



Faculty of Computer Science and Information Technology

GAIA: CONSERVING THE EARTH'S ENVIRONMENT

MUHAMMAD FIRDAUS BIN SUHAIMI

Bachelor of Multimedia Computing with Honours

(MC)

2024/2025

UNIVERSITI MALAYSIA SARAWAK

GAIA: CONSERVING THE EARTH'S ENVIRONMENT

MUHAMMAD FIRDAUS BIN SUHAIMI

The project is submitted in partial fulfilment of the
Requirements for the degree of
Bachelor of Multimedia Computing with Honours
(MC)

Faculty of Computer Science and Information Technology

UNIVERSITI MALAYSIA SARAWAK

2024/2025

THESIS STATUS ENDORSEMENT FORM

TITLE **Gaia: Conserving the Earth's Environment**

ACADEMIC SESSION: 2024/2025

(CAPITAL LETTERS)

hereby agree that this Thesis* shall be kept at the Centre for Academic Information Services, Universiti Malaysia Sarawak, subject to the following terms and conditions:

1. The Thesis is solely owned by Universiti Malaysia Sarawak
2. The Centre for Academic Information Services is given full rights to produce copies for educational purposes only
3. The Centre for Academic Information Services is given full rights to do digitization in order to develop local content database
4. The Centre for Academic Information Services is given full rights to produce copies of this Thesis as part of its exchange item program between Higher Learning Institutions [or for the purpose of interlibrary loan between HLI]
5. ** Please tick (✓)

☐

CONFIDENTIAL

(Contains classified information bounded by the OFFICIAL SECRETS ACT 1972)

☐

RESTRICTED

(Contains restricted information as dictated by the body or organization where the research was conducted)

☒

UNRESTRICTED



(AUTHOR'S SIGNATURE)

Validated by



(SUPERVISOR'S SIGNATURE)

Permanent Address

No 11, Tingkat 3, Flat Balai Polis Sungai Maong,
Jalan Tun Ahmad Zaidi Aduce, 93150 Kuching, Sarawak

Date: 22th June 2025

Date: 27th July 2025

Note * Thesis refers to PhD, Master, and Bachelor Degree

 ** For Confidential or Restricted materials, please attach relevant documents from relevant organizations / authorities

DECLARATION

I hereby declare that this project is my original work. This project has been carried out as part of my academic requirements at University Malaysia Sarawak (UNIMAS), and it is the result of my own research, design and development efforts. All sources of information, data, and assistance that were used or referenced during the development of this project have been properly acknowledged and cited,



MUHAMMAD FIRDAUS BIN SUHAIMI

Matric NO 78241

28th July 2025

ACKNOWLEDGEMENTS

I would like to express my heartfelt gratitude to my supervisor, Dr. Izzatul Nabila bt Sarbini, for her invaluable guidance and support throughout the course of my final year project. Her insightful feedback and dedication have been instrumental in ensuring the smooth progress of my work and improving the quality of my project.

I extend my sincere thanks to the respondents who participated in the survey, taking the time to provide honest and valuable feedback. Your contributions have been pivotal in shaping the direction of my project, ensuring it meets the needs and expectations of its intended users.

I am deeply thankful to my family and friends for their unwavering support and encouragement throughout the semester. Your guidance, hope, and belief in me have motivated me to strive harder and achieve my goals.

Finally, I am profoundly grateful to University of Malaysia Sarawak (UNIMAS) for providing me with the opportunity to pursue my studies and access to the resources and facilities that have enriched my learning experience. The university's support has been essential in enabling me to complete this final year project successfully.

ABSTRACT

Environmental degradation caused by human actions is an ongoing issue that threatens natural resources and biodiversity. Educating youths on the importance of environmental conservation is essential to foster awareness and promote sustainable behaviors. A 2D story-driven role-playing game (RPG) may be used as an educational tool in raising environmental awareness among youths. By integrating interactive storytelling and environmental themes, the game allows players to explore real-world conservation challenges and solutions through engaging gameplay. The project adopts a user-centered design (UCD) approach combined with agile methodology to prioritize user experience and to create an impactful learning environment. This educational game aims to inspire behavioral changes and instill a deeper understanding of the value of conserving the environment.

Keywords: environmental degradation, environmental conservation, environmental awareness, 2D story-driven role-playing game (RPG)

Table of Contents

Lists of Tables	iii
Lists of Figures.....	iv
1) CHAPTER 1: INTRODUCTION	6
1.1 Background.....	6
1.2 Problem Statement	7
1.3 Objective	7
1.4 Brief Methodology	8
1.5 Scopes	8
1.8 Expected Outcome	9
1.9 Project Outlines.....	10
2) CHAPTER 2: LITERATURE REVIEW	12
2.1 Introduction.....	12
2.2 Review of Similar Existing Systems.....	12
2.2.1 To The Moon.....	13
2.2.2 Endling: Extinction Is Forever	14
2.2.2 Spiritfarer	15
2.2.3 Comparison of Features between Systems	16
2.3 Proposed Games System.....	16
3) CHAPTER 3: REQUIREMENT ANALYSIS AND DESIGN	18
3.1 Introduction.....	18
3.2 User-Centered Design and Agile	18
3.3 Requirements	19
3.3.1 Survey	20
3.3.2 Functional Requirements	31
3.3.2 Non-Functional Requirements	31
3.3.4 Software Requirements	31
3.3.5 Hardware Requirements.....	32
3.4 Design	32
3.4.1 Storyboarding and Storytelling	33
3.4.2 Game Mechanics.....	34
3.5 Wireframes	35
3.5.1 Main Menu	35

3.5.2	Dialogue	36
3.5.3	Settings.....	37
3.5.4	Inventory	38
3.5.5	Combat.....	39
3.6	Use Case Diagram.....	40
3.6.1	Player Use Cases	41
3.6.2	NPC Use Case.....	50
3.6.3	Enemies Use Case	52
3.7	Summary	53
4)	CHAPTER 4: IMPLEMENTATION	54
4.1	Introduction.....	54
4.2	Hardware and Software.....	54
4.3	Starting The Game Development.....	55
4.4	Map Design.....	56
4.5	Sprite Design.....	62
4.6	Character Design.....	64
4.6	Characters	65
4.7	Events.....	67
4.7	Minigames.....	68
5)	CHAPTER 5: TESTING.....	71
5.1	Introduction.....	71
5.2	Testing.....	71
5.3	Functional and Non-Functional Testing Results	72
5.4	Usability Testing	81
5.5	Usability Testing Results	81
5.6	Conclusion	86
6)	CHAPTER 6: CONCLUSION AND FUTURE WORK	87
6.1	Introduction.....	87
6.2	Objectives Achievement	87
6.3	Project Limitations	87
6.4	Conclusion	88
6.5	Future Work.....	89

Lists of Tables

Table 1.1 Project Schedule.....	9
Table 2.1 Comparison of Features between Systems.....	16
Table 3.1 Hardware Requirements.....	32
Table 4.1 Hardware Requirements.....	54
Table 5.1 Functional Testing Test Case F1.....	72
Table 5.2 Functional Testing Test Case F2.....	73
Table 5.3 Functional Testing Test Case F3.....	74
Table 5.4 Functional Testing Test Case F4.....	75
Table 5.5 Functional Testing Test Case F5.....	76
Table 5.6 Functional Testing Test Case F6.....	77
Table 5.7 Functional Testing Test Case NF1.....	78
Table 5.8 Functional Testing Test Case NF2.....	79
Table 5.9 Functional Testing Test Case NF3.....	80

Lists of Figures

Figure 2.1 To The Moon	13
Figure 2.3 Endling: Extinction Is Forever	14
Figure 2.4 Spiritfarer.....	15
Figure 3.1 User-Centered Design (UCD) flow diagram	18
Figure 3.2 Agile Methodology flow diagram.....	19
Figure 3.3 Have you heard of the term "environmental conservation" before?.....	20
Figure 3.4 Where did you first learn about environmental conservation?	20
Figure 3.5 How familiar are you with the concept of environmental conservation?	21
Figure 3.6 Which of the following environmental issues are you aware of?.....	21
Figure 3.7 Have you ever participated in activities that promote environmental conservation?	22
Figure 3.8 How do you learn about environmental issues or conservation efforts?	22
Figure 3.9 How important do you think it is to address environmental issues?	23
Figure 3.10 Have you ever played a story-driven RPG game before?	23
Figure 3.11 Which story-driven RPG games have you played, or heard of before?.....	24
Figure 3.12 What do you enjoy the most about story-driven RPGs?.....	25
Figure 3.13 How often do you play story-driven RPGs?.....	25
Figure 3.14 Would you be interested in a story-driven RPG that focuses on environmental themes?	26
Figure 3.15 Which environmental topics would you like to see addressed in a game?.....	26
Figure 3.16 What platform do you prefer playing videogames on?	27
Figure 3.17 What type of gameplay mechanics do you enjoy most in RPG games?	27
Figure 3.18 How important is it for a game to teach players real-world lessons?.....	28
Figure 3.19 Would you prefer a game where your choices affect the environment in real time?	28
Figure 3.20 What type of narrative would you prefer for a game about environmental conservation?	29
Figure 3.21 What would motivate you to play a game focused on environmental conservation? (Open-ended)	30
Figure 3.22 Main Menu	35
Figure 3.23 Dialogue.....	36
Figure 3.24 Settings	37
Figure 3.25 Inventory.....	38
Figure 3.26 Combat.....	39
Figure 3.27 Use Case Diagram	40
Figure 4.1 Creating a New Project.....	55
Figure 4.2 Game Project Layout.....	55
Figure 4.3 First Map Design (Greenville).....	56
Figure 4.4 Second Map Design (Willow Forest)	57
Figure 4.5 Third Map Design (Rush Lake).....	58
Figure 4.6 Rush Lake House Design	59
Figure 4.7 Fourth Map Design (Misty Hollow).....	60
Figure 4.8 Fifth Map Design (Willow Grove)	61

Figure 4.9 Aseprite Boot Up Screen	62
Figure 4.10 Imported Tile Sheet	63
Figure 4.11 Character Generation Window.....	64
Figure 4.12 Exporting Specific Parts of Character	65
Figure 4.13 Main Character Interaction	66
Figure 4.14 Event Button	67
Figure 4.15 Event Window	67
Figure 4.16 Clearing Up The River.....	68
Figure 4.17 Dousing Fire	69
Figure 4.18 Planting Seedlings	70
Figure 5.1 I think that I would like to use this system frequently.....	81
Figure 5.2 I found that the system is unnecessarily complex	82
Figure 5.3 I thought the system was easy to use	82
Figure 5.4 I think that I would need the support of a technical person to be able to use this system	83
Figure 5.5 I found the various functions in this system were well integrated	83
Figure 5.6 I thought there was too much inconsistency in this system.....	84
Figure 5.7 I would imagine that most people would learn to use this system very quickly	84
Figure 5.8 I found the system very difficult to use.	85
Figure 5.9 I felt very confident using the system.....	85
Figure 5.10 I needed to learn a lot of things before I could get going with this system	86

CHAPTER 1: INTRODUCTION

1.1 Background

As the human population has continued to increase over time, our natural resources is being ever so difficult to maintain. Natural resources are any biological, mineral, or aesthetic item obtained naturally that is used for beneficial use (Editors of Encyclopaedia Britannica, 2024). These natural resources such as air, water, and food, are essential to our daily lives, as we depend on it to live. Moreover, resources like soil and minerals are also used to create building materials which enhances development of cities and countries.

Typically, natural resources are split into two parts, one being renewable resources and the other being non-renewable resources. Renewable resources as its name implies, are resources that can replenish. It replenishes naturally over time and if used properly, is sustainable. Nonrenewable resources do not replenish naturally. This makes them finite and overusing it can lead to depletion of these resources.

The reasons for this natural resource being difficult to maintain includes human activities and environmental changes. Human activities are the main cause of natural resources depletion, mainly from deforestation. Charkravarty, S. et al (2012) states that the earth is covered by

3.9 billion hectares of forestry, which makes up 30 percent of the earth's land area. Forests are essential for their ecological and social benefits. However, deforestation poses a threat as it will increase greenhouse gas emissions, reduce biodiversity among plants and animals, and degradation and erosion of soils.

Typically, deforestation happens due to industrialization and agriculture. However, these itself poses new problems as pollutions can occur from waste and chemicals dumped from industrial and agricultural activities. These contaminate the air, water and soil which causes resources to be unusable can affecting not only human health, but wildlife as well. Furthermore, these human activities also bring towards climate change that leads to global warming, and waste mismanagement.

Over time, with no conservation plans taken to curb the issue of depleting natural resources, severe or irreversible negative effects can be seen throughout. One of the negatives includes the loss of biodiversity and extinction of species. As each species has a unique role,

their extinction can create a domino effect that impacts other living organisms. In addition, this also accelerates climate change as with less trees from deforestation mentioned earlier can lead to less carbon dioxide absorption. This can lead to rising temperatures which inadvertently lead to rising of sea levels. It can also lead to further extinction of species.

1.2 Problem Statement

Despite there being environmental and natural resource depletion globally, awareness and engagement in conservations effects remains low. This can be seen clearly among younger generations, which in time has been stated to play a crucial role in shaping the future. However, younger generations lack sufficient knowledge about the impact of human activities and its consequences on natural resources and the environment. Without early exposure, education and engagement, it may lead to further issues of deforestation, pollution and biodiversity loss that will lead to severe environmental consequences.

Hence, this project aims to bridge the gap between younger generations and the importance of conserving natural resources by creating an interactive 2D game titled “Gaia: Conserving the Earth’s Environment” that educates teenagers to young adults on earth conservation and the importance of sustainable resource management. By immersing players in real-world environmental challenges, the game encourages critical thinking and problem-solving to create and develop a sense of responsibility and awareness among younger players. According to the abstract by Liu, Shaikh, & Gazizova (2020), in their study, their research founds that game-based learning showed an increase in motivation and attraction to learning.

1.3 Objective

The objectives for this study are as follows:

1. To design and develop a game that educates players on pollution.
2. To design and develop a game that educates players on deforestation.
3. To design and develop a game that educates players on climate change.
4. To promote the adoption of environmentally friendly solutions through gameplay mechanics.

1.4 Brief Methodology

This project will utilize a combination of User-Centered Design and Agile Development in designing, developing and refining the story driven 2D RPG game to educate teenagers to young adults on environmental conservation.

The methodology consists of research and analysis, where initial research will be conducted to understand and identify the effective methods needed to educate teenagers to young adults on environmental issues, preferably by surveys and focus group. Based on this, the step of design and prototyping comes in where low-fidelity prototypes of the game is created to showcase the story elements, conservation challenges, and gameplay mechanics. This is then shared with users for feedback in order to adjust the game project.

Agile development is used as the project is divided into development sprints with each focused on implementing specific game features. Each sprint will have playtesting sessions with target users to obtain feedback on gameplay and education impact, thus improving the game continuously. As all of the features is done, a final testing will be conducted with teenagers to young adults' participants to evaluate their knowledge retention and attitudes towards conservation before and after gameplay. This way, the assessment will ensure that the game project effectively met its objectives.

1.5 Scopes

This project focuses on developing a story-driven 2D RPG game targeted at teenagers and young adults, aiming to educate them about environmental conservation through interactive storytelling and gameplay. The game will introduce players to key environmental issues that includes pollution, deforestation and climate change. This will encourage the target players to take actions that drive positive change within the game world.

1.6 Significance of project

This project brings significance in the potential to raise environmental awareness among teenagers to young adults. It is achieved by presenting key environmental issues through interactive storytelling. As this will entertain teenagers to young adults, the game will also give a sense of responsibility and a deeper understanding and importance of conservation within them. Compared to traditional education tools, this immersive give will provide

enjoyment and a good experience that makes teenagers to young adults to think critically regarding their actions and its impact towards the planet.

1.7 Project Schedule

Tasks/Week	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Week 20	Week 21	Week 22	Week 23	Week 24
Brief Proposal																								
Full Proposal																								
Chapter 1																								
Chapter 2																								
Chapter 3																								
Chapter 4																								
Chapter 5																								
Chapter 6																								

Table 1.1 Project Schedule

1.8 Expected Outcome

1. Creating a 2D story-driven RPG game that increase player's awareness of environmental issues by providing an engaging narrative that deepens their understanding of real-world environmental challenges.
2. Players will gain knowledge in sustainable solutions by using eco-friendly solutions in game such as reforestation, renewable energy, and waste reduction that mirrors the real-world sustainability practices.

1.9 Project Outlines

1. Chapter 1

- Environmental conservation is a value that needs to be instilled within youths as human actions are depleting natural resources which if not solved, can lead to huge impact such as loss of biodiversity. This project aims to create 2D story-driven RPG game that teaches youths in the importance of environmental conservation and its impact on our earth by giving real life examples. This will be achieved by using UCD with agile that prioritizes user experience for an enhanced learning and gameplay experience.

2. Chapter 2

- This chapter reviews and analyse existing systems with the proposed 2D RPG game on environmental conservation. The outcome of the analysis of three game systems compares its strengths in their storytelling, environmental education and gameplay mechanics. From there, a solution on the game project is developed by choosing and improving the greatest aspect from the three reviewed game systems.

3. Chapter 3

- The chapter outlines the design and development process for the proposed 2D RPG game that includes describing the methodology applied which are UCD with agile practices. Surveys are also conducted on 21 respondents that is used to determine the hardware, software, functional and non-functional requirements. Moreover, the storyboarding and storytelling, game systems, wireframe and use-case diagram are also developed. This chapter also goes in depth of each actor, system and use-cases in the use-case diagram.

4. Chapter 4

- The chapter describes the development process of the game project by using RPG Maker MZ and Aseprite, and details about the steps of the game project creation such as map design, character design and event design. Details of characters and NPCs are also documented as well as the minigames within the game that is related to conservation issues with ways to overcome the issue with conservation efforts.

5. Chapter 5

- The testing chapter highlights the tests being made to test the functional and non-functional requirements by using test cases, where all the test cases that were completed get a pass. Another test has also been made to gauge and obtain the general perception of players with the game system by using a system usability scale (SUS). The game has been play tested by 10 players and give their responses in a SUS form.

6. Chapter 6

- This chapter details the conclusion of the project, describing its objectives achievement where the objectives made in chapter 1 has been achieved, as well as mentioning any project limitations and future work. In project limitations, the mention of an exclusion of battle system with the use cases regarding battle system being removed is also mentioned due to irrelevancy and less to no impact of the system in reaching the project's objectives.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In the coming years, games have been used as educational tools for teaching and learning. It has gained its reputation over the past few years, with numerous studies that highlight the potential to enhance learning and engagement. This form of education, known as gamification or game-based learning, is quite effective in teaching complex concepts that can be hard to understand compared to traditional education methods. This is due to the interactive and immersive environment that gamification provides, which encourages active participation (Liu, Shaikh, & Gazizova, 2020). For teenagers to young adults, educational games have proven to be a powerful medium for developing critical thinking, problem-solving skills, and environmental awareness (Okonkwo, Toromade & Ajayi, 2024).

Engaging younger audiences in the context of environmental education is essential in fostering long-term behavioural changes and helps in addressing global issues such as climate change, deforestation, and pollution. Teaching younger generations about sustainability and environmental challenges, such as renewable energy and green chemistry, prepares them to be informed and responsible citizens empowered to make sustainable decisions (Okonkwo, Toromade & Ajayi, 2024). Traditional methods of teaching environmental education often fail to capture the attention of younger learners, which prompts the exploration of innovative approaches like game-based learning to communicate these concepts effectively (Liu, Shaikh, & Gazizova, 2020).

This literature review aims to identify and examine existing research on the use of gamification for educational purposes, the role of storytelling in enhancing player engagement as well as the effectiveness of games in promoting environmental awareness. By identifying gaps and insights from previous studies, this chapter will establish a theoretical framework for the development of the proposed 2D story-driven RPG game on environmental conservation.

2.2 Review of Similar Existing Systems

This section reviews existing systems that have and share similarities with the proposed 2D RPG game on environmental conservation. As the use of games as educational tools increases rapidly, many of the existing systems incorporate compelling storytelling and environmental themes or use gamification to engage players. These systems provide valuable insights into creating entertaining and educational games that target younger audiences. Thus, reviewing similar games is essential as it helps in understanding how different approaches have been used to deliver engaging and meaningful content, especially in areas like environmental conservation and interactive storytelling.

Although some games have great storytelling and education, gaps can be seen in addressing environmental issues with actionable, real-world solutions being a focus. Some games focus more on awareness rather than providing players with direct applications of sustainable practices. Therefore, this review assess similar games based on their relevance to the proposed project in three key areas, that being storytelling, game-based learning and gameplay mechanics.

By evaluating these aspects, this review makes sure that the proposed 2D RPG game effectively combines interactive storytelling with good game-based learning and gameplay mechanics, which can lead to achieving the objective of educating players about environmental conservation through engaging gameplay.

2.2.1 To The Moon

To The Moon is a story-driven RPG that is developed by using an engine called RPG Maker XP. Wilkerson (2022) states that the narrative follows a pair of doctors who changes people's memories in their final moments to achieve the dream of a person named Johnny. The game has no combat, and instead focuses on puzzles and exploration.



Figure 2.1 To The Moon

The game has strengths where it has a strong narrative with puzzles that support storytelling. Its use of pixel art style complements the nostalgic, emotional tone which engages players emotionally. However, it lacks educational or real-world themes that can deter and make it difficult to bring awareness towards players.

2.2.2 Endling: Extinction Is Forever

Endling is a survival game in which players control the last remaining mother fox on earth that is protecting her cubs. Watts (2022) states that in the game, Earth is in grave danger due to our greedy behaviour, as smoke covers the planet and rivers and forests are being polluted with toxic waste. The game showcases the effects of pollution, deforestation, and the overconsumption on wildlife.



Figure 2.2 Endling: Extinction Is Forever

This narrative-driven game has been noted in raising awareness about environmental issues by immersing players in the consequences of it. This results in an emotion connection towards the player, thus making the message more impactful despite not going in depth regarding conservation and its effects towards Earth.

2.2.2 Spiritfarer

Spiritfarer is a management simulation game in which players accompany spirits to the afterlife. It focuses on exploration and resource management while having an emotional storytelling to tell players. Hookshot, Charge Beam and Revive (2021) explain the game's premise, where the game places itself in the compelling but comfortable feedback loop of most management games.



Figure 2.3 Spiritfarer

The game is impactful from first glance; however, the themes focus on emotional growth rather than real-world issues. Furthermore, the resource mechanic is less tied to real-world applications as well due to the setting of the game.

2.2.3 Comparison of Features between Systems

Aspect/Game	To The Moon	Endling: Extinction is Forever	Spiritfarer
Storytelling	Emotional, linear narrative	Environmental driven, emotional narrative	Emotional narrative with character- driven quests
Game-Based Learning	Encourages emotional connection but lacks interactive learning elements	Demonstrates the consequences of environmental degradation. However, it lacks player- driven educational mechanics.	Teaches resource management and emotional intelligence through character interactions
Gameplay Mechanics	Simple puzzle and linear interaction	Repetitive gameplay	Resource management with repetitiveness

Table 2.1 Comparison of Features between Systems

2.3 Proposed Games System

From the review of similar games, this project will integrate an emotional narrative with player-driven choices, ensuring that decisions impact the storyline and outcomes. Inspired by To The Moon, the game will allow players to make meaningful choices that shape the narrative which reinforces the consequences of their actions.

For game-based learning, the project will take inspiration from Endling: Extinction is Forever by incorporating an engaging and accessible approach to environmental education. Rather than passive learning, NPCs will provide valuable conservation insights, and players can unlock new sustainability concepts through progression. This enhances the interactivity and immersion while reinforcing real-world environmental knowledge.

In terms of gameplay mechanics, the game will adopt a task-based system similar to a quest system where players engage in various environmental conservation activities, which differs from each type of conservation issues faced. This ensures a balance between challenge and education for players.

By combining these elements, the project aims to create a game that is both emotionally engaging while being educational, which can give players a deep understand of environmental conservation through interactive storytelling and decision-making.

CHAPTER 3: REQUIREMENT ANALYSIS AND DESIGN

3.1 Introduction

For a game development project to be successful, it needs to undergo thorough planning which involves understanding the requirements and designing the system to meet the project goals. This chapter focuses on identifying both functional and non-functional requirements essential for the development of the proposed 2D story-driven RPG game about environmental conservation. This analysis ensures that the game meets users' expectations while also aligning with the project objectives.

Furthermore, this chapter discusses the system design which includes the game architecture, user interactions, and interface designs. These three elements establish the framework for creating an engaging and educational gaming experience.

3.2 User-Centered Design and Agile

As stated in chapter 1 on brief methodology, the methodology used in this game development project is user-centered design (UCD) and Agile. The combination of UCD and Agile ensures that the game's development remains user-focused while allowing for flexibility and adaptation during the project lifecycle.

UCD is a design methodology that prioritizes the needs, preference and feedback of the end users, which in this case is youths, throughout the development process. This ensures for an intuitive, engaging and effective game that educates players on environmental conservation. The UCD process focuses on user needs by surveys and feedback. It also designs prototypes that reflects user preferences and allows testing with users to get feedback and iterate on it.

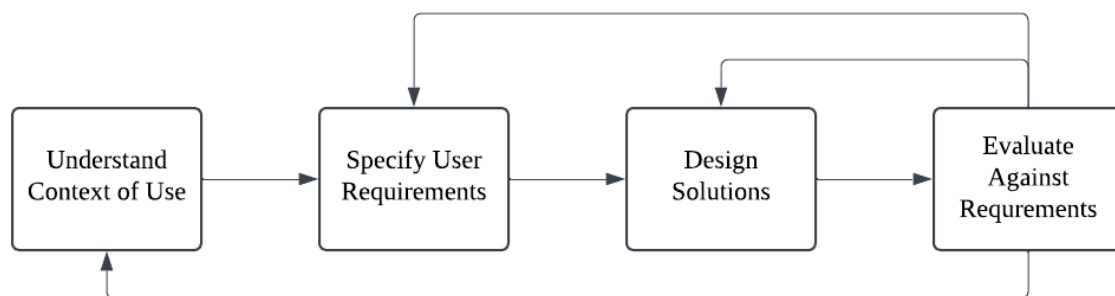


Figure 3.1 User-Centered Design (UCD) flow diagram

The next methodology, Agile, is an iterative project management methodology that emphasizes user feedback. It allows rapid development through sprints which ensures that the

project adapts quickly to changes. This is important in maintaining a game with the user feedback in mind. When implementing the survey, a question has been added in asking for respondents if they want to partake in testing the game. This allows for multiple iterations of the game to be made via Agile, which helps in completing the project in small stages, from early stages until the completed stage.

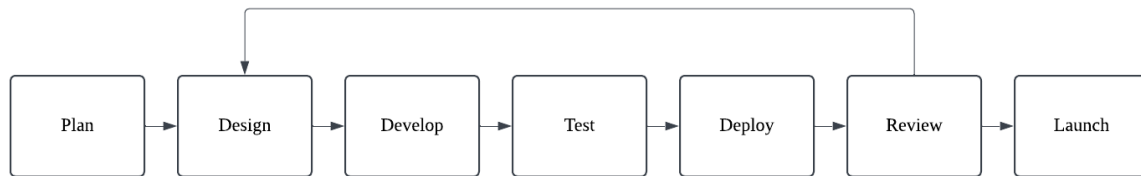


Figure 3.2 Agile Methodology flow diagram

3.3 Requirements

UCD is used in this section through a survey which was conducted to better understand the target audience. The survey goes into the target audience's knowledge regarding conservation, their experience with story-driven RPG games, and their gaming preferences. This gives valuable insights into their awareness of environmental issues, while also identifying their familiarity with the RPG genre. Moreover, it allows me to assess their preferences regarding gameplay features and platforms, ensuring that the game project design aligns with their interests and needs. The result of the survey is crucial in shaping the direction of the game, while also enhancing its relevance and appeal to the target audience. A total of 21 people has participated in the survey and will be used in determining the functional and non-functional requirements.

3.3.1 Survey

Have you heard of the term "environmental conservation" before?

21 responses

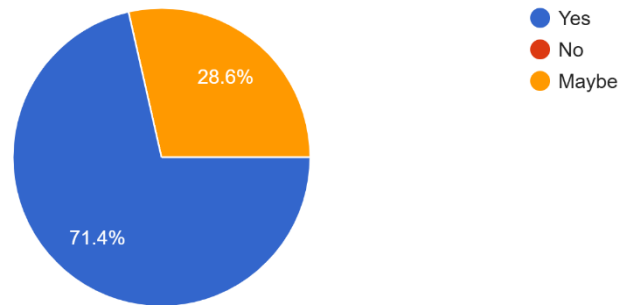


Figure 3.3 Have you heard of the term "environmental conservation" before?

Figure 3.3 shows that 71.4%, or 15 people have heard of the term environmental conservation before, and 28.6% or 6 people have maybe heard of the term. This question highlights that the term environmental conservation is fairly known among the respondents.

Where did you first learn about environmental conservation? (Select all that apply)

21 responses

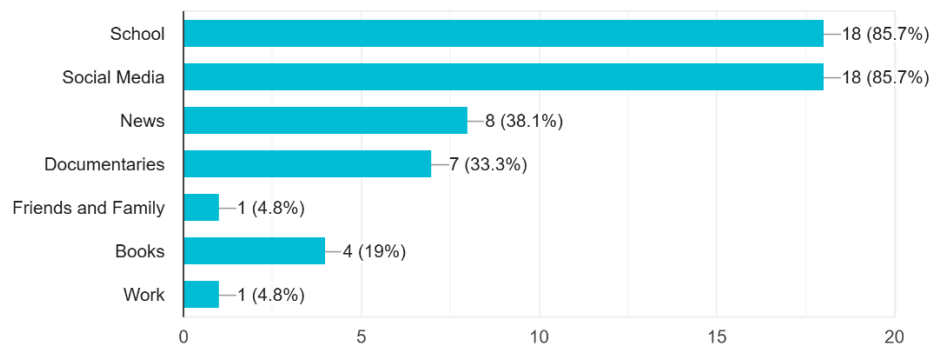


Figure 3.4 Where did you first learn about environmental conservation?

From figure 3.4, the respondents list out where they have learned of the term environmental conservation. School and social media played a huge role in exposing the term environmental conservation to the respondents, with other notable ones being news, documentaries and books. Friends and family, and work has the least result which is 1.

How familiar are you with the concept of environmental conservation?

21 responses

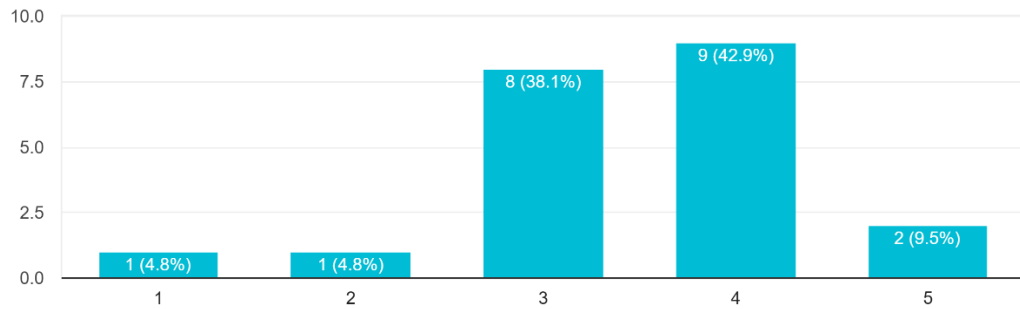


Figure 3.5 How familiar are you with the concept of environmental conservation?

Figure 3.5 shows a linear scale form question that is used to rate the question according to the participant perception. The rating of one indicates that respondents are very unfamiliar, while the rating of five indicates strong familiarity. Based on the figure, most respondents rated three and four. This shows that the respondents are somewhat familiar with the concept of environmental conservation.

Which of the following environmental issues are you aware of? (Select all that apply)

21 responses

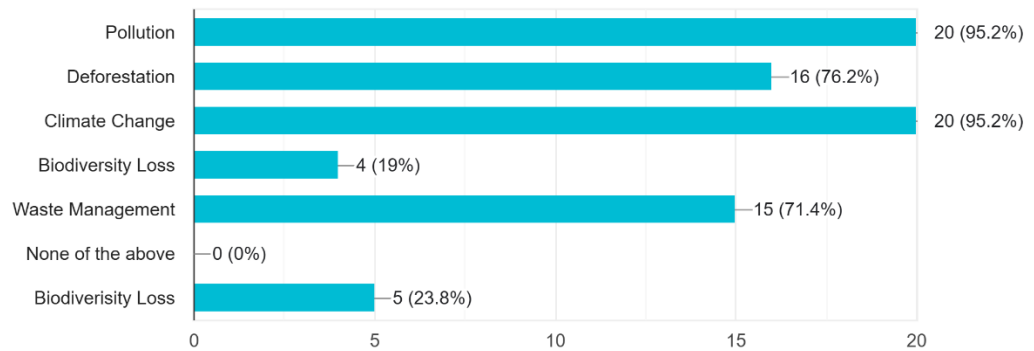


Figure 3.6 Which of the following environmental issues are you aware of?

Figure 3.6 shows the types of environmental issues that the respondents are aware of. From this, we can see that pollution and climate change scores the most with the score of 20. Despite this, all the environmental issues listed has been selected at least once, which shows some level of knowledge regarding environmental issues.

Have you ever participated in activities that promote environmental conservation?

21 responses

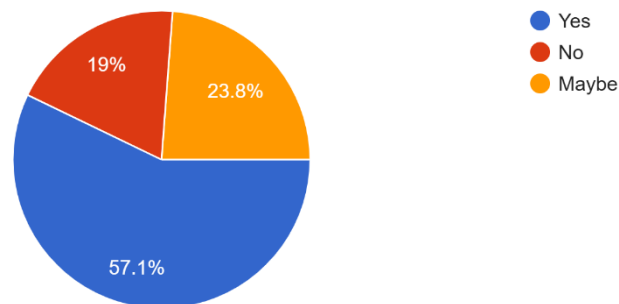


Figure 3.7 Have you ever participated in activities that promote environmental conservation?

From figure 3.7, we can see that that 57.1% or 12 respondents has ever participated in activities that promote environmental conservation. 23.8% of respondents or 5 respondents may have participated in activities. The other 19% or 4 respondents has never participated in one.

How do you learn about environmental issues or conservation efforts? (Select all that apply)

21 responses

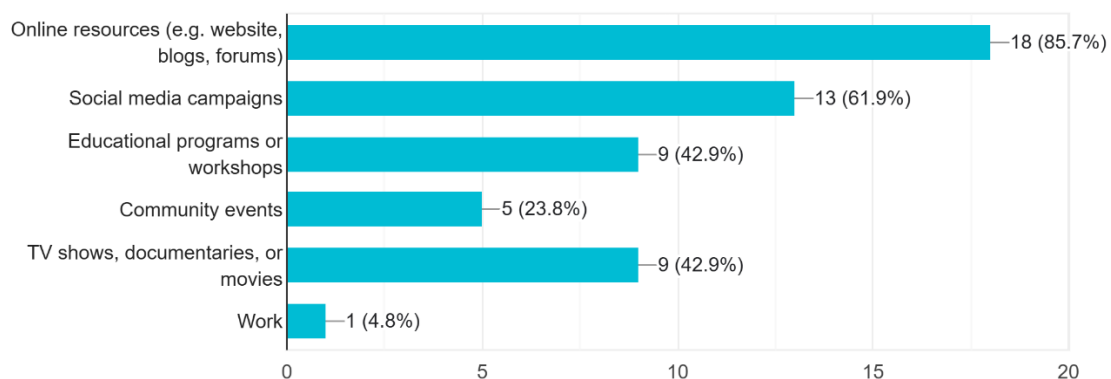


Figure 3.8 How do you learn about environmental issues or conservation efforts?

From figure 3.8, online resources, social media campaigns, educations programs or workshops, and TV shows, documentaries or movies are where participants mostly learn about environmental issues or conservation efforts. The game project will give participants exposure to the environmental issues or conservation effort via these methods for more immersion.

How important do you think it is to address environmental issues?

21 responses

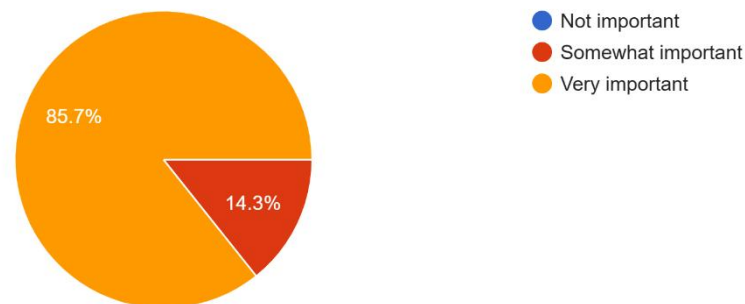


Figure 3.9 How important do you think it is to address environmental issues?

Figure 3.9 shows that 85.7% of the participant sees that addressing environmental issues is very important as it can instil values of conservation within the player. The remaining 14.3% of the respondents sees it as somewhat important.

Have you ever played a story-driven RPG game before?

21 responses

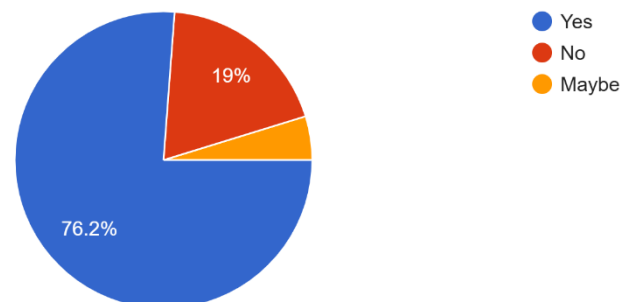


Figure 3.10 Have you ever played a story-driven RPG game before?

From the figure 3.10 above, 76.2% of respondents have played a story-driven RPG game, compared to 19% that has not, with the remaining 4% being maybe. This shows that most players are familiar with the type of game the project aims to be.

Which story-driven RPG games have you played, or heard of before? (Select all that apply)

21 responses

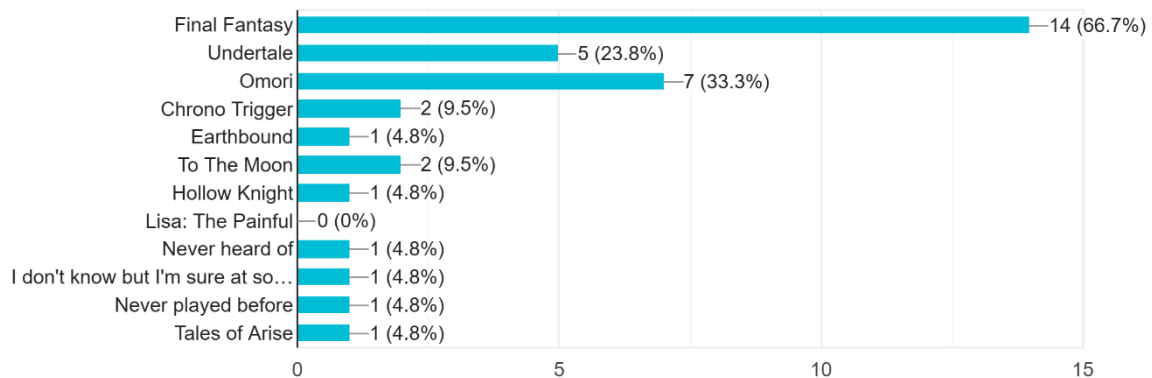


Figure 3.11 Which story-driven RPG games have you played, or heard of before?

Figure 3.11 shows a chart that asks respondents regarding their familiarity with story-driven RPG games. Among the 21 respondents, Final Fantasy is picked as the most recognized game with 66.7% or 14 respondents heard or played it. Omori and Undertale are the other two notable games from this chart, while Lisa: The Painful received no votes. This shows that there is general awareness of RPG games, mainly with those with strong narratives. Incorporating elements from popular games by their engaged storytelling can resonate with the target audience.

What do you enjoy the most about story-driven RPGs?

21 responses

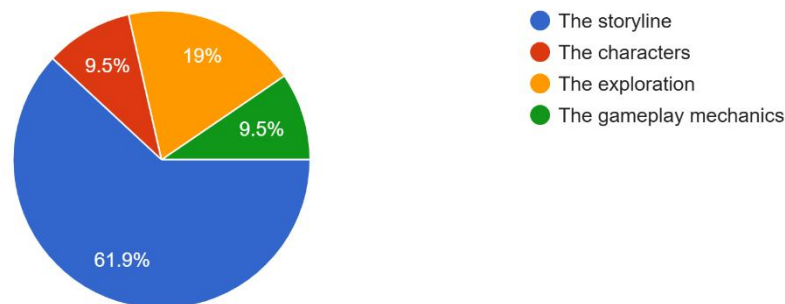


Figure 3.12 What do you enjoy the most about story-driven RPGs?

Figure 3.12 shows a pie chart regarding what aspect the respondent enjoy the most in story-driven RPGs, with 61.9% of participants choosing the storyline as the most enjoyable aspect. These results highlight that an engaging storyline is the key factor in attracting players to try story-driven RPGs. This shows the importance of a compelling narrative for the game. Exploration is also significant with 19%, which suggests that the game should include immersive environments to enhance user engagement and experience.

How often do you play story-driven RPGs?

21 responses

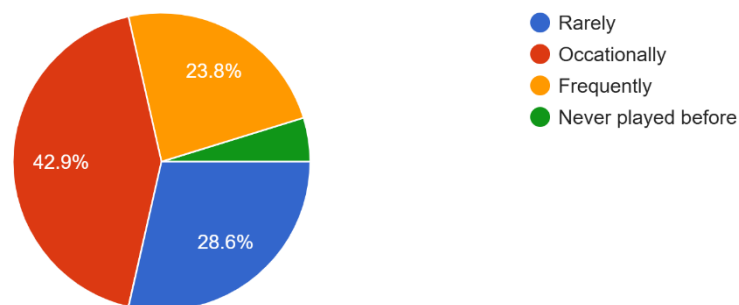


Figure 3.13 How often do you play story-driven RPGs?

From this pie chart above, we can see that most respondents play occasionally, making up 42.9% of the pie chart. 28.6% of respondents play rarely, 23.8% of respondents play frequently while the remaining 4.8% of respondents never played before. This highlights that the game should be designed to appeal both casual and frequent players.

Would you be interested in a story-driven RPG that focuses on environmental themes?

21 responses

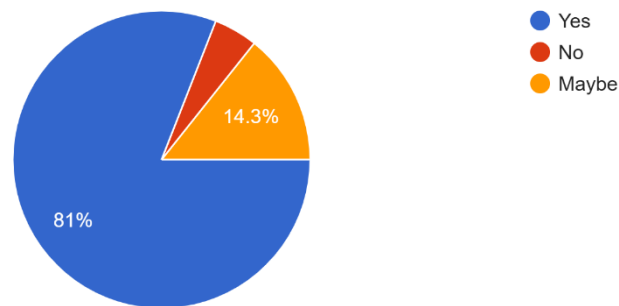


Figure 3.14 Would you be interested in a story-driven RPG that focuses on environmental themes?

Figure 3.14 above shows that 81% of respondents showed interest in a story-driven RPG that focus on environmental themes, with the remaining 14.3% and 4.7% of respondents leaning on maybe and no. This positive response shows strong support for the game project's proposed title and theme and aligns with the target audience's preferences. Furthermore, this encourages incorporating environmental challenges and solutions into the storyline.

Which environmental topics would you like to see addressed in a game? (Select all that apply)

21 responses

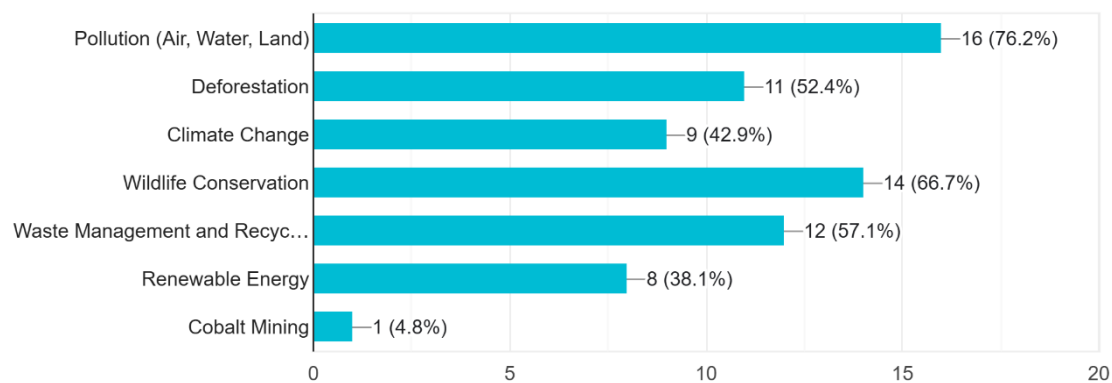


Figure 3.15 Which environmental topics would you like to see addressed in a game?

The figure above shows a bar chart that highlights topics participants would like to see addressed in a game. This shows that the game should focus on addressing pollution, wildlife conservation, and waste management as these can enhance engagement and educational impact.

What platform do you prefer playing videogames on?

21 responses

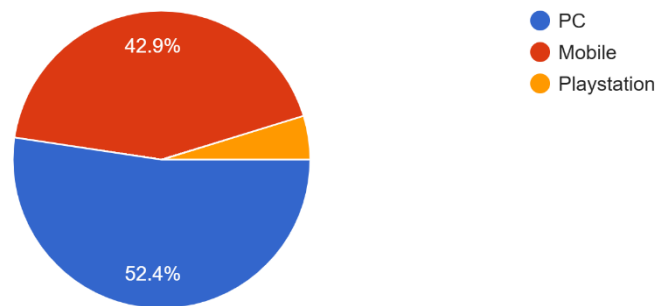


Figure 3.16 What platform do you prefer playing videogames on?

Based on the pie chart above, 52.4% of respondents prefer playing videogames on portable computer (PC) as compared to playing on mobile and Playstation. Therefore, the game will be built to be played on PC.

What type of gameplay mechanics do you enjoy most in RPG games? (Select all that apply)

21 responses

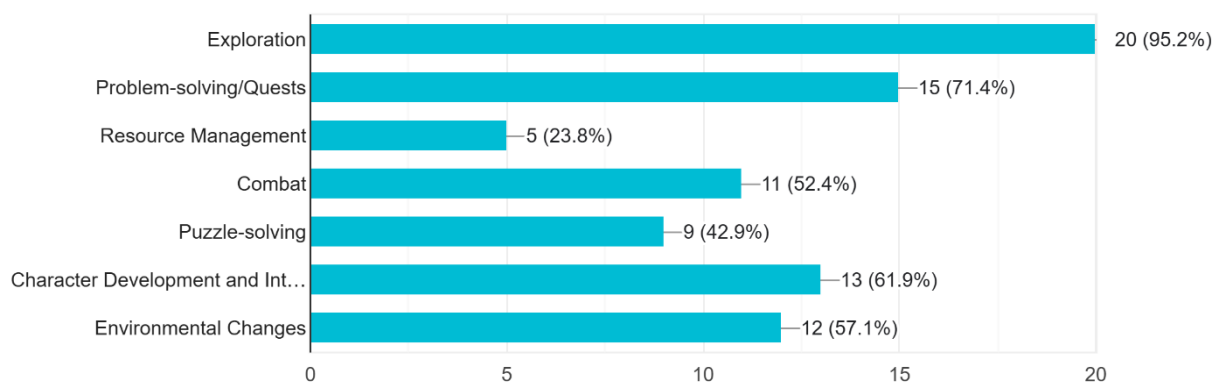


Figure 3.17 What type of gameplay mechanics do you enjoy most in RPG games?

This bar chart shown in figure 3-17 shows the respondent's favourite gameplay mechanics in RPGs. The most popular mechanic is Exploration with 20 respondents choosing it. This shows the critical role exploration has in engaging players. Furthermore, these findings show and stresses the importance of having rich exploration opportunities and well-designed quest to capture the player's interest.

How important is it for a game to teach players real-world lessons?

21 responses

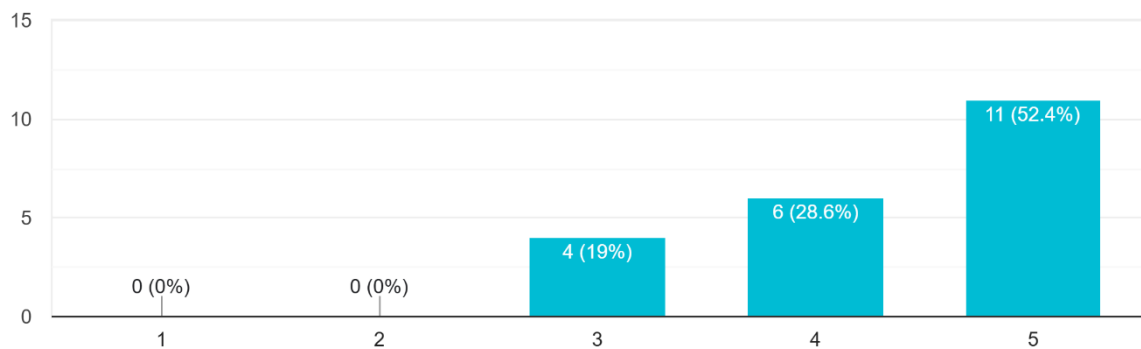


Figure 3.18 How important is it for a game to teach players real-world lessons?

Figure 3.18 shows a linear scale form asking respondents on how important it is for a game to teach real-world lessons. From the figure above, the rating ranges from 3-5, with a high number of respondents giving it a 5. This shows that it is very important for a game to teach players real-world lessons as it can make an impact with their lives.

Would you prefer a game where your choices affect the environment in real time (e.g. trees on a map grows after replantation)

21 responses

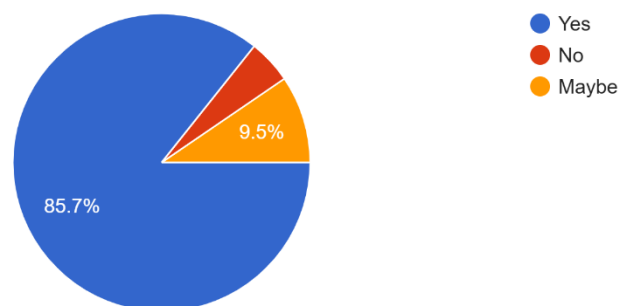


Figure 3.19 Would you prefer a game where your choices affect the environment in real time?

From the pie chart above, it shows that a huge majority of respondents prefer a game where the choices made affects the environment in real time. This highlights that having a choice that show changes in the game map can give players a sense of success and rewarding.

What type of narrative would you prefer for a game about environmental conservation?

21 responses



Figure 3.20 What type of narrative would you prefer for a game about environmental conservation?

From figure 3.20 above, it shows the respondent's preferences for the narrative style in a game regarding environmental conservation. Nearly half of the respondents favoured a mix of both serious informative narrative and a light-hearted adventure-driven story. This highlights the importance of having a story that is both engaging and educational, blending different narrative tones to engage with a wider audience.

What would motivate you to play a game focused on environmental conservation? (Open-ended)

15 responses

Emotional elements that could hit deep into the player's feelings and psyche

good visuals and combat mechanics

A game where the decisions I make affect the environment.

The knowledge I gain from the game and the game mechanics.

Story plot.

Depends on how enjoyable the game for me.

If I could play with other players

RPG

Curiosity on how well a game incorporate the aspect of environmental conservation into their game.

Figure 3.21 What would motivate you to play a game focused on environmental conservation? (Open-ended)

Figure 3.21 is an open-ended question to respondents regarding their motivations for playing a game centered on environmental conservation. These insights highlight the importance of balancing entertainment, education, and interactive storytelling to create a compelling 2D story-driven RPG game experience that successfully engages players while also promoting environmental awareness.

3.3.2 Functional Requirements

From the survey above, we can create functional requirements based on the respondent's feedback. These requirements consist of:

1. A narrative system where the player's choice influences the storyline and environmental outcomes.
2. Environmental interaction system where the player must be able to interact with in-game elements such as NPCs, planting trees or protecting wildlife that results in visible environmental changes.
3. Quest and task system that consists of quest-based mechanics for players to solve environmental challenges through decision-making and actions.
4. Exploration mechanics that allows for free movement in a designed environment, which enables players to explore different areas for quest or resources.
5. Player decision impact system that tracks player decisions and applies consequences to the environment, NPC interactions, and story progression.
6. The game must have at least three different environmental visual state that is based on the player's actions.

3.3.2 Non-Functional Requirements

In addition to functional requirements, non-functional requirements can also be created in focusing the game's overall quality and performance. These requirements include:

1. The game interface should allow the players to navigate the menus and controls with minimal guidance with the UI elements having a response time of less than 1 seconds when clicked.
2. Performance efficiency where the game should have and maintain a minimum frame rate of 30 frames per second on a system that meets the minimum hardware requirements, while also having loading screen not exceeding 10 seconds when switching to other areas or maps.
3. Platform compatibility for the game to the tested-on PC to ensure smooth performance and compatibility with standard system requirements.

3.3.4 Software Requirements

The software used in this project is RPG Maker MV. It is a game development engine that is specifically designed in creating 2D role-playing games, better known as 2D RPG game. The software is user-friendly, with the ability to export the game in multiple types of platforms. Since the 2D story-driven game focuses on narrative, with the environmental themes and player choice, RPG Maker MV is a great choice as it has an event system with scripting capabilities.

Another software that will be used in this project is Aseprite. Aseprite is a tool dedicated in creating pixel art and animation. It's simplicity in creating sprites and animations makes it a good choice in making a pixel-based or retro art style. This can allow for custom character creation as well as environmental tiles to create a more desirable setting for the game.

3.3.5 Hardware Requirements

The game project will be developed and played in a computer or similar devices. Thus, for the game to be run smoothly, the computer must have these minimum requirements that includes the following:

Component	Minimum Requirement
Operating System	Windows 7/8/8.1/10 (32-bit or 64-bit) or Mac OS X 10.10 or later
Processor	Intel Core 2 duo or equivalent (2.0 GHz or higher)
Memory (RAM)	2 GB
Graphics	DirectX 9/OpenGL 4.1 capable GPU
Storage	At least 500 MB of free disk space
Display Resolution	Minimum 1024 x 768

Table 3.1 Hardware Requirements

3.4 Design

In this section, the storyboard and the storytelling of the project will be discussed, as well as the game mechanics that will be implemented in the project. The storyboard, storytelling and game mechanics reviewed will be based on the survey from earlier.

3.4.1 Storyboarding and Storytelling

The game's storyline is story-driven with a role-playing game (RPG) style which focuses on environmental conservation. It follows the main character's journey as they become aware of the environmental degradation and take action to restore balance. The story progresses through player choices, quests, and interactions with non-playable characters (NPCs), which can lead to different outcomes.

The game begins with the main character in their hometown, a once lush environment now suffering from pollution, deforestation and wildlife decline. The player is introduced to basic gameplay mechanics through an opening scenario, where they are able to explore their surroundings. Witnessing an event occurring that is related from pollution, the character is then determined to seek knowledge from elderly NPCs, learning about the past and how the environment used to be.

This sparks the main character to do tasks, cleaning a polluted area or planting a tree, as a way to introduce the game mechanics. The tasks can be obtained by interacting with NPCs, which also can give them conservation ideas and items in return. This sparks a realization to the player, showing that their action can lead to change.

The player then sets off on an adventure beyond their hometown, travelling through different areas with different environmental crisis. They may meet NPCs that gives perspective to the scenario.

Depending on the player's efforts to overcoming the environmental crisis and putting up conservation efforts, the game reflects this by showing a greener area. This shows the efforts made by the player to achieve a greener world, affecting other NPCs and wildlife as well.

3.4.2 Game Mechanics

1. Role-Playing Game (RPG) Style Interface

The video game will implement a role-playing game (RPG) style interface. This allows the player to explore the world freely, interacting with non-playable characters (NPCs) and objects. The player can accept quests from the NPC and gain valuable rewards in return.

2. Inventory System

An inventory system will be implemented in the project, which allows players to store items that they obtained from quests or interacting with in-game objects. Players can also obtain items from interacting with NPCs and even read the description of obtained items.

3. Quest System

The project will have a quest system, which tasks players with a main or side quests. The main quests will continue the main story of the game project, while side quests can be taken and completed for extra rewards. The quests can be accepted either when the player interacts with an NPC, or when reaching a certain area.

4. Combat System

The project will implement a combat system as well. During the player's adventures around the world, they may encounter enemies that disrupts the environment. This enemies range from polluters that pollute the natural areas by dumping waste, to poachers that hunts wildlife for profit. Defeating these enemies helps in protecting endangered animals and reclaim polluted areas.

5. Reward System

The game project will have a rewards system that is designed to give satisfaction to player engagement and aligns with the theme of environmental conservation. This system functions upon every completed quests and player actions, which includes functional rewards to continue the game progression, visual and aesthetic rewards where the map gets progressively cleaner and greener with each successful quests and correct options to show the player's impact towards the game area, and narrative rewards with the game having a good and bad ending, depending on the functional rewards, or key items, obtained.

3.5 Wireframes

3.5.1 Main Menu



Figure 3.22 Main Menu

Figure 25 shows the layout for the screen menu, which consists of new game, continue, and settings button where players can adjust the volume of the game. The continue button is only clickable if the player has a save made on the game throughout their gameplay.

3.5.2 Dialogue

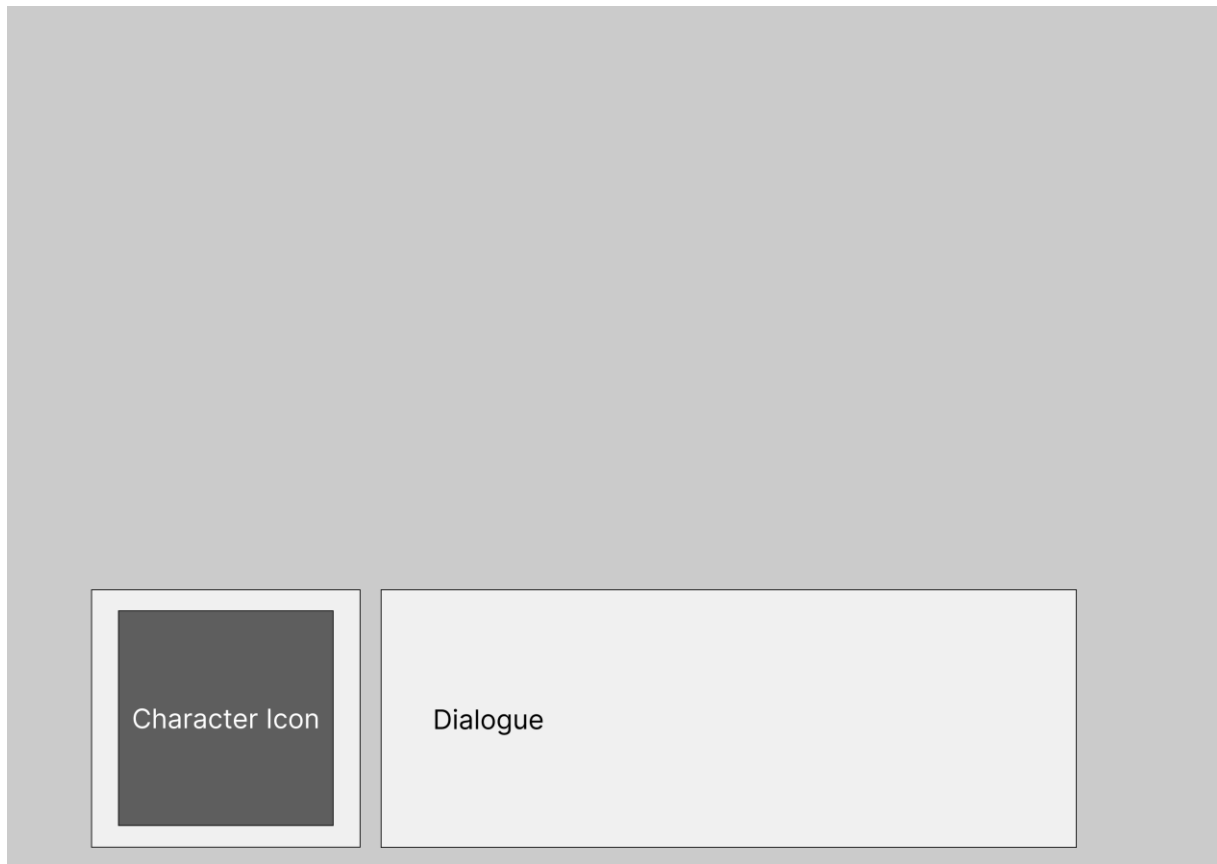


Figure 3.23 Dialogue

Figure 26 shows the Dialogue section, which can be shown whenever the player interacts with an NPC or an object. This is used to give details or clarity to the player regarding the item or situation at hand. The left side shows the character icon of NPCs or the main character, while the right side shows the dialogue spoken by the characters.

3.5.3 Settings



Figure 3.24 Settings

Figure 27 shows the settings shown when pressing the settings button on the main menu. The settings consist of 5 toggleable settings, which can be enabled or disabled based on the user's preferences. A back button is visible on the top right of the screen, should the user want to go back to the main menu.

3.5.4 Inventory

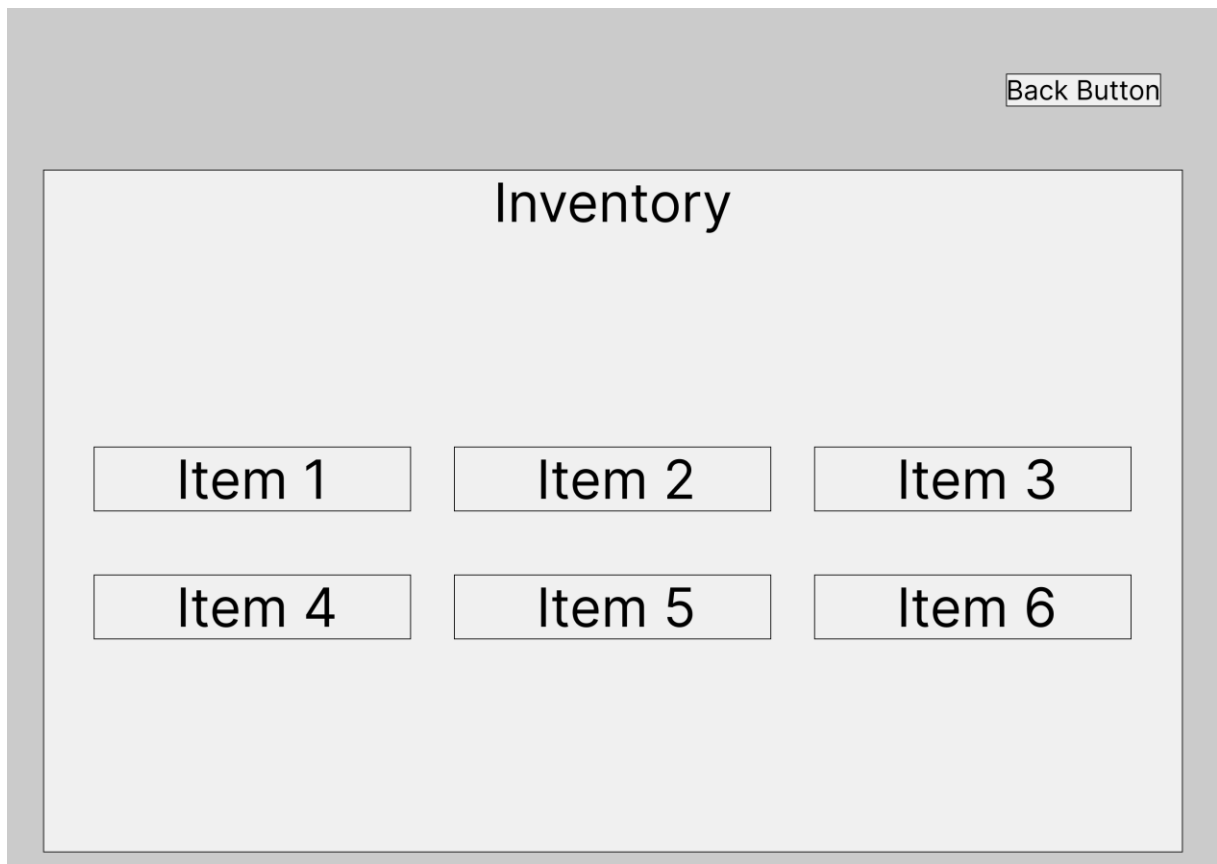


Figure 3.25 Inventory

Figure 28 shows the inventory section, where items collected from the game displayed as items 1 to 6, are shown. Players can view the collected item, with some having descriptions of it. Similar to the settings section, it has a back button as well.

3.5.5 Combat



Figure 3.26 Combat

Figure 29 is the combat layout when facing enemies. The character icon is displayed on the left, while the actions are displayed on the right side of the character icon. In the middle of the screen is the enemy sprite.

3.6 Use Case Diagram

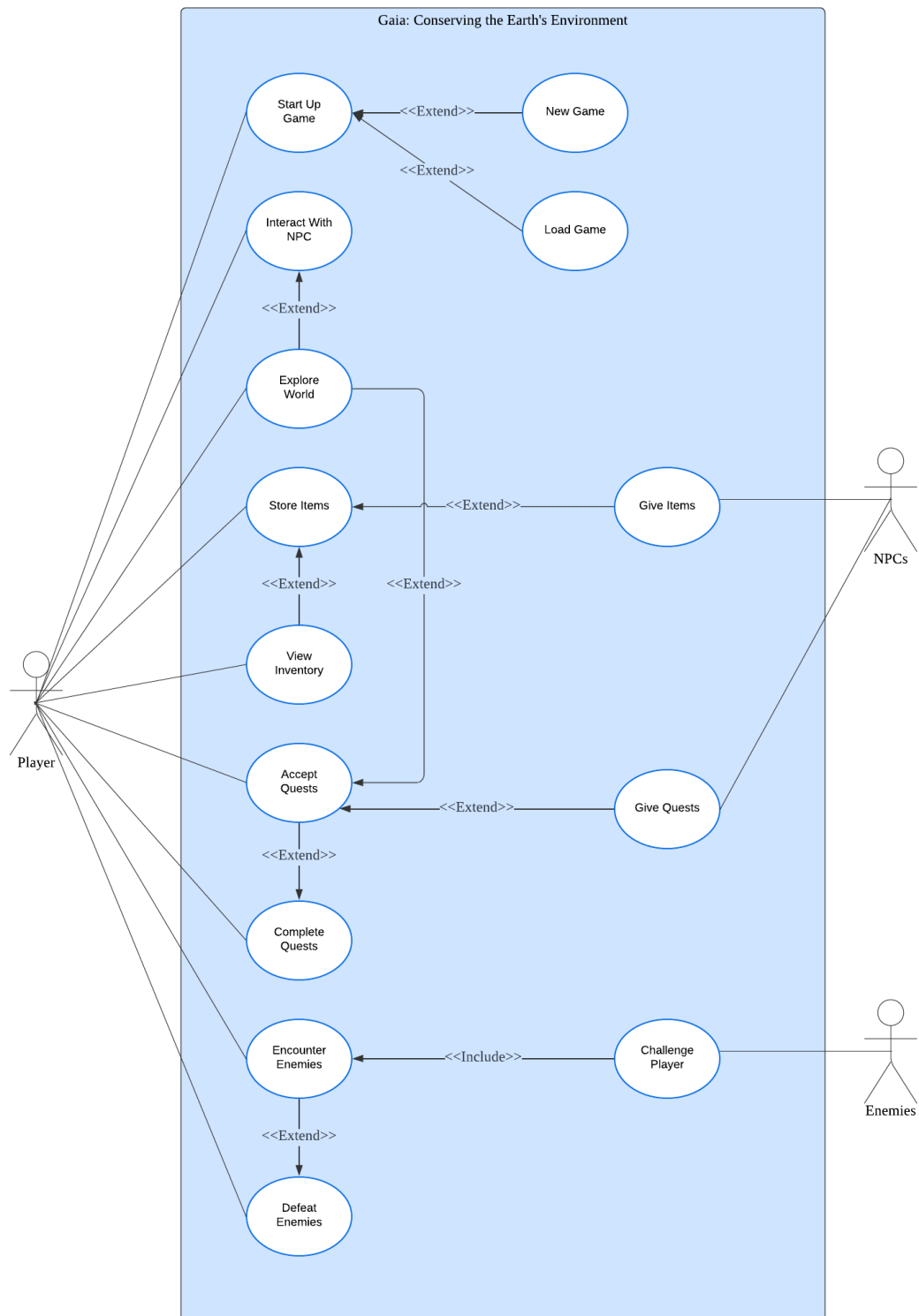


Figure 3.27 Use Case Diagram

3.6.1 Player Use Cases

3.6.1.1 Start Up Game

Actors: Player

Goal: For players to start up the game and choose to either start a new game or load a saved game.

Preconditions:

1. The game must be installed and runnable.
2. The player's device must meet the minimum system requirements to run the game.

Postconditions: The player is loaded up to the main menu, with the option to start or load a game.

Main Flow:

1. The player starts up the game.
2. The game initializes the game engine and the resources
3. The game displays the main menu options, which is new game, load game, settings, and exit.
4. The player selects a new game that starts the game from the beginning, or load game that loads the most recent or selected save file.

Alternate Flow: The load game option is disabled when there is no saved game available.

Exceptions: If the game fails to load, it will display an error message and then sends the player back to the main menu.

Relationships: Extends new game and load game.

3.6.1.2 Interact With NPC

Actors: Player, and NPC as supporting actor

Goal: Allow the players to interact with NPCs in the game to obtain information and accept quests.

Preconditions:

1. The player must be near or beside an NPC.
2. The NPC must be interactable.

Postconditions:

1. The player can receive a quest or reward.
2. The player gains dialogue or story progression.

Main Flow:

1. The player approaches an NPC in the map.
2. The system detects the player's distance from the NPC
3. The player interacts with the NPC.
4. The system detects and retrieves the player's interaction input at the NPC.
5. The system displays the dialogue by the NPC and the player.

Alternate Flow: None.

Exceptions: None.

Relationships: Extends explore world.

3.6.1.3 Explore World

Actors: Player, and NPC and enemies as supporting actor

Goal: Allows the player to freely navigate the game world, while obtaining quests and items.

Preconditions:

1. The game has booted up, with the player in control of the character.
2. The player's path is not blocked by barriers.

Postconditions:

1. The player has interacted with NPC.
2. Obtained quests.
3. Encounter enemies.
4. Obtain items.

Main Flow:

1. The player inputs movement commands to move the character.
2. The system receives and updates the player's position in the map.

Alternate Flow: If a player reached a locked area, a text will be displayed.

Exceptions: None.

Relationships: Extends with interact with NPC, accept quests, encounter enemies.

3.6.1.4 Store Items

Actors: Player

Goal: The player can store collected items in the inventory.

Preconditions:

1. The game has been booted up.
2. The item must be obtained by the player.

Postconditions:

1. The player is able to use the item at any time.

Main Flow:

1. The player interacts with an NPC or object.
2. The system detects and process the player's interaction.
3. The system determines the outcome of the interaction.
4. The system checks if the player has enough space in their inventory.
5. The system adds the received item in the player's inventory.

Alternate Flow: When the inventory is full, a text will display to the user that informs that the inventory is full.

Exceptions: The player is locked behind a cutscene.

Relationships: View inventory is extended to store item.

3.6.1.5 View Inventory

Actors: Player

Goal: The player can view their inventory to look at obtained items.

Preconditions:

1. The game is booted up.
2. The player can control the player.

Postconditions:

1. The player can view collected items.
2. The player can interact with the item to read their description.

Main Flow:

1. The player goes to the settings menu.
2. The system displays the settings menu.
3. The player selects the inventory section.
4. The system retrieves the contents of the player's inventory data.
5. The system displays the inventory screen to the player.
6. The player selects an item in the inventory.
7. The system displays the description of the item.

Alternate Flow: None.

Exceptions: The player is locked behind a cutscene.

Relationships: Extends store item.

3.6.1.6 Accept Quests

Actors: Player, and NPC as supporting actor

Goal: The player accepts quests from an NPC

Preconditions:

1. The player must be near an NPC
2. The player interacts with the NPC

Postconditions: The player obtains a quest

Main Flow:

1. The player walks to an NPC that has a quest.
2. The player then interacts with the NPC.
3. The system detects the player's interaction input.
4. The system starts a dialogue cutscene between the player and the NPC.
5. The system then adds the details of the quest to the player.

Alternate Flow: If the NPC is a normal NPC, no quests will be given.

Exceptions: None.

Relationships: Extends to complete quests.

3.6.1.7 Complete Quests

Actors: Player

Goal: The player has completed a quest obtained from an NPC

Preconditions:

1. The player must have accepted a quest.
2. The player has completed all the quest requirements.

Postconditions:

1. The player can progress the story.
2. The environmental issue is solved.
3. The player receives a reward.

Main Flow:

1. The player successfully finishes the quest.
2. The system detects that the player has fulfilled the quest.
3. The player then goes to the NPC that gives the quest.
4. The player interacts with the NPC.
5. The system checks if the player completes the quest.
6. The quest is marked complete, and the player receives reward.

Alternate Flow: The player does not complete the quest task, thus preventing from quest completion.

Exceptions: The player does not complete prerequisite requirements, thus is unable to accept the quest.

Relationships: Accept quest is extended to complete quests.

3.6.1.8 Encounter Enemies

Actors: Player, enemies

Goal: The player encounters the enemies throughout their journey.

Preconditions:

1. The player must be controlling the character.
2. The player must be within the area of where the enemy can be encountered.

Postconditions: The player can engage with the enemy into combat.

Main Flow:

1. The player explores the place by controlling the character.
2. The system processes the player's movement input.
3. The system does a random encounter check based on fixed probabilities.
4. If the encounter is triggered, the system transitions the player to a battle with an enemy or multiple enemies.

Alternate Flow: The enemy acts as an NPC.

Exceptions: The player must be in an area where the enemy cannot be encountered like in a city.

Relationships: Extends to defeat enemies

3.6.1.9 Defeat Enemies

Actors: Player, enemies

Goal: The player engages into combat with the enemies.

Preconditions:

1. The player is able to move the character
2. The player encounters an enemy

Postconditions: The player receives a reward in defeating the enemy.

Main Flow:

1. The player does an action during combat.
2. The system processes the player's combat actions
3. The system updates the game state based on the player's actions.
4. The system updates the game state based on the enemy's actions.
5. The system determines the reward when defeating the enemies.

Alternate Flow: The player retreats from the battle, avoiding the battle and not receiving any rewards.

Exceptions: The player is in an area where enemies cannot spawn.

Relationships: Encounter enemies is extended to defeat enemies.

3.6.2 NPC Use Case

3.6.2.1 Give Items

Actors: NPC, with player as supporting actor

Goal: Allow NPCs to provide items to the player during an interaction.

Preconditions:

1. The NPC has an item to give to the player from player interaction or quest completion.
2. The player has enough space in their inventory.

Postconditions:

1. The item is added to the player's inventory.
2. The player can view the item in their inventory.

Main Flow:

1. The player approaches and interacts with the NPC.
2. The system gets the player's interaction.
3. The NPC mentions that they will give the player an item.
4. The system checks the player's inventory to see for extra space.
5. The system adds the item into the player's inventory.

Alternate Flow: If the player's inventory is full, the player will be unable to accept the item.

Exceptions: None

Relationships: Extends player's store item

3.6.2.2 Give Quest

Actors: NPC, with player as supporting actor

Goal: Provides the player with a quest that can give side content or advance the storyline.

Preconditions:

1. The NPC has an available quest to give.
2. The player is near the NPC.

Postconditions:

1. The quest is given to the player.

Main Flow:

1. The NPC has an available quest for the player.
2. The system shows the signal to the player that the NPC has a quest available.
3. The player interacts with the NPC.
4. The system displays the NPC's dialogue to the player
5. The player accepts the quest.

Alternate Flow: If the player declines the quest, the quest is still available to be accepted from the NPC.

Exceptions: If the quest is locked behind story progression.

Relationships: Extends to the player's accept quest.

3.6.3 Enemies Use Case

3.6.3.1 Challenge Player

Actors: Enemies, with player as the supporting actor

Goal: To challenge the player roaming around the area.

Preconditions:

1. The player must be at the enemies spawning area.

Postconditions:

1. The player engages in a battle with the enemy.

Main Flow:

1. The enemy notices the player nearby.
2. The system notifies the enemy of the player's presence.
3. The enemy moves towards the player to engage in combat.
4. The player fights the enemy.

Alternate Flow: The player does not trigger any battle when walking on a tile.

Exceptions: The player is outside of the enemy spawn area.

Relationships: Extends to the player's encounter enemies.

3.7 Summary

The chapter has outlined the design and development process for the 2D-story driven RPG game that focuses on environmental conservation. It covers the methodology used, while also covering the surveys obtained from respondents for the hardware, software, functional and non-functional requirements. The chapter also covers the storyboarding and storytelling of the project, the wireframe of the game project as well as a use-case diagram for the game project. The game project's use case diagram is documented with each actor and use case diagram described in detail.

CHAPTER 4: IMPLEMENTATION

4.1 Introduction

This chapter describes the implementation of the prototype for the proposed project by accomplishing the objectives of the proposed project. The implementation phase is critical to the project as the development of software. The need to modify the project using the software based on the project's goals is important in realizing the project. The 2D, story-driven RPG game titled Gaia: Conserving the Earth's Environment, was developed using two software. The software mentioned are RPG Maker MZ, and Aseprite. A hardware is also used in order to run the game.

4.2 Hardware and Software

Component	Minimum Requirement
Operating System	Windows 7/8/8.1/10 (32-bit or 64-bit) or Mac OS X 10.10 or later
Processor	Intel Core 2 duo or equivalent (2.0 GHz or higher)
Memory (RAM)	2 GB
Graphics	DirectX 9/OpenGL 4.1 capable GPU
Storage	At least 500 MB of free disk space
Display Resolution	Minimum 1024 x 768

Table 4.1 Hardware Requirements

For the software, Aseprite is mainly used to create custom tile sheet and character sheet, allowing for a custom design on the game. The game will be made on RPG Maker MZ, an engine that specialises in creating RPG-based games. It has all the necessary tools and assets needed to create a game. It's easy-to-follow steps allows for a smooth development process.

4.3 Starting The Game Development

The development starts by booting up RPG Maker MZ. Once booted, the mouse cursor is hovered on the file section, which allows the new project to be pressed. When pressed, a pop-up window shows up, where the name of the project, the title, and the save file can be set up.

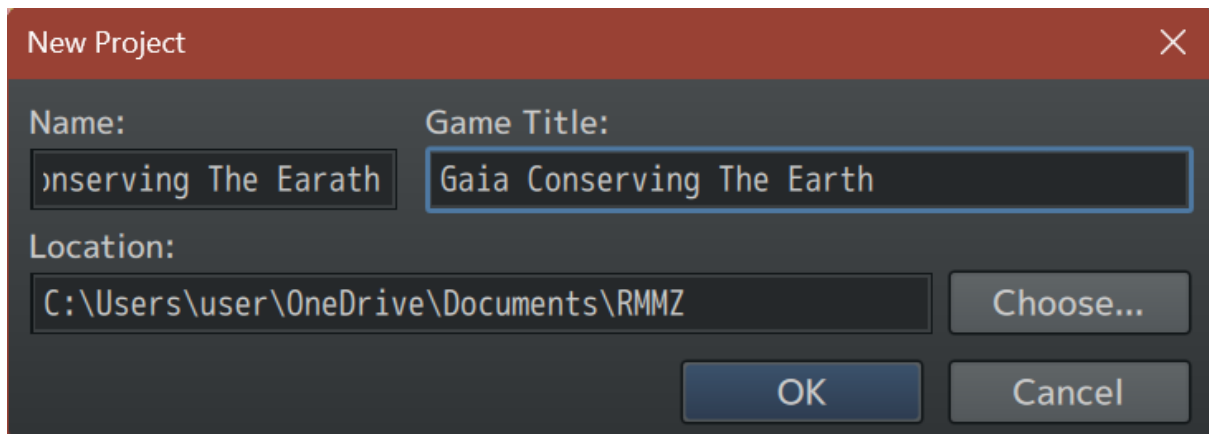


Figure 4.1 Creating a New Project

Once the project has been created, the software presents us a base map with the available tilesheets.

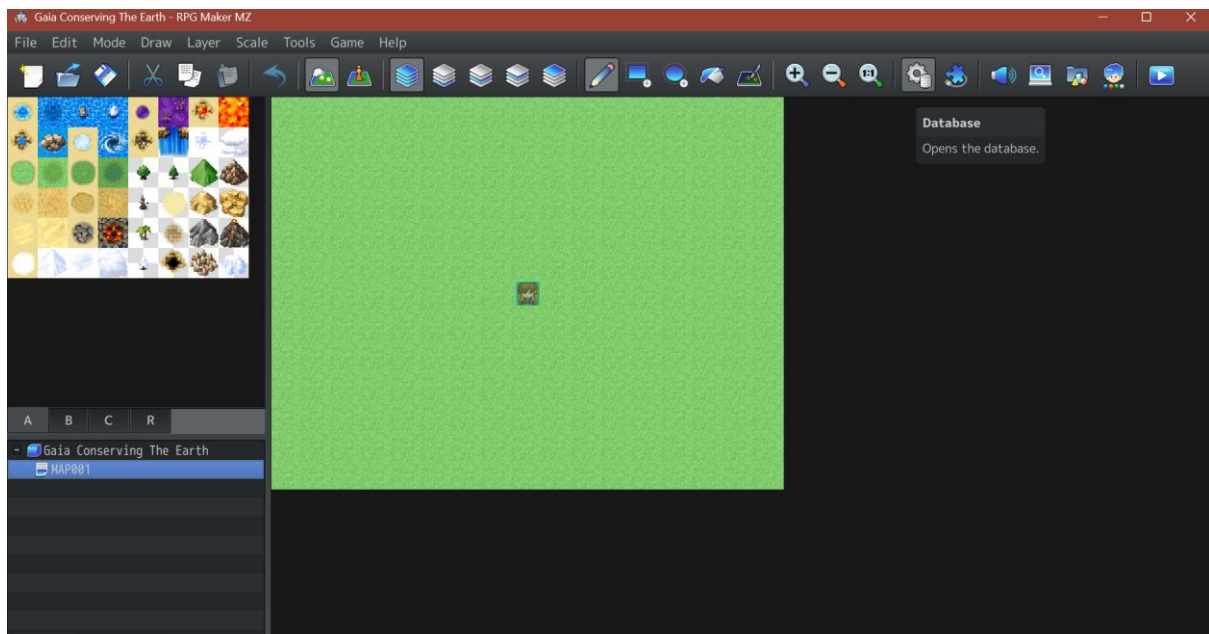


Figure 4.2 Game Project Layout

From the figure above, the base character can be seen on an empty tile sheet map on the screen. On the bottom left is the map within the project, which the project preloads it with MAP001. Above it is the tile sheets to which we can use for our project in designing the map. The tile sheets are categorized as A, B, C, and R. The type of tile sheets used in the project can be altered on the database, denoted on the top left of the screen hovered by the mouse cursor.

4.4 Map Design

Once the project has been created, the project continues its development by designing the map. By selecting the appropriate tile sheets and adding more empty maps to design, the project continues its map development.

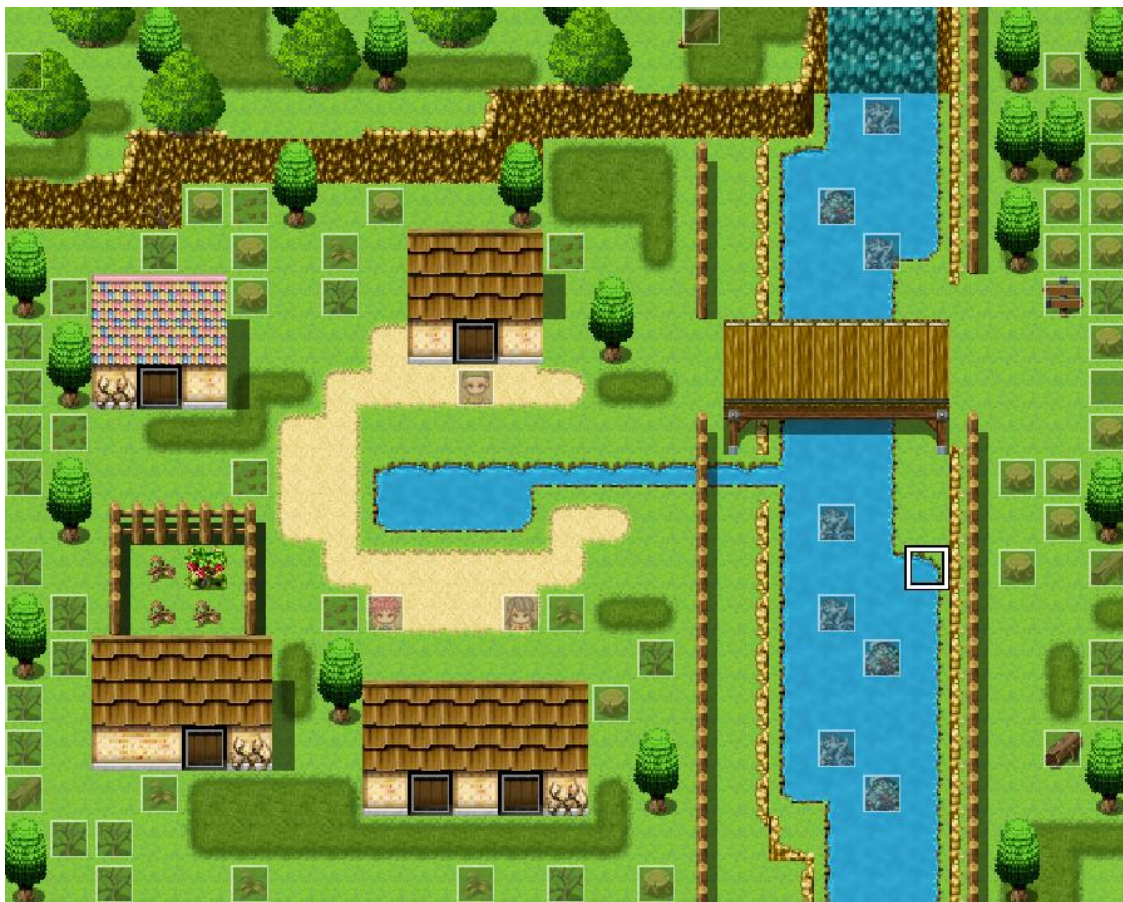


Figure 4.3 First Map Design (Greenville)

The first map design is where the player starts the game. The player, on the left side of the screen, is a player that lives in the map called Greenville. A village once flourished with life; the main character is saddened to see the deteriorating state of the village. Wanting to see a change at the place, the player moves as the main character as he sees the various environmental issues at the area and thinking of solutions to overcome and conserve the nature. The first map heavily emphasizes the damage towards nature with the wilted trees, chopped trees and river filled with litter.



Figure 4.4 Second Map Design (Willow Forest)

The second map design, Willow Forest, starts with the player spawning on the left. From there, it will branch into three different paths, each with its own environmental issues. The player will face issues such as pollution, open burning and deforestation, which the map implies with the example of the trees cut down on the south of the map.



Figure 4.5 Third Map Design (Rush Lake)

On the third map design is the first map where player will encounter environmental issues which highlights the issue of pollution. The map showcases this by the oil barrels scattered around the map, with a small design of wood barks around the map to hint on other environmental issues present in the game. The map includes a house, where an ill NPC houses at the area.



Figure 4.6 Rush Lake House Design

Inside the house is the house of the NPC staying at Rush Lake. To showcase the effect of environmental issue, the house is designed to be in a damaged state, with the NPC resting on the bed to show the effect environmental issue has on people. This house design shows the deuterating state of both the house and the NPC.



Figure 4.7 Fourth Map Design (Misty Hollow)

The next map design named Misty Hollow, plans to tackle on the environmental issue of climate change. The map is spacious, has a few oil barrels around, with the centre being the area of open burning caused by the workers from the organisation, OilCorp. There are also small lakes at the map area, which helps in the minigame dousing off the fire. This map that is also dense with trees can cause urgency and worry when open burning activities goes wrong.

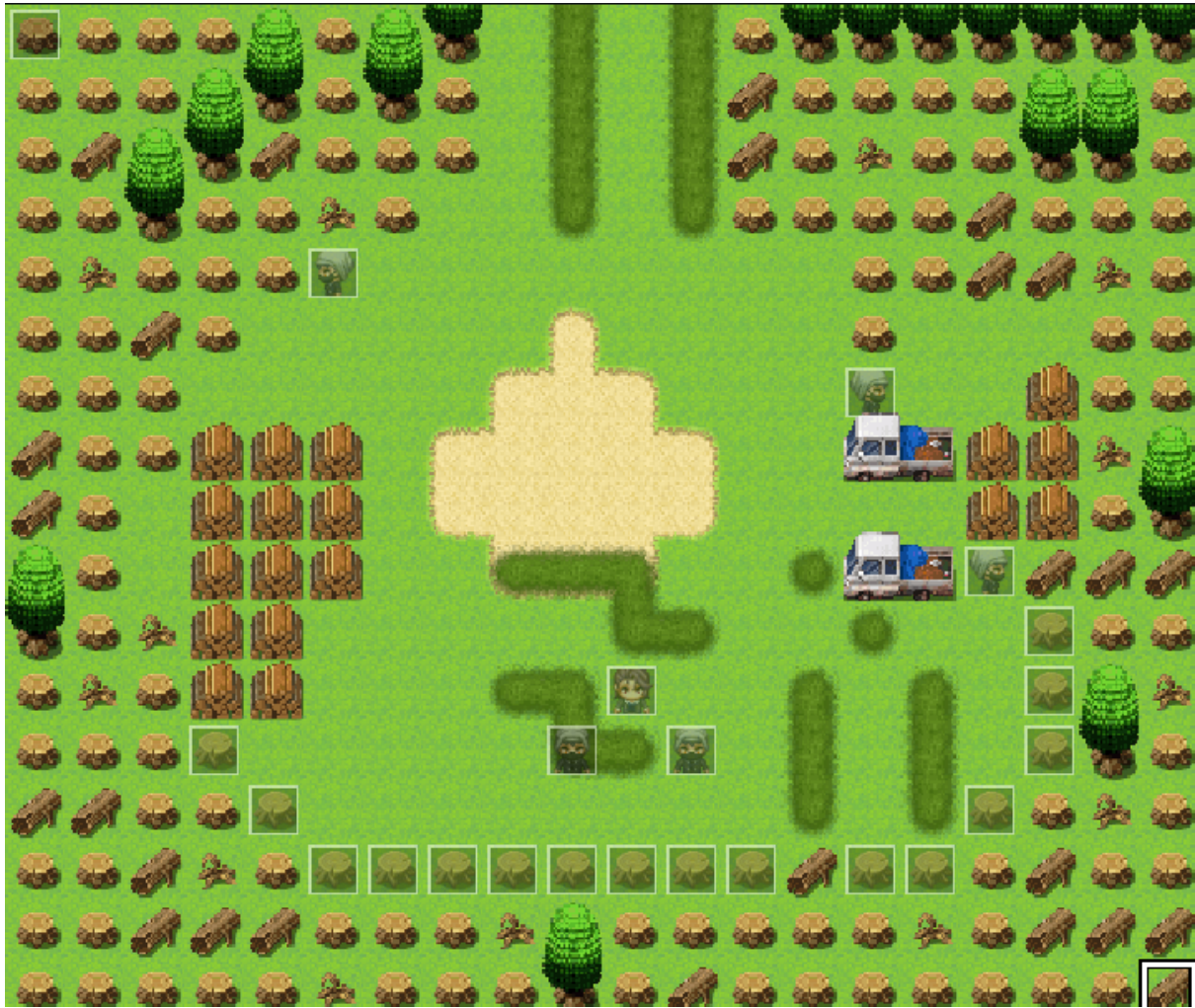


Figure 4.8 Fifth Map Design (Willow Grove)

The fifth map, Willow Grove, is an area filled with dense, lush trees all over. However, illegal logging caused by the company causes most of the lush trees to be logged down. This map emphasizes this by the area covered with tree stumps instead of trees, with a few trees still standing. Darkened grass also shows and hints on vehicles being present at the area. Furthermore, this map explores around the issue of deforestation. This map is also where the last minigame highlighting replanting is played, and the final confrontation with the owner of the company.

4.5 Sprite Design

In the RPG maker MZ, there are specific tiles needed for the game which the software does not have. To overcome this, Aseprite, an engine used to create custom sprites, is used in this project to create custom tiles. To use Aseprite, the software must be downloaded and booted up.

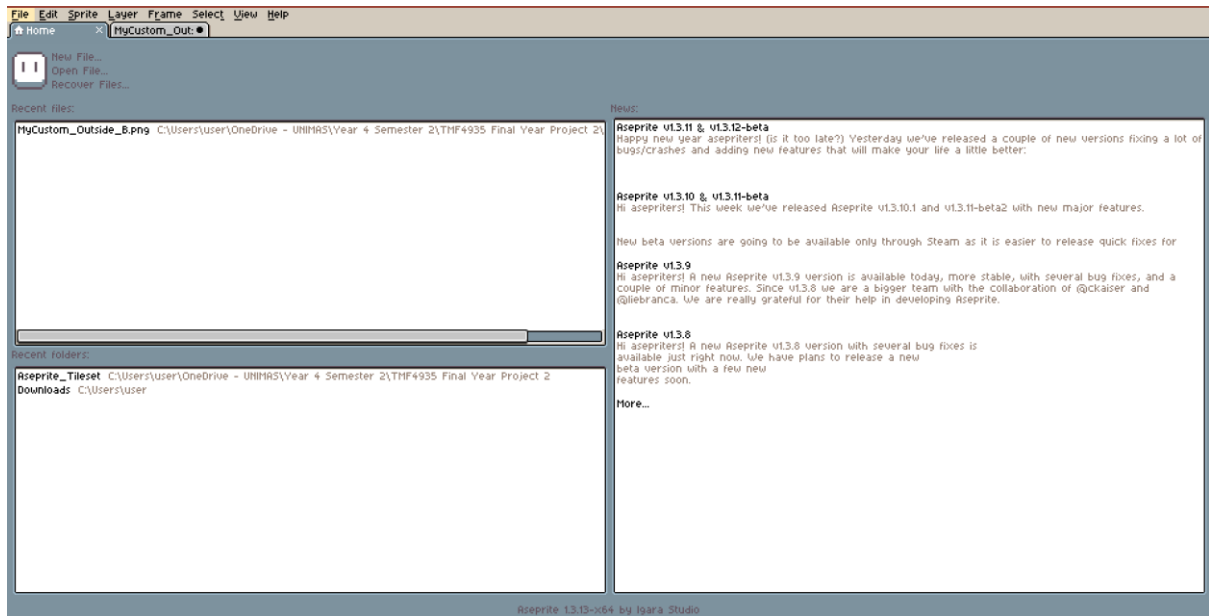


Figure 4.9 Aseprite Boot Up Screen

Once Aseprite is booted up, a tile sheet from the game project is exported over under a new name and is then opened on the Aseprite software. The exported tile sheets are renamed under a new name to avoid errors within the RPG Maker MZ when importing it back.

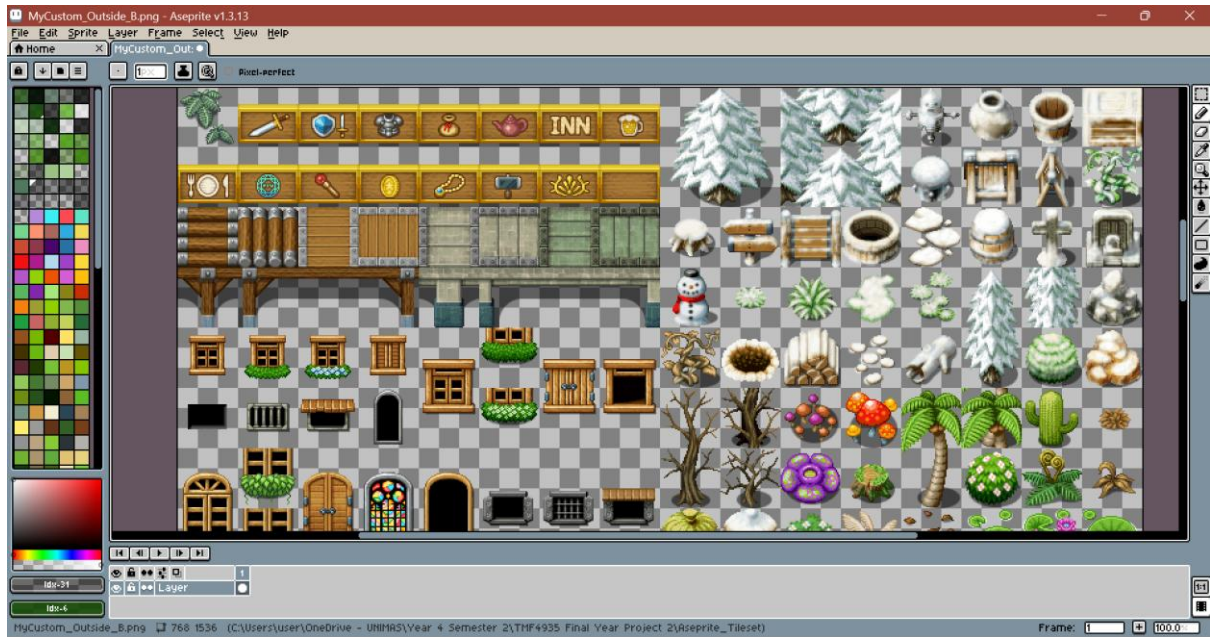


Figure 4.10 Imported Tile Sheet

The tile sheet size is 768 by 768 and increasing it to 768 by 1536 allows for more tiles to be created and added. Each individual tiles have its size of 16 by 16. With the tools Aseprite provides, custom tiles can be created, and it allows the customization of preset tiles as well.

4.6 Character Design

RPG Maker MZ offers a way to design a character, which is by using the character generator function, located at the right side of the top layout with the character icon. This opens the character generator window.

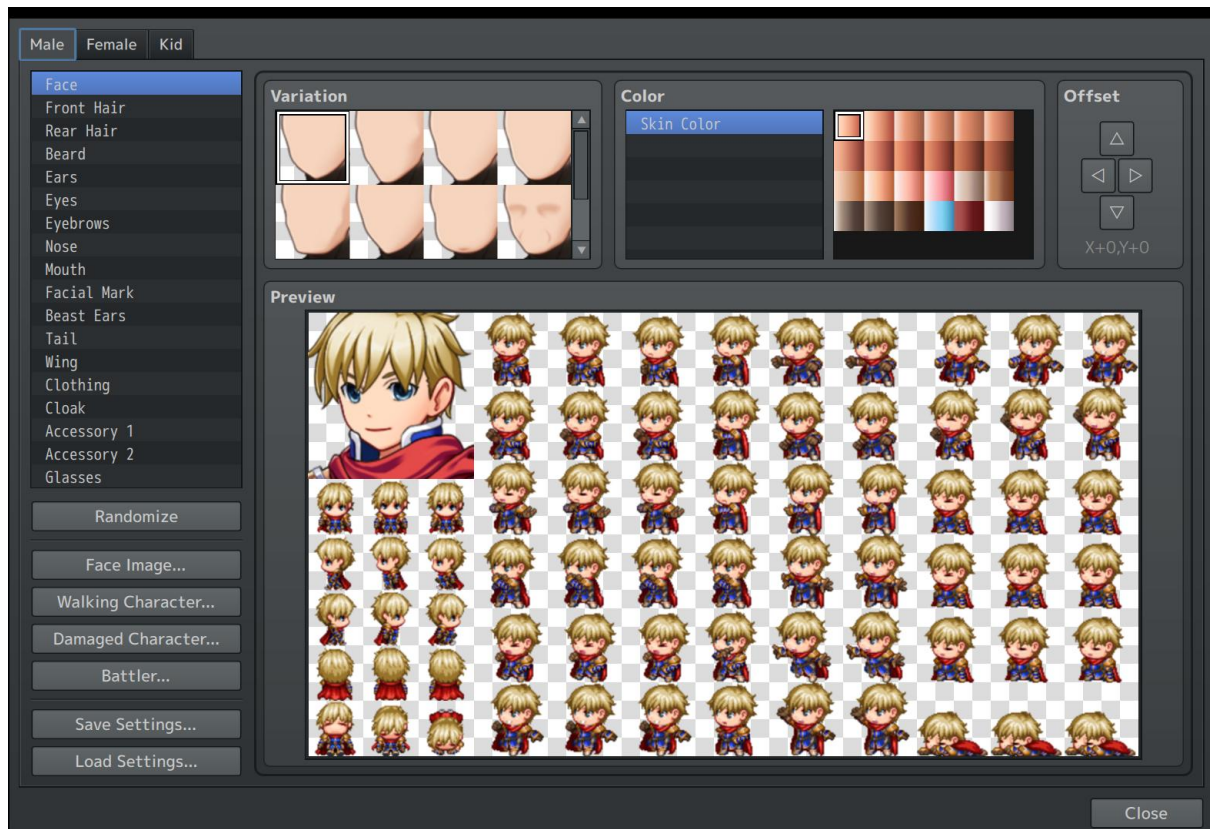


Figure 4.11 Character Generation Window

Figure 41 shows the character generation window. This window is where the characters, whether it being main character or NPC, can be created. It starts by selecting the type of the character in mind, from male, female, to kid. After choosing the type of character, customisation of the character can start, from choosing their facial details to their clothing and accessory. This allows for an endless combination, and to create characters that fits to the design and story. Parts of the customisation such as skin, clothing can also have their colours edited as well.

Once done with the design, the design can be saved by clicking on save settings, where the image generated will be saved on the game project folder. Specific sections such as the face image, walking character, damaged character and battler can be saved individually.

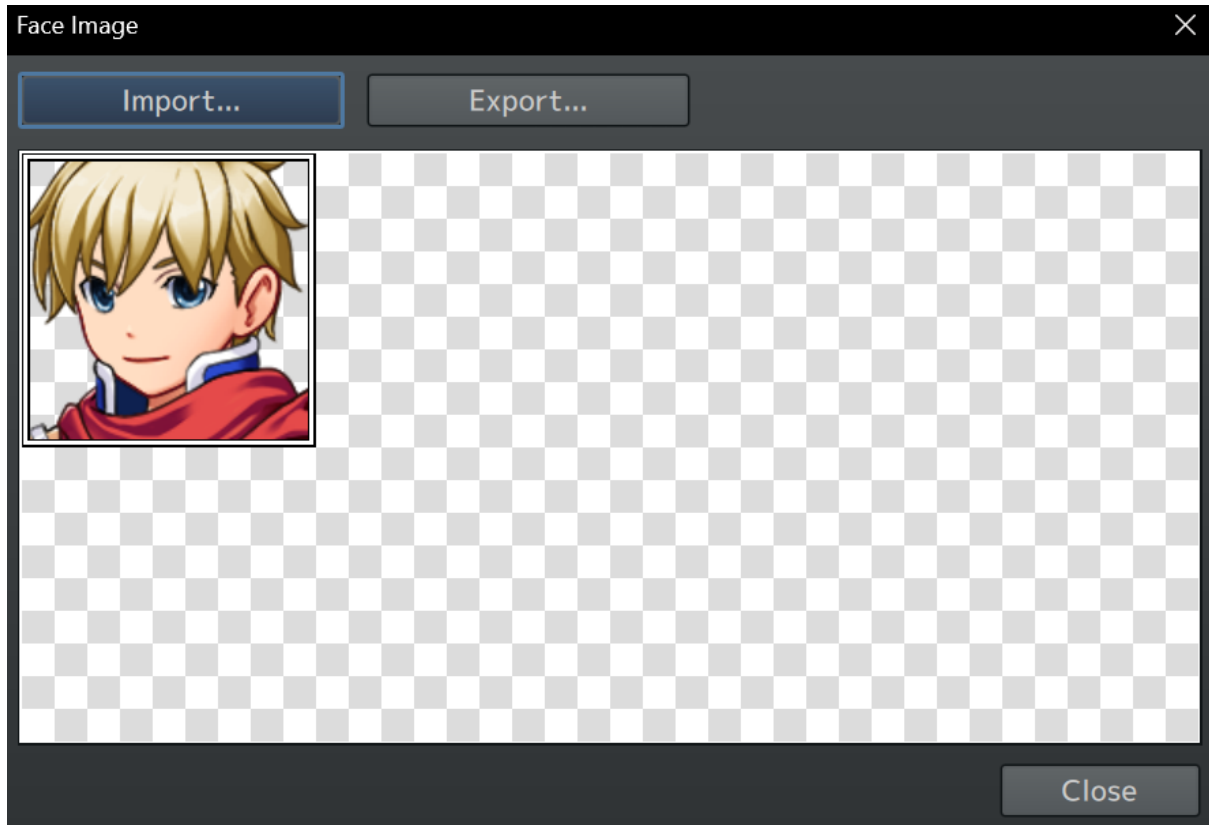


Figure 4.12 Exporting Specific Parts of Character

For example, in figure 42, pressing on the face image opens the face image window, where the face of the designed character can be exported to the game project folder. The option to import custom made face image is also available to offer more options for character design.

4.6 Characters

In Gaia: Conserving the Earth's Environment, there are a handful of NPCs within the game to tell the story of Greenville, from when it was a lush place to its current deteriorating state filled with tons of environmental issues. These NPCs can give them quests and as well as giving them items to aid on their quests, thus progressing their storyline.

The main character of the game is named Ali, a person living in Greenville. He witnessed the events of the company OilCorp making its first appearance at the village, threatening the nature by saying it will “change their lives”. This makes the main character witness the change around Greenville, before choosing to step up and do something about it for the sake of the forest, nature, and the villagers.



Figure 4.13 Main Character Interaction

Apart from the main character, Ali, notable characters or NPCs are also present in the game, which includes:

- Choo: An elderly man living in Greenville.
- Maria: A young girl living in Greenville.
- Luke: A young boy living in Greenville.
- ???/Mr Tan: Owner of OilCorp that plans to use the nature's resources at Greenville while conducting illegal practices.
- Rainy: An elderly woman living at Rush Lake. She always clears the river with the help of other villagers.
- Lackeys A & B: OilCorp's workers that can be first seen at the fourth map, Misty Hollows.
- Abraham: A high-ranking worker in OilCorp seen at Misty Hollows. He does not care about the impact of illegal activities and any conservation ideas.
- Syazani: A high-ranking worker in OilCorp that expresses doubts and concerns regarding OilCorp's practices.

4.7 Events

In RPG Maker MZ, events are used to create events in the game. It is useful in creating cutscenes, creating minigames, or as a way for the character to interact with NPC.

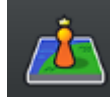


Figure 4.14 Event Button

Clicking on the event button opens the event layout, where the map will be sectioned into grids based on the tiles. Clicking on any tiles creates an event on the tile, and opens the event window.

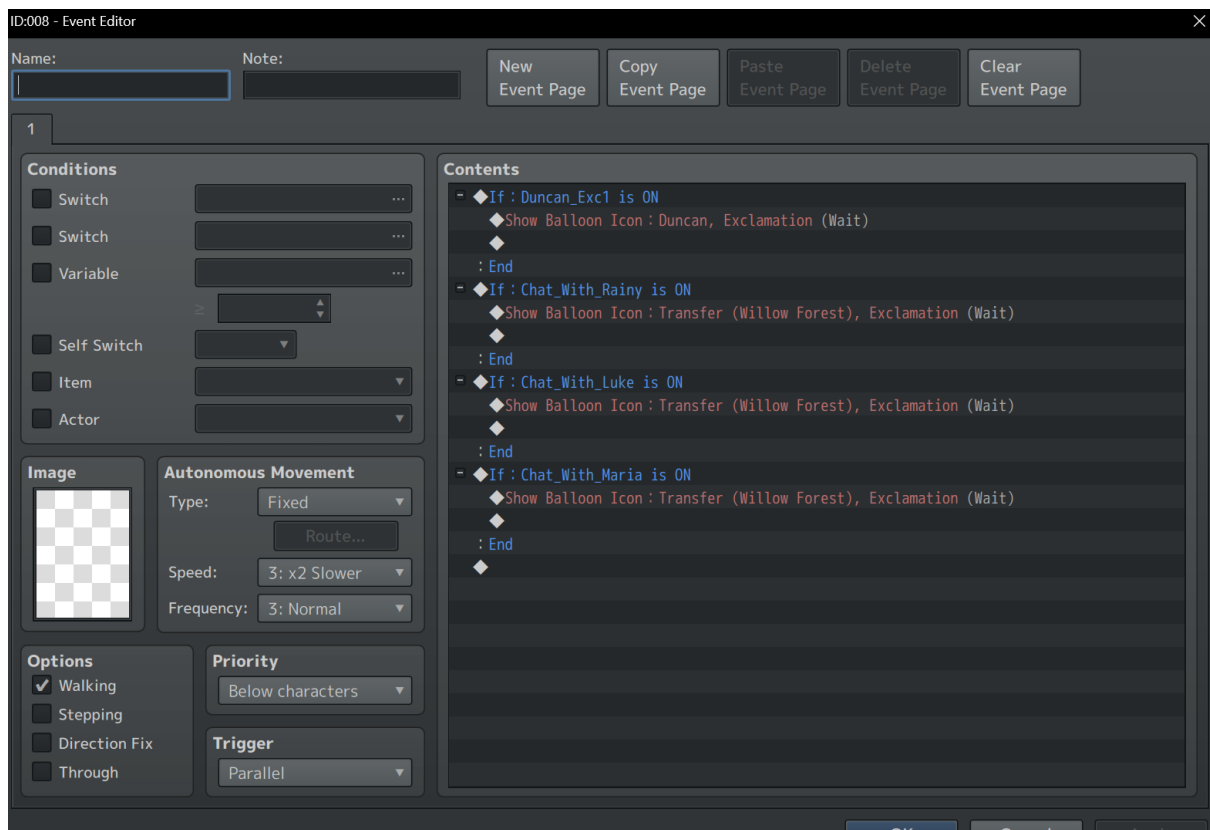


Figure 4.15 Event Window

At the event window, the name of the event can be set, with the option in adding notes as a reminder. The window is split into seven parts, page, conditions, image, autonomous movement, options, priority, trigger and contents. The page acts as a place to add different event types, which is affected by conditions. For events to play certain pages, a condition must be set earlier by checking on any required conditions. An image can be set in order to create an interactable NPC.

To create an interactable NPC, the trigger must be set to either player touch or player button. The Priority must be the same as character as above or below characters will make it unable for the player to interact with the NPC or events. Then, when interacted, the contents will be played to the player. Autonomous movement is used when creating NPCs that is moving or placed in static.

4.7 Minigames

Throughout the game, the game progression depends on completing the minigames. In total, three minigames are included in the game where players will tackle on environmental issues while also doing conservation efforts to prevent the environmental issues from worsening. Completing these minigames not only resolves the environmental issues but also give the player a good ending where the village Greenville goes back to the lush state it once was.



Figure 4.16 Clearing Up The River

The first minigame consists of clearing up the river filled with trash and waste dumped by OilCorp. Completing these clears up the river and teaches on the conservative methods which is cleaning up rivers. This minigame is aligned to the first objective stated in Chapter 1, which is to design and develop a game that educates players on pollution.



Figure 4.17 Dousing Fire

The second minigame revolves around dousing off the fire that is spreading to the trees at Misty Hollows. This tackles the issue of open burning, and it is up to the player to either douse off the fire or run away. Resolving the environmental issue causes the fire to stop spreading and further shows how simple and easy conservation methods can be. This minigame revolves around the objectives in Chapter 1, which is to design and develop a game that educates players on climate change. Although the minigame is related to open burning, open burning releases significant amounts of greenhouse gases and soot into the atmosphere. These releases are major contributors to climate change.

Having a localized activity that contributes to climate change such as open burning not only shows how to tackle climate change issue, but to also teach players on the causes of climate change and how human activities contribute to it.

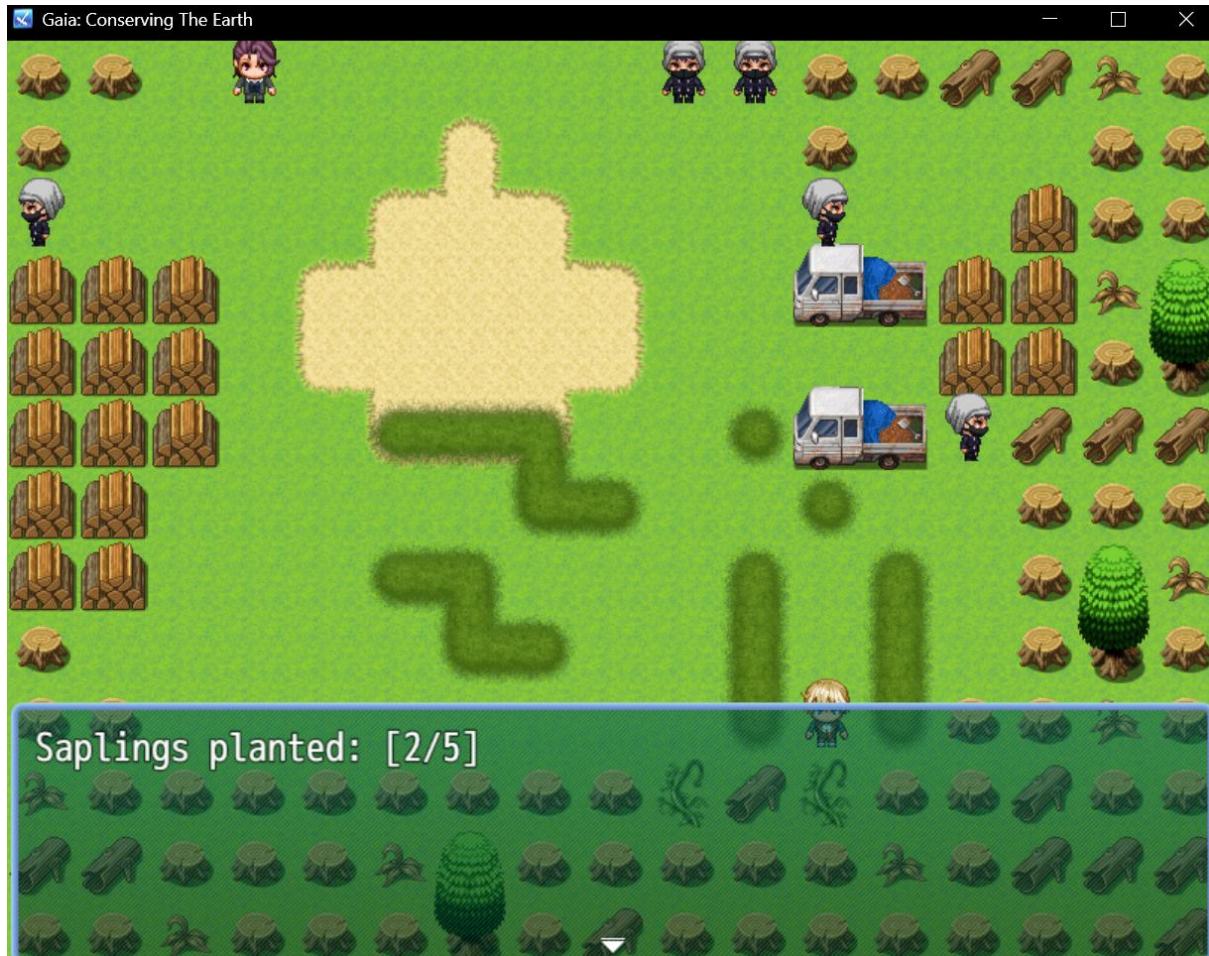


Figure 4.18 Planting Seedlings

The last minigame depends on the previous two minigames and involves replanting seedlings on logged trees at Willow Grove. This tackles the environmental issues related to deforestation, while promoting replantation as the solution and conservation methods. This aligns with the objectives stated in Chapter 1, which is to design and develop a game that educate players about deforestation

Completing all the minigames leads to a new, flourished area of Greenville, where the player can interact with all the NPC at each minigame area. The game ends with an encouraging speech act that raises awareness on the environmental issues and how a simple act of conservation can help tackle these issues. Failure of completing all the minigames leads to the defeat of the player, with a dialogue stating how OilCorp won and all the resources at Greenville being drained away. This minigame format of tackling environmental issues and fixing it by conservation methods allows for the last objective mentioned in Chapter 1 to be achieved, which is to promote the adoption of environmentally friendly solutions through gameplay mechanics.

CHAPTER 5: TESTING

5.1 Introduction

After completing the implementation phase and thus completing the game project creation, the next step involves testing the completed game project. Testing needs to be conducted to verify that then functional and non-functional requirements are met. Testing in general plays a vital role that helps in identifying and resolving issues so that any early issues are resolved. To make sure that all potential issues are resolved, the testing will be conducted multiple times to ensure a through testing.

The main objective of testing is to ensure that the game project is free from bugs that can soft lock the player within the game, ensure that it fills the objectives and most importantly, is to ensure a seamless experience. For this game project, several test methods have been conducted which includes functional testing and non-functional testing, which is conducted by using test cases, as well as usability testing to ensure that no usability problems are encountered during testing and to obtain overall experience of the testers. The usability testing will be done by using a system usability scale (SUS).

5.2 Testing

As mentioned previously, two main testing will be conducted for the game project Gaia: Conserving the Earth's Environment. One of them is test cases which will be used for functional and non-functional requirements of the game project, while the other is system usability scale (SUS) test.

As the functional requirements covers the use cases in the game project, it serves as a good way to test for the use cases as well. This allows for full coverage of both, ensuring that the gameplay is engaging and reaches the expectations of the game's objectives. Non-functional testing, on the other hand, tests on how well the game project performs its functions, such as its loading speeds. To ensure that the functional and non-functional can be tested, the game is fully created and is monitored throughout the testing.

5.3 Functional and Non-Functional Testing Results

Functional Testing Test Case ID		F1	
Test Case Description		To test the player's choice influences the storyline and environmental outcomes.	
Pre-conditions		1. The player must have completed the quest at Rush Lake 2. The player must be at the entrance near Misty Hollow.	
Step no.	Test Description	Expected Result	Results
1	Walk near the two NPCs near the entrance.	The event tile will trigger, showing dialogue between the two NPCs.	Pass
2	Walk to the open burning scene and talk to the NPC with the exclamation mark.	An event will trigger that shows the open burning go out of hand, affecting nearby trees.	Pass
3	Go to the nearby lake and pick up a bucket.	The bucket will be picked up by the player.	Pass
4	Go to the water nearby and interact with the water	The player will obtain a bucket filled with water	Pass
5	Use the bucket filled with water at the burning trees.	The trees will be doused, preventing from further destruction of the forest caused by open burning and moves onto the next quest.	Pass

Table 5.1 Functional Testing Test Case F1

Fucntional Testing Test Case ID		F2	
Test Case Description		To test environmental interaction system where the player must be able to interact with in-game elements such as NPCs, planting trees or protecting wildlife that results in visible environmental changes.	
Pre-conditions		1. The player must have completed the quest at Rush Lake and Misty Hollow. 2. The player must be at the entrance near Willow Grove. 3. The player must speak with the NPC Mr Tan. 4. The player must talk to the NPC with the exclamation mark.	
Step no.	Test Description	Expected Result	Results
1	Interact with the tree stump.	The event tile will change the tree stump into saplings.	Pass
2	Repeat step 1 5 times at four other tree stumps.	The other tree stumps will also change to saplings, causing a cutscene to occur and change all the stumps to saplings.	Pass

Table 5.2 Functional Testing Test Case F2

Fuctional Testing Test Case ID		F3	
Test Case Description		To test the quest and task system that consists of quest-based mechanics for players to solve environmental challenges through decision-making and actions.	
Pre-conditions		1. The player must have obtained the axe from the NPC named Choo. 2. The player uses the axe to cut the bush to enter Rush Lake	
Step no.	Test Description	Expected Result	Results
1	Walk forward into the map.	The event tile will trigger, showing dialogue from the main character.	Pass
2	Walk to the house that has an exclamation mark.	The door will open, leading the player into an NPC named Rainy's house.	Pass
3	Interact with the NPC.	The NPC will give a task to the player to clean the river	Pass
4	Leave the house.	The player will see trash at the river.	Pass
5	Go to the river and interact with the trashes.	The player will collect the trashes.	Pass
6	Go back to the NPC's house	The NPC will have a question mark.	Pass
7	Talk to the NPC	The NPC will thank and gives an item to the player.	Pass

Table 5.3 Functional Testing Test Case F3

Fucntional Testing Test Case ID		F4	
Test Case Description		To test the exploration mechanics that allows for free movement in a designed environment, which enables players to explore different areas for quest or resources.	
Pre-conditions		1. The player must boot up the game. 2. The player goes through the first cutscene.	
Step no.	Test Description	Expected Result	Results
1	Use the control keys to move the character.	The character will move according to the control keys.	Pass
2	Go towards an NPC and interact with it using space bar or enter.	The player will be able to interact with the NPC, with the NPC giving dialogue.	Pass

Table 5.4 Functional Testing Test Case F4

Fucntional Testing Test Case ID		F5	
Test Case Description		To test the player decision impact system that tracks player decisions and applies consequences to the environment, NPC interactions, and story progression.	
Pre-conditions		1. The player must complete the quest at Rush Lake and Misty Hollows. 2. The player is at the first map, Greenville. 3. The player has interacted with the NPC named Choo.	
Step no.	Test Description	Expected Result	Results
1	Interact with the NPC named Maria	The NPC will talk to the player and asks if the player wants her and another NPC to clean the village.	Pass
2	Select yes from the choice option.	The screen fades for a moment, and the map has the stump, leaf litters, and dead trees removed.	Pass

Table 5.5 Functional Testing Test Case F5

Fuctional Testing Test Case ID		F6	
Test Case Description		To test that the game has at least three different environmental visual state that is based on the player's actions.	
Pre-conditions		1. The player completed the quests at Rush Lake and Misty Hollows. 2. The player must enter Willow Grove.	
Step no.	Test Description	Expected Result	Results
1	Move the main character down	The player will see the state of the trees at Willow Grove being cut down.	Pass
2	Complete the minigame at Willow Grove	The map changes its state where the map looks greener with the tree stumps changing to saplings.	Pass
3	Interact with the NPC.	A dialogue and cutscene will be played, transporting the player to the Greenville village with a time lapse.	Pass
4	Chat with the NPC named Choo.	The player will give whereabouts of 3 NPCs to talk to.	Pass
5	Leave Greenville and enter Willow Groove.	The player will be able to see the flourished state of Willow Grove after doing conservation efforts.	Pass

Table 5.6 Functional Testing Test Case F6

Non-Functional Testing Test Case ID		NF1	
Test Case Description		To test that the game interface should allow the players to navigate the menus and controls with minimal guidance with the UI elements having a response time of less than 1 seconds when clicked.	
Pre-conditions		1. The game is installed on the test PC 2. The test PC has the minimum specification requirements.	
Step no.	Test Description	Expected Result	Results
1	Press new game.	The game will load the map, starting the new game.	Pass
2	Press escape or hamburger icon.	The menu pop up will appear in less than one second.	Pass

Table 5.7 Functional Testing Test Case NF1

Non-Functional Testing Test Case ID		NF2	
Test Case Description		To test the performance efficiency where the game should have and maintain a minimum frame rate of 30 frames per second on a system that meets the minimum hardware requirements, while also having loading screen not exceeding 10 seconds when switching to other areas or maps.	
Pre-conditions		1. The game is installed on the test PC. 2. The test PC has the minimum specification requirements.	
Step no.	Test Description	Expected Result	Results
1	Press new game button.	The game loads, switching the player to the main map without exceeding 10 seconds.	Pass
2	Move the character around with the arrow buttons.	The menu pop up will appear in less than one second.	Pass

Table 5.8 Functional Testing Test Case NF2

Non-Functional Testing Test Case ID		NF3	
Test Case Description		To test the platform compatibility for the game to the tested-on PC to ensure smooth performance and compatibility with standard system requirements.	
Pre-conditions		1. The game is installed on the test PC. 2. The test PC has the minimum specification requirements.	
Step no.	Test Description	Expected Result	Results
1	Launch the game.	The game boots up.	Pass
2	Navigate through the main menu options.	The options load up well without lag.	Pass
3	Start new game.	The game starts without lag.	Pass
4	Play the full game.	The player should play the game from start to finish without lag.	Pass

Table 5.9 Functional Testing Test Case NF3

5.4 Usability Testing

In this section, a usability testing is conducted to ensure that the game project is easy to play and contains no bugs. To do so, a total of 11 testers has been selected and conduct a full play test of the game. Next, the play testers fill in a system usability scale (SUS) form to quantify perceived usability, and to identify general usability problems. A high SUS score indicates a well-received game project, while a low SUS score indicates poor reception of the game. This works to showcase how well received the game's interface and core mechanics are in terms of ease of use.

5.5 Usability Testing Results

1. I think that I would like to use this system frequently.

11 responses

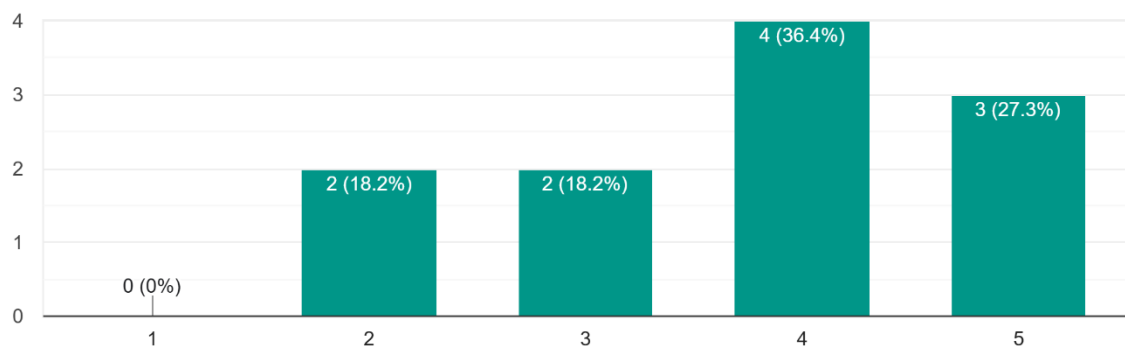


Figure 5.1 I think that I would like to use this system frequently

Figure 5.1 shows the SUS rating of how often testers would want to use this game project system. From this, it shows that most testers agree that they would use this system quite frequently.

2. I found that the system is unnecessarily complex.

11 responses

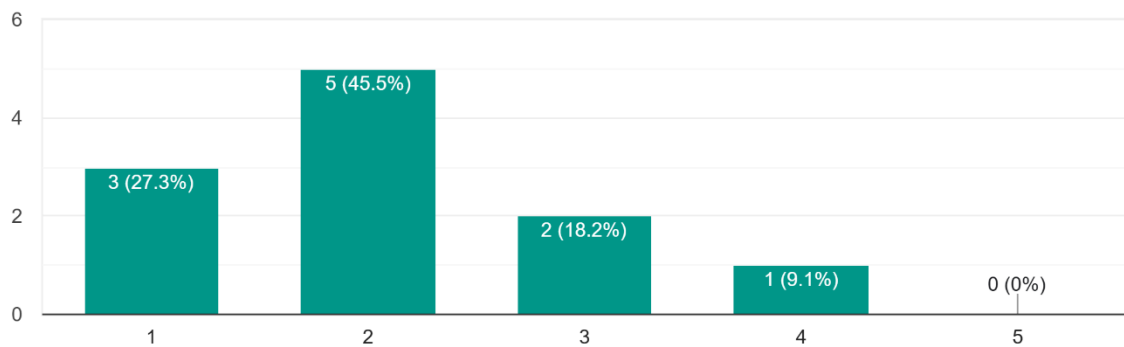


Figure 5.2 I found that the system is unnecessarily complex

Figure 5.2 shows the question on whether testers find the system unnecessary complex. A significant number of testers disagree that the system is not overly complicated. Although a user states that it is complex, the disagree outweighs it by a mile. This suggests that the game project system is appropriately complex and is not hard to use.

3. I thought the system was easy to use.

11 responses

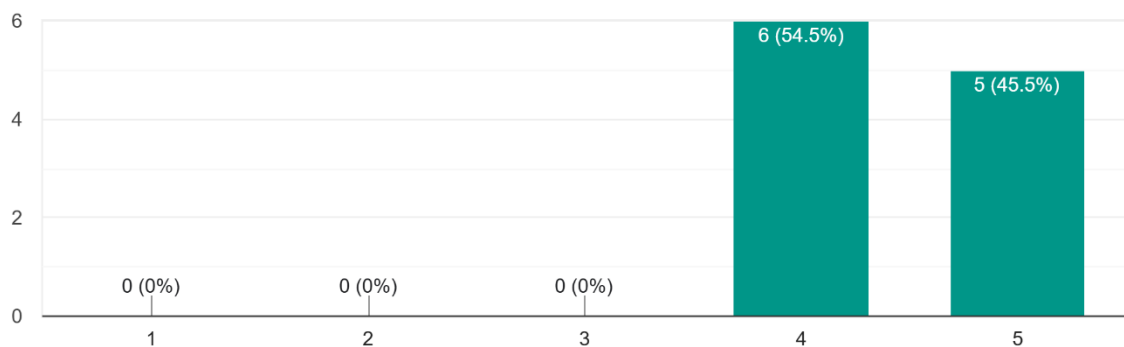


Figure 5.3 I thought the system was easy to use

For figure 5.3, it shows that the testers unanimously agreed that the system is easy to use, which highlights that the game project system has a very straightforward functionalities and interface, alongside being intuitive to interact with.

4. I think that I would need the support of a technical person to be able to use this system.

11 responses

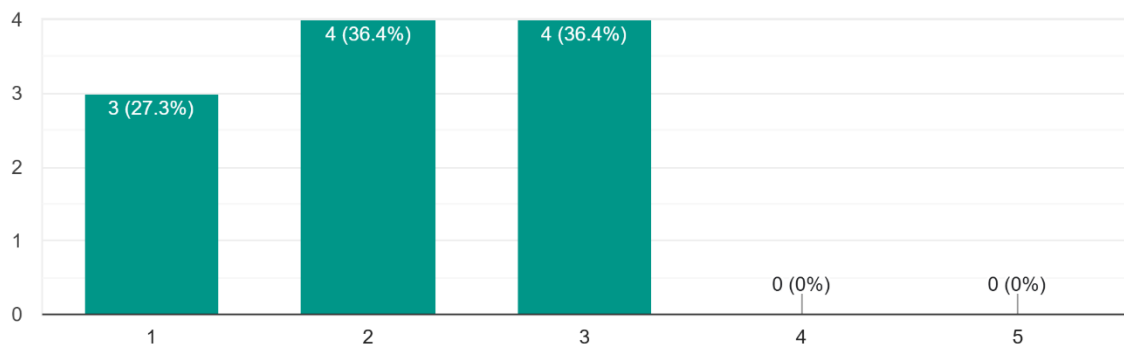


Figure 5.4 I think that I would need the support of a technical person to be able to use this system

The figure above shows that results from 11 testers are overwhelmingly positive, as a majority strongly disagreed or disagreed on the SUS settings. This shows that users feel capable of using the system independently.

5. I found the various functions in this system were well integrated.

11 responses

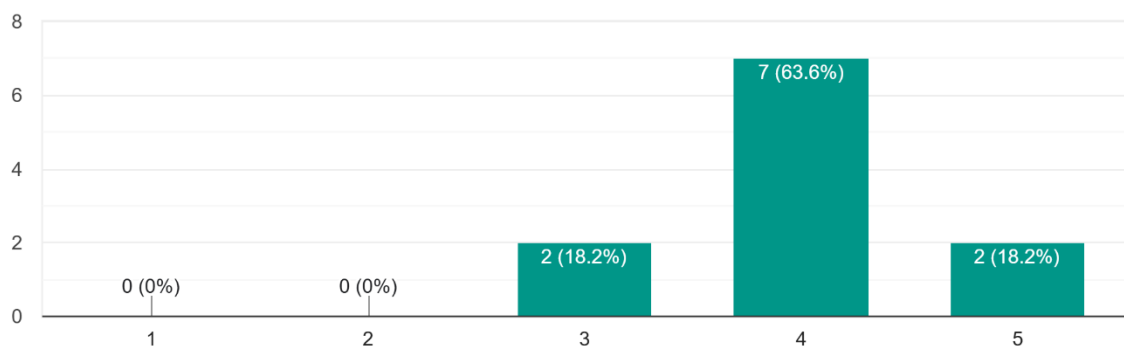


Figure 5.5 I found the various functions in this system were well integrated

From the figure above, shows that the results are favoured to the agree parts of the SUS rating. This suggests that the game project system's features and mechanics are accepted to be cohesive and to work seamlessly, thus adds a positive layer to the overall user experience.

6. I thought there was too much inconsistency in this system.

11 responses

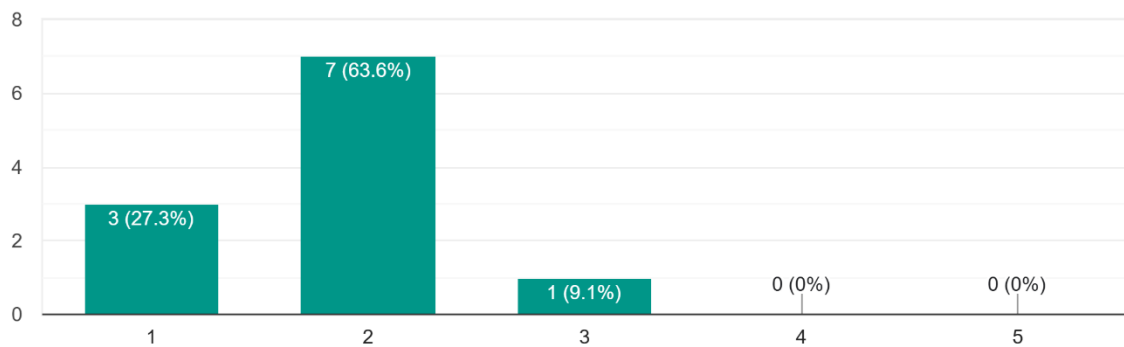


Figure 5.6 I thought there was too much inconsistency in this system.

Figure 5.6 asks on how much inconsistency there is within the game project system. From this, most of the testers disagree on this question, indicating that within the game project system, there are little to no inconsistencies. This shows that the gameplay was smooth and simple to follow, without it being too overwhelming towards them.

7. I would imagine that most people would learn to use this system very quickly.

11 responses

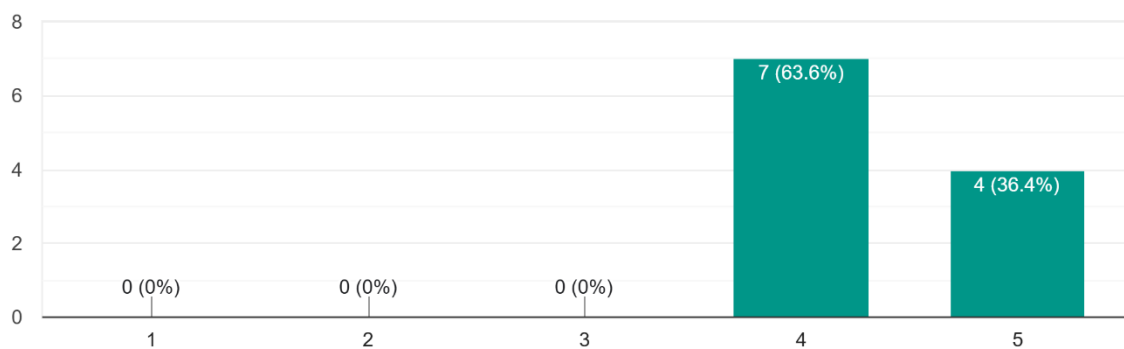


Figure 5.7 I would imagine that most people would learn to use this system very quickly

The above figure shows a unanimous agreement with the question that the system can be learned by most people very quickly. This shows that the testers and future users can find the interface and mechanics very intuitive and easy to use immediately, which give an overall

positive to the game project system's usability.

8. I found the system very difficult to use.

11 responses

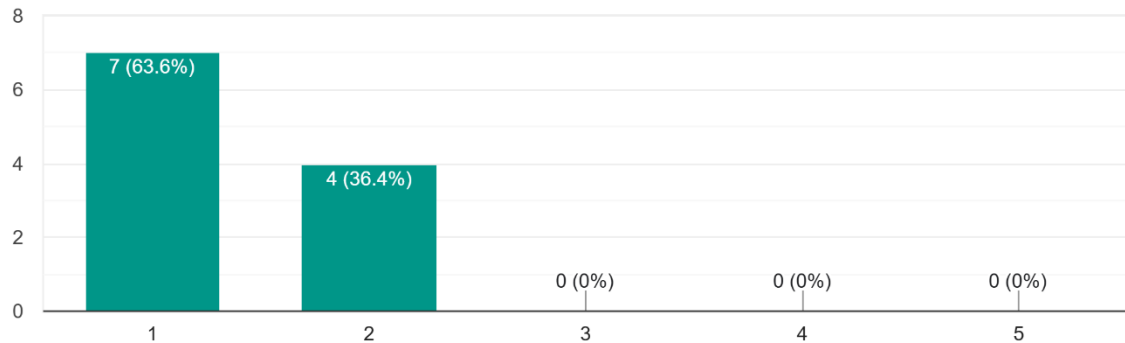


Figure 5.8 I found the system very difficult to use.

Figure 5.8 shows the SUS question whether testers find it difficult to use the system. The figure shows that all testers disagree on this question, which indicates that instead, testers found the game project system quite easy to use.

9. I felt very confident using the system.

11 responses

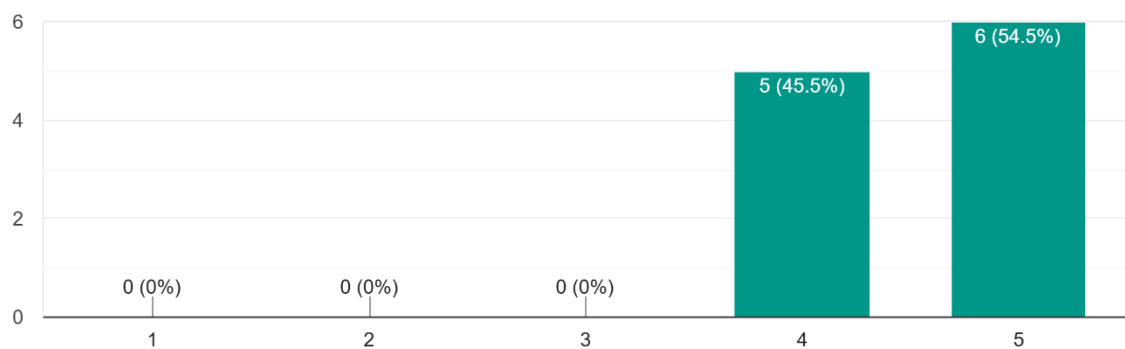


Figure 5.9 I felt very confident using the system

From the figure above, it shows that most of the testers are on the agreeing majority. This shows that testers are very confident in using the game project system, showing that without guidance, they can navigate through the game easily.

10. I needed to learn a lot of things before I could get going with this system

11 responses

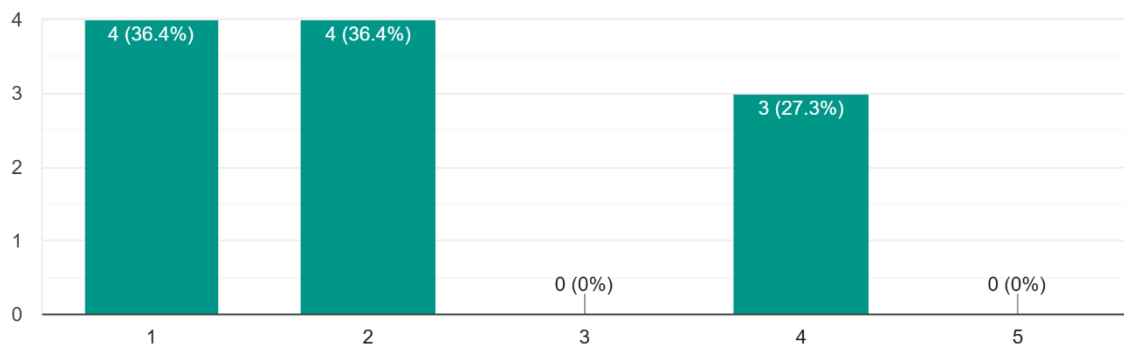


Figure 5.10 I needed to learn a lot of things before I could get going with this system

From the figure above, it shows that a lot of the testers disagree, which means that they felt that they can get on the game project without extensive learning. Despite this, a handful still felt like there was more to learn which is indicated by the amount of agrees.

5.6 Conclusion

Overall, throughout this testing phase, the test cases proves that all the tests made on the functional and non-functional requirements are a pass, which indicates that the game runs smoothly and with little to no known bugs. Furthermore, results from the system usability test from 11 testers have shown that the testers overall agree that the game project system is a well-developed system that is easy to use with good user interface and user experience. This can be seen as the SUS results are mostly positive.

CHAPTER 6: CONCLUSION AND FUTURE WORK

6.1 Introduction

This chapter discusses the achievements of the objectives, listing out any objectives that are not achieved as well as the limitations encountered within the project. This chapter also concludes the project with a potential future work to expand on the project topic.

6.2 Objectives Achievement

Throughout the development of the project, the objectives mentioned in chapter 1 is evaluated to check if it's achieved. The objectives 1 to 3 in of implementing a game that educates players on pollution, deforestation and climate change has been achieved by creating stages that cater to these specific objectives. Furthermore, the completion of objectives 1 through 3 achieves objective 4 in promoting the adoption of environmentally friendly solutions through gameplay mechanics.

6.3 Project Limitations

In creating and completing the project, there are some limitations that can be seen throughout. One of it being limited scope and scale. Where the game focuses on environmental theme, only three of the themes are being focused. This makes the game not being able to cover all conservation topics in a more comprehensive matter.

A huge limitation that can be seen on the project is the exclusion of game combat system. The combat system as well as it's corresponding use case and use case actor has been dismissed throughout the project. This is due to the battle system feeling out of place, as it does not serve any conservational value or story wise. Although enemies can drop items which can be implemented to drop items important to the game, the system feels out of place, and it does not aid in educating players on conservation methods through proactive and ethical engagement. Moreover, this combat system does not lead to achieving any of the game project's objectives.

Survey responses can be further increased to further polish and target broader target audience as well. Moreover, due to time and resource constraints, few rounds of user testing and feedback implementation can be conducted to improve the game.

6.4 Conclusion

This project aims to raise awareness about environmental conservation among youth through an interactive, story-driven 2D RPG game. It combines storytelling, player-driven choices, and educational content to engage with players while promoting sustainable thinking. Methodologies such as User-Centered Design (UCD) and Agile ensures that the game is tailored to the user needs with improvements through iterative feedback. With the help of the survey, the game's design, features and mechanics are shaped to align better with the target audience's preferences. Overall, this project shows how games can be powerful tools for education and thus inspires younger generations to take the idea of conservation more seriously.

6.5 Future Work

Future works on the game focuses on expanded game content, where more environmental issues such as renewable energy can be touched upon. The educational depth of the game can be enhanced with collaboration with environmental experts. This can ensure the accuracy and the depth of the conservation content.

In terms of game design, voice acting and improvements of sound design can improve game immersion towards the user with custom sound effects. The visuals of the game as well as it's gameplay features can be improved by creating more animations, using custom assets and adding a variety of mini games to make the gameplay more dynamic and engaging.

References

- Britannica, T. Editors of Encyclopaedia (2024, October 26). *natural resource*. *Encyclopedia Britannica*. <https://www.britannica.com/science/natural-resource>
- Chakravarty, S., Ghosh, S. K., Suresh, C. P., Dey, A. N., & Shukla, G. (2012). Deforestation: Causes, effects, and control strategies. InTech. doi: 10.5772/33342
- Liu, Z.-Y., Shaikh, Z. A., & Gazizova, F. (2020). Using the concept of game-based learning in education [Abstract]. *International Journal of Emerging Technologies in Learning (iJET)*, 15(14), 53–64. <https://doi.org/10.3991/ijet.v15i14.14675>
- Hookshot, Charge Beam, Revive. (2021, January 25). *Spiritfarer Review: Almost a Masterpiece*. <https://hookshotchargebeamrevive.com/2021/01/25/spiritfarer-almost-a-masterpiece/>
- Watts, R. (2022, July 19). *Endling - Extinction Is Forever review: another cute animal survival game that'll make you cry*. Rock Paper Shotgun. <https://www.rockpapershotgun.com/endling-extinction-is-forever-review>
- Wilkerson, Z. (2020, January 22). *To the moon review*. RPGFan. <https://www.rpgfan.com/review/to-the-moon-3/>

Appendices

Appendix A

Survey on Environmental Conservation Awareness and Story Driven, 2D-RPG Game "Gaia: Conserving the Earth's Environment":

<https://docs.google.com/forms/d/e/1FAIpQLSdhmqYXceFwxUAOAhckdCV-MpRsA6i6X3GbikDbvbt-cgwzwwg/viewform?usp=header>

Appendix B

System Usability Scale (SUS) for Gaia: Conserving the Earth's Environment FYP Project 2025

https://docs.google.com/forms/d/e/1FAIpQLSfZxJTDqC_nrk_23DizHF2UyHFZMkaAUm8VYwq4SGNfVQpEHQ/viewform?usp=header