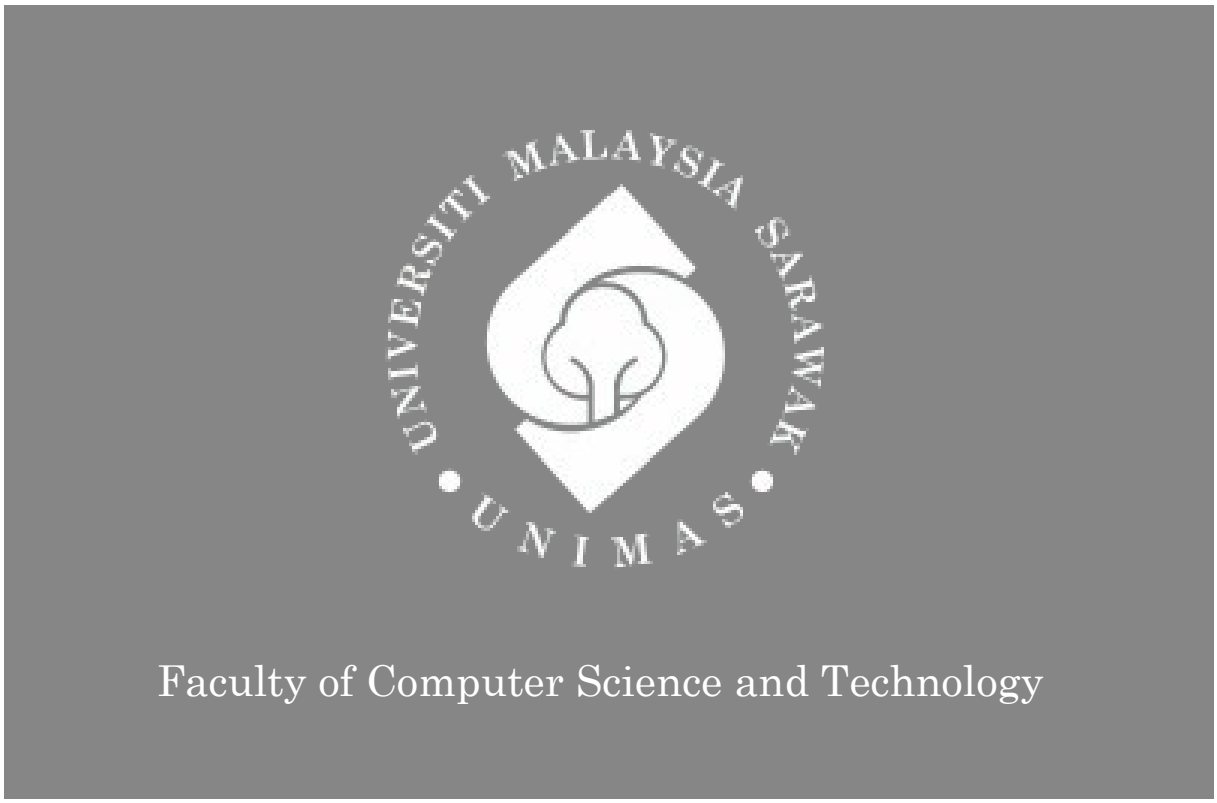

DEVELOPMENT OF AN EDUCATIONAL VIDEO GAME ABOUT BIDAYUH CULTURE

Abraham Lawsaint Anak Marcus

Bachelor of Computer Science with Honours (Multimedia Computing)

2025

DEVELOPMENT OF AN EDUCATIONAL VIDEO GAME ABOUT BIDAYUH CULTURE

ABRAHAM LAWSAINT ANAK MARCUS

This project is submitted in partial fulfilment of the requirements for the degree of Bachelor of Computer Science with Honours (Multimedia Computing)

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Abstract

Educational video games are a platform where any sorts of educational contents like cultural heritage can be promoted. There is a lack of educational video games about Bidayuh culture that can provide both engaging and educational content. In this project, the issue is addressed by developing an educational video game about Bidayuh culture using Unity Game Engine. The game, which is called Spirit of The Harvest, incorporates elements from existing video games, including RPG game mechanics, inventory, quest, transaction, and crafting systems. Each game mechanic and element in the game are inspired by existing video games. While the main focus of the game is to promote Bidayuh culture, there are also fantasy elements being implemented. These elements and game mechanics combined allow the game to be both educational and engaging to players. Results of the testing phase conducted with the help of 31 participants show that the game scored high usability and engagement score. Feedback given were also mostly positive, with many praising the educational impact and cultural storytelling. The project highlights the potential of video games as a medium for cultural preservation

Abstrak

Permainan video pendidikan ialah platform di mana sebarang jenis kandungan pendidikan seperti warisan budaya boleh dipromosikan. Terdapat kekurangan permainan video pendidikan tentang budaya Bidayuh yang boleh menyediakan kandungan yang menarik dan mendidik. Dalam projek ini, isu ini ditangani dengan membangunkan permainan video pendidikan tentang budaya Bidayuh menggunakan Enjin Permainan Perpaduan. Permainan ini, yang dipanggil Spirit of The Harvest, menggabungkan elemen daripada permainan video sedia ada, termasuk mekanik permainan RPG, inventori, pencarian, transaksi dan sistem kerajinan. Setiap mekanik dan elemen permainan dalam permainan diilhamkan oleh permainan video sedia ada. Walaupun fokus utama permainan ini adalah untuk mempromosikan budaya Bidayuh, terdapat juga elemen fantasi yang dilaksanakan. Elemen dan mekanik permainan ini digabungkan membolehkan permainan menjadi pendidikan dan menarik kepada pemain. Keputusan fasa ujian yang dijalankan dengan bantuan 31 orang peserta menunjukkan bahawa permainan ini mendapat skor tinggi dari segi kebolehgunaan dan tahap keterlibatan. Maklum balas yang diberikan juga kebanyakannya positif, dengan ramai memuji impak pendidikan dan penceritaan budaya yang disampaikan. Projek ini menonjolkan potensi permainan video sebagai medium untuk pemeliharaan budaya.

CHAPTER 1: INTRODUCTION

1.1 Introduction

In this technology-driven era, information is readily available via the Internet and it is is available in many types of formats and media, from informative video and film to educational video game. Educational video games are particularly effective for sharing knowledge as they are interactive and can pique a person's interest and curiosity in learning more about a subject. This report will present a game development project that focusses on developing an educational video game with interactive gameplay that allows players to explore and learn about the Bidayuh culture. Currently, there are no video games centred around the Bidayuh culture. Therefore, our motivation for creating an educational game on the content aim to preserve the culture.

The video game will be developed using the Unity game engine. The Unity game engine is a multi-platform game engine that utilizes the C# scripting language. It includes a drag-and-drop feature that enables developers to select any objects and elements in the engine for game construction and design (Singh and Kaur, 2023). The Unity's practicality and user-friendly functions open up numerous possibilities to incorporate good game mechanics and elements on the Bidayuh heritage into the game.

The video game will focus on a specific Bidayuh culture, using gaming features to ensure the game is easy to play and enjoyable. The major target audience is youths of all races. It is suggested that the video game would focus on articulating the game design and content in order to find a balance between entertainment and teaching. The game will be in an RPG-style interface that allows players to manoeuvre their character around the area and search for objects.

This game style allows players to explore a Bidayuh village and learn about Bidayuh culture through explorations, interactions, and completing tasks and missions.

1.2 Problem Statement

Educational video games are one of the most efficient types of video games for learning. However, most people tend to perceive educational games as dull and only for children. Perhaps most children's instructional video games lack immersive elements. It is possible that educational games place a greater emphasis on content and pedagogy than on fun components. It's difficult to strike the right mix between content and enjoyable games. It is unclear how to strike the right balance for a good education video game that allows immersive fun learning.

This project will tackle this issue by developing an immersive educational video game about Bidayuh culture that incorporates different game elements and mechanics inspired by modern video games and genres, such as fantasy elements, and role-playing game (RPG) mechanics. The video game will be designed in a way that the engagement is balanced with the educational content while remaining fun. This allows players to learn about Bidayuh culture while they play the game. The mechanics includes mission completion and role-playing elements, allowing players to fully immersed themselves in the Bidayuh life and culture in the game. A pedagogical approach will also be implemented in the game by integrating game mechanics such as rewarding players based on progressions and narrative driven quests to support the learning objectives of the game. Through this approach, the game can be both engaging and educational.

1.3 Motivation

Sarawak is known for the abundance of different ethnic groups, which made up of Iban, Ulu, Bidayuh, and Malay. Compared to other ethnic groups, Bidayuh has lesser exposure to the outsiders particularly among youth even though Bidayuh makes up around 8% of Sarawak

population, which is the fourth largest ethnic group in Sarawak. The Sarawak government and the local NGOs have tried to promote the cultural significance of Bidayuh, but the lack of digital engagement reduced their efforts' appeal and reach. This presents an opportunity to utilise technological resources available in this modern era to overcome this issue.

Creative media, video game and mobile application are such resources that can be used to create interesting and engaging platforms to showcase Bidayuh culture. In this project, video game would be the most suitable platform as it allows education to be incorporated in the platform. By utilizing modern game engines like Unity, the Bidayuh heritage can be transformed into a playable gameplay. This provides a way for players to learn about Bidayuh culture by exploring and interacting with the game.

1.4 Objectives

The breakdown of the project's objectives are as follows;

1. To ideate and design an educational gameplay.
2. To develop an educational video game.
3. To test the game design features and interactivity of the video game.

1.5 Methodology

Phase 1: Ideation

This phase generates ideas based on the issue definition and requirements. Ideas will be brainstormed and filtered until the best few are selected. Information concerning the video game's content will be studied and gathered. This phase aims to collect ideas and important data that can be used as the core content of video game development.

Deliverables:

- Complete storyline of the video game
- Game requirements, elements and mechanics

Duration:

- 15th November 2024 to 8th December 2024
- 23 days

Phase 2: Design

In this phase, the concepts and solutions are sketched out materialize into wireframe and static prototype. The tools that will be used in this phase are Figma and Adobe Express. This phase aims to create a blueprint of the flow of the video games to guide the development of the working prototype of the video game.

Deliverables:

- Wireframe of the video game
- Static prototype
- Character designs and User Interface designs
- Soundtrack development

Milestones:

- Video game design
- Sketching the solutions and concepts
- Wireframe and static prototype development

Duration:

- 9th December 2024 to 30th January 2025

- 52 days

Phase 3: Development

In this phase, the actual development of working prototype of the video game will start. The visual media and programming are done throughout this phase. This phase aims to produce a working prototype of the video game.

Deliverables:

- Working prototype of the video game
- Report of the development phase

Milestones:

- Development of the working prototype of the video game
- Documentation of the development phase

Duration:

- 30th January 2025 to 25th May 2025
- 115 days

Phase 4: Prototype Testing

In this phase, the working prototype is tested. Any problems and bugs occurred during this phase will be fixed during this phase. This phase aims to fix any issues in the working prototype so that the final product would be stable.

Deliverables:

- Testing report
- Final product

Milestones:

- Prototype testing and debugging
- Reviewing test cases
- Documentation of the prototype testing

Duration:

- 26th May 2025 to 22nd June 2025
- 27 days

Phase 5: Conclusion

In this phase, the final product is released to the public and presented to responsible parties. Report is finalized in this phase. There will be a self-reflection in this phase to review the whole project.

Deliverables:

- Final report of the project
- Reviews of the product

Milestones:

- Release of the video game to the public
- Finalizing the final year report
- Documenting the whole process of project
- Self-reflection

Duration:

- 23rd June 2025 to 12th July 2025

- 17 days

1.6 Project Scope

Target User

The targeted user of this project will be youth. Non-Bidayuh youth are chosen as targeted user because they are hardly exposed to the Bidayuh culture.

Resources

1. The information about Bidayuh culture will be obtained from journal articles, reliable sources and data collected through interview and questionnaire.
2. The tool that will be used to develop the video game is Unity.
3. The arts and media used in the game will be made through Adobe Express and AI tools.

Project Deliverables

1. A working video game with minimal bugs and issues.
2. An informative and educational video game.

1.7 Significance of Project

This project is motivated by having the desires to promote the beauty of Bidayuh culture to non-Bidayuh people, particularly the youth. Interactive medium like video game is rarely used to promote Bidayuh culture. By developing the educational video game, it will be one of the very few games developed to share about the culture to public. The end output of the project will also provide a unique experience for youth to learn about Bidayuh culture, rather than through traditional way.

1.8 Project Schedule

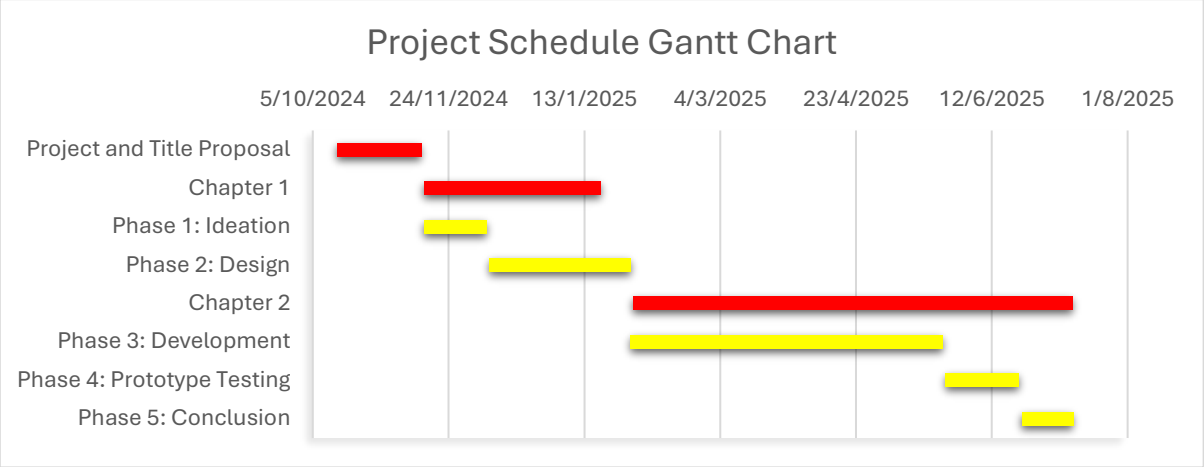

Figure 1: Project Schedule

1.9 Expected Outcome

By the end of this project, it is expected that the fully functional educational video game that promote Bidayuh culture will be finished on time and released to the public. Youth of other ethnicities will be able to learn about Bidayuh culture and heritage by playing the video game. The video game will also provide accurate representations and information of Bidayuh culture, which will be shared through engaging yet educational gameplay.

1.10 Project Outline

1.10.1 Chapter 1: Introduction

Chapter 1 provides the main descriptions of the project. The introduction, problem statement and objectives are discussed in this chapter to highlight the background of the project. The other important project descriptions like the project schedule, expected outcome, project scope, methodology and project significance are also mentioned to provide deep insights in the progress of the project.

1.10.2 Chapter 2: Literature Review

Chapter 2 discusses on the overview of educational video games and the cultural heritage of Bidayuh. This chapter will also highlight the importance of using Unity as the main game engine to develop the educational video game.

1.10.3 Chapter 3: Requirement. Analysis and Design

Chapter 3 describes the methodology that is used in this project. This chapter will also explain the details of how the progress of the project flows using diagrams and technical explanations.

1.10.4 Chapter 4: Implementation

Chapter 4 describes the core development of the video game. This chapter will cover the tools and technologies used to realize the development of the video game, such as Unity game engine, Adobe Express, Figma, Generative Artificial Intelligence (AI), Visual Studio 2022 and related frameworks and APIs. The front-end and back-end development are fully documented in this chapter.

1.10.5 Chapter 5: Testing

Chapter 5 documents the testing of the working prototype of the video game through various test cases. The functionality and usability are also documented to provide deep insights of the product. Any issues and bugs found during the testing phase are immediately fixed to improve the playability.

1.10.6 Chapter 6: Conclusion and Future Work

Chapter 6 concludes the project by releasing the finished product to the public. This chapter will also reflect on the achieved outcomes and objectives and concluding the main

findings of the project. The impact of the product in the future development of educational video game will be discussed in this chapter.

1.11 Summary

In summary, this chapter provides details on the main descriptions of the project and the main motivations behind the project proposal. The project highlights the opportunity to develop an educational video game to promote Bidayuh culture to youth of different ethnicities. Through video game, Bidayuh culture and heritage are transformed into a digital content that is interactable, thus making it more engaging to the youth.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Chapter 2 of the report will discuss about the background of educational video game and why it is used in this project to promote Bidayuh culture to the youth of non-Sarawakian ethnicities. The gameplay inspiration for the video game will also be discussed and reviewed.

2.2 Educational Video Game

2.2.1 History of Video Game

Video game has long existed since the era of computer. During the early days of video game, they were all physically made using the hardware components of the console by using the integrated circuits (ICs) and arranging them on a custom printed board. Game developers then moved towards using random-access memory (RAM), graphical processing units (GPU) and Central Processing Units (CPU) to develop video game that can be played in a console by storing the video game data in a read-only memory (ROM) cartridge. Then, the evolving media of the video game has led to it being distributed physically such as in the forms of DVDs and Blu-rays. As the Internet progressed to its current state, the digital distribution of video game was made possible. Consumers can download game from websites and digital stores without going to physical stores (Mattioli, 2020). Figure 2 shows an example of digital store for video game distribution platform, Steam Marketplace. When the working product is finished at the end of the project, it will be available on digital video game library to make it accessible to the public, especially to non-Sarawakian youths. Thus, the Bidayuh culture will be promoted through the educational video game effectively.

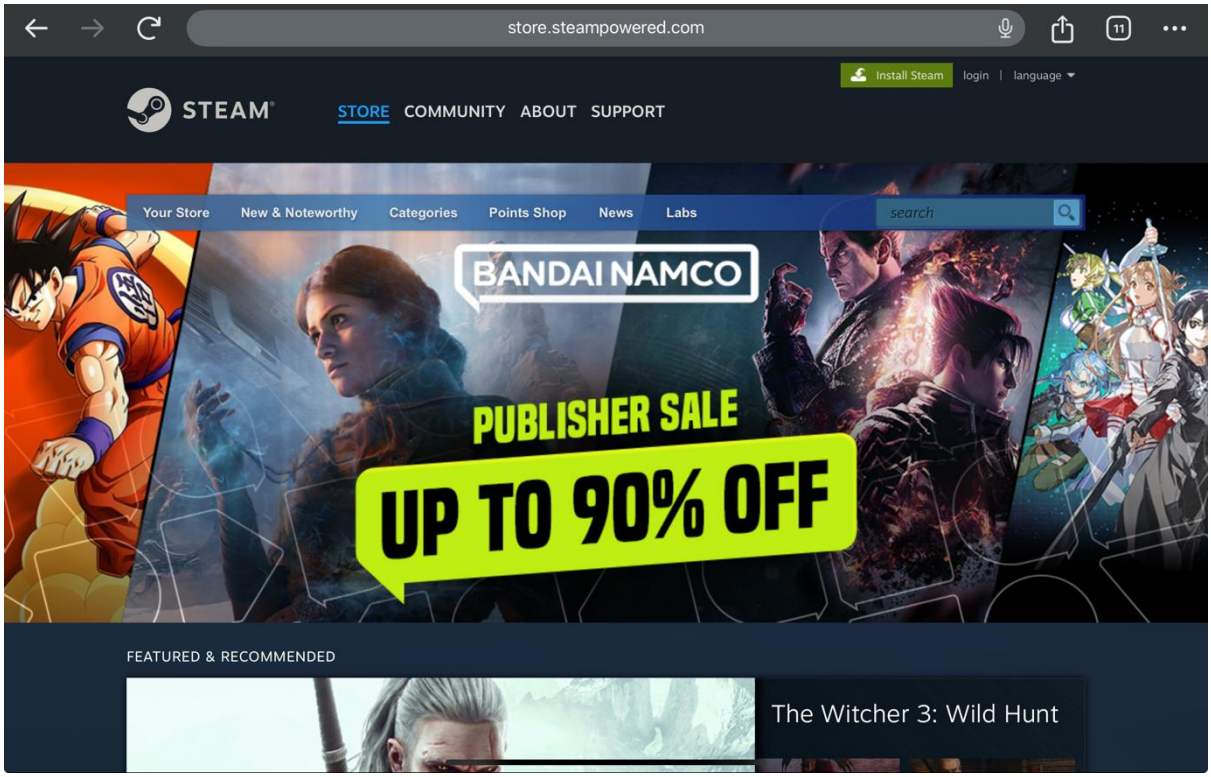

Figure 2: Steam Marketplace

2.2.2 The Role of Video Game in Cultural Transmission

Video game has long evolved from solely existing to provide entertainment to consumers to having many purposes, primarily as a medium for cultural transmission. In this part of the chapter, the role of video game in cultural transmission and dissemination is discussed as this project aims to promote cultural heritage of Bidayuh ethnic to non-Sarawakian youths. A study done by Cerezo-Pizarro et al. (2023) found that implementing cultural aspects in video game is an effective way to give platform for developers to promote culture of any aspects. Of all the cultural themes that were reviewed, it was found that representations of specific ethnic cultures total up to slightly less than 20% of the cultural themes, second to militarism and ideological culture, which are 26.67%. This proves that video game has always been used as a medium for cultural transmission.

The implementation of cultural theme in video game has led to the possibility of preserving cultural heritage in video games. Video game itself is a cultural heritage that deserves to be preserved, but it is also the perfect medium to preserve cultural heritage of any kinds. Players can experience how a specific community of culture unfamiliar to them live through interacting with the game. For example, the experience of living in the historical eras like ancient Greek polis and 18th century Paris can be relived through Assassin Creeds franchise. Moreover, in the Assassin Creed Unity, which takes place in the 18th century Paris, players can experience the French Revolution and explore the Paris of that era. Figure 3 shows a screenshot of Assassin's Creed Unity gameplay that takes place in the 18th century Paris. The most notable building during that era, Notre Dame cathedral, is available to be explored in the game as the exact replica of the building was designed and modelled to maintain the authenticity of the Paris experience. There are also games that aims to accurately represent a cultural heritage through video game for the purpose of educating players about a specific culture, like Roma Nova project. The developers target to provide the most exact historical representation of Ancient Rome to the public by digitizing the historical place and era (Harkai, 2022). Figure 4 shows a screenshot of the Roma Nova project gameplay. Promoting cultural heritage in video game would not only provide a unique experience for players, but it is also a great way to preserve cultural heritage.

Figure 3: Assassin's Creed Unity Gameplay

Figure 4: Screenshot of Roma Nova project gameplay

2.2.3 The Effectiveness of Educational Video Game

There exist many forms of video game. One of them is educational video game, which the primary goal is to provide and teach educational content to its target audience. In the project's video game, the target audience is youth. The audience consists of several types of gamers that have distinct gaming preferences. In a study done by Manero et al. (2017), it is found that educational video game will be effective if the type of the game is tailored to a specific group of people. They also found that age does not affect the effectiveness of the educational video game, but only because the game used as the subject is specifically made for teenagers and the intended audience of the test are teenagers of age ranged between 11 to 16. One thing that they concluded is that gaming preferences do affect the effectiveness. The age of a person and their gaming preferences are correlated, which means that gaming preferences might change as they grow older. Teenagers and young adults are known to have gaming preferences of adventure and exploration, which may increase the effectiveness of the project educational video game.

There are instances in which educational video game successfully provided what their target audience want, which is educational yet engaging gameplay. According to a study done by Gordillo et al. (2022), an experimental group of Software Engineering students from Universidad Politecnica de Madrid (UPM) were asked to learn their software engineering learning materials exclusively through a video game that was created by a course teacher using the SGAME authoring tool provided by UPM. Figure 5 shows the interface of the SGAME platform. A control group consists of their classmates were asked to learn the materials through lecture video. It is found that students from the experimental group learned more about the course materials through game-based learning compared to the control group, which used video-based learning as their medium to study the course materials. It is also found that students

are way more motivated to learn using game-based learning because of the engaging element of the game and students from both groups favour game-based learning over video-based learning.

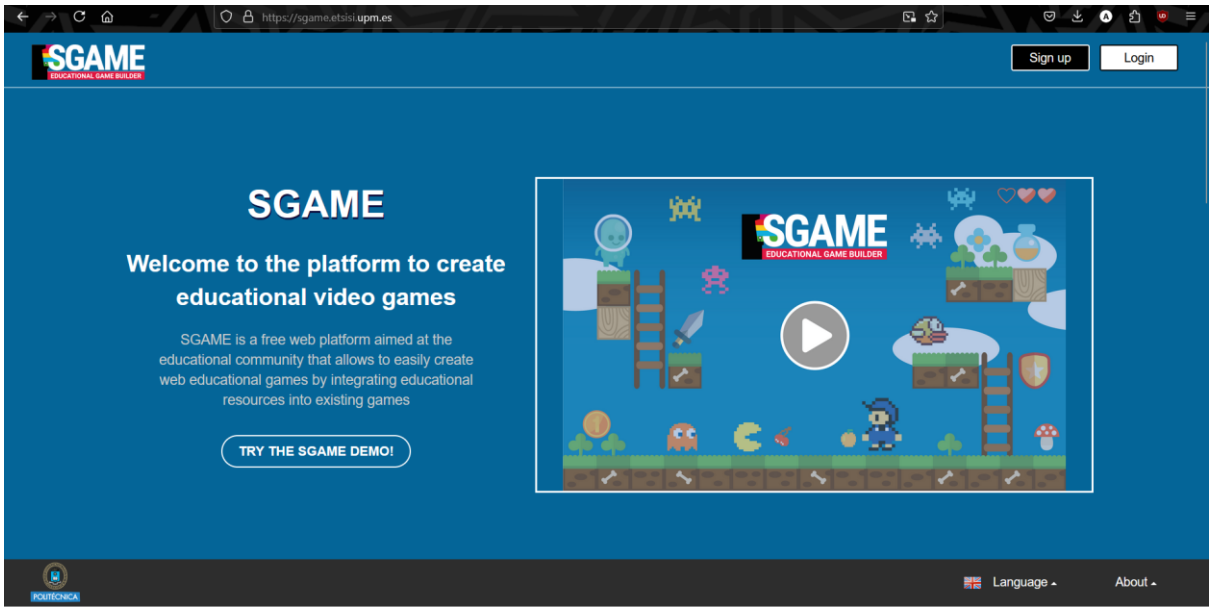

Figure 5: SGAME authoring tool

In another study done by Zhao et al. (2022), the impacts of educational video game in enhancing programming courses are studied by having over 100 students from three European institutions participating play two different educational video games. The games are Loop game and Variables games, in which the former provides learning material to learn about loop functions in programming and the latter provides learning material to learn about variables in programming language. The study found that students were able to understand abstract programming concepts better through the video games. The visuals and interactivity of the video games were also able to motivate students to learn about programming concepts from the games.

2.3 Gameplay Inspiration

In the video game development, there are several game mechanics and ideas that inspire the creation of the video game. This part of the chapter will discuss about the existing video games that influence the whole mechanics of the video game.

2.3.1 Role-Playing Games

The genre of the game is role-playing, in which players take the role of a major character, in this case the protagonist to interact with the environment of the game and to play the main roles of the character. This is an integral part of the game as the main goals of the game can only be achieved if the players assume the roles of the character. There are also non-playable characters (NPCs) in that type of the game in which they either play major or minor role in the game. Depending on their roles in the game, players may or may not have to interact with them to progress to the later stage of the game, but in most cases, players only have to interact with NPCs that play significant role in the game to advance. NPCs that play minor roles tend to be there to improve the experience of the game as their presence make the game feel richer and more authentic (Zhao, et al, 2022).

The game design of the game is heavily inspired by Harvest Moon: Friends of Mineral Town. Harvest Moon is a 2D RPG game that takes place in a beautiful village. Similarly, the project's video game is a 2D RPG game, taking place in a Bidayuh village. The storyline is also loosely inspired by Harvest Moon, which the main character of Harvest Moon is tasked with taking care of his grandfathers' farm after his death (Harris, 2003). Meanwhile, the protagonist of the project's video game is tasked with learning about Bidayuh culture and getting key Bidayuh items to save the Gawai spirit and Gawai festival. Figure 6 shows the main character

of Harvest Moon being given the responsibility to take care of the farm after his grandfather's death. Figure 7 shows the interface and design of Harvest Moon.

Figure 6: Protagonist of Harvest Moon: Friends of Mineral Town is given responsibility to take care of his grandfather's farm

Figure 7: Harvest Moon: Friends of Mineral Town gameplay

In role-playing game, players have various tasks that they can do to progress to next stage. These tasks or more familiarly called as quests among gamers tend to be challenging and would give out rewards to players. The rewards are useful in the game and can take many forms, such as in-game currency and key items that can be used in the main quests. For example, in Rune Fantasy 4, players are tasked with many jobs such as cooking and crafting. Finishing a job would give out in-game cash to players, which can be used to buy items in the game. Some jobs would also give out unique items that are useful in other jobs (Sullivan, 2013). Figure 8 shows the quest system in Rune Factory 4. In this project, the video game would only have two types of quest, which are crafting items and collecting and distributing items, but both quests will reward the players with either in-game cash or rare items. Some of the items can be used to craft the items needed to complete a chapter and the in-game cash are useful as players are able to buy items that are only available in the in-game shops and market.

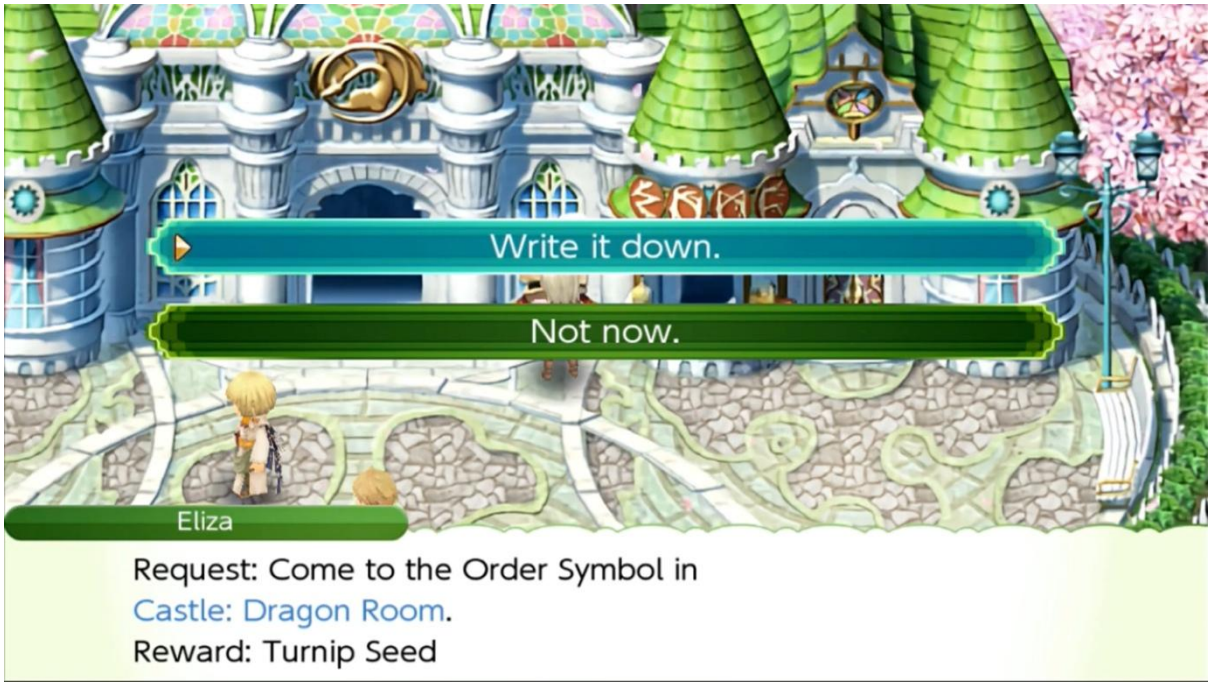

Figure 8: Quest System in Rune Factory 4

Transaction system is also one of the most prominent features available in role-playing game genre. The transaction system utilizes the in-game cash to purchase items that can help improve the gameplay experience. There are many games of this genre that is taken as an inspiration for the project's video game transaction system, particularly Harvest Moon: Friends of Mineral Town. In Harvest Moon, players would have to tackle jobs available to earn money, which can be spent on upgrading facilities, crops and livestocks, medicine and so on (Harris, 2003). Players would have to interact with certain NPCs to purchase items or upgrading facilities. The project's video game will implement similar transaction system to the Harvest Moon's transaction system. Figure 9 shows the shop and transaction system of Harvest Moon. Minus upgrading any facility, the video game allows players to purchase items from certain NPCs in a shop or at the market. The items will aid the players in the quest completion.

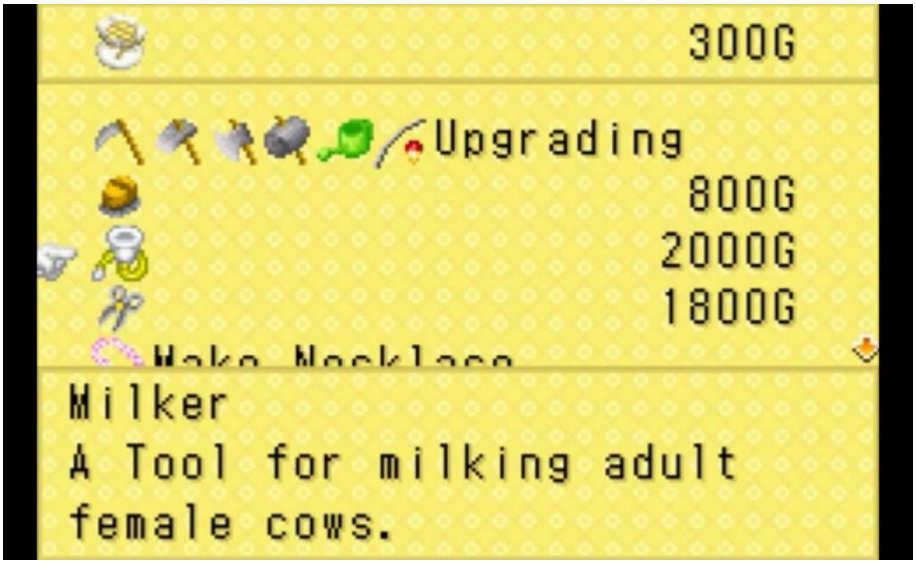

Figure 9: Transaction system in Harvest Moon: Friends of Mineral Town

2.3.2 Minecraft

In each chapter of the game, players are required to craft items based on the items that they have gained throughout the chapter playthrough at the end of the chapter. The crafted items are key items that will be useful for beating the final boss of the game. This idea is based on Minecraft, where players can craft a new item using items that they obtained through mining and exploration (Minecraft, n.d.). There are many types of items that can be crafted, including tools, weapons and armors. The crafted items are pivotal in the playthrough of the game because they can be used to advance in the game and enhance the gameplay experience. Meanwhile, the crafting system in the project's video game can only be done at the end of the chapter. The players will be given a crafting recipe for each key item in a form of poem. Decoding the poem would reveal the ingredients needed to craft the items, but players may try their luck to blindly guess the ingredients, which in Minecraft players can try crafting new item using random items available. Figure 10 shows a screenshot of crafting system in Minecraft.

Figure 10: Crafting system in Minecraft

2.3.3 The Legend of Zelda: Breath of The Wild

In the last chapter of the video game, players are tasked with defeating the final boss to free the spirit. Initially, it is thought that the final boss cannot be beaten, but with the crafted items, players can weaken the boss as the items will be used to conduct a Bidayuh ritual to ask for the ancestor spirits's help to defeat the boss. The gameplay is inspired by the universally acclaimed video game, The Legend of Zelda: Breath of The Wild (BOTW). In BOTW, players are encouraged to complete several optional main quests to defeat the main antagonist of the game, Calamity Ganon. The optional main quests mentioned are freeing four divine beasts to help weaken the final boss. The reason is the Calamity Ganon is too hard to be defeated without getting help from the four divine beast machines (Rodriguez, 2024). Figure 11 and figure 12 shows the before and after health of Calamity Ganon after getting weakened by the Divine Beasts respectively.

Figure 11: Calamity Ganon health before getting weakened

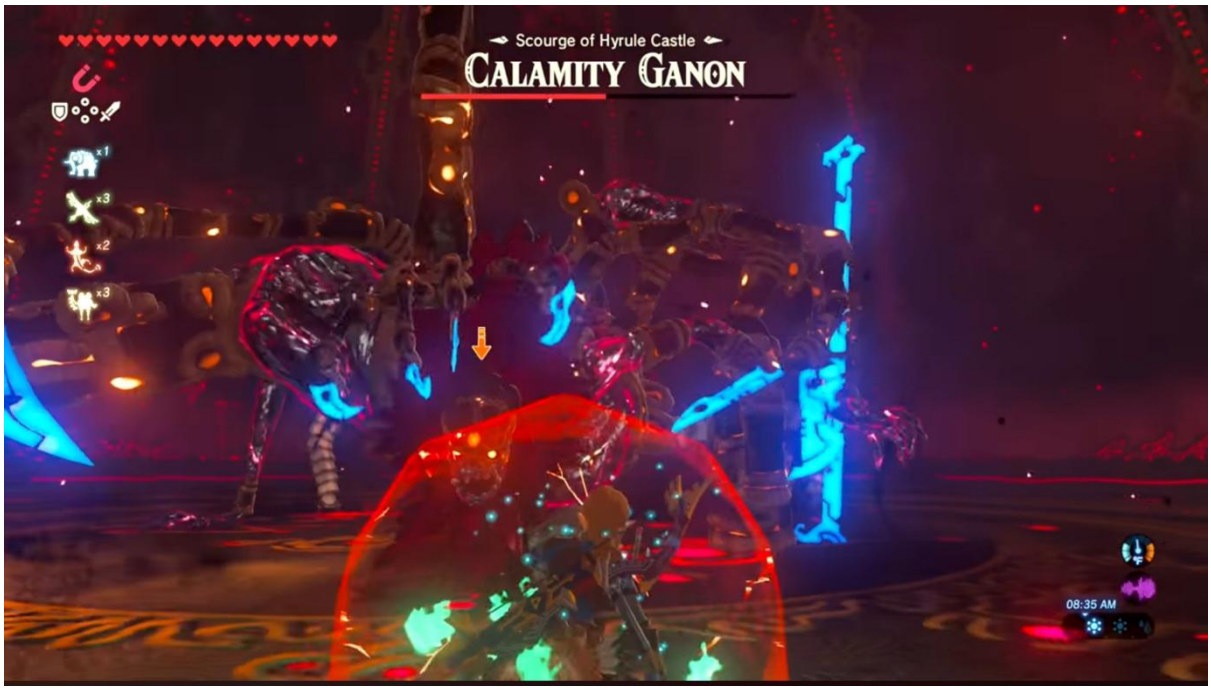

Figure 12: Calamity Ganon health after getting weakened by Divine Beasts

As for the video game in the project, the main goal of each chapter is loosely based on BOTW optional main quests, albeit it is not optional but rather a requirement to complete the

chapter. At the end of each chapter of the video game excluding the last chapter, players will obtain the crafted items that can be used in the last chapter as means to weaken the final boss and ultimately defeat it.

2.4 Discussion

Educational video game can be a very effective way to preserve and promote cultural heritage. Games like Assassin's Creed Unity and Roma Nova project have proven that players can immerse themselves in another culture through video game, as these games emphasize on providing accurate cultural heritage to players. Educational video game is also a good platform to teach their target audience on specific subject, whether it be programming concepts or cultural heritage. The engaging element of the educational video game allows for an active participation of players in consuming the educational content implemented in the video game. In this project, the video game will focus on providing accurate representation of Bidayuh culture. With the lack of educational video game about Bidayuh culture being developed, this project provides a perfect opportunity for producing one of only few video games that revolves around Bidayuh culture.

RPG element is adopted in the video game as it allows players to fully experience Bidayuh culture with its story-driven gameplay. In RPG games, transaction and quest systems are vital. These systems allow players to engage themselves in the game more and give players a sense of responsibility as they play the protagonist role in the game. The video game will implement these systems to make it more engaging. Craft system like in Minecraft is also implemented in the video game with the addition of inventory system. Inventory system will greatly help in providing educational content in the game, as players are able to read the information of an item from the inventory. Most of the in-game items are all related to Bidayuh

items, traditions and Gawai ritual. This addresses the potential issue of this project, which is the lack of interactivity and enjoyability elements in the educational video game.

2.5 Summary

In this chapter, the history of video game, the effectiveness of educational video game and the role of video game in culture preservation are discussed. The literature review has proven that video game is the perfect platform to promote Bidayuh culture, while providing both enjoyment and educational content. The gameplay and game mechanics inspirations are also reviewed in this chapter. The game will have RPG-like gameplay and players will take on a role as the protagonist of the game. The game will have crafting system and transaction system in the game.

CHAPTER 3: REQUIREMENTS ANALYSIS AND DESIGN

3.1 Introduction

In this chapter, the requirements analysis and the design of the project are discussed. The main elements of the video game, which include storyboarding, media, game mechanics and tools used are also reviewed.

3.2 Storyline

The game's storyline is heavily influenced by Bidayuh culture and heritage with a twist of fantasy. The game revolves around the main character of the video game, a Bidayuh guy who is responsible for organizing a Gawai festival in his hometown. The Gawai festival can only be organized if the Gawai spirit is there to help the main character, but the Gawai spirit was kidnapped by an evil spirit, which makes it impossible to organize the Gawai festival. To save the Gawai spirit, the main character must get help from his Bidayuh relatives and friends in his grandparents' village.

In the village, the main character will take up jobs to earn money and items. The items can be used to craft an item that will be used in a ritual perform by the villagers to help defeat the evil spirit and eventually release the Gawai spirit. The purpose of the ritual is to request help from the ancestors' spirit to weaken the evil spirit. This storyline preserves the educational element of the game, which the main goal of the game is to promote Bidayuh culture while also providing engaging gameplay. Fantasy element is implemented in the storyline of the game. The element combines well with the mystic elements of Gawai ritual that is performed by Bidayuh people.

3.3 Media Used

This game will use different types of media to enhance the interactivity and aesthetics of the video game.

Image

The core component of the game, which is the visual of the game will utilise images. The background, character design, and user interface (UI) are designed and made into images first before being put into the game. Sprites, which are the game main components, are made using images. Characters, buildings, and objects in the gameplay are all sprites. To animate the character sprites as if it is actually walking, the protagonist will have many sprites that consist of each walking movement frame.

Audio

Other than image, audio is also main component of the game. In the game, a background theme will accompany the player throughout the whole gameplay. The background theme will be different based on the scenario in which the player is currently playing.

3.4 Game Elements from Literature Review

In literature review, several game elements have been reviewed and will be implemented in the development of the video game. The game will have a story driven gameplay as it enhances the players' experience. The game will also implement RPG style gameplay that includes quest and transaction elements which allows players to fully immerse themselves in the game as the main character. Inventory system will also be implemented as the game revolves around dealing with items in the game. Inspired by Minecraft, the game will have a crafting system as the main element of the game to progress in the game.

3.5 Game Mechanics

2D Graphics Style

The video game will utilise two-dimensional (2D) graphics style. 2D graphics use flat sprites as the graphic elements in the game, such as the characters and buildings. The movement of main character is limited to up, down, left, and right. As there is only one person in the development of the video game, it is sensible to use 2D graphics as the graphics style of the game as it is much easier to develop compared to 3D graphics style. Moreover, the lack of resources makes developing 3D graphics style hard to be realised.

Role-playing game (RPG) Style Interface

The video game will implement role-playing game (RPG) style interface. In this style, players can explore the Bidayuh village freely and interact with non-playable characters (NPCs) and objects. Players will also take the role of protagonist and every NPC in the video game will either play a major or minor role in the storyline. Additionally, players will be able to learn common Bidayuh language through interaction with NPCs and objects. Figure 13 shows the RPG gameplay interface of the game.

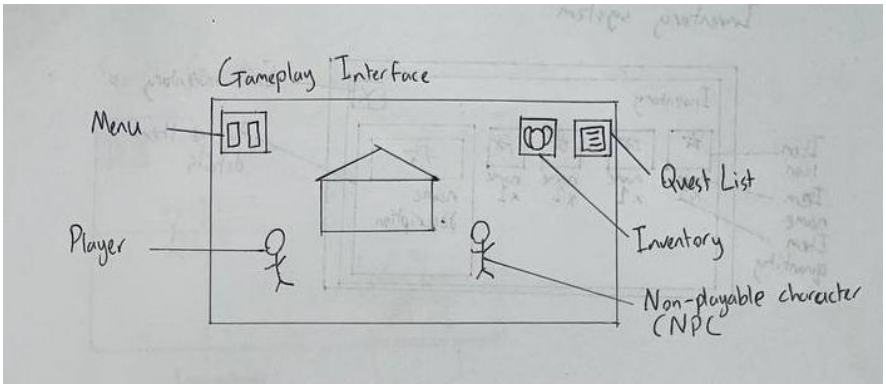

Figure 13: RPG gameplay interface

Inventory System

An inventory system will be implemented in the video game. The inventory system allows players to store items that they obtained from quests or interacting with in-game objects and characters. Players can read the description of the items in the game. Figure 14 shows the inventory system in the game.

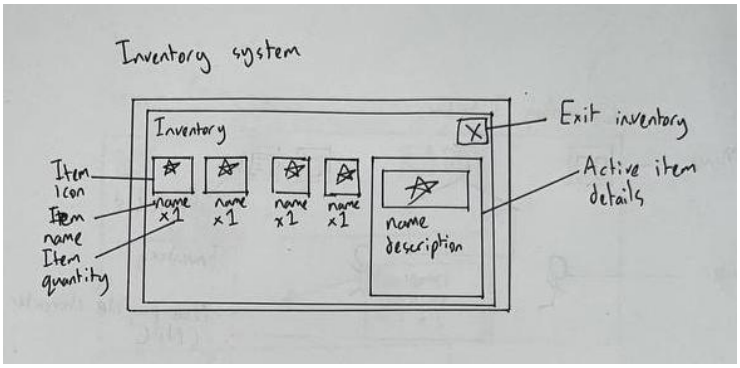

Figure 14: Inventory system

Quest System

Quest system will be implemented in the video game. In this system, players will be tasked with a main or secondary job. Only several NPCs will give the jobs to the player if the player interacts with them. Completing the job will reward players with in-game cash or items. Figure 15 show NPC giving quest to the player and quest details respectively.

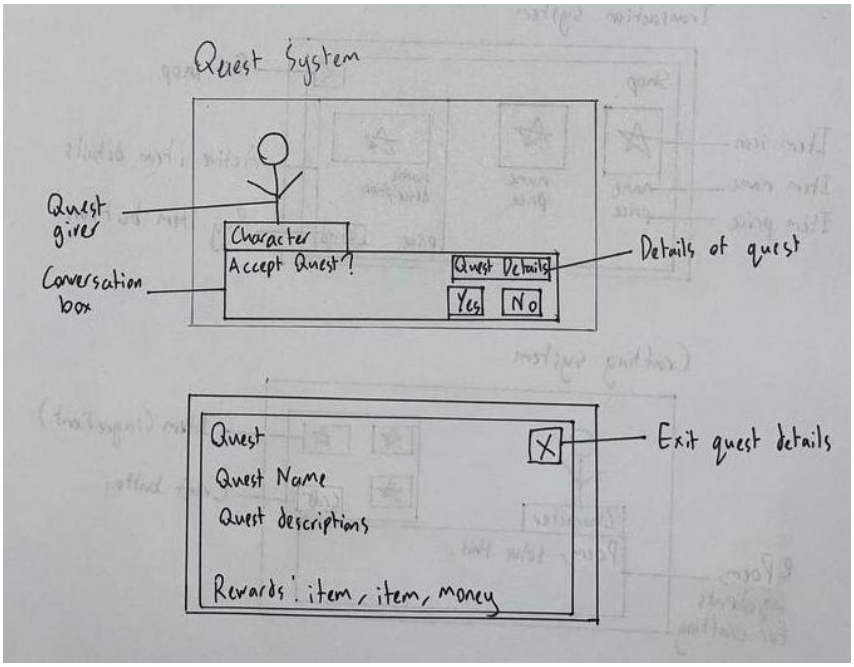

Figure 15: NPC giving quest and quest details respectively

Craft System

Craft system will be implemented in the video game. Players can make a new item using existing items in their inventory. This system will only appear when player interacts with certain NPCs that can create important item that will be used to defeat the evil spirit by utilizing the items in Bidayuh ritual. Figure 16 shows the quest system interface.

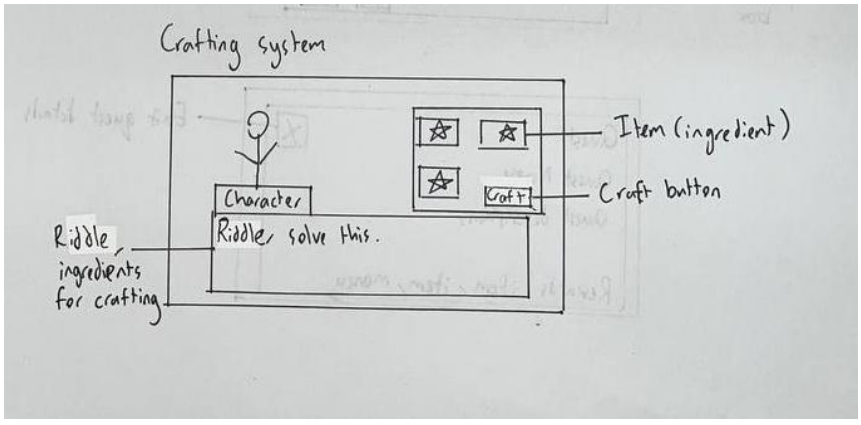

Figure 16: Quest system

Transaction System

Transaction system will be implemented in the game. Players can purchase items that cannot be found through searching and interactions in a shop. Figure 17 shows the transaction system in the game.

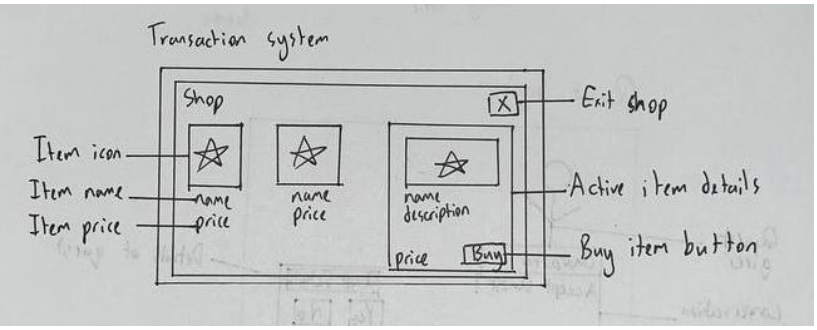

Figure 17: Transaction system

Search Mechanic

The search mechanic is a gameplay where players can search and earn items through interaction with interactable objects and NPCs. Figure 18 shows the search gameplay of the game.

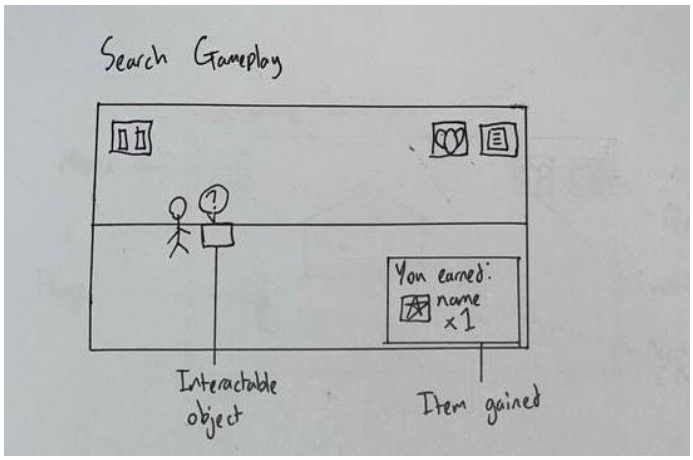

Figure 18: Search gameplay mechanic

Encyclopaedia

In the game, players may access the encyclopaedia to learn more about Bidayuh culture based on the interactions that they had with items or characters. Through this encyclopaedia, players can learn more about Bidayuh objects, dishes, languages, and crafts. Figure 19 shows the encyclopaedia interface. The object list will be empty initially, but as the player progresses through the game, the list will eventually be filled up with information about Bidayuh objects, dishes, languages, and crafts.

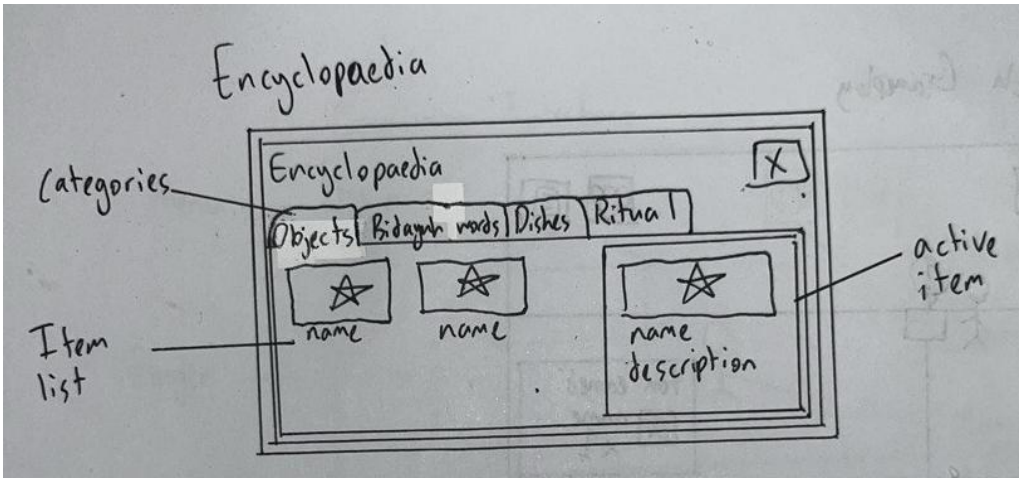

Figure 19: Encyclopaedia

Gameplay

The main objective of the game is to defeat the evil boss to save the Gawai spirit. To do so, players are required to perform a Bidayuh ritual with Bidayuh villagers. In the game, players can explore the Bidayuh village. Through this gameplay mechanic, they may get a job or items by interacting with objects and characters. Completing the quest will reward players with in-game cash and items. The cash can be used to purchase items. The items earned can be used to craft items for Bidayuh ritual purposes. Figure 20 shows the gameplay loop.

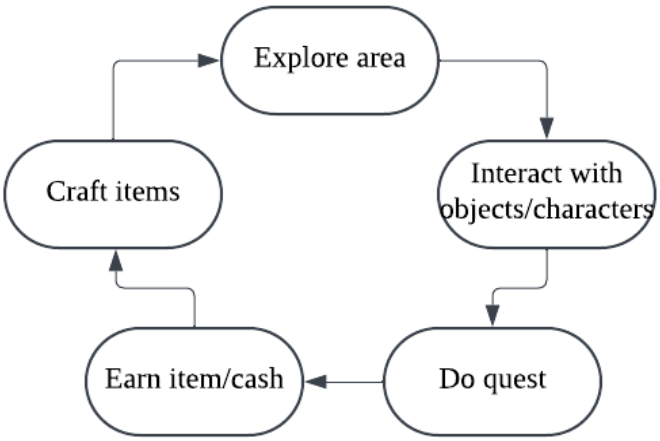

Figure 20: Gameplay Loop

3.5 Hardware Requirements

The development of the video game is solely done in a laptop. The laptop model is GIGABYTE G5 KE and the specs of the laptop are as below:

Table 1: Hardware Requirements

Specs	**Description**
12th Gen Intel® Core™ i5-12500H 2500MHz (12 cores/16 threads)	The Intel i5-12500H is a processor that has 12 cores and a total of 16 cores and uses Alder Lake-H architecture. This processor is great in video game development as it specializes in multitasking processes.
NVIDIA GeForce RTX 3060 Laptop GPU (6GB VRAM)	The NVIDIA GeForce RTX 3060 Mobile is a graphics processing unit (GPU) that has 6GB video random-access-memory (VRAM). This GPU is exceptionally good in

	this project as it can handle Unity game engine quite well. This GPU can only operate if the laptop is charged.
Intel® Iris® Xe Graphics	The Intel Iris Xe Graphics is an integrated GPU. This GPU is adequate when making and editing designs for the video game when the laptop runs on battery.
Windows 11 Home Single Language 24H2	Windows 11 Home is used as the operating system (OS) of the laptop. With the frequent system and security updates for this OS, it is perfect for this development as it ensures the laptop is in optimal condition for the development
16GB RAM	The random-access-memory (RAM) size of the laptop is 16GB. This provides smooth development of the video game as it can run any software used in this project without issues.
1920x1080 32bit (ClearType) Screen	The screen used in this laptop is 1920x1080 32bit (ClearType) screen. This screen is enough for the project as it can display accurate colours of the video game prototype.

3.6 Testing Method

The testing method of the video game involves 30 people to play the working prototype of the game. After finishing the video game, each tester will be asked to fill out a questionnaire to evaluate the overall experience of the game. The questionnaire model is based on ENI CBC Med. (n.d.) questionnaire template for game testing.

Demographic Information

Table 2: Demographic Information

Demographic Information	**Answers Options (if applicable)**
Name	
Email	
Age	
How often do you play video game	Never Rarely: from time to time Monthly: at least once a month Weekly: at least once a week Daily: every day.
How proficient are you in using computers?	Novice Intermediate Advanced
What type of device do you use for playing digital games? [Select all those that apply]	Computer device Gaming console device Handheld gaming device Mobile devices (smartphones, tablets)

	AR headsets VR headsets
How often do you play non-digital games (card or board games, etc.)?	Never Rarely: from time to time Monthly: at least once a month Weekly: at least once a week Daily: every day

SUS Questionnaire

Table 3: SUS Questionnaire

Statements	**Select an option as your evaluation**				
	Strongly disagree	**Disagree**	**Neither disagree nor agree**	**Agree**	**Strongly agree**
I think that I would like to use this game frequently					
I found the game unnecessarily complex					
I found the various functions / stages in this game were well integrated					

I would imagine that most people would learn to play this game very quickly					

Nasa Task Load Index (TLX) Questionnaire

Table 4: Nasa Task Load Index (TLX) Questionnaire

Statements	**Degree**						
	1	**2**	**3**	**4**	**5**	**6**	**7**
How mentally demanding was the gaming experience/task?							
How physically demanding was the gaming experience/task?							
How hurried or rushed was the pace in the game?							
How successful were you in accomplishing what you were asked to do?							
How hard did you have to work to accomplish your level of performance?							
How insecure, discouraged, irritated, stressed and annoyed were you?							

Ad-hoc Game Experience Questionnaire

Table 5: Ad-hoc Game Experience Questionnaire

Statements	**Select an option as your evaluation**

	Strongly disagree	**Disagree**	**Neither disagree nor agree**	**Agree**	**Strongly agree**
The game design is attractive					
The game rules are clear and easy to understand					
The game objectives are clear and easy to understand					
The game captured my attention rapidly					
The material/devices provided are adequate					
The game evolution (content, phases, storyline) is coherent					
The game story line can be easily understood					
The game complexity levels are adequate					
I felt involved in the game experience					
I think the games provide delightful surprises (e.g.					

hidden stories, rewards, unexpected events…)					
The game duration is adequate					
I think the game is unique or original					
I liked the game					

Specific Ad-hoc Questions [Optional]

Please, list two/ three strong aspects or benefits of the game: _____

Please, list two/ three weak aspects or limitations of the

game: _____

Please, add any further comment or suggestion, if you wish: _____

Net Promoter Score (NPS)

To what degree would you recommend this game to someone else. (0 to 10)

Questions after all Gaming Experience

Table 6: Questions after all Gaming Experience

Statements	**Select an option as your evaluation**				
	Strongly disagree	**Disagree**	**Neither disagree**	**Agree**	**Strongly agree**

			nor agree		
I think the availability of this kind of game becomes a useful tool to get richer knowledge about Bidayuh culture					
I like learning about Bidayuh culture through gamified experiences					
The overall gaming experiences fulfilled my expectations					
In general, I am satisfied with the overall gaming experiences					
The availability of these kinds of games about Bidayuh culture can help in promoting Bidayuh culture to non-Sarawakian youth					

CHAPTER 4: IMPLEMENTATION

4.1 Introduction

This chapter describes the development of the working prototype of the video game. The assets creation is also explained in this chapter, together with the coding of the gameplay logic. The software requirements are listed in this chapter.

4.2 Software Requirements

Table 7 Software Requirements

Software	**Description**
Unity Game Engine	Unity Game Engine is a game engine used to develop 2D and 3D software, particularly video game. Unity is used in this project as it provides intuitive design for developers and can be used as a framework.
Procreate	Procreate is a drawing software. This software is used to draw characters and scenery in the game.
Canva	Canva is a photo editing software. This software is used to edit interface of the game.
GarageBand	GarageBand is an audio editing software. This software is used to create the soundtracks in the game.

ChatGPT	ChatGPT is used to aid in the design of the characters and the scenery by generating related images.

4.3 Unity Configuration

In the Unity Hub, click on the 'Install Editor' button to install the Unity 6 version on the Installs page.

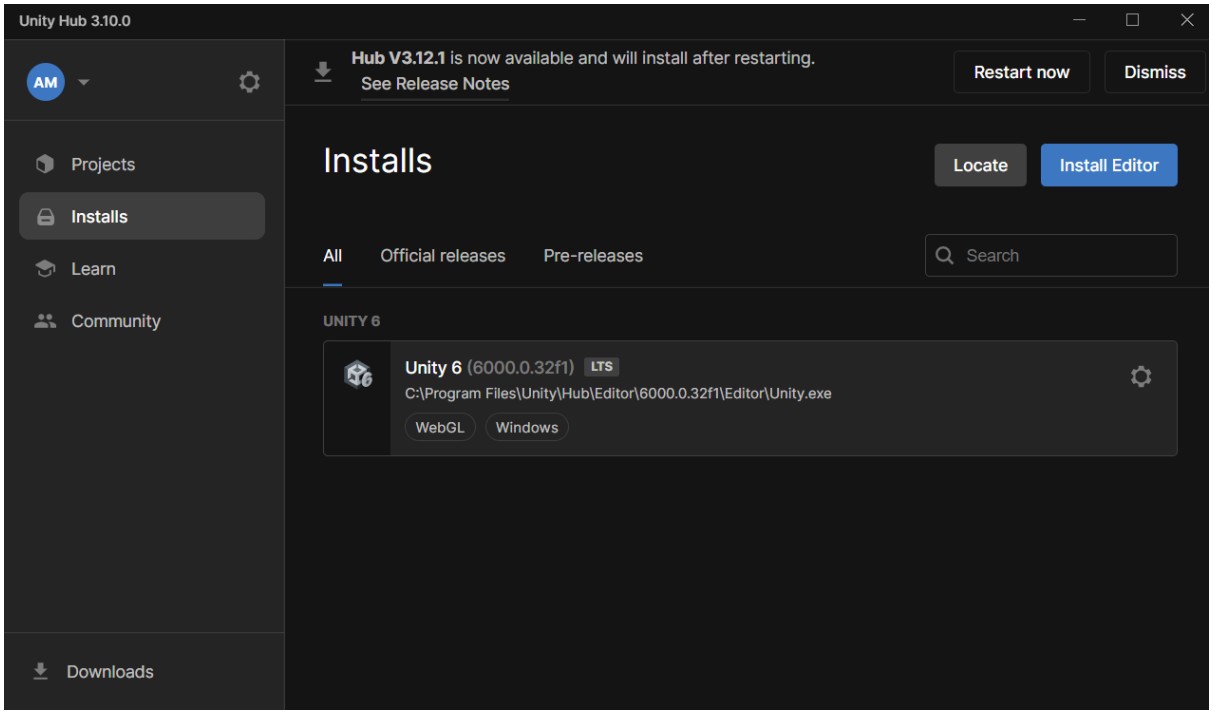

Figure 21 Unity Hub

On the Projects page, create a new project by clicking the 'New Projects' button.

On the popup screen, choose the "Universal 2D" template for the Spirits of The Harvest project. This template is used as the game uses 2D graphics. Project Settings are configured based on the project requirements.

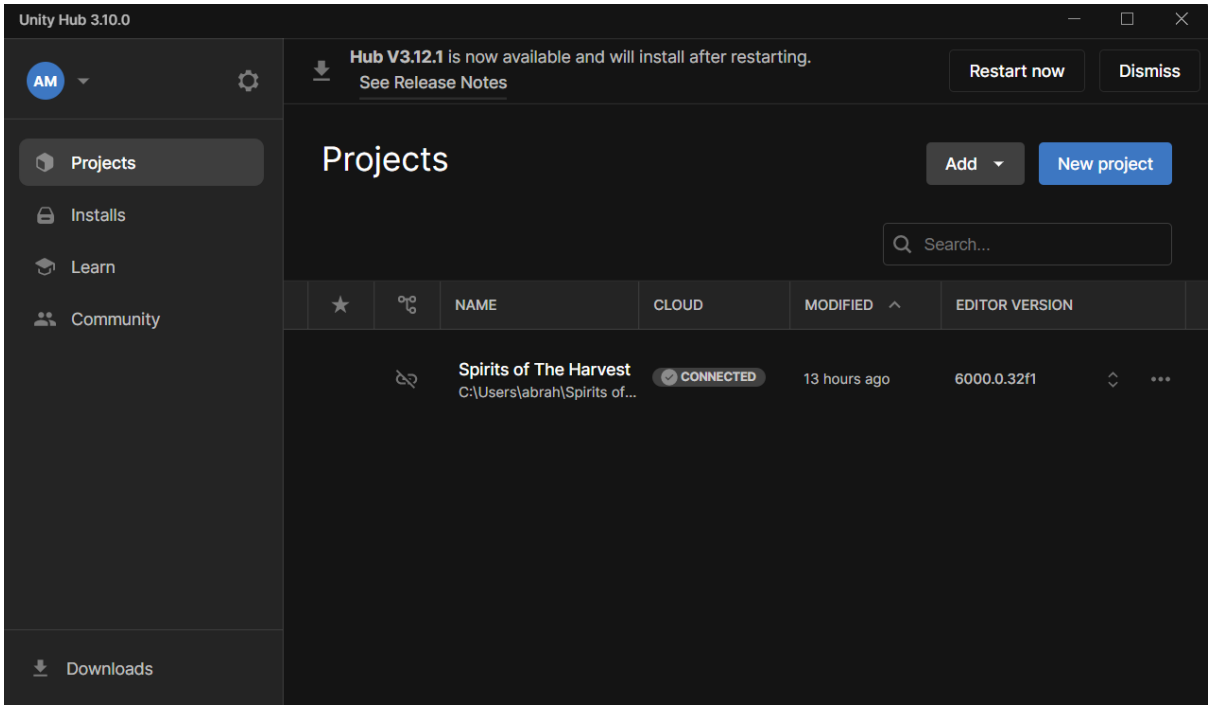

Figure 22 Unity Hub

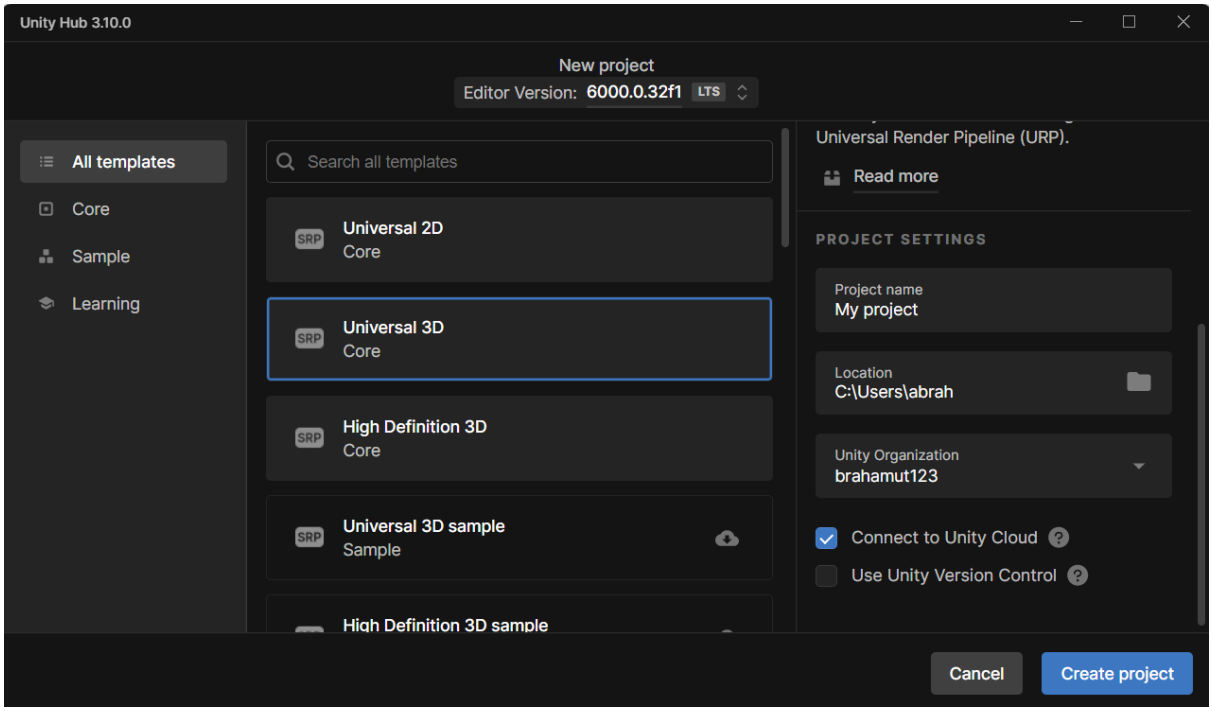

Figure 23 Project Page Unity Hub

4.4 Assets Design Process

Procreate is used as software to draw character sprites.

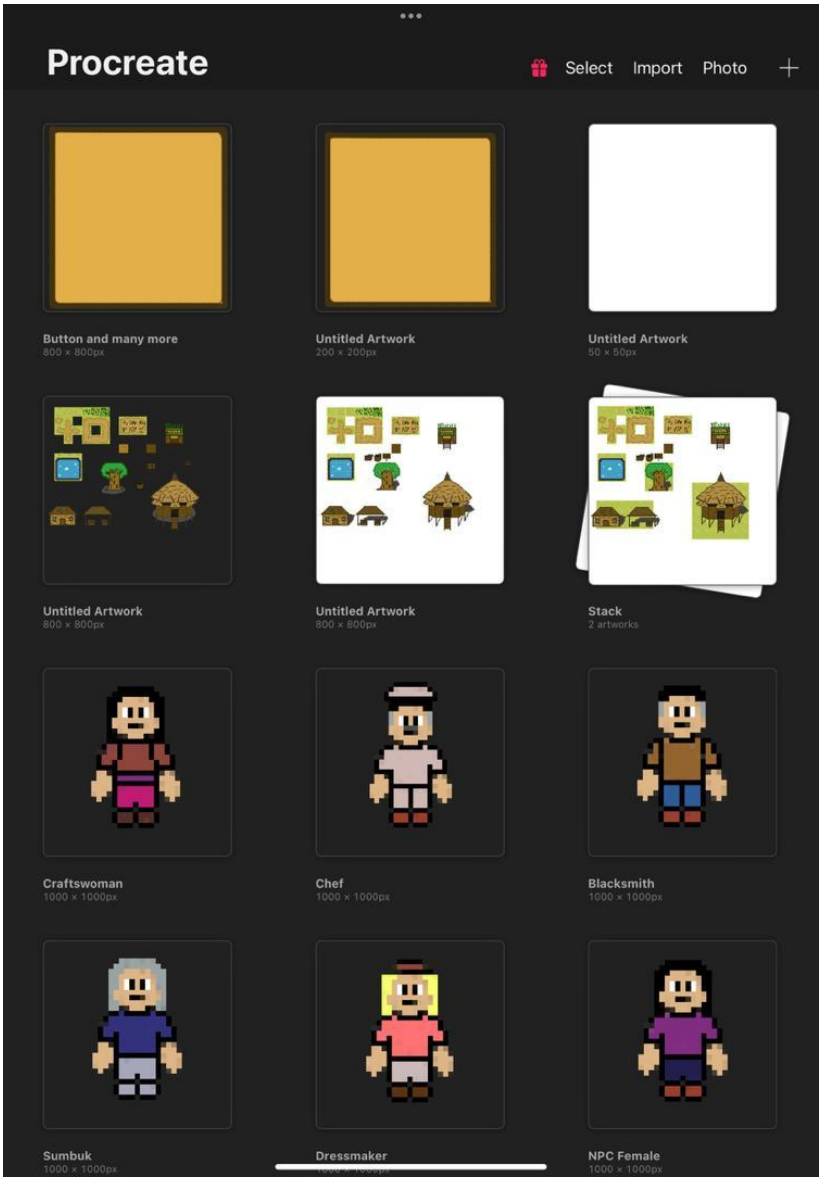

Figure 24 Procreate

Brush style that was used to draw character sprites were pixelated brush to evoke the nostalgic feel of retro 2D pixel art games.

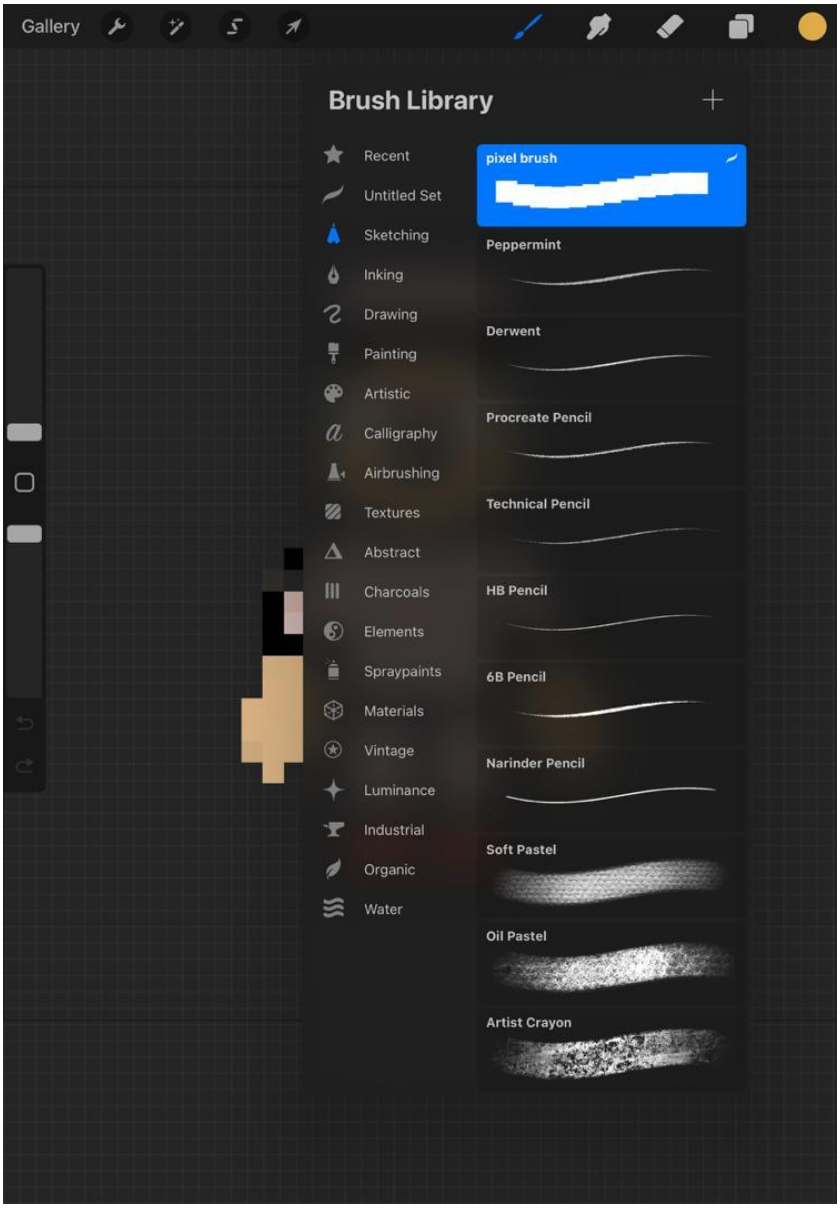

Figure 25 Brush Style

Due to limited drawing skills, characters and objects were designed with simple, minimalistic shapes. This enhances the traditional charm of the game.

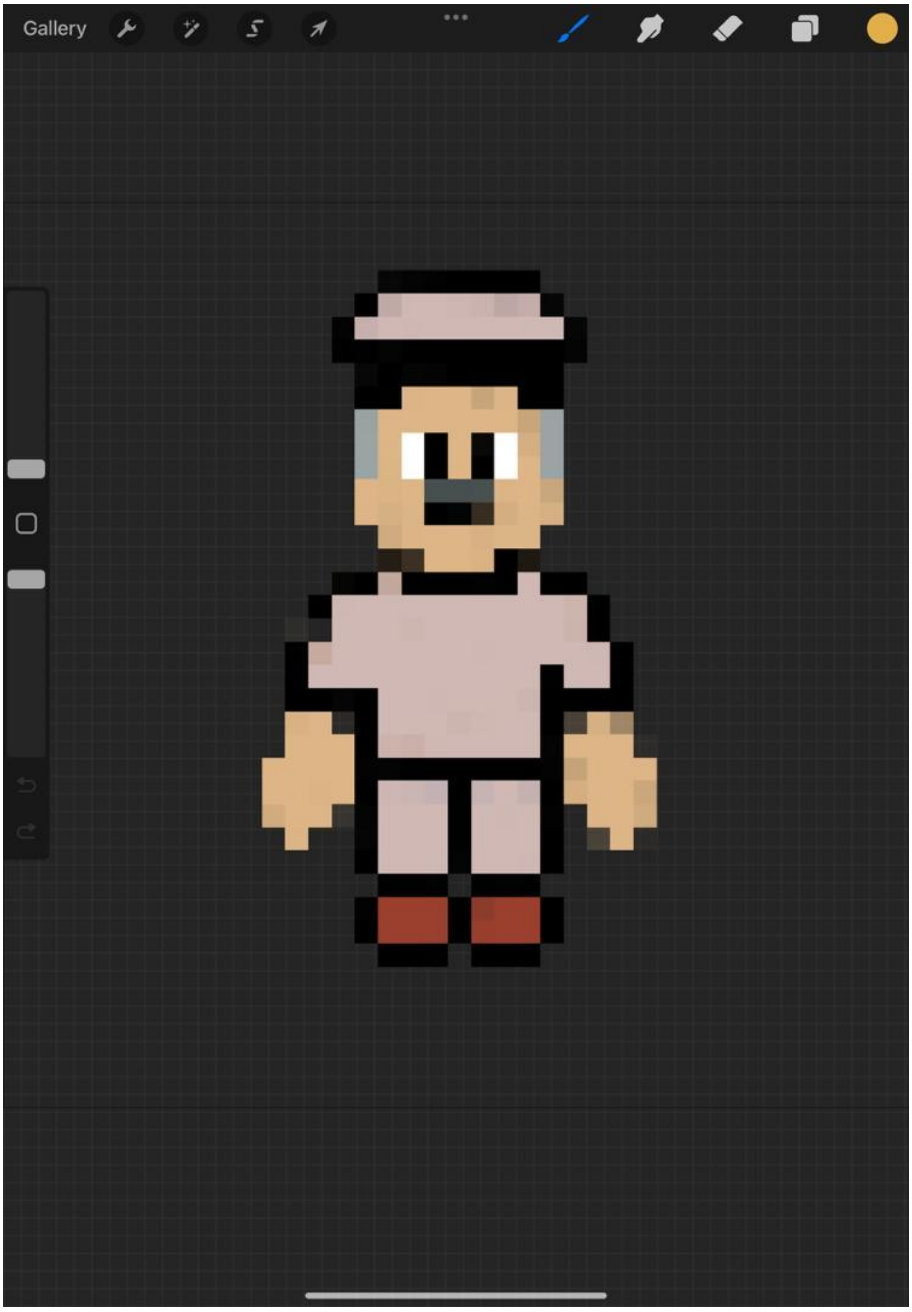

Figure 26 Character Design

Assets Creation

Key buildings such as houses and baruk (traditional Bidayuh structure) were drawn manually using Procreate. A variant of the Sarawak-style house was generated using AI (ChatGPT image generation). Objects such as stove, sewing machine, and crafting table were created using AI tools. Buttons and interface components were drawn digitally using procreate. The popup info

bubble for dialogues was generated using AI. Sound effects in the game were created using GarageBand.

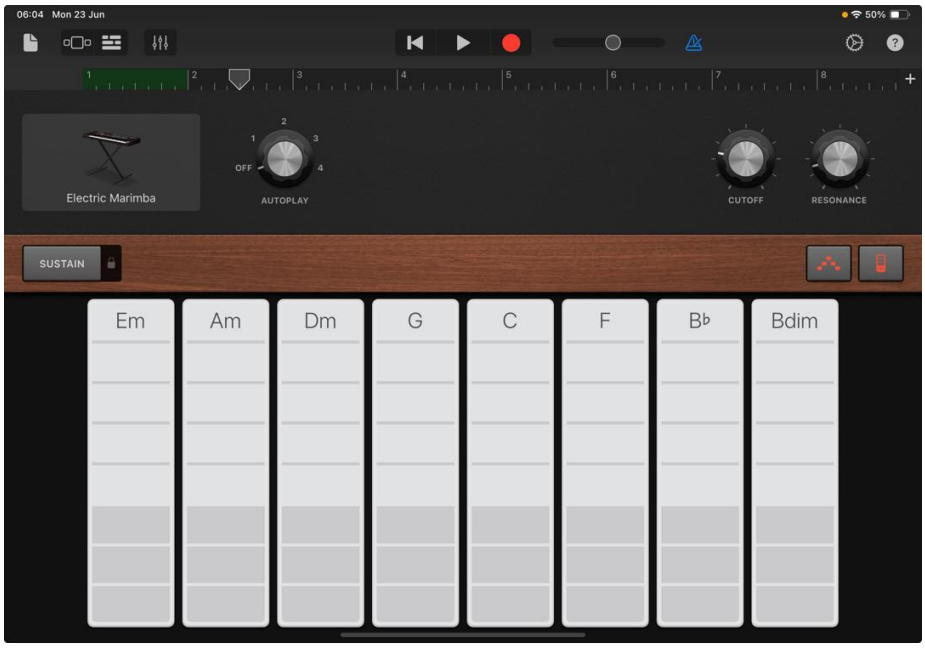

Figure 27 GarageBand

Background music of the game was generated using Suno AI.

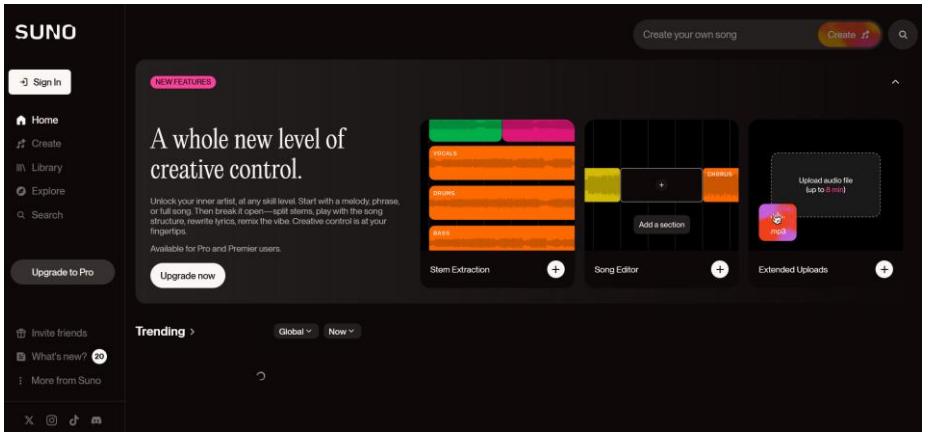

Figure 28 Suno AI

4.6 Dialogue Generation

Sources

There are dialogues that were generated using AI and there are also dialogues that were made using information available through Internet, literature and from knowledgeable Bidayuh people.

Educational elements

There are dialogues that include Bidayuh vocabulary with in-line translations to give player context of the words used. Cultural and historical Bidayuh facts are included in some of the conversations in the game to enhance cultural awareness.

Figure 29 Dialogue With Translation

Gameplay purpose

Some dialogues are functional, which help players to understand objectives or progress in quests.

Figure 30 Dialogue with Trivia

4.7 Prototype Development

Quest System

The quest system is managed using a script called QuestController.cs. This script is responsible for checking active quests, checking objectives, updating quest progress and handling the completed quests.

There are two main quest types, item collection quests (gathering specific resources) and location-based quests (reaching designated areas on the map).

There are many key functions in QuestController.cs, which are:

1. Accepting and activating quests
2. Tracking collected items or visited locations
3. Checking for quest completion
4. Handing in completed quests and rewarding players
5. Synchronizing the UI with the current state of quests

Code snippet of QuestController.cs

```
public class QuestController : MonoBehaviour
{
    public static QuestController Instance { get; private set; }
    public List<QuestProgress> activateQuests = new();
    private QuestUI questUI;
    private BoundingMapTracker mapTracker;
    public List<string> handInQuestIDs = new();

    private void Start()
    {
        mapTracker = FindObjectOfType<BoundingMapTracker>();
    }

    private void Awake()
    {
        if (Instance == null)
            Instance = this;
        else
            Destroy(gameObject);
```

```
    questUI = FindObjectOfType<QuestUI>();
}

public void AcceptQuest(Quest quest)
{
    if (IsQuestActive(quest.questID)) return;

    var newQuestProgress = new QuestProgress(quest);
    activateQuests.Add(newQuestProgress);
    CheckPreviouslyVisitedLocations(newQuestProgress);
    questUI.UpdateQuestUI();
}

public void UpdateLocationObjective(string locationName)
{
    foreach (var quest in activateQuests)
    {
        foreach (var objective in quest.objectives)
```

```
        {
            if (objective.type == ObjectiveType.ReachLocation &&
                objective.objectiveID.ToLowerInvariant() == locationName.ToLowerInvariant()
&&
                !objective.IsCompleted)
            {
                objective.currentAmount = 1;
            }
        }
    }
    questUI.UpdateQuestUI();
}

public void UpdateItemObjective(int itemID, int amount)
{
    string itemIDString = itemID.ToString();
    foreach (var quest in activateQuests)
    {
        foreach (var objective in quest.objectives)
```

```
        {
            if (objective.type == ObjectiveType.CollectItem &&
                objective.objectiveID == itemIDString &&
                !objective.IsCompleted)
            {
                objective.currentAmount += amount;
                if (objective.currentAmount > objective.requiredAmount)
                    objective.currentAmount = objective.requiredAmount;
            }
        }
    }
    questUI.UpdateQuestUI();
}

public void HandInQuest(string questID)
{
    if (!CheckIfObjectiveCompleted(questID)) return;

    QuestProgress quest = activateQuests.Find(q => q.QuestID == questID);
```

```
        if (quest != null)
        {
            SoundEffectManager.Play("ReceivedCoin");
            handInQuestIDs.Add(questID);
            activateQuests.Remove(quest);
            FindObjectOfType<Money>().AddMoney(quest.quest.reward);
            questUI.UpdateQuestUI();
        }
    }
}
```

Inventory System

The inventory system enables players to store, view and interact with collected, bought and crafted items.

Core features:

1. Items are displayed in slots within the UI
2. Each slot shows the item icon and name
3. A separate temporary slot system that allows referencing items without removing them from main inventory.
4. Supports saving and loading item data.

Code snippets of InventoryController.cs:

Adding items to inventory

```
public bool AddItem(GameObject itemPrefab)
{
    foreach (Transform slotTransform in inventoryPanel.transform)
    {
        Slot slot = slotTransform.GetComponent<Slot>();
        if (slot != null && slot.currentItem == null)
        {
            GameObject newItem = Instantiate(itemPrefab, slot.transform);
            newItem.GetComponent<RectTransform>().anchoredPosition = Vector2.zero;
            slot.currentItem = newItem;

            Item item = newItem.GetComponent<Item>();
            TextMeshProUGUI slotLabel = slot.GetComponentInChildren<TextMeshProUGUI>();
            if (slotLabel != null && item != null)
            {
                slotLabel.text = item.Name;
                slotLabel.ForceMeshUpdate();
            }
```

```
            QuestController.Instance.UpdateItemObjective(item.ID, 1); // Update quest progress
            UpdateAllButtonStates();
            return true;
        }
    }
    return false;
}
```

Creating and toggling temporary slots

```
public void ToggleTemporarySlots()
{
    temporarySlotsVisible = !temporarySlotsVisible;
    temporarySlotPanel.SetActive(temporarySlotsVisible);

    if (temporarySlotsVisible)
    {
        CreateTemporarySlots();
    }
```

```
}
```

Displaying item information

```
public void ChangeItemDescription(GameObject item)
{
    if (item != null)
    {
        Item itemComponent = item.GetComponent<Item>();
        itemIcon.GetComponent<Image>().sprite = item.GetComponent<Image>().sprite;
        itemName.GetComponent<TextMeshProUGUI>().text = itemComponent.Name;
        itemDesc.GetComponent<TextMeshProUGUI>().text = itemComponent.Description;
    }
}
```

Saving and loading inventory data

```
public List<InventorySaveData> GetInventoryItem()
{
    List<InventorySaveData> invData = new List<InventorySaveData>();
    foreach (Transform slotTransform in inventoryPanel.transform)
```

```
    {
        Slot slot = slotTransform.GetComponent<Slot>();
        if (slot.currentItem != null)
        {
            Item item = slot.currentItem.GetComponent<Item>();
            invData.Add(new InventorySaveData
            {
                itemID = item.ID,
                slotIndex = slotTransform.GetSiblingIndex(),
                itemName = item.Name
            });
        }
    }
    return invData;
}
```

Crafting system

Crafting system allows players to combine existing items and create new items based on predefined recipes.

The interface shows a craft button that is enabled if there is a valid combination, a temporary crafting panel with slots where platers place item references and UI elements that display the resulting item's icon, name and description

Crafting system flow:

1. Players drag item into temporary slots.
2. The system will check if the items match any recipe.
3. If a match is found, the resulting item's info is displayed and the craft button is enabled.
4. Upon pressing the craft button, the ingredients will be removed from the inventory, crafted item will be added to the inventory and temporary slots are cleared.

CraftController.cs Code Snippets

Recipe checking and result preview

```
public void CheckForValidRecipes()
{
   List<GameObject> temporarySlotItems = GetItemsInTemporarySlots();
   currentValidRecipe = null;

   foreach (CraftingRecipe recipe in availableRecipes)
   {
      if (recipe.MatchesRecipe(temporarySlotItems))
      {
```

```
            currentValidRecipe = recipe;
            Item itemComponent = recipe.resultItem.GetComponent<Item>();
            if (itemComponent != null)
            {
                itemSprite.GetComponent<Image>().sprite = itemComponent.GetComponent<Image>().sprite;
                itemName.GetComponent<TextMeshProUGUI>().text = itemComponent.Name;
                itemDesc.GetComponent<TextMeshProUGUI>().text = itemComponent.Description;
            }
            break;
        }
    }

    craftButton.interactable = currentValidRecipe != null;
}
```

Crafting the item

```
public void CraftItem()
{
```

```
    if (currentValidRecipe == null) return;

    RemoveItemsUsedInCrafting();
    bool itemAdded = inventoryController.AddItem(currentValidRecipe.resultItem);

    if (!itemAdded)
        Debug.LogWarning("Inventory full, cannot add crafted item!");

    ClearTemporarySlots();
    currentValidRecipe = null;
    craftButton.interactable = false;
}
```

Remove ingredients after crafting

```
private void RemoveItemsUsedInCrafting()
{
    foreach (Transform slotTransform in inventoryController.temporarySlotPanel.transform)
    {
        Slot slot = slotTransform.GetComponent<Slot>();
        if (slot != null && slot.referencedItem != null)
```

```
        {
            RemoveItemFromInventory(slot.referencedItem);
        }
    }
}

private void RemoveItemFromInventory(GameObject itemToRemove)
{
    foreach (Transform slotTransform in inventoryController.inventoryPanel.transform)
    {
        Slot slot = slotTransform.GetComponent<Slot>();
        if (slot != null && slot.currentItem == itemToRemove)
        {
            slot.currentItem = null;
            Destroy(itemToRemove);
            var label = slot.GetComponentInChildren<TextMeshProUGUI>();
            if (label != null) label.text = "";
            break;
        }
```

```
    }
}
```

Cleaning up the crafting panel

```
public void ClearTemporarySlots()
{
    foreach (Transform slotTransform in inventoryController.temporarySlotPanel.transform)
    {
        Slot slot = slotTransform.GetComponent<Slot>();
        if (slot != null)
        {
            if (slot.currentItem != null)
            {
                Destroy(slot.currentItem);
            }
            slot.currentItem = null;
            slot.referencedItem = null;

            var label = slot.GetComponentInChildren<TextMeshProUGUI>();
            if (label != null) label.text = "";
```

```
        }
    }
    ResetDisplay();
}
```

Interaction System

The NPC script enables interaction between players and various non-playable characters (NPCs). NPCs can initiate dialogues, offer quests, serve as shopkeepers or open crafting stations. The behavior is determined by the type of NPC and their configuration.

There are many features in this system, which are:

Multi-role NPCs. NPCs can be configured as shop vendors (isNPCShop), crafting stations (isCraftingStation) and dialogue-only characters.

Dialogue with quest integration. NPCs display different dialogue based on the quest state, which hare not started, in progress and completed. Quest progress is updated via dialogue choices and interactions.

Sample interaction logic

```
public void Interact()
{
    if (isNPCShop)
    {
```

```
        popup.ShowShopPopup();
    }
    else if (isCraftingStation)
    {
        popup.ShowCraftPopup();
    }
    else
    {
        if (dialogueData != null)
        {
            if (isDialogueActive) NextLine();
            else StartDialogue();
        }
    }
}
```

Quest-aware dialogue

```
private void SyncQuestState()
{
    if (QuestController.Instance.IsQuestCompleted(dialogueData.quest.questID))
```

```
        questState = QuestState.Completed;
    else if (QuestController.Instance.IsQuestActive(dialogueData.quest.questID))
        questState = QuestState.InProgress;
    else
        questState = QuestState.NotStarted;
}
```

Dialogue choices. Supports dialogue branching through DialogueChoice. Choices can either start a quest or lead to other dialogue lines.

Chained dialogues between NPCs. After a dialogue ends, the script can automatically start a dialogue with another NPC.

```
if (dialogueData.nextNPC != null)
{
    NPC nextNPC = FindNPCWithDialogue(dialogueData.nextNPC);
    nextNPC?.StartDialogue();
}
```

CHAPTER 5: TESTING

5.1 Introduction

This chapter provides the details of the testing phase of the project. The functional requirements are tested to check if the game mechanics mentioned in chapter 3 exist in the game and work without any problem in the game. The questionnaire for the testing phase mentioned in chapter 3 is also given out to 10 people who tested the working prototype of the game and the results are shown in this chapter.

5.2 Functional Requirements

Table 8 Functional Requirements

Functional Requirements	Status
The game has 2D graphics style	Exists and working
The game's interface is role-playing game (RPG) style	Exists and working
The game has inventory system	Exists and working
The game has quest system	Exists and working
The game has craft system	Exists and working
The game has transaction system	Exists and working

The game has search mechanic	Exists and working
The game has encyclopedia	Implemented in inventory system
The gameplay mentioned is the same as the gameplay of the actual prototype	Exists and working

5.3 Questionnaire Results

SUS Questionnaire

The System Usability Scale (SUS) provides assessment of the usability of the game.

Frequent Use Intention (Average: 3.4/5)

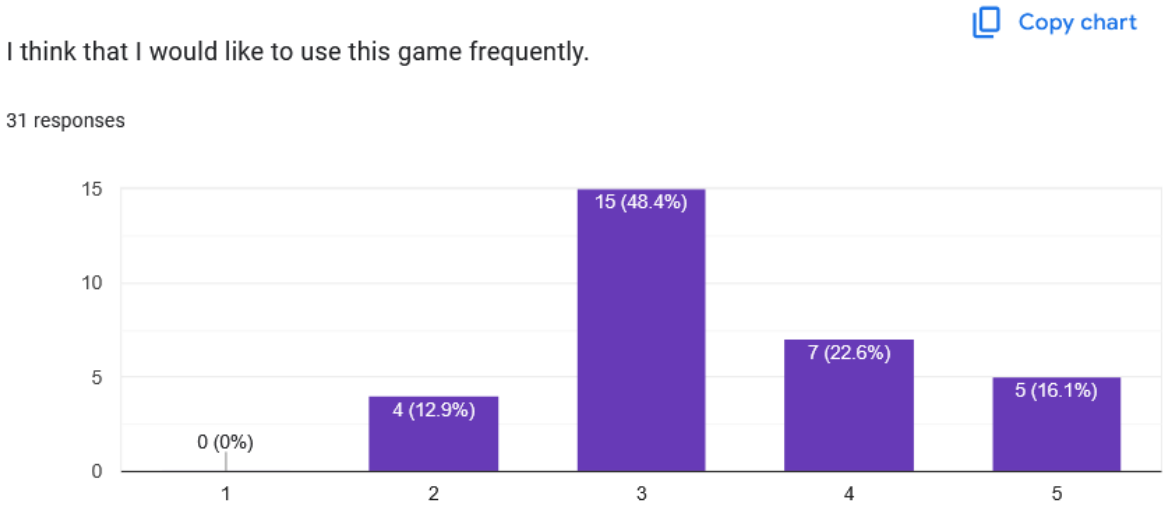

Figure 31 Frequent Use Intention

Participants who scored higher here give higher ratings in the Ad-hoc Game Experience Questionnaire, provide more positive comments about cultural learning in the open-ended sections and give higher Net Promoter Scores (NPS)

Perceived Complexity (Average: 2.7/5)

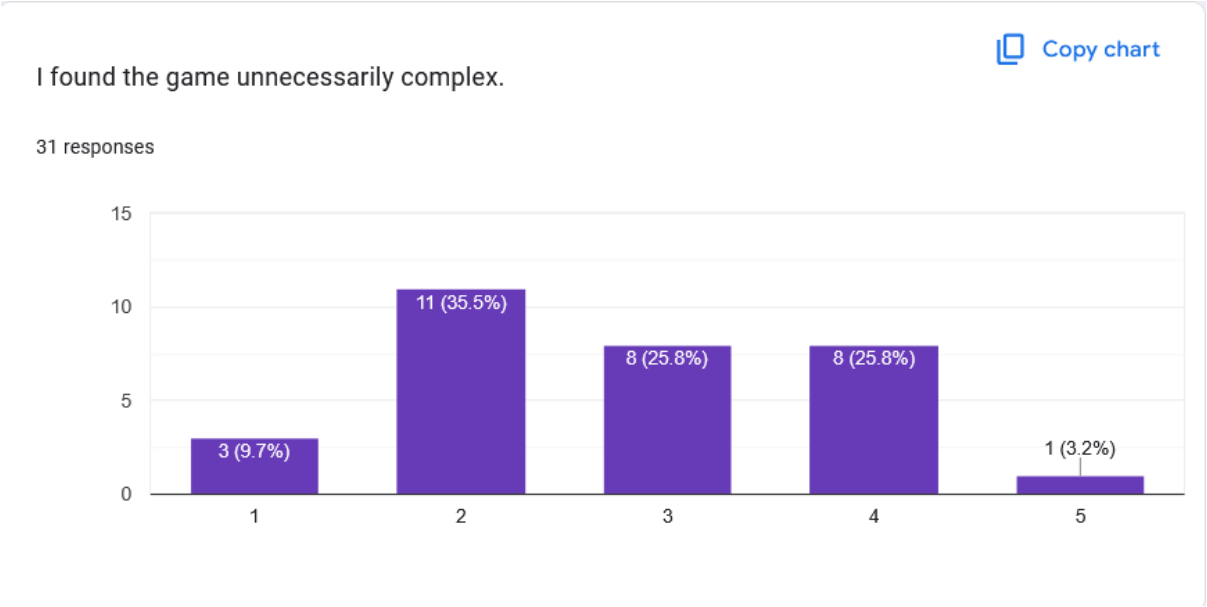

Figure 32 Perceived Complexity

The lower complexity ratings are related with higher scores on "game rules are clear" at ad-hoc section, lower mental/physical demand scores in the NASA-TLX questionnaire and fewer navigation-related complaints in the weak aspects' comments.

Function Integration (Average: 4.2/5)

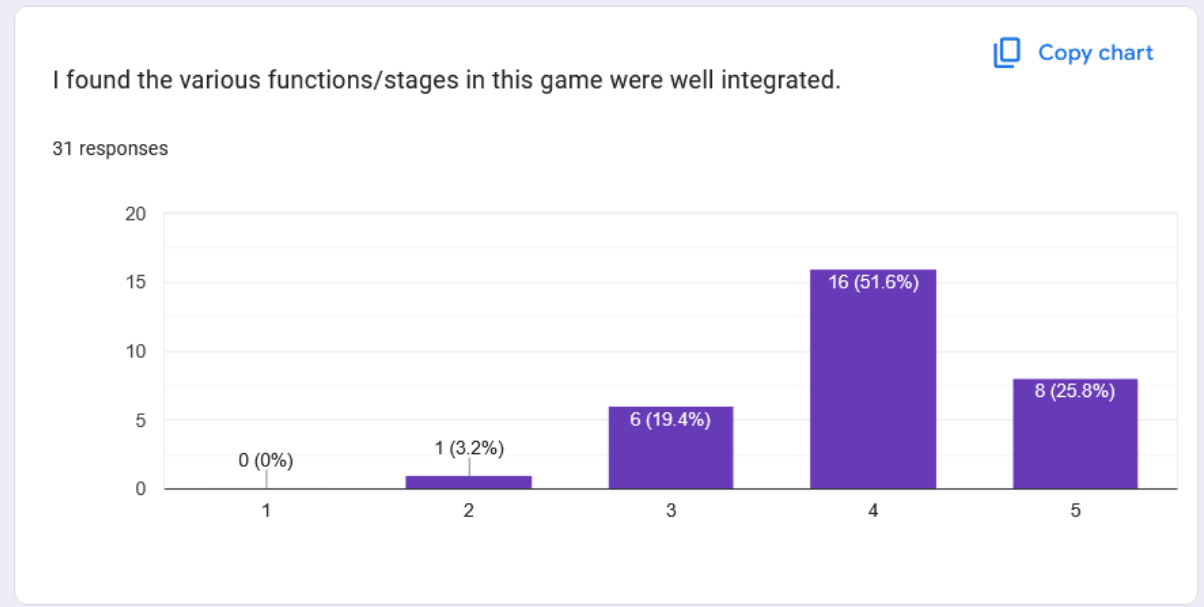

Figure 33 Function Integration

The strong integration score means higher coherence ratings in the game evolution question, more positive comments about game flow in the open-ended responses and higher satisfaction with overall gaming experience

Learnability (Average: 4.2/5)

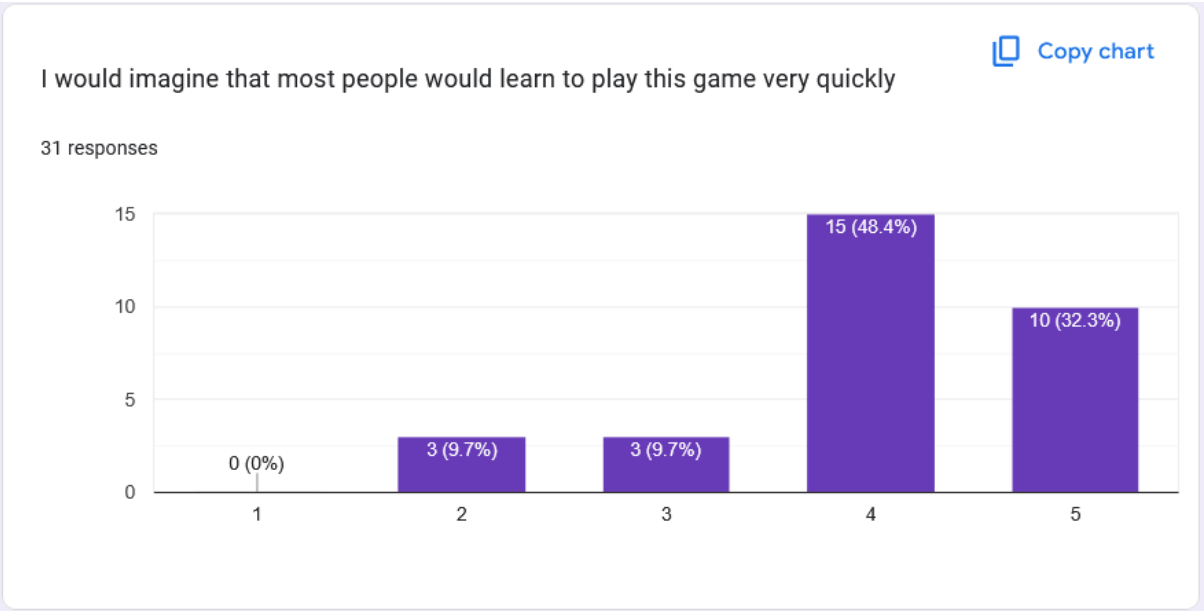

Figure 34 Learnability

High learnability scores are connected to lower mental demand in NASA-TLX questionnaire, more positive responses about game objectives clarity and higher ratings for cultural promotion potential, which is the main objective of educational gameplay

NASA-TLX Questionnaire

The NASA Task Load Index measures the workload perceived by the players throughout the whole gameplay.

Mental Demand (Average: 2.9/5)

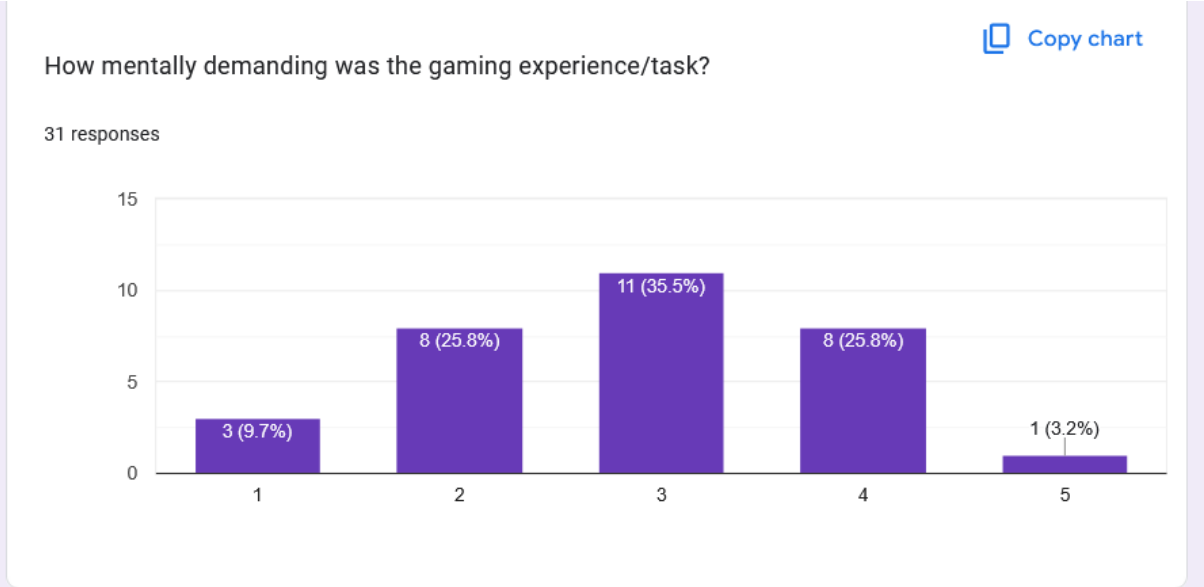

Figure 35 Mental Demand

Lower mental demand is associated with higher SUS usability scores, more positive evaluations of game instructions and rules clarity and higher rate to recommend the game

Physical Demand (Average: 2.1/5)

Figure 36 Physical Demand

The minimum physical demand in this part means fewer complaints about controls in the weak aspects' comments and higher ratings for device adequacy

Frustration (Average: 2.4/5)

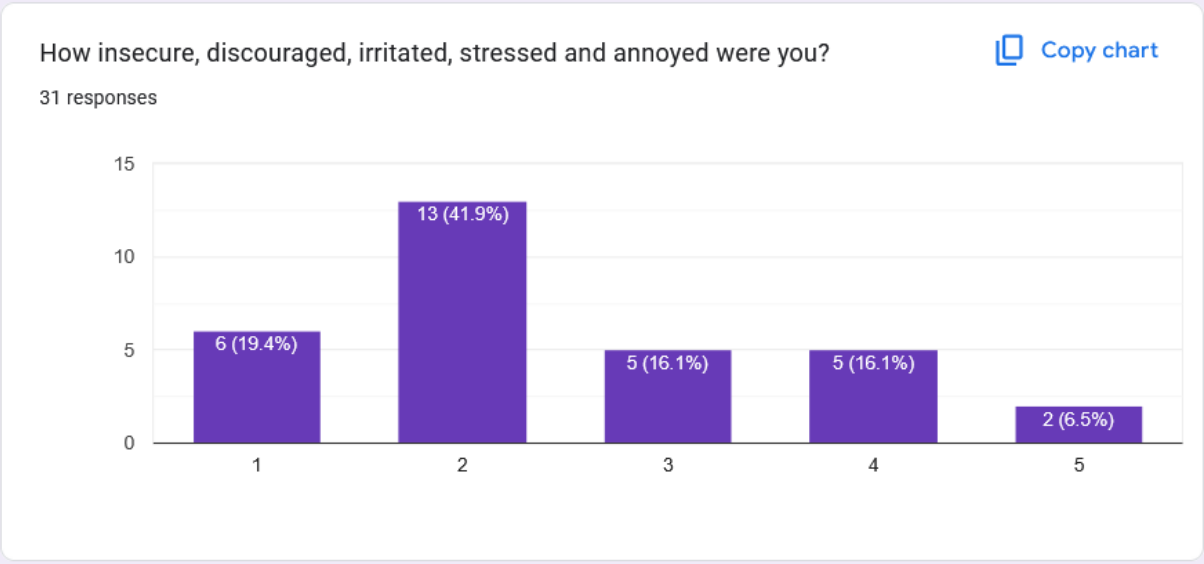

Figure 37 Frustration

Lower frustrations are related with higher scores on "I liked the game" question, more positive comments about cultural learning in the game and higher overall satisfaction ratings.

Ad-hoc Game Experience Questionnaire and Final Section

This part of questionnaire is about game experience evaluation.

Design Attractiveness (Average: 4.3/5)

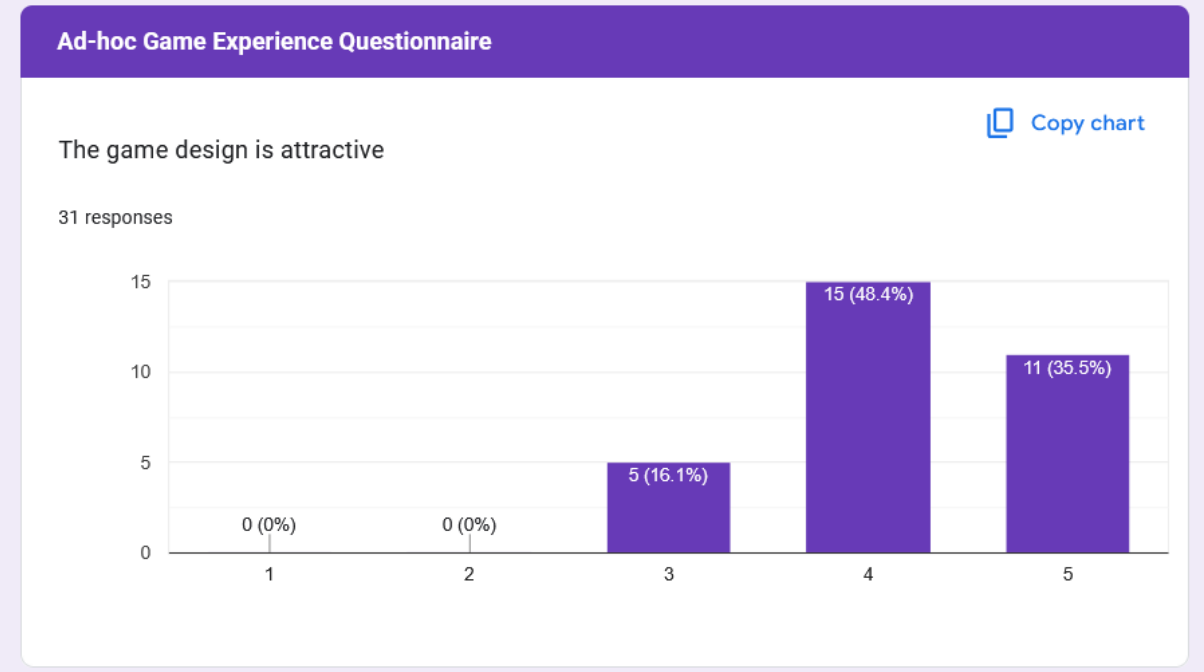

Figure 38 Design Attractiveness

The high scores of this result indicate greater agreement that the game promotes Bidayuh culture, higher likelihood to recommend the game and more enthusiasm in open-ended comments

Cultural Learning Elements

1. Storyline coherence (Average: 4.4/5)

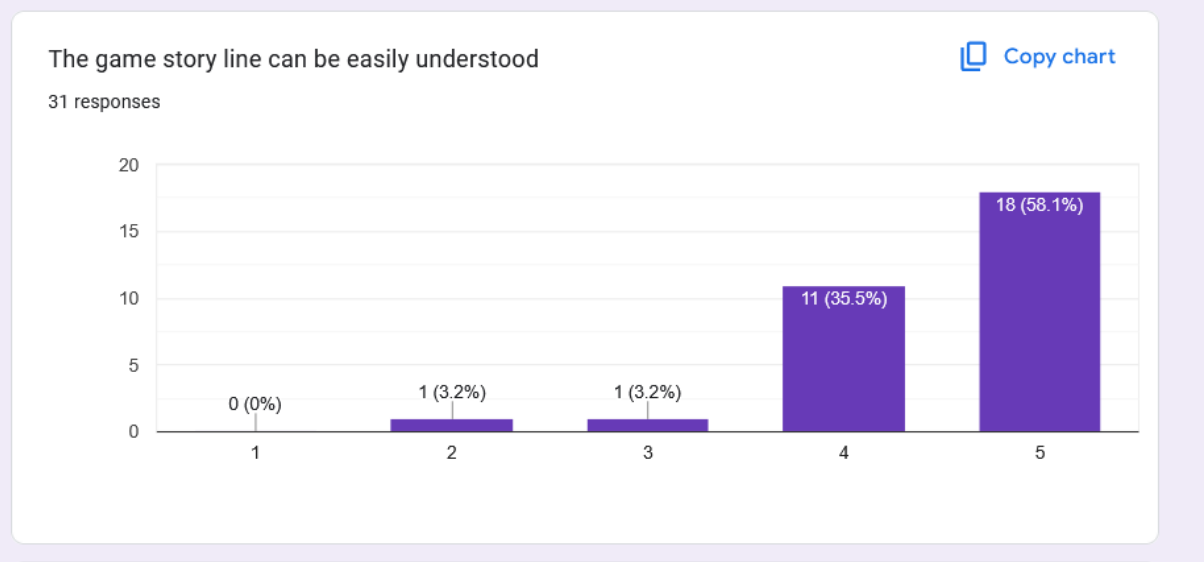

Figure 39 Storyline Coherence

2. Attention capture (Average: 4.3/5)

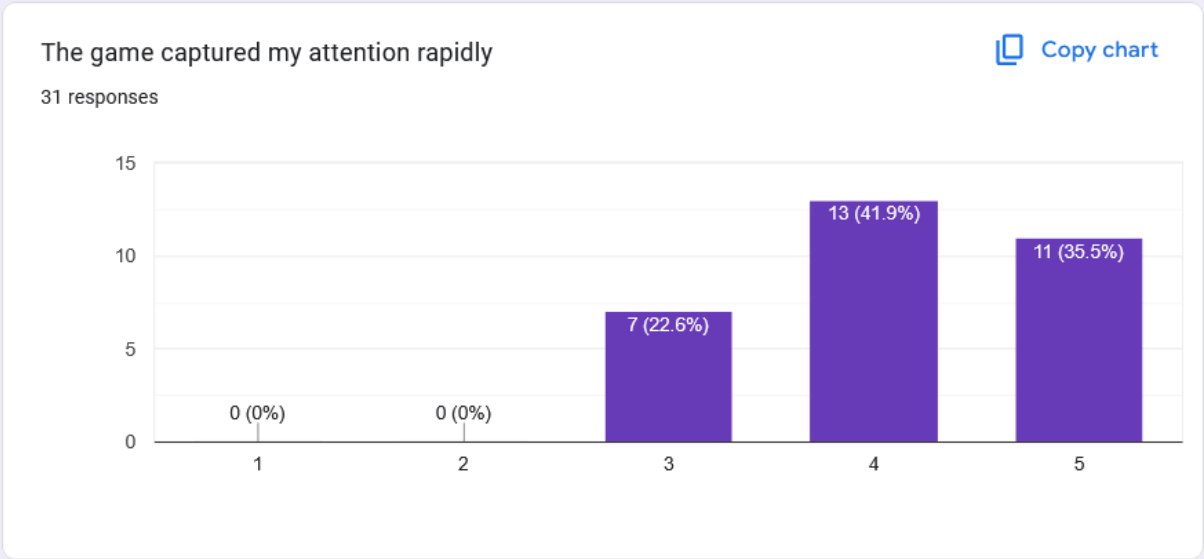

Figure 40 Attention Capture

3. Delightful surprises (Average: 4.3/5)

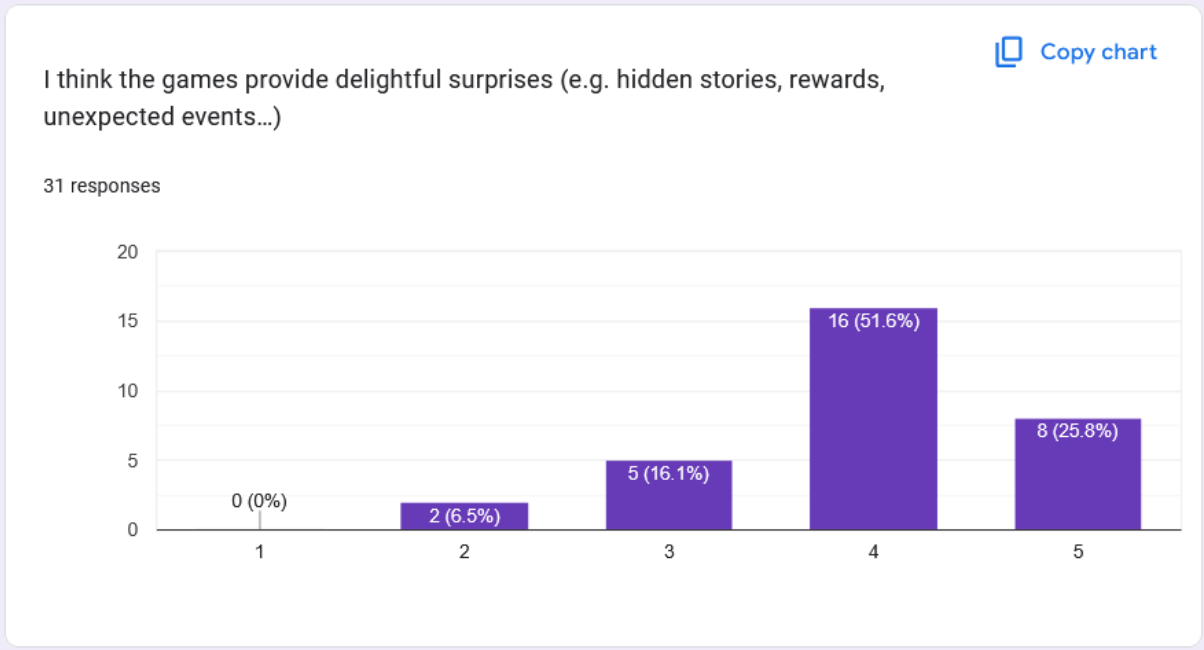

Figure 41 Delightful Surprises

These scores are correlated with these:

1. Agreement that the game helps promote Bidayuh culture (Average: 4.6/5)

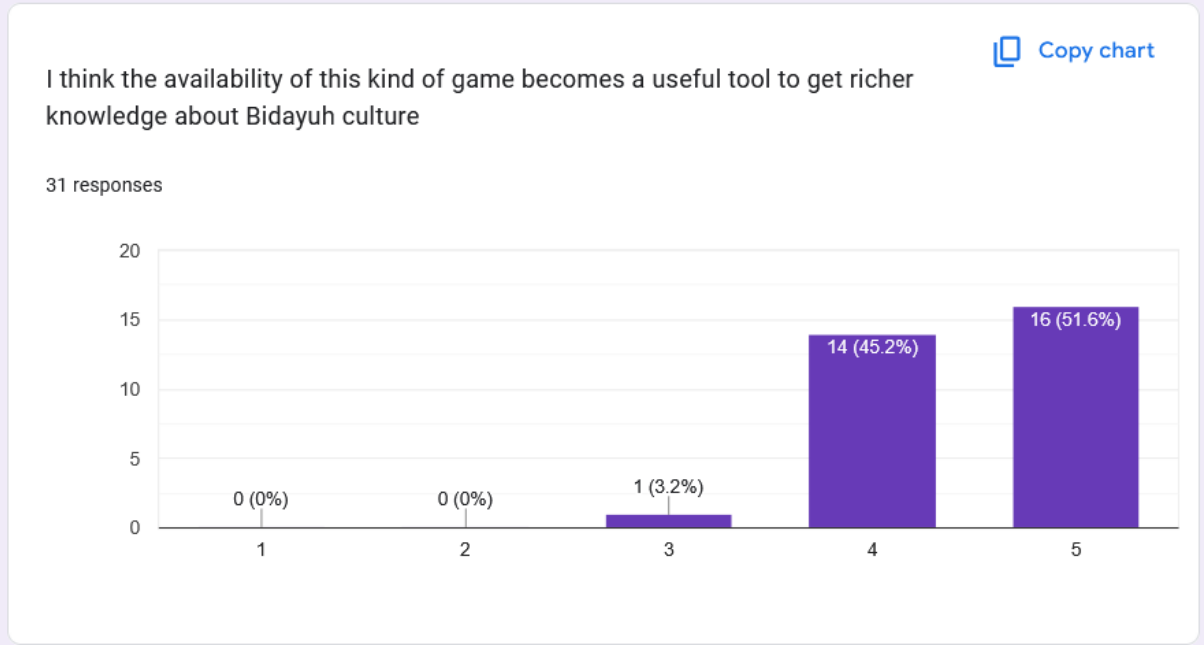

Figure 42 Agreement that the game helps promote Bidayuh culture

2. Preference for learning through gamification (Average: 4.5/5)

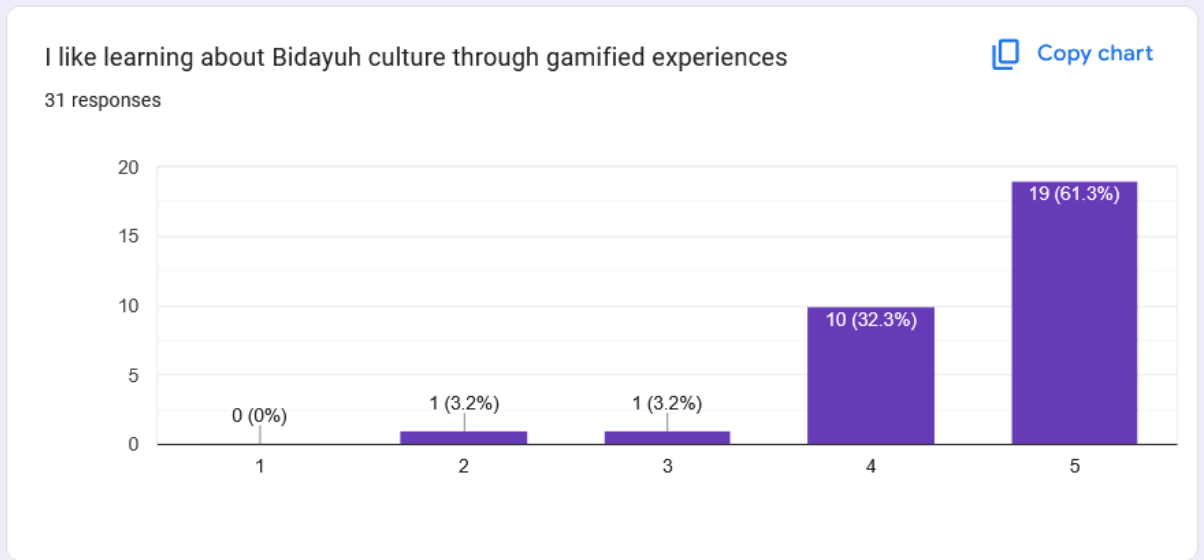

Figure 43 Preference for learning through gamification

Game Duration Adequacy (Average: 4.2/5)

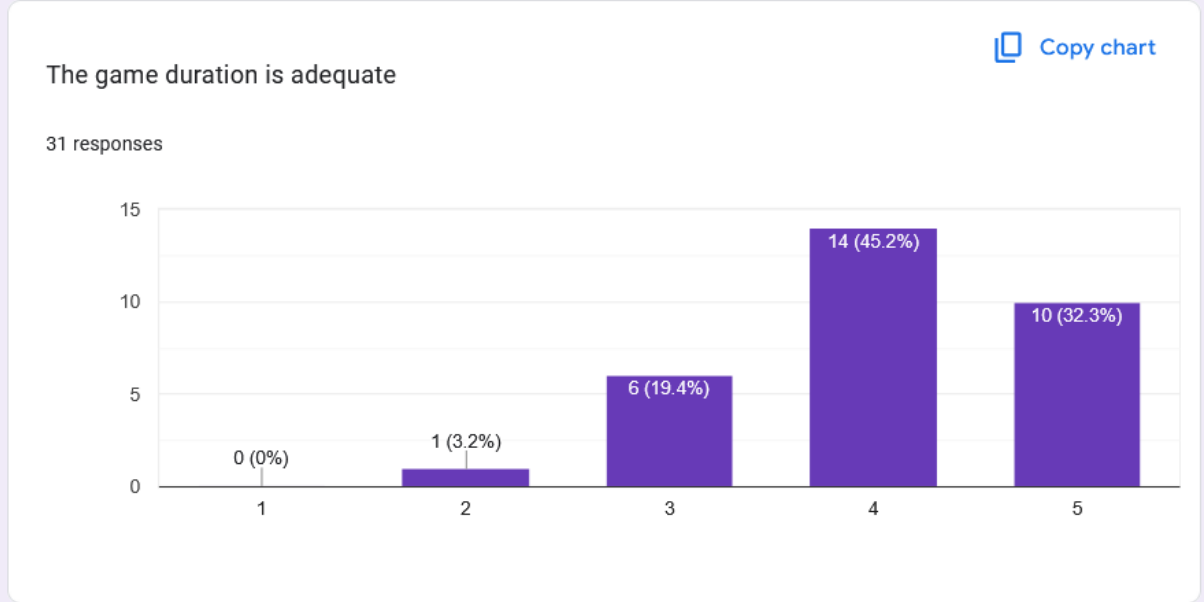

Figure 44 Game Duration Adequacy

The high score of this question means higher rate that expectations are fulfilled and good overall satisfaction.

Net Promoter Score (NPS)

The average NPS was 4.3/5.

Figure 45 Net Promoter Score

5. Final Cultural Impact Assessment

As this section's questions all averaged above 4/5 score, these were predicted by previous questionnaire sections' score, which are the positive SUS usability scores, low NASA-TLX frustration levels, high ratings for cultural elements in the ad-hoc section and the enthusiastic comments about cultural learning that were made in the open-ended questions.

5.4 Discussion

The high SUS scores show that players appreciate the cultural elements of the game and prove that video game can have huge educational value. As for the frustrations in the gameplay, it is shown in the results that minor frustrations can greatly decrease players' engagement with the educational content. What drove most players to continue playing the game until the end were the attractive designs and clear storytelling of the game. These elements were important in increasing the effectiveness of cultural transmission in the game.

To further improve the game as an educational video game, there are a few things that need to be considered. First, the navigation and dialogue control issues, which are the weak aspects of the game, should be addressed to improve SUS scores and reduce NASA-TLX frustration. Next, cultural storytelling elements should be maintained and enhanced since these elements received strong praise. Other than that, optional depth in the gameplay should be considered for more experienced gamers, while maintaining the current accessibility of the game. Lastly, the educational value of the game should be marketed using the strong cultural promotion ratings received in the questionnaire.

5.5 Conclusion

In this phase, the working prototype of the game was tested. The functional requirements of the game were checked to see if they existed and worked properly. Then, a questionnaire was distributed to testers of the game to evaluate their game experience and the game as an educational video game. Overall, the responses of the questionnaire are reasonable, with many loved the cultural aspects of the game, even if they were frustrated by the game mechanics.

CHAPTER 6: CONCLUSION AND FUTURE WORK

6.1 Introduction

This chapter discusses the objectives achievement and if there are any objectives that could not be achieved due to any factors. Project limitations are also discussed to list out any game mechanics that could not be added to the game due to time constraint or skill limitations. At the end of the chapter, the project is concluded and potential future work is discussed to see the possible expansion of the project.

6.2 Objectives Achievement

The first objective, which is to ideate and design an educational gameplay was able to be achieved as the contents of the game revolve around Bidayuh culture and Gawai ritual. This directly realized the second objective, which is to develop an educational video game. The third objective, which is to test the game design features and interactivity of the video game was able to be achieved with the help of the 31 testers.

6.3 Project Limitations

During the development of the project, there were a few problems encountered due to external factors such as the huge workload of assignment given and the service learning that was compulsory for students to attend and conduct. These problems caused the delay in prototype completion. As for the prototype, some of the features are not working properly due to the lack of experience in developing the game. After days of rigorous testing and debugging, all of the features finally work properly.

Some features like encyclopedia which was originally planned to have its own section in main menu had to be adjusted due to time constraints and the huge number of features being added into the game. Having a section only for encyclopedia would have overwhelmed players. This

feature was eventually revised, having Bidayuh culture info that was initially planned to be in the encyclopedia being integrated in whole gameplay like in inventory and interacting with any NPCs or objects.

Last but not least, the instable release of the working prototype. During the distribution of the game to testers, there were many problems with the game. One of them being the game not working as intended, but if the game is played inside the Unity itself, the game works fine. This problem was able to be solved by adding cache functionality to the game. There was also a problem with file of the game. Some testers could not download the file due to their antivirus flagging the game as a virus.

6.4 Conclusion

Educational video games have a bad reputation in the video game industry because of its nature, where the main goal of this type of video game is to educate people about a topic through gamified experiences while neglecting the fun aspect of video games. In this project, an educational video game about Bidayuh culture was developed to educate non-Sarawakian youths about Bidayuh culture. The fun elements of video games were able to be added into the game. This helps make the video game to be more interesting and interactive, while maintaining the educational aspect of the game.

6.5 Future Work

After this project is completed, it is expected that the game will be used as an inspiration to create more games that teach youths about any educational content, particularly the cultures of any community. As for the future updates of the game, there will be improvement in the visuals and the gameplay of the game. The recommendations given by the testers will also be taken into consideration when updating the game.

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APPENDICES

Google Form Link:

https://docs.google.com/forms/d/e/1FAIpQLSdMfPMUfoJllaNDyo7LGFCqvDyQZCIXHcZIA8kMPmKJ_RHpWQ/viewform?usp=header