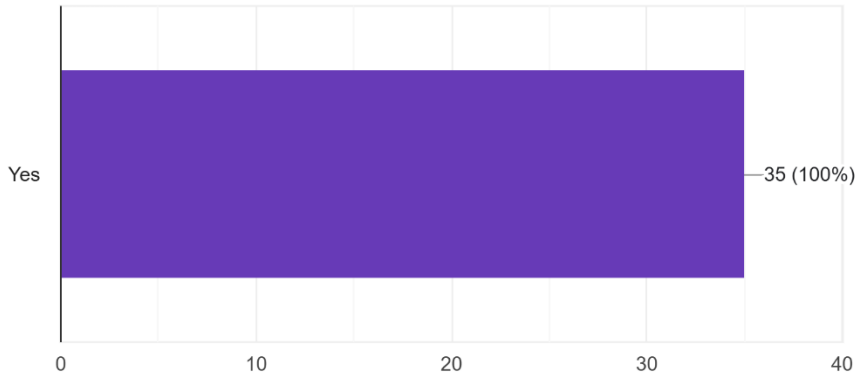
Siti Lydiawati binti Sahmat
Penolong Pendaftar Kanan

s.k. - **Timbalan Dekan, Prasiswazah,** FSKTM

Appendix C: FYP 1 Survey Results

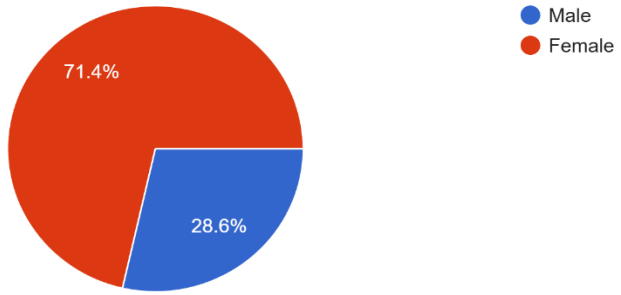
I agree to participate in the research study, I understand the purpose and nature of this study and I am participating voluntarily understand that I can w... any penalty or consequences. Tick all that apply.

35 responses



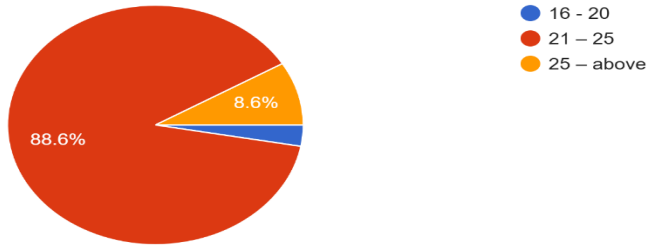
1. Gender

35 responses



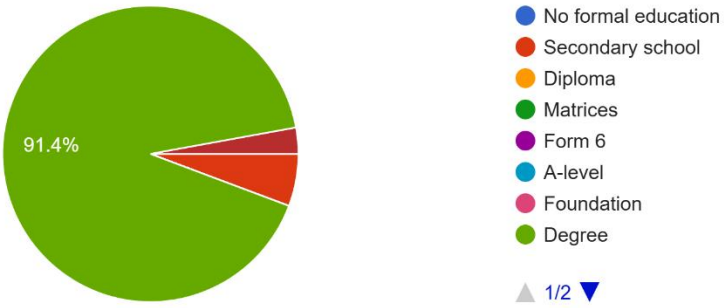
2. Age

35 responses



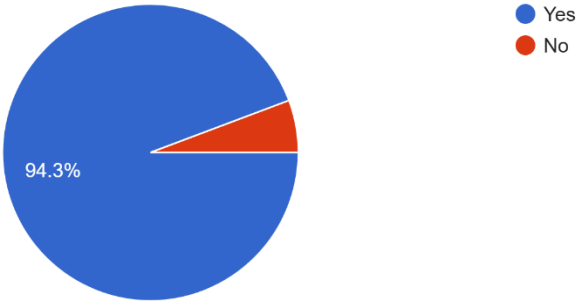
3. Education level.

35 responses



4. Are you a former/current STEM student?

35 responses

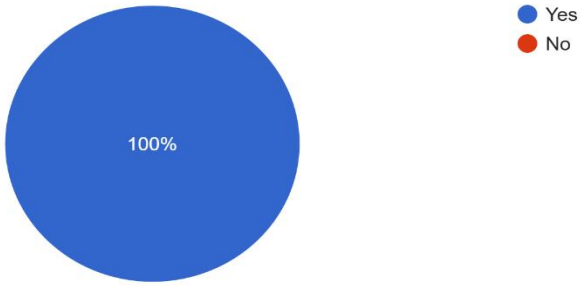


5. Are you familiar with coding languages, especially C#?

35 responses

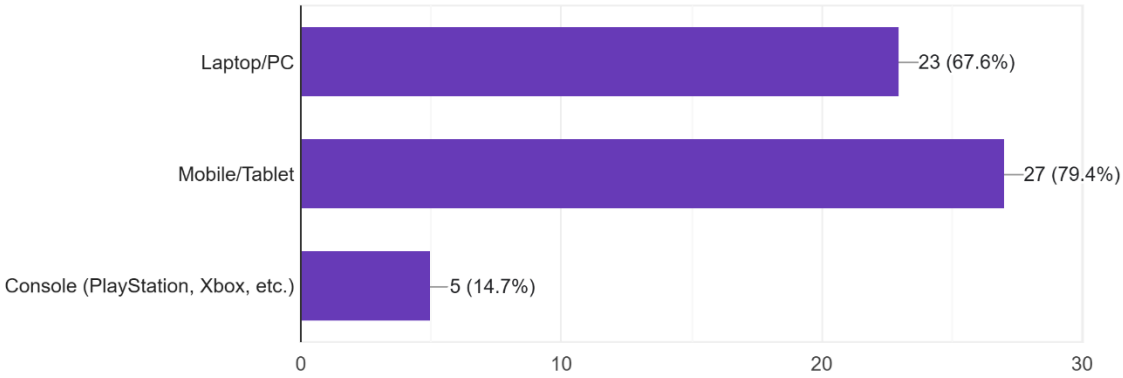
6. Do you play video games?

35 responses



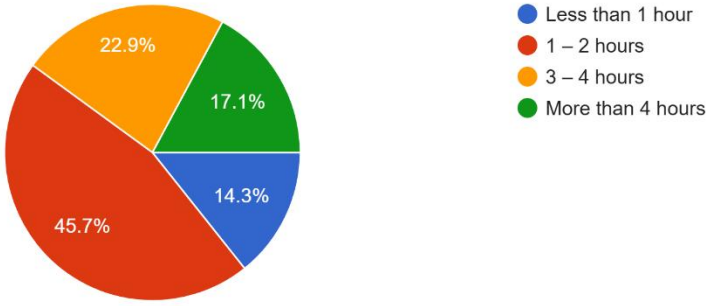
7. What are your preferred gaming devices? (you may choose more than one)

34 responses



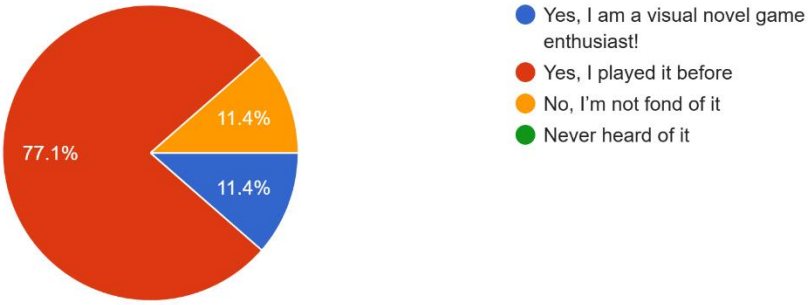
8. How many hours do you spend playing a game in a day?

35 responses



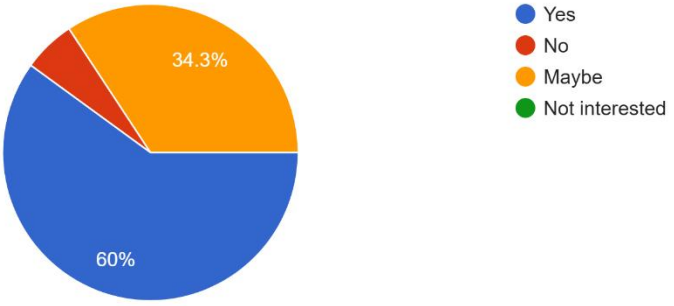
9. Have you played a visual novel game before?

35 responses



10. Have you played an educational game before?

35 responses

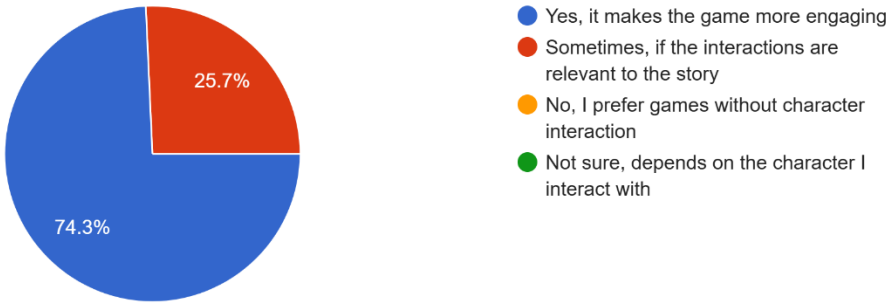


11. Do you like games with an engaging storyline?

35 responses

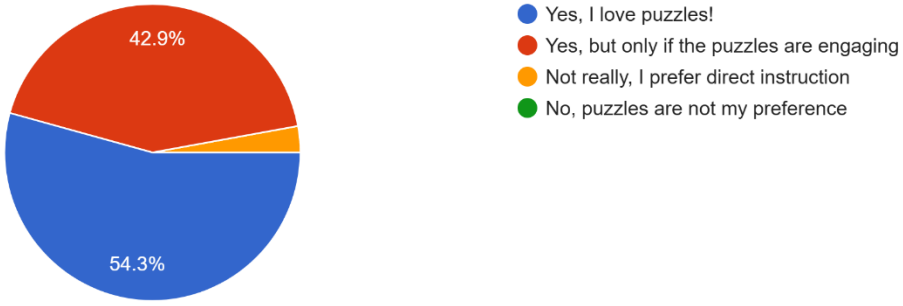
12. Would you like games where you can interact with characters?

35 responses



13. Would you enjoy learning coding concepts by solving puzzles?

35 responses



14. Does the art style of a game affect your focus or interest in playing it?

35 responses

15. Would you be interested in a visual novel game that teaches C# programming languages through interactive gameplay, engaging storyline and solving puzzles?

35 responses

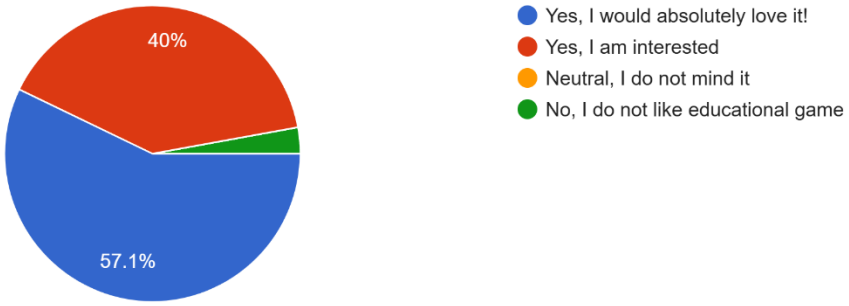


Figure 3.16

16. Do you have any suggestions on what you would like to see in this game?

27 responses

No

Have difficulty level

Make it fun

Add music and sound effects

I would love to see features such as syncing GitHub/Git or Replit with the gameplay. This could indirectly teach users the related platforms and make it more fun for sandbox coding.

Good luck!

Anime girls teaching coding

More endings

Easy game play mode

Honestly, I want handsome guy there too. 😏

Explain the code for me

A good storyline can enhance the experience..

Multiple endings!

Show how the coding work by explain each meaning

Voice acting

can customized character

I'd like to see engaging challenges and rewards to make learning fun and interactive.

Sharing of semantic and syntax of C#

make it engaging throughout the game

I want husbando >.<

The game style

Reward functin

No DLC pls

N/A

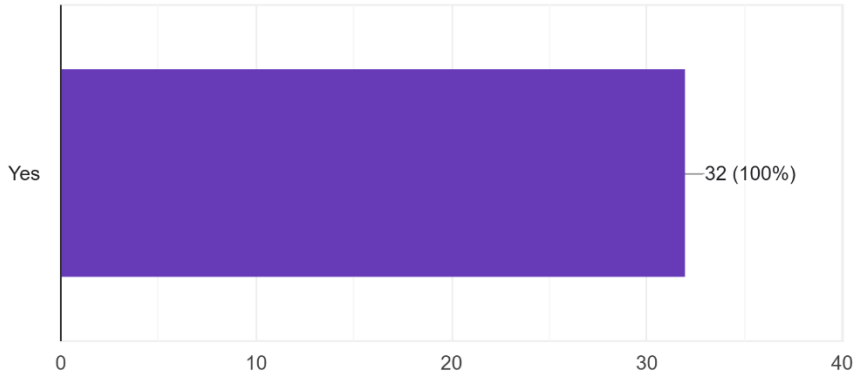
AI that can generate coding

I want good looking character

Appendix D: FYP 2 Survey Results

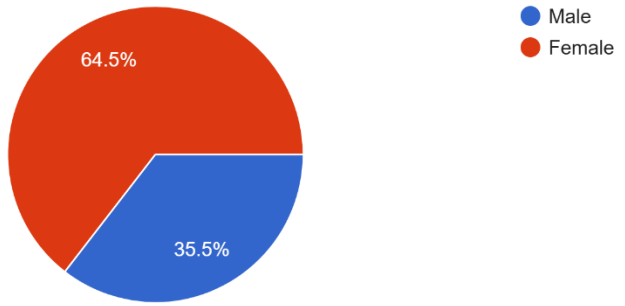
I agree to participate in the project feedback, I understand the purpose and nature of this study and I am participating voluntarily understand that I can w... any penalty or consequences. Tick all that apply.

32 responses



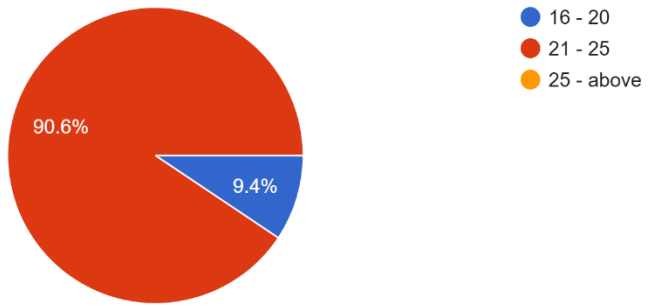
1. Gender

31 responses



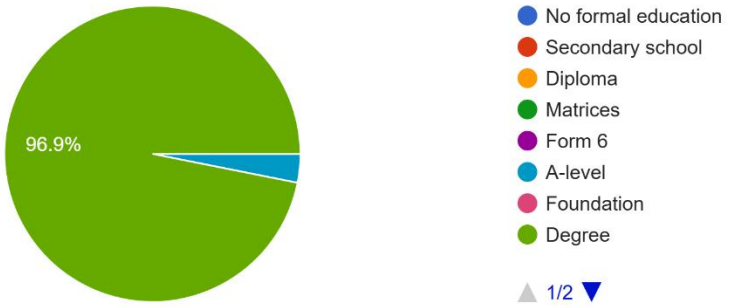
2. Age

32 responses



3. Education Level

32 responses

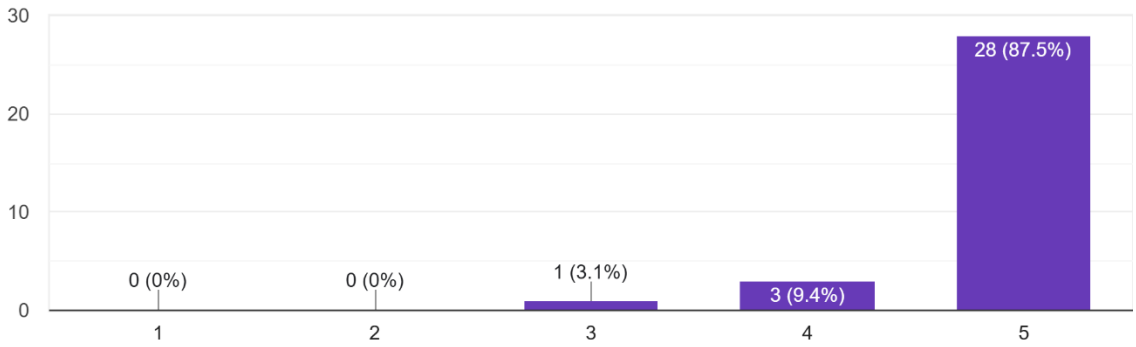


4. Are you familiar with coding languages, especially C#?

32 responses

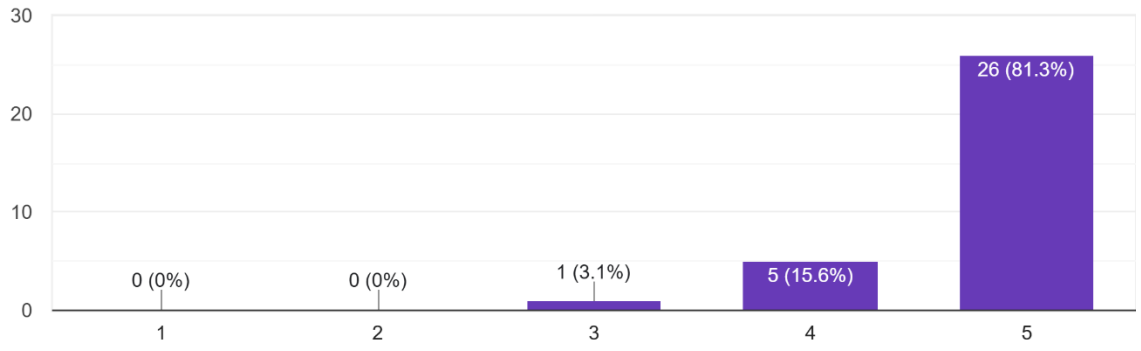
5. You find the game engaging.

32 responses



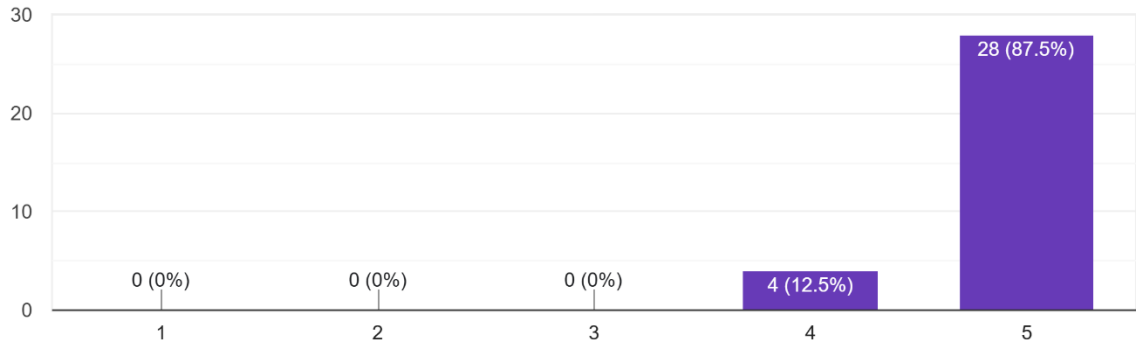
6. You are able to navigate through the game easily.

32 responses



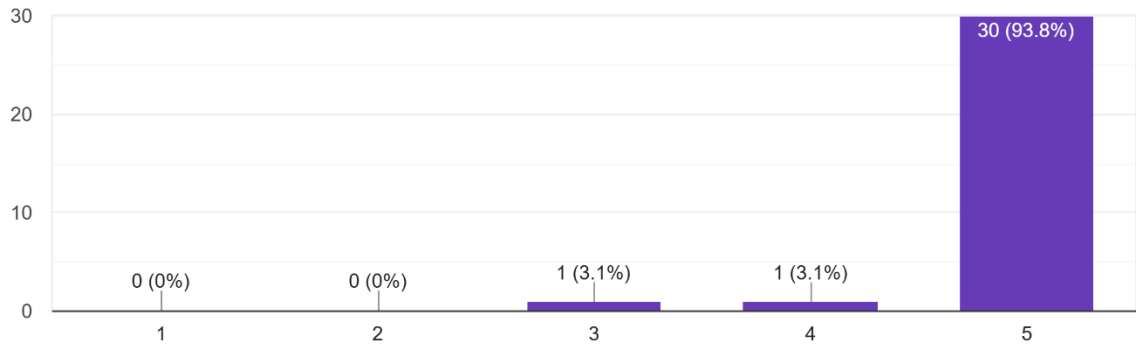
7. You enjoy the game storyline.

32 responses



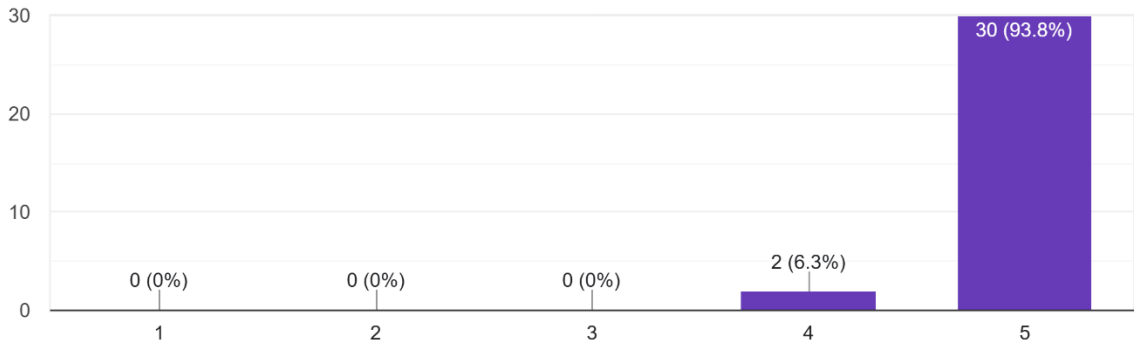
8. You appreciate the game music background.

32 responses



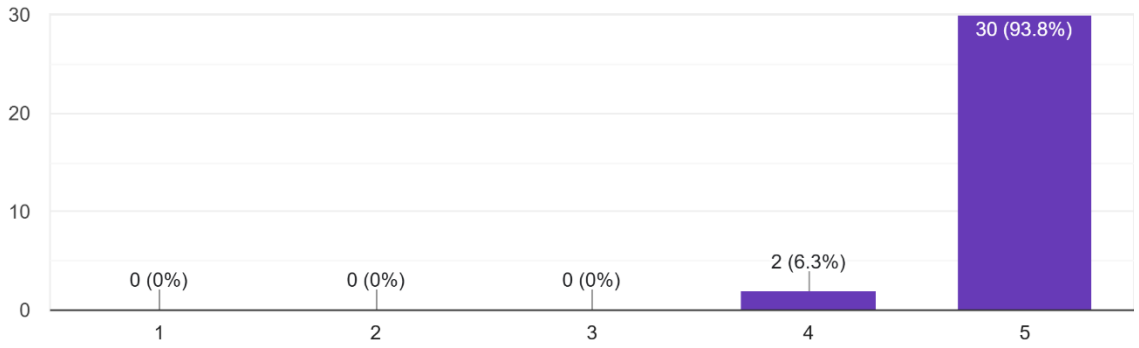
9. You like the sound effects of the game.

32 responses



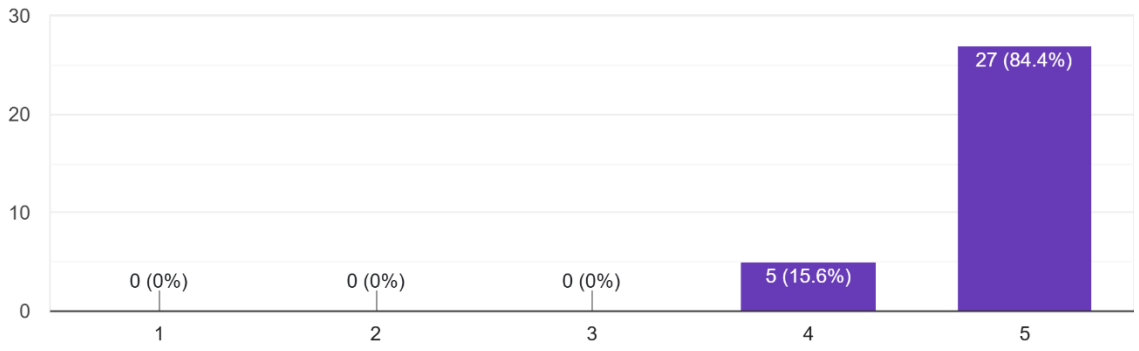
10. You like the character design.

32 responses



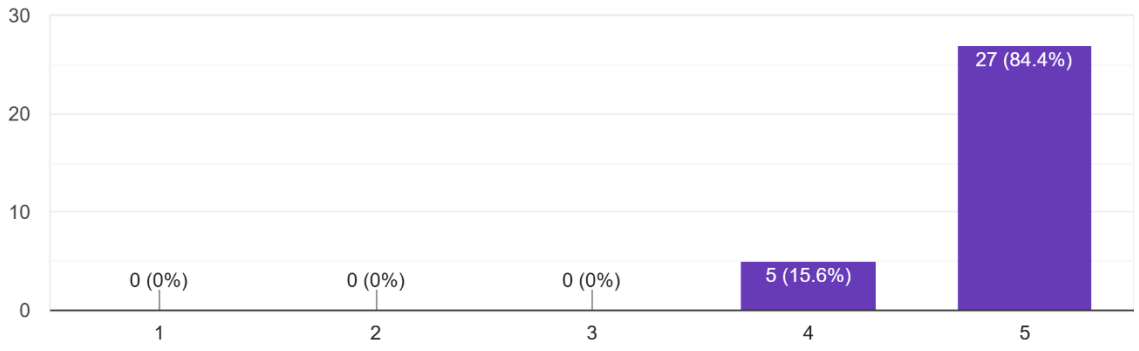
11. You are able to learn C# programming from this game.

32 responses



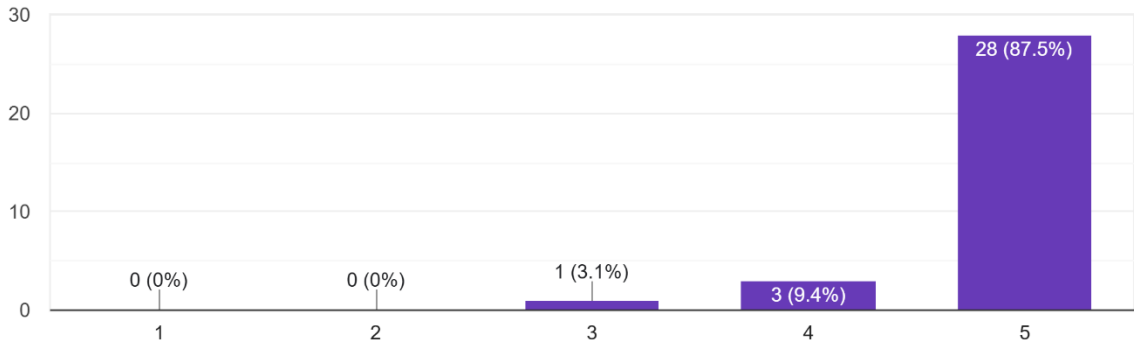
12. You find this game educational.

32 responses



13. You would like to learn more about C# programming through this game.

32 responses



14. Any feedback and suggestion on what would you like to see be included in the game in the future. (i.e. more characters, more endings, more choices, et cetera)

29 responses

More female characters

very good!

-

More female characters

music fits the game vibe

Add more character

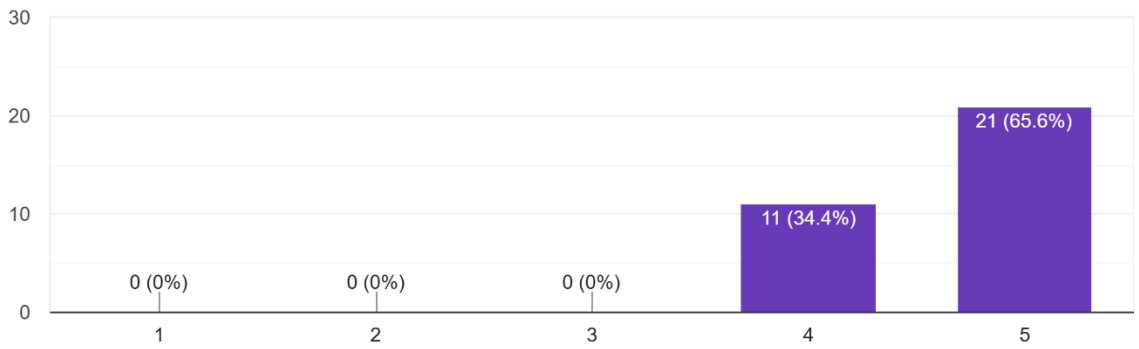
more good looking character pls

more background music

character very beautiful

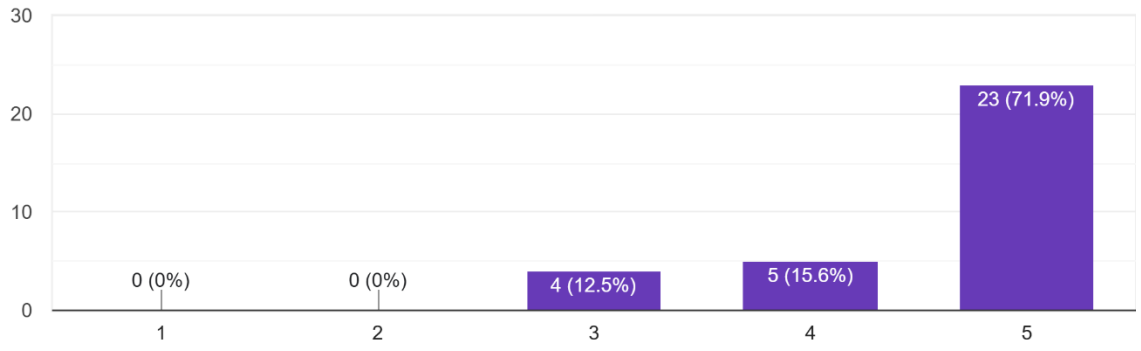
15. I would play this game frequently.

32 responses



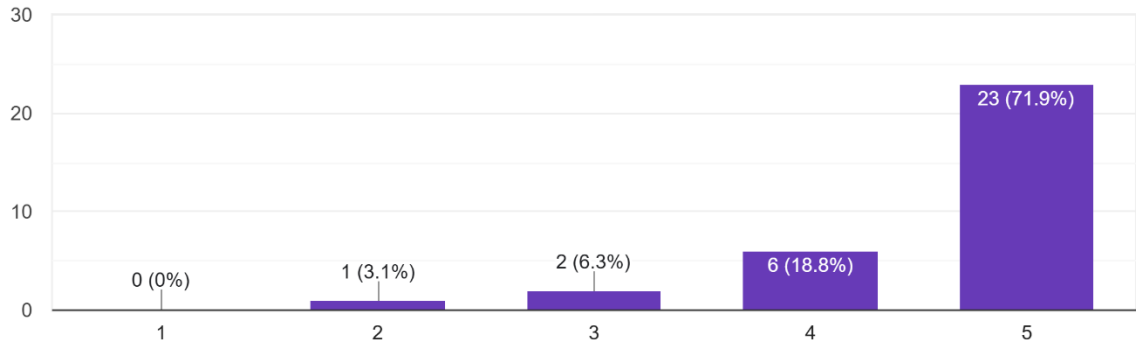
16. I found the game difficulty to be easy.

32 responses



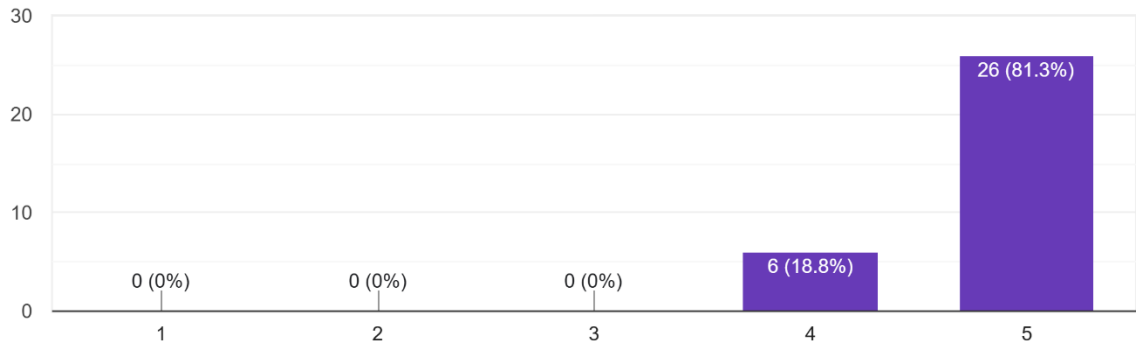
17. I do not need help from others to set up and play the game.

32 responses



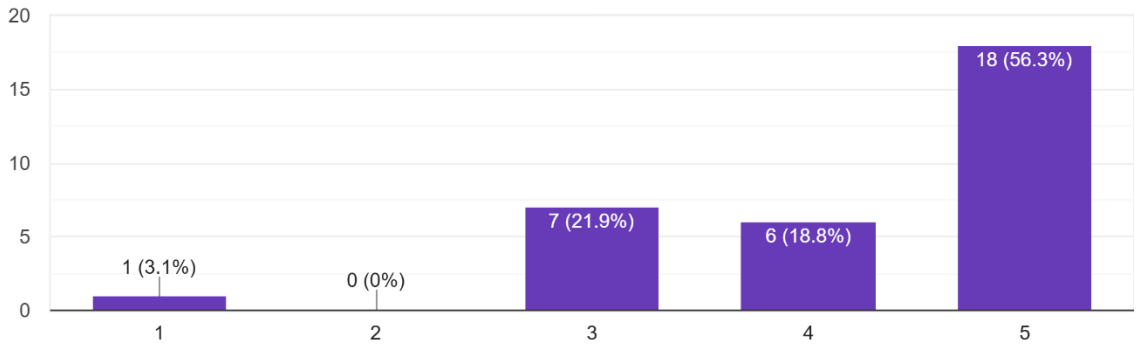
18. I enjoy the multiple ending that the game provides.

32 responses



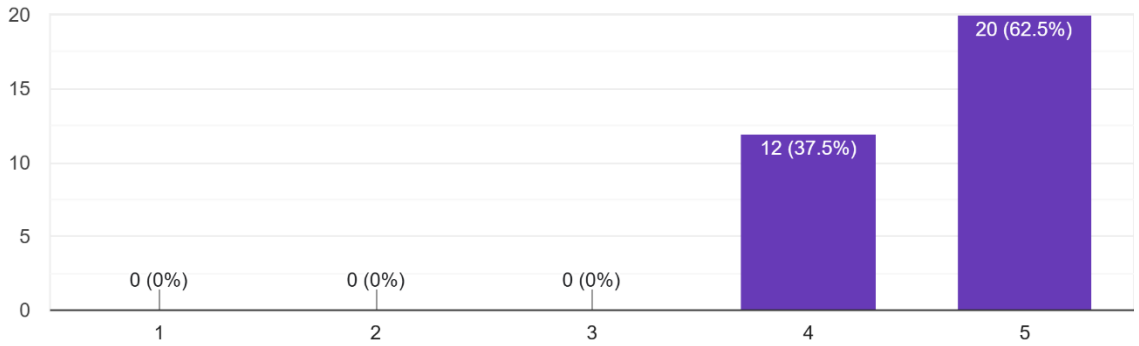
19. I do not need to know C# programming in order to play this game.

32 responses



20. I could learn C# programming from this game.

32 responses



21. Provide any other feedback or comments about your experience with the game *LEARN YOUR CODE!* (i.e. Any additional features you like to see? How would you like the game improved?)

23 responses

All good G

More choice/options

too ez

no comment

okay

I like it

More background music

very nice

i learn how to pronounce C# as C - Sharp!

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