ReSchool: A Role-Playing Game as a Tool to Augment Teaching Elementary Math.

A Capstone Project Presented to the Faculty of the

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ABSTRACT

This team aims to develop a 3D Low Poly Action Role Playing game as a tool to augment teaching elementary math. The paper will cover the implementation of animation, scripting, and integration of visual elements of the game. ReSchool is an action Role-playing game. The story of the game begins when an evil wizard's wish was granted by the demon he released, the wizard wished for the demon to cast a spell that created a virus that would make anyone infected forget how to do simple mathematics. The main character is a masked adventurer summoned from another world to help the kingdom and defeat the evil wizard to dispel the virus. There are 6 game levels filled with quests and Non-playable Characters (NPC): (1) Guild Area, where the guild is and where the main character starts his/her adventure; (2) Wilderness Area; (3) Snowfields; (4) Desert; (5) Dark Forest; (6) Volcano. This paper aims to create a challenging and entertaining game that will improve the player's ability to do elementary math. The game was developed using Unity 2020.3.12f1. The 3D assets were created using Blender 2.8, and Adobe Photoshop for creating textures and UI elements. Visual Studio Code was used for back-end development.

Keywords: 3D game, Low Poly Game, Third Person Action Role Playing Game, Elementary Mathematics

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CHAPTER I

INTRODUCTION

Rationale of the Study

In the midst of a pandemic, students struggle to learn on an online platform. In the middle of long Zoom calls, etc., students get bored and it affects how he or she learns online and worse, it could negatively affect the student's mental and emotional psyche as well as anxiety and even depression.

Additionally, learning mathematics for elementary students is quite important as arithmetic is quite an integral part of the intellectual development of a student. Mathematics provides opportunities for developing important intellectual skills in problem-solving, deductive and inductive reasoning, creative thinking, and communication.

According to current observations, the modular learning done by elementary students today isn't providing enough for the learner; and in some cases, their parents do the modules for them. Basic important mathematical concepts are not being well absorbed by their young minds.

The purpose of this project is to be an entertaining medium for players to test their wit on elementary mathematics at their own pace.

Game Example: Stardew Valley, a farming simulation game that utilizes pixel graphics and a simple combat system. Typically considered a relaxing game that players can progress at their own pace.

Eternium by Making Fun is a mobile action role-playing game reminiscent of ARPG classics such as the Diablo series by Blizzard. Eternium is played offline and has staple ARPG elements such as class system and abilities while being in a mobile platform.

ReSchool is an Action Role-playing Game where the main character's task is to solve the kingdom's problems and defeat the evil wizard to free the kingdom from the virus. The main character follows the main story's quest line to progress to the next area of the game, each area has a different level of difficulty in quests, monsters, and bosses.

Stardew Valley is a game with a peaceful tone to its gameplay and has a vast and beautifully designed world. In terms of combat, the game's combat system, though very simple, is fun and easy to follow. This aspect of Stardew Valley pushed the developers to pursue a similar form of simplicity in the combat system.

Eternium on the other hand is a game renowned within the mobile game community. Eternium takes aspects from traditional ARPGs, such as skills, quests, etc., and translates some key systems, such as controls, into a mobile platform. The developers see Eternium as a model for how an ARPGs can be implemented into an Android Platform.

The developers see the peaceful and set-your-own-pace aspect from Stardew Valley, and the simple RPG world design and ARPG mechanics from Eternium, as significant characteristics being used in the development of ReSchool.

Significance of the Study

The study will be valuable and significant to elementary school students, and future researchers.

Elementary school students are the main audience of this study. They are the target users of the game, and they will use this game to test their wit on mathematics as well as have fun.

This study may serve as a basis and format for future researchers to conduct and apply in their studies.

REVIEW OF RELATED LITERATURE

The proponents believed that the articles and studies stated below played an important part in influencing the development of the application:

Gamified Learning or the gamification of learning is a popular way of improving a students learning capabilities while still being entertaining to the student. The concept throughout the years has been explored thoroughly. According to a journal from Smiderle, “The gamification of education can enhance levels of students’ engagement similar to what games can do, to improve their particular skills and optimize their learning.”

Role-playing games and mathematics also share similar aspects. A study done by Ahmad in 2010 states that due to the interactive and stimulating nature of Role-playing games, the genre is a suitable medium for learning the subject of mathematics.

A book chapter released by Green in 2012, exclaimed that, During the author's time in high school, mathematics and Role-playing games have a suitable relationship with one another and played an integral role to the author's pursuit of a career involving mathematics, to which he is now a professor teaching mathematics.

REVIEW OF RELATED WORKS

Our game uses key concepts and designs present in the following games:

Stardew Valley, is a Farming Simulation game that has pixel graphics and a simple combat system. Typically considered a relaxing game that players can progress at their own pace.

Eternium by Making Fun is a mobile action role-playing game reminiscent of ARPG classics such as the Diablo series by Blizzard. Eternium is played offline and has staple ARPG elements such as class system and abilities while being in a mobile platform.

Aron`s Adventure is an Action-Adventure RPG that takes place in a fantasy world called Elor. An ancient evil re-awakens and the fate of the land is thrown into Aron's hands. Aron will have to unite the people all while learning how to use his new abilities.

Project Objectives

This study aims to build a 3D Low Poly Action Role Playing game that challenges the player to tackle the realm's issues and rout the enemies while testing the player's ability to do elementary mathematics. This study also seeks to grow the diversion experience of the players.

With this game, the developers aim to:

1. Create a 3D low poly game using the Unity game engine.
2. Create 6 different world levels that the player can explore.
3. Create 3D assets using blender and other 3D modeling software.
4. Create quest lines that follow a simple story and mathematical learning
5. Design the UI for better game experience.
6. Integrate math problems/challenges using a dialogue system.
7. Integrate sound effects and background music.

SCOPE AND LIMITATION OF THE STUDY

The focus of this study is to build an immersive world set that the player can explore to find new resources to use and trade.

Six stages will be made available to the player to explore. Each stage will feature different environments. Stage one will have the guild area, stage two: the wilderness area, stage three: the snowfields, stage four: the desert area, stage five: the dark forest area,

and stage six: the volcano area. These levels can only be accessed by players after solving the mathematical problems.

Players can choose between a Warrior class that uses physical attacks, or a mage class that uses magic spells and uses them to fight monsters and bosses. Players complete different type of math problems through the form of quests.

. The leaderboard will be utilized to show the progress of the players.

Players receive rewards upon completion of a quest.

Each level has different types of monsters that fights back when taunted or if a player enters the monster's area or region. Each level also has a boss that is spawned once the last quest of the level is accepted.

The player will control the character by using the touch controls to move and to attack respectively. The game will be deployed on the Android platform.

CHAPTER II

GAME DESIGN DOCUMENT

GAME NAME

ReSchool: A 3D Low Poly Action Role Playing game

GAME OVERVIEW

Game Concept

ReSchool is a 3D Action Adventure Role Playing Game for Android where players follow the adventure of a warrior summoned from another world to help a kingdom whose

people have forgotten how to do math due to a spell cast by an evil wizard. Armed with either magic spells or a sword, and a mask for protection against the spell, the adventurer must explore the new fantasy world and help the inhabitants solve mathematical problems through quests. The masked adventurer solves quests given to them by eliminating the correct number of monsters needed. The player must explore, fight and solve math problems to help the adventurer complete the quests and help the people. The game has six stages, each with a unique environment, and different quests to take. The players must defeat the Boss of each level to advance to the next level.

Genre

Action role-playing games or ARPG's is a subgenre of a traditional role-playing game as the game emphasizes real-time combat where the player has direct control over the characters as opposed to turning or menu-based combat while still having a focus on character's stats to determine relative strength and abilities. Combining RPG elements and challenging math problems with an innovative storyline.

Target Audience

As an Action Role-Playing Game, action role-playing games are a typical genre in the gaming industry, and mostly target a younger audience. The target audience of this game are pupils aging 6-12 yearsold, with consideration that children have access to Android smartphones and internet connection.

Game Flow Summary

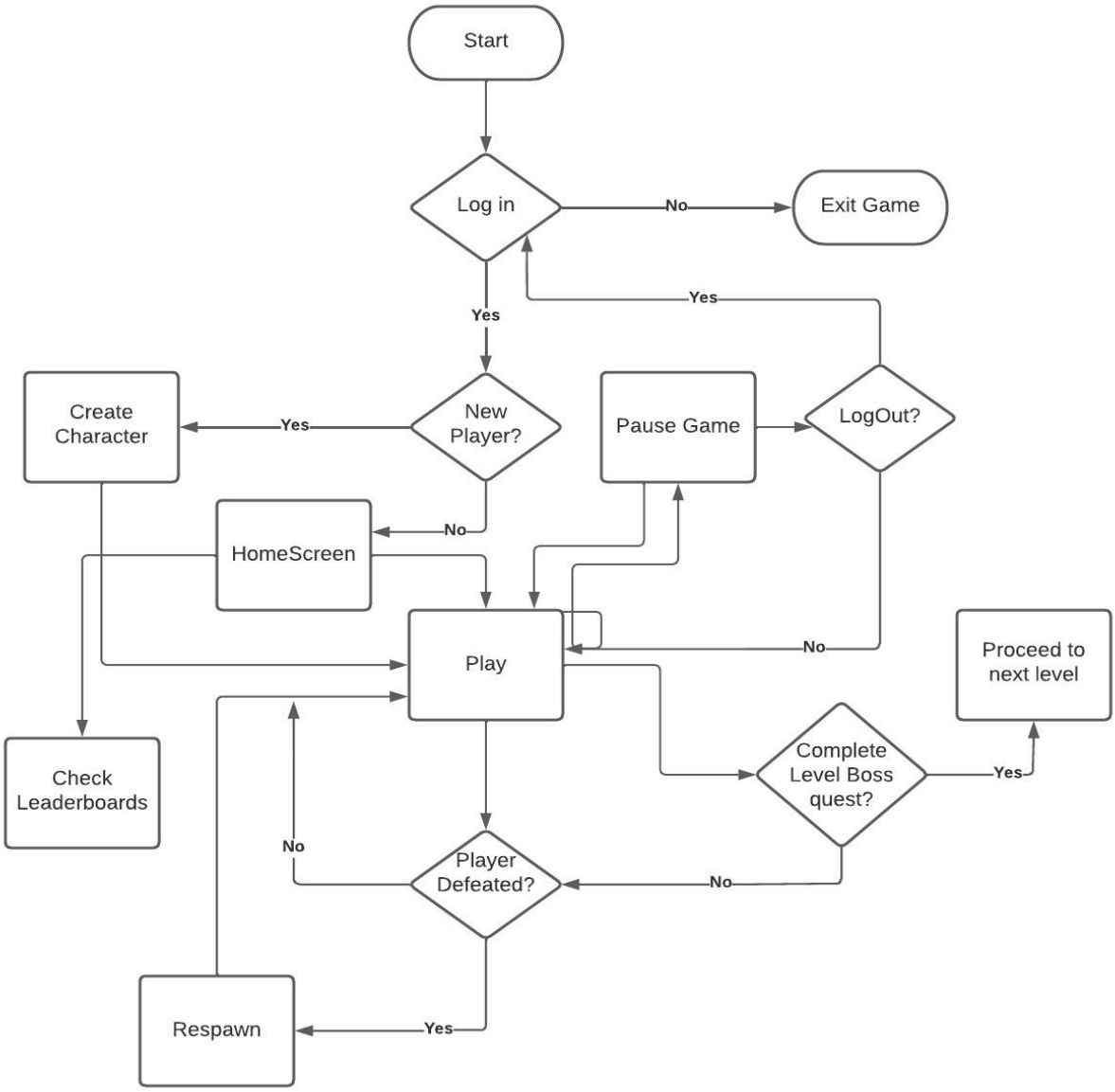


***Figure 1**: Game Flow Summary*

GAMEPLAY

Game Progression

The game is played from a top-down perspective and features some unique gameplay mechanics. The player is equipped with a sword or magic spells depending on which class the player chooses. The players can explore the world, interact with NPCs, and fight monsters. The player can attack enemies using a sword or magic spells. The player can use items like healing potions and mana potions to recharge their health and mana. The player cannot proceed to the next stage if the player cannot complete the task by defeating the level's boss monster. If the player dies, the player will respawn at the most recent checkpoint.

Mission and Challenge Structure

The game uses quests as the primary medium of how mathematical problems are presented to the player. Completing main quests will open succeeding quests and lead to the overall progression of the game.

Quest Structure

Quests in the game are categorized into Counting Quests where the player is presented with a mathematics problem which has a more visual aspect. e.g. Player is presented with 5 skulls and must defeat 5 Skeletons. The second category is Word quest where players are presented with a word problem. The player must accept the quest before he can proceed with the challenges.

Boss Structure

Every stage has a Boss Monster that is spawned after accepting the final quest of the level. Before the player can advance to the next stage, the player must defeat the Boss Monster. The Boss Monster differs from level to level and has different abilities. The players must defeat the boss to unlock the next stage.

Game Objectives

In Chapter 1, The Village Priest summons the player and begins to give quests. The player quickly goes and explores, finding and taking quests along the way. The player defeats the Skeleton King at the end of the cemetery and proceeds to the next level.

Chapter 2, Continuing the player`s journey. The player pushes forward tracking down the next area; the Wilderness area. The player helps recover stolen crops for the farmers and defeats the bandit leader hidden in their bandit hideout.

Chapter 3, The player continues to the Snow Fields to protect the Villagers from the dangers exposed to them. Fighting the bandits who have relocated to the snowfields and defeating the yeti that has been terrorizing the villagers for years.

Chapter 4, The player goes to the desert to fight off Desert Skeletons summoned by a witch. The player explores the catacombs and defeats the leader of the Desert Skeletons, the mummy.

Chapter 5, The player seeks out the witch and fights through skeletons and lesser witches through a dark forest. The player defeats the witch and leads the player to where the evil wizard is.

Chapter 6, The player seeks out the final boss, the Evil Wizard hidden in a volcanic area. The player fights through rock golems and defeats the Evil Wizard. The spell cast on the world is broken and the player is deemed a hero.

Play Flow

ReSchool is a game played with a game quest and math problems. The player should be able to explore, defeat monsters and solve the math problems to finish the quest successfully.

Influences and sources

The proponents have extensively researched and based the in-game quests on gathered learning outcomes from the Mathematics workbook, from Grade 1 to Grade 6, sourced from the website: www.depedtambayan.org

MECHANICS

The player interacts with an NPC and is presented with a quest, the player must first answer the correct answer of the given quest to accept it. The quest then appears on the quest tab. Each chapter has different quests with different levels of difficulty. Players

must complete the main questline to proceed and must defeat the monster boss to unlock the next stage.

Physics

Physics in the game work as such:

- The character moves, either from left to right, or from right to left and either backward to forward, or forward to backward.
- The character can attack monsters.
- The character can pick up the potions
- The character can interact with NPCs to accept quests

Movement

Players move in a traditional 4 axis plus diagonals. Players can move forward, backward, left and right.

Classes

The player can choose between Warrior or Mage. The warrior class uses a sword and close combat physical attacks while the Mage utilizes long-range utility attacks.

Actions

The Player can perform these actions in ReSchool:

- Joystick - Movement
- Health potion - restore health if available
- Mana Potion - restore mana if available
- Attack - Warriors slashes the sword as a basic attack while Mage throws a fireball
- Dash (Warrior) - Speeds up for a short time
- Spin attack (Warrior) - Attacks in a radius and deals double damage
- Snowball (Mage) - If it hits an enemy, the enemy will be unable to move for a short duration.
- Burst (Mage) - Charges up energy and releases in a radius dealing double damage.
- Talk - Button that allows player to interact with NPCs

STORY, SETTING, AND CHARACTER

Story and Narrative

Once upon a time, there was a kingdom with a king that was adored by the people. His advisor was a spiteful wizard and hated the king, so he devised a plan to bring ruin to the kingdom. He summoned a demon and as a reward for his release, the demon cast a spell that released a virus which whoever got infected forgets how to do simple mathematics. Without the knowledge of mathematics, the kingdom's doctors are unable to create a cure. Upon orders of the king, the priest uses magic to summon an adventurer from another world who is knowledgeable of mathematics and is equipped with a mask to repel the virus created by the demon. Thus, armed with either magic spells or a sword and a mask for protection against the virus, the masked adventurer sets out to help the people of the kingdom and defeat the evil wizard.

Game World

ReSchool has six levels to complete,namely: Guild Area; Wilderness Area; Snowfields; Desert; Dark Forest; Volcano. Each area has 4 explorable sub-areas.

Level 1- Guild Area is a peaceful place. The player is summoned by the priest and is set out to help the Village. The player encounters skeletons and defeats the Skeleton King to save the Village.

***Figure 2**: Guild Area*

Figure # shows the scene in Chapter 1 This environment is a peaceful village wherein the player must explore the environment to find NPCs offering quests.

Chapter 2 – Wilderness Area is filled with bandits and thieves. Player helps the Villagers and the nearby farmers by exploring the area,retrieving stolen crops and defeating the Bandits and the Bandit Leader.

Figure 3. shows the wilderness area, a natural place with a farm and is full of Bandits.

Chapter 3- Snowfields Area lies a Village, a forest and snowfields. There are also snow bandits that are remnants from the bandits the player encountered before. The player helps the village by defeating snow bandits and the Yeti, a monster which was feared by the villagers for a long time.

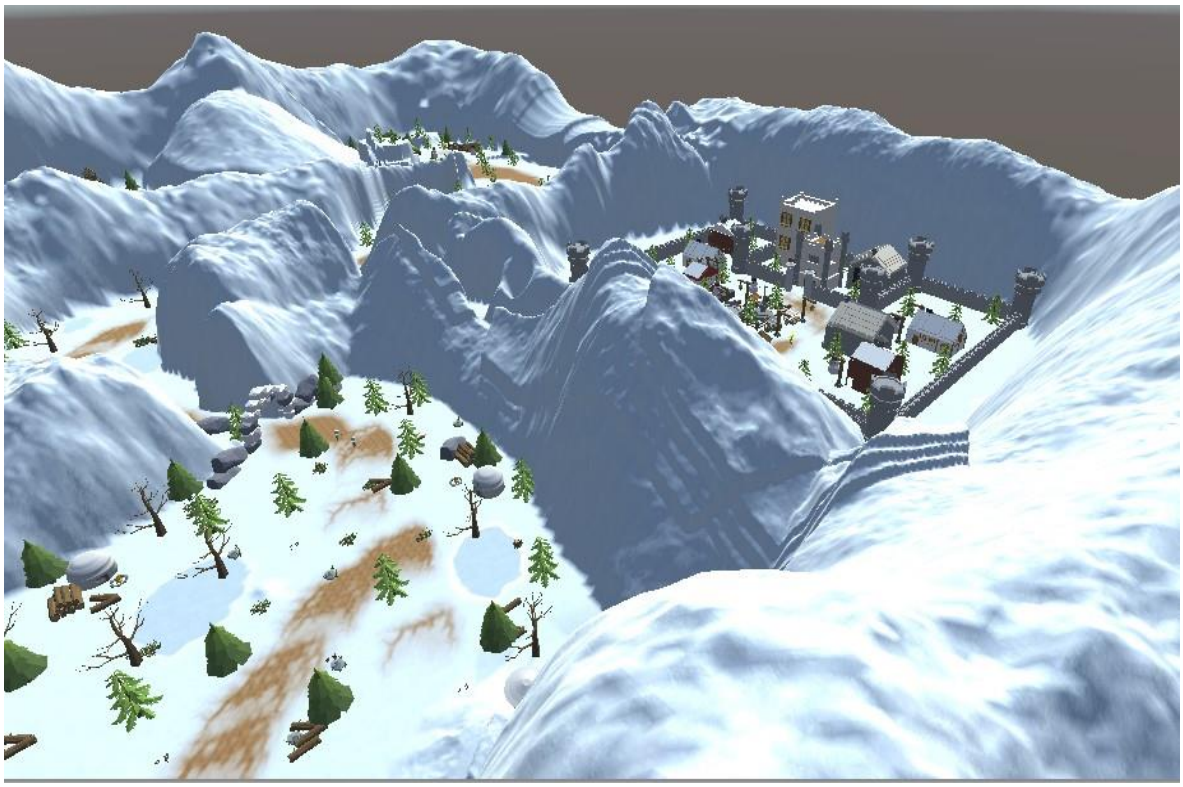


Figure 4. shows the Snowfields scene

Chapter 4 – Desert where it is very sunny and the area is filled with sand. Desert Skeletons have risen from the catacombs and are terrorizing the Villagers of the desert. The player defeats the Mummy and frees the Village.

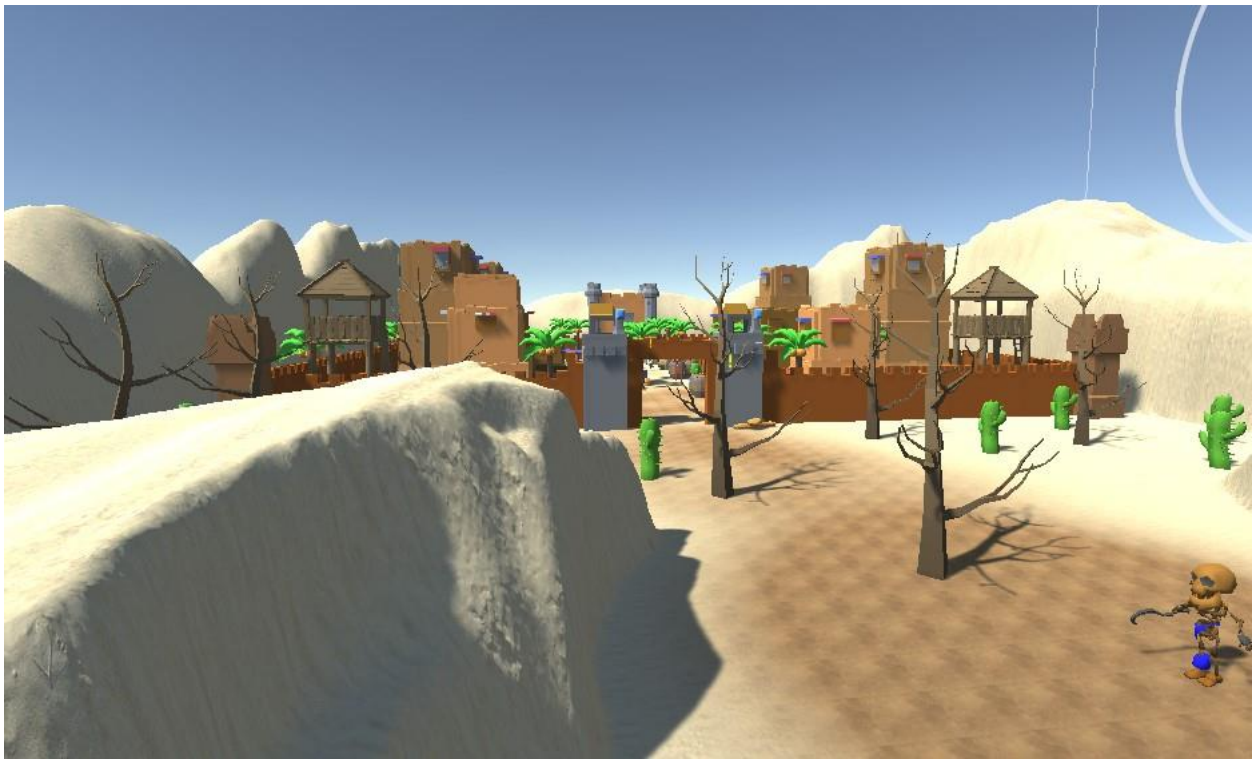


Figure 5. shows the scene of the desert area.

Chapter 5 – Dark Forest as a place of sorcery and peril is found among old stories. A location beyond which people normally travel, where strange things may happen, and bizarre individuals may live, the home of the witch. The player fights through more skeletons and skeleton mages to defeat the witch. The witch leads the player to where the wizard is after she is defeated.

Figure 6. shows the scene of Dark Forest.

Chapter 6 – Volcano hot lava, volcanic ash, and gases to escape from a magma chamber below the surface. The place is filled with golems made of rock and magma. The player fights through all of them and meets the evil wizard to free the whole kingdom from the curse.

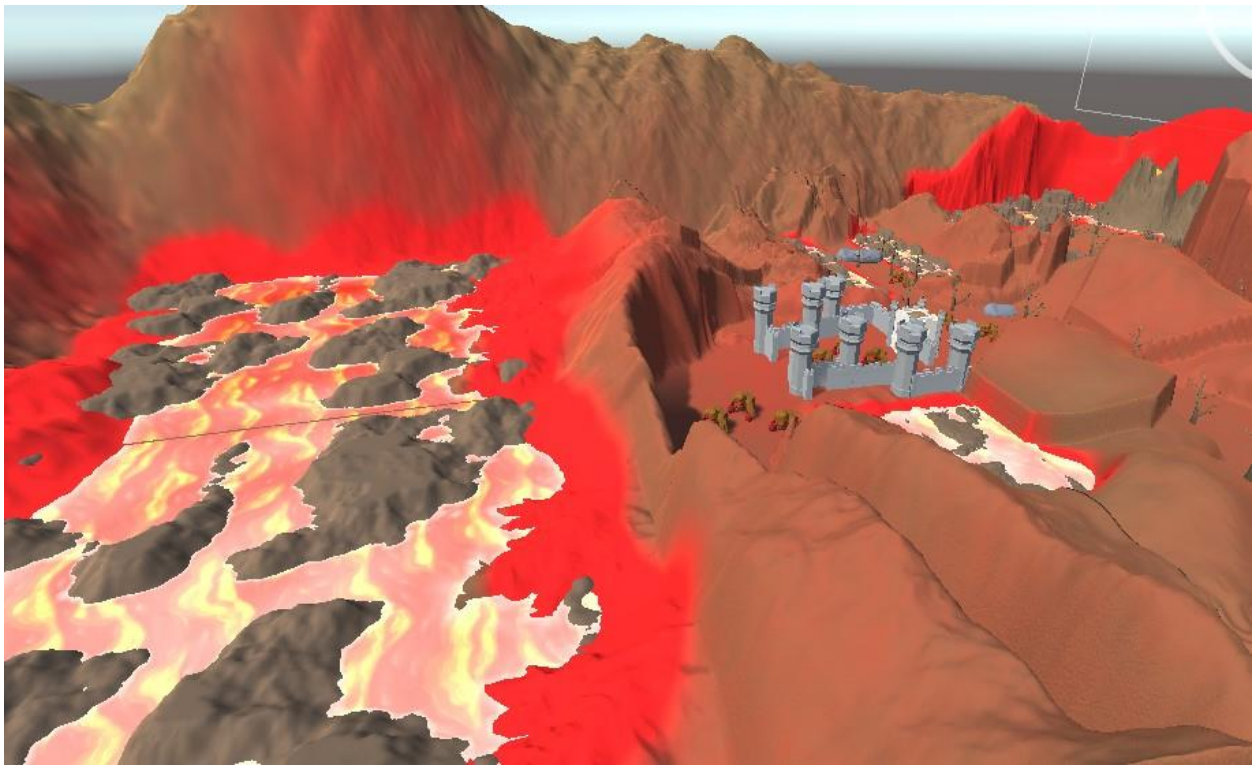


Figure 7. shows the scene of a Volcano. The volcano's environment is covered with magma.

INTERFACE

Visual System

On application start, the player is greeted with a login page. On successful login, the player is directed to a Homescreen and is presented with the option to check the leaderboards or play. If the user has input incorrectly the password or username, the log in will be unsuccessful.

When a player registers, they have to choose a unique username. During the register phase, the user must also create a password and must re-input the password to proceed. If register is successful, the player is directed to another page to choose which class they wish to play.

After a successful registration, the player is redirected to the login page.

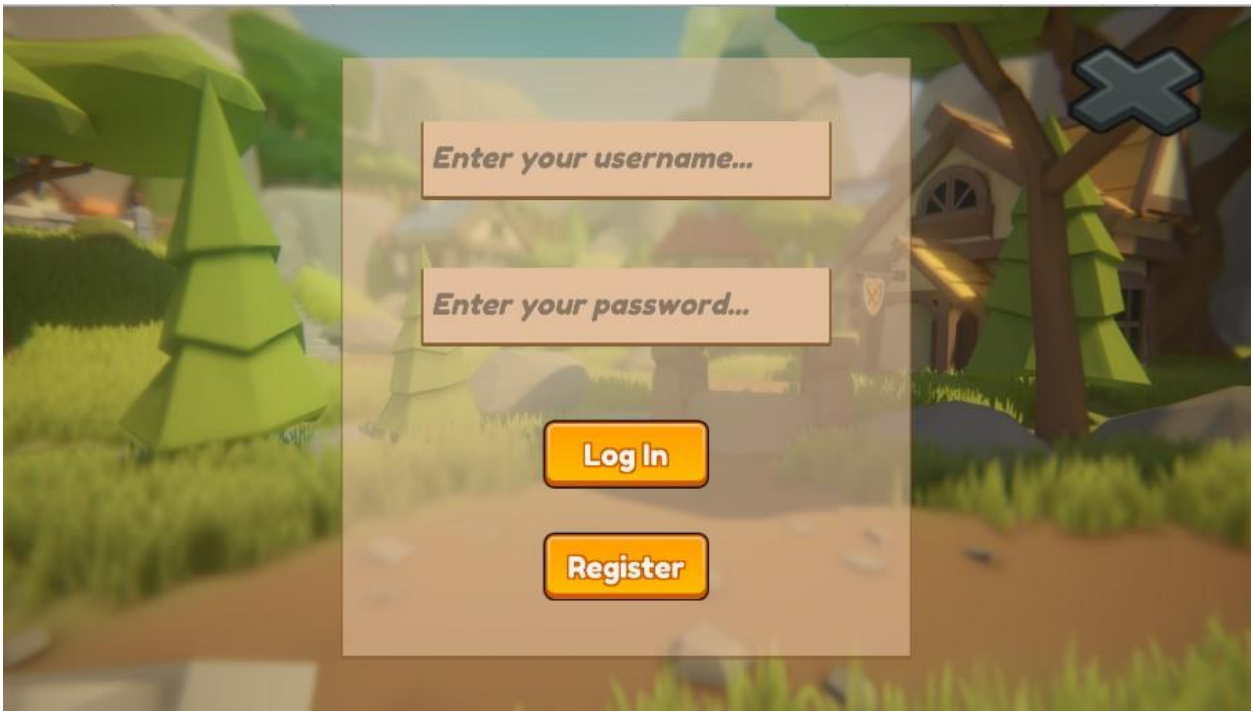


Figure 8: *Log in page*

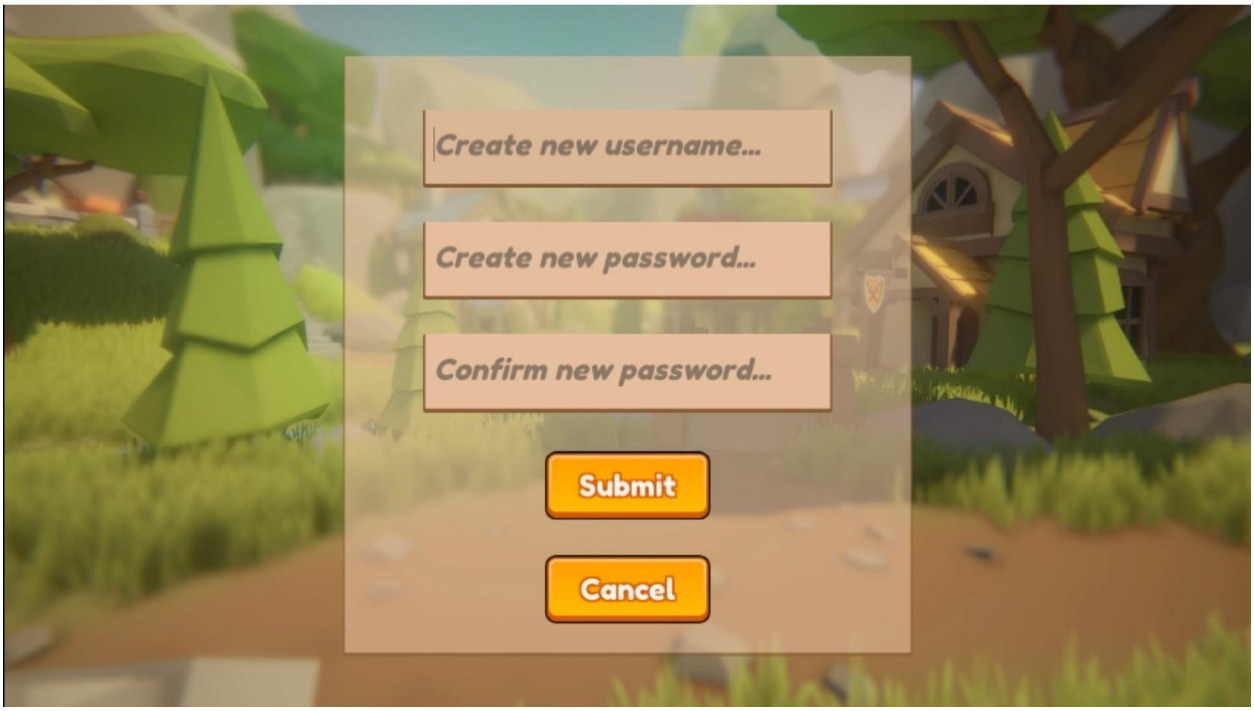


Figure 9: *Register page*

Figure 10: *Page where user chooses a class to play* The Homescreen welcomes the user and has a few distinct options. The Play button load the level or scene that corresponds to the players current level and class. eg. A player with a level of 2 and a class of Mage will load the 2nd level of the game and the player will be using the mage character.

The Leaderboard option shows a leaderboard of the top players ordered by level and experience.

Figure 11: *Homescreen*

Figure 12: *Leaderboards*

TECHNICAL

The developers of the game utilize the use of low-poly graphics and limited particle effects, this decision was in view of player accessibility. The developers desire the game to be playable in most Android devices, Thus the utilization of low-poly graphics and particles effects is to prevent players from being unable to play the game due to hardware limitations. Furthermore, the game is projected to have a fairly conservative minimum system requirements such as: (1) Android 4.4 or later, (2) 1 GB of RAM, (3) 200 Mb of free storage, and (4) a stable internet connection for database purposes.

Software Development Tools

- **Adobe Photoshop** - is a raster graphics editor developed by Adobe used to edit digital art and digital photos. The developers will use this application to enhance textures, particles, and UI elements.
- **Unity Game Engine** - is a Real-Time development platform created by Unity Technologies and used by the majority of Game Developers around the world. The developers will use Unity to develop and render the prototype and final game.
- **Visual Studio** is an IDE created by Microsoft used to develop programs, websites, and web applications. The developers will use this application to create and edit scripts.
- **Blender** - an open-source 3D computer graphics software toolset used for creating animated films, visual effects, art, 3D printed models, motion graphics, interactive 3D applications, virtual reality, and computer games.
- **Mixamo** - is a 3D computer graphics technology company. Based in San Francisco, the company develops and sells web-based services for 3D character animation. Mixamo's technologies use machine learning methods to automate the steps of the character animation process, including 3D modeling to rigging and 3D animation.

Architectural Design

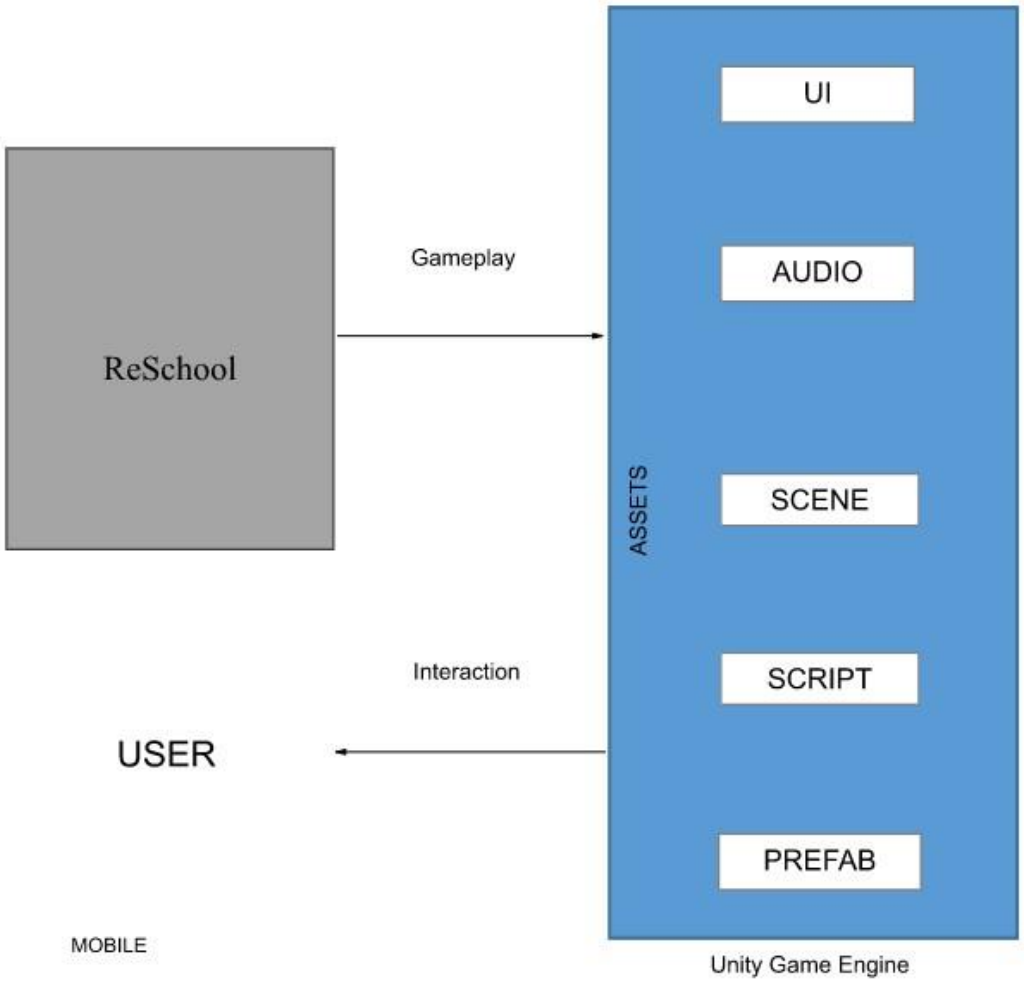


Figure 13: *Architectural Design*

The figure shows Unity's game engine manages and loaded these unity assets such as UI, audio, prefab, scene, script, and prefab to respond to the player active during the game. It also shows the interaction between a user and a unity game engine.

Database Architecture

The database's purpose in the application was to support Save/Load features among different players along with accessing the data within the database to display on the leaderboards. XAMMP was used to create and monitor the database.

The database only holds a single table titled "users" and holds the following values:

1. id (int)
2. username (varchar)
3. password (varchar)
4. class (varchar)
5. level (int)
6. experience (smallint)
7. questprogress (varchar)
8. playerprogress (varchar)

"id" is the primary key of the table and is an initial identifier of each unique user.

"username" is the unique string that players use to identify their accounts.

"password" is a associative string to username and is a requirement to access a player's account.

"class" is a string that corresponds to the player's chosen class during the registration phase.

"level" is an integer that represents the player's level and corresponds to which level in the game the player is loaded into.

“experience” is an integer that represents how much experience points the player has gathered throughout the game.

Both level and experience are used as metrics for sorting players to show in the leaderboards.

“questprogress” and “playerprogress” are series of string in JSON Format. Both represent a specific players progress on quests and player’s statistics such as health and mana etc., correspondingly.

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	id	int(11)			No	*None*		AUTO_INCREMENT	Change Drop More
☐	2	username	varchar(50)	utf8mb4_general_ci		No	*None*			Change Drop More
☐	3	password	varchar(50)	utf8mb4_general_ci		No	*None*			Change Drop More
☐	4	class	varchar(10)	utf8mb4_general_ci		No	*None*			Change Drop More
☐	5	level	int(10)			No	*None*			Change Drop More
☐	6	experience	smallint(255)			No	*None*			Change Drop More
☐	7	questprogress	varchar(1500)	utf8mb4_general_ci		No	*None*			Change Drop More
☐	8	coins	int(100)			No	*None*			Change Drop More
☐	9	playerprogress	varchar(500)	utf8mb4_general_ci		No	*None*			Change Drop More

Figure 14: *Snippet of Database Structure within phpMyAdmin*

CHAPTER III

SOFTWARE DEVELOPMENT AND TESTING

To successfully develop a game, everything must undergo a process; have an effective working environment and helpful tools to be used. The research uses some development tools to build a game. The study primarily used the latest technologies from the Unity game engine that are used to integrate and build the game itself.

DEVELOPMENT SOFTWARE PLATFORMS, DEVELOPMENT ENVIRONMENTS, AND TOOLS

ReSchool was developed under Android 4.4. The predominant tool used in the development was Unity. The game's model and assets were developed using Blender and animated using Mixamo. All 3D assets such as the characters and the monsters were developed using Blender. All 2D assets were developed using Adobe Photoshop. The cut scenes and visuals effect in the game are made using Unity.

The primary programming language used in the game was C# while using Microsoft Visual Studio as the Integrated Development Environment (IDE).

DEVELOPMENT AND TESTING PROCESS

Pre-Production

Game Concept

Action Role Playing is a term describing a game where the player has direct control over the characters as opposed to turning or menu-based combat. The most characterizing highlight is normally the world. As opposed to having set stages or a world map, the entire game takes place inside one giant map, which you must traverse about. Not just any map, however normally a guide loaded up with a wide range of mysteries. The map is typically divided into sectors. An example is Aron`s Adventure, with its accessible yet challenging gameplay, well-designed controls, strong storytelling, rewarding exploration, and mesmerizing environmental design.

Figure 15: *Aron`s Adventure*

The concept the developers wished to implement within the game was to combine aspects of traditional Action RPG's and structuring mathematical problems around the gameplay and mechanics of this specific genre.

Storyboard

Once there was a kingdom whose king was loved by all but one. The advisor despised the king so much that he planned to one day ruin his kingdom.

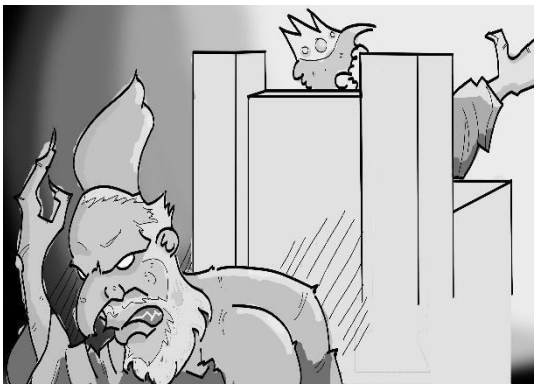
One night the evil advisor set free a powerful demon. As a reward, the demon would cast any magical spell that the evil advisor wants.

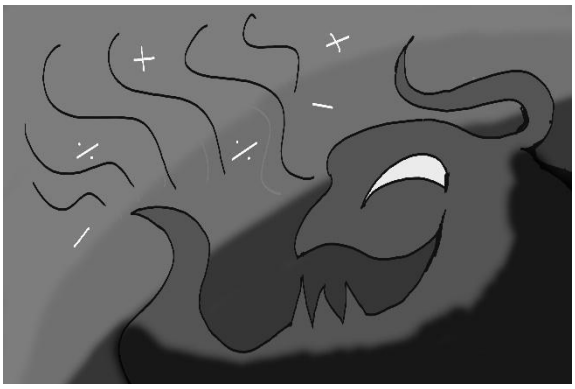
The advisor asked the demon to cast a spell that would make everyone in the kingdom lose the ability to do the math. So, the demon used magic to spread a deadly virus that would make anyone inhale it lose the ability to do the math.

Once people forgot how to do the math, the kingdoms' people struggled to solve problems.

And without the ability to do the math, the kingdom cannot figure out how to make the vaccine.

By the order of the king, the head priest of the kingdom summoned a warrior from another world. Armed with the knowledge of mathematics and a mask that protects him from the virus, he sets out to solve problems in the kingdom, defeat the evil advisor and his demon, and restore the kingdom's peace.





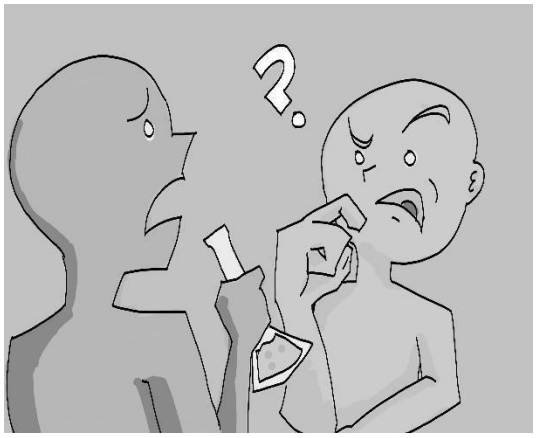


Figure 16: *Storyboard*

Figure shows the storyboard that was created in the initial stages of development.

Modeling

In the modeling process, assets are made and edited using Blender.

Figure 17: Character models of Mage (Left) and Warrior (Right)

Figure 18. shows the skeleton monster`s whole-body mode

Level Design

Each level of the game uses a combination of Linear and Hub and Spokes level design. Each level linearly succeeds another level. Each level also has 4 explorable sub-areas which serve as the spokes of the level design.

Figure 19. shows the level layout design for the Guild Area

Environment Design

Before the development process, the team made concept art assets and the characters involved in the gameplay. The environment is based on classic RPG fantasy

tropes such as Villages, Wilderness, etc. Further levels in the game compose of other environments that correspond to it's given theme.

Figure 20. shows the design concept for the Village area.

Character Design and 3D Modelling Process

The player can choose between 2 classes, Warrior and Mage. The warrior class is armed with a sword and sports blond hair, a headband, and a mask for protection against

the virus. The mage sports brown hair has no weapons but is armed with magic spells. Likewise, the mage is also equipped with a mask.

The character modelling process was done using Blender, with coherence to the low-poly style of the game, the use of simple and primitive shapes and meshes were used to form the characters.

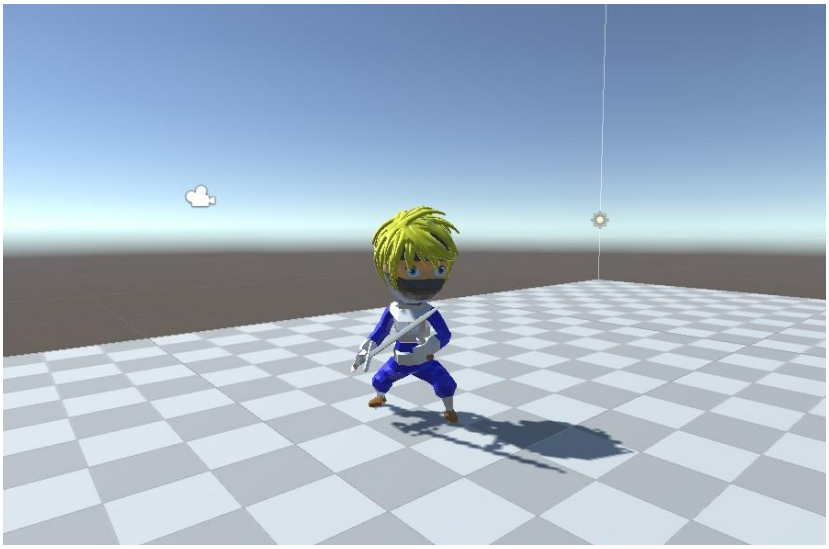


Figure 21. shows the model of Warrior.

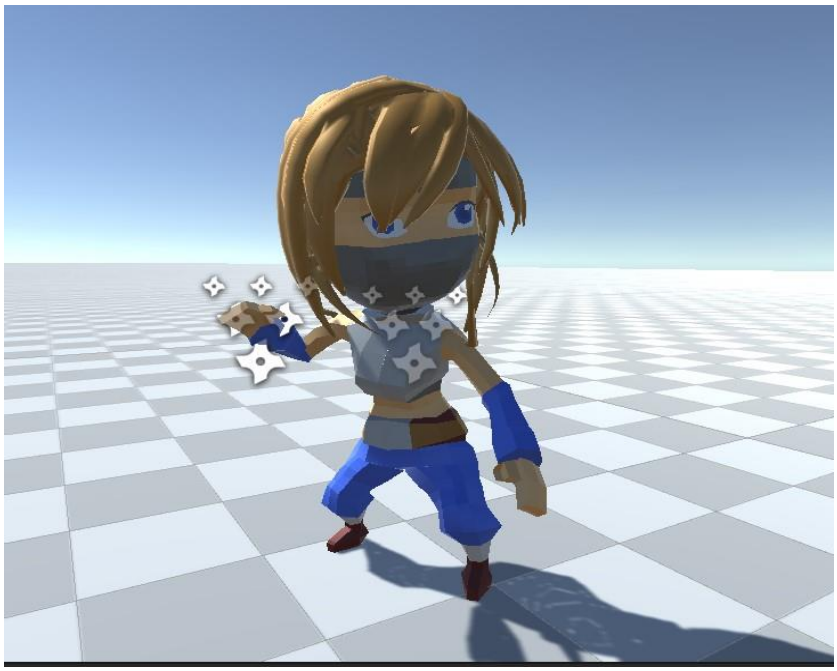


Figure 22. shows the model of Mage

Each level of the game has a specific Mob or Enemy, and a Boss that corresponds to the level's theme or context. The Enemies are the objective of the quests in the level and the Boss of the level is a requirement to defeat in order to proceed to the next level of the game.

The Guild Area's exclusive enemy are skeletons, they are armed with swords and chase the player and strike once they are close enough.

Figure 23. *Model of Skeleton*

The Boss of the Guild Area is the Skeleton King who holds a much larger sword, walks a lot slower, and has a crown on it’s head.

Figure 24. *Model of Skeleton King*

The Wildnerness level is home to bandits and are also armed with swords. They have red outfits and are hooded.

Figure 25. *Model of Bandit*

The Wildnerness Level's boss is the Bandit Leader who is much larger, wears a large pirate hat, and is armed with a musket. The Bandit Leader shoots the player when the player is within it's sight line. The Bandit Leader is found at the end of the Bandit's hideout.

Figure 26. *Model of Bandit Leader*

The Snow Fields are inhabited by Snow Bandits, who are bandits that escaped from the Wilderness Area and are now harassing the villagers. They are similar to the Bandits design but have a cyan strip on they outfit to blend with the snow theme of the level.

Figure 27. *Model of Snow Bandit*

The boss of the Snow Field is the Yeti, which appears alone in an isolated field. It chases the player if the player gets close and attacks using a jump and smash attack.

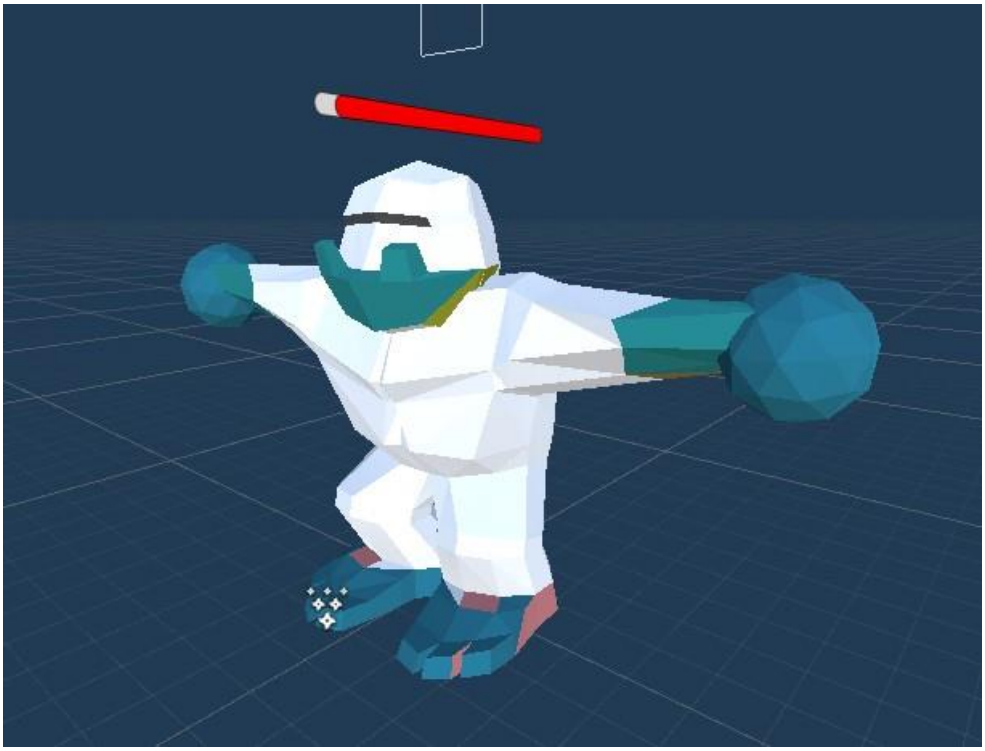


Figure 28. *Model of Yeti*

The Desert is occupied by Desert Skeletons, their design is similar to the Skeletons but are brown and armed with sickles instead of a sword to fit the corresponding theme of the level.

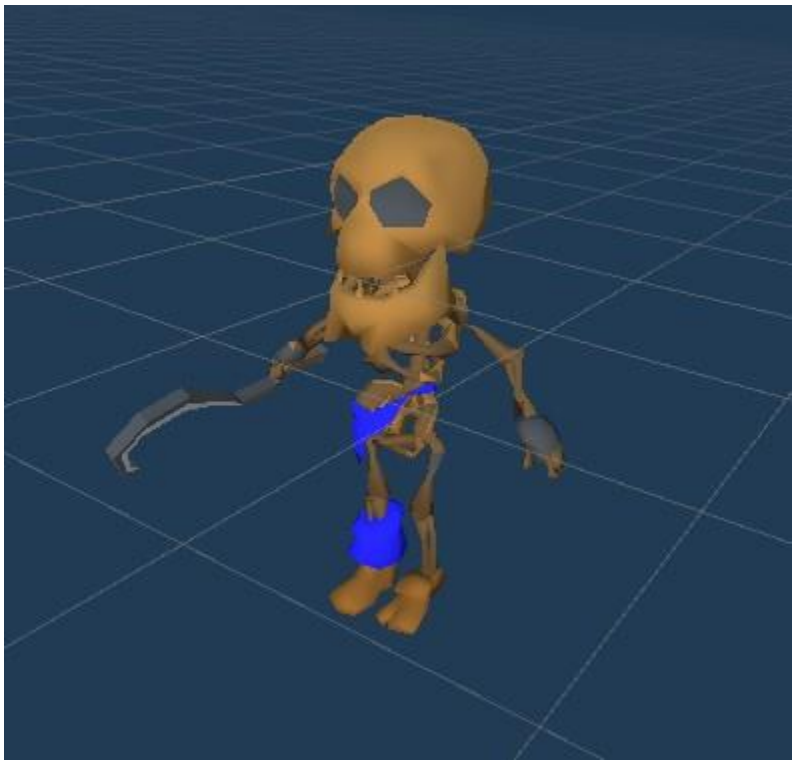


Figure 29. *Model of Desert Skeleton*

The Desert's Boss is the Pharaoh Mummy, it wears an Egyptian Headdress and a Pharaohs Cane. It attacks the player using the can and summons a pair of Desert Skeletons once it's health becomes less than half it's maximum health.

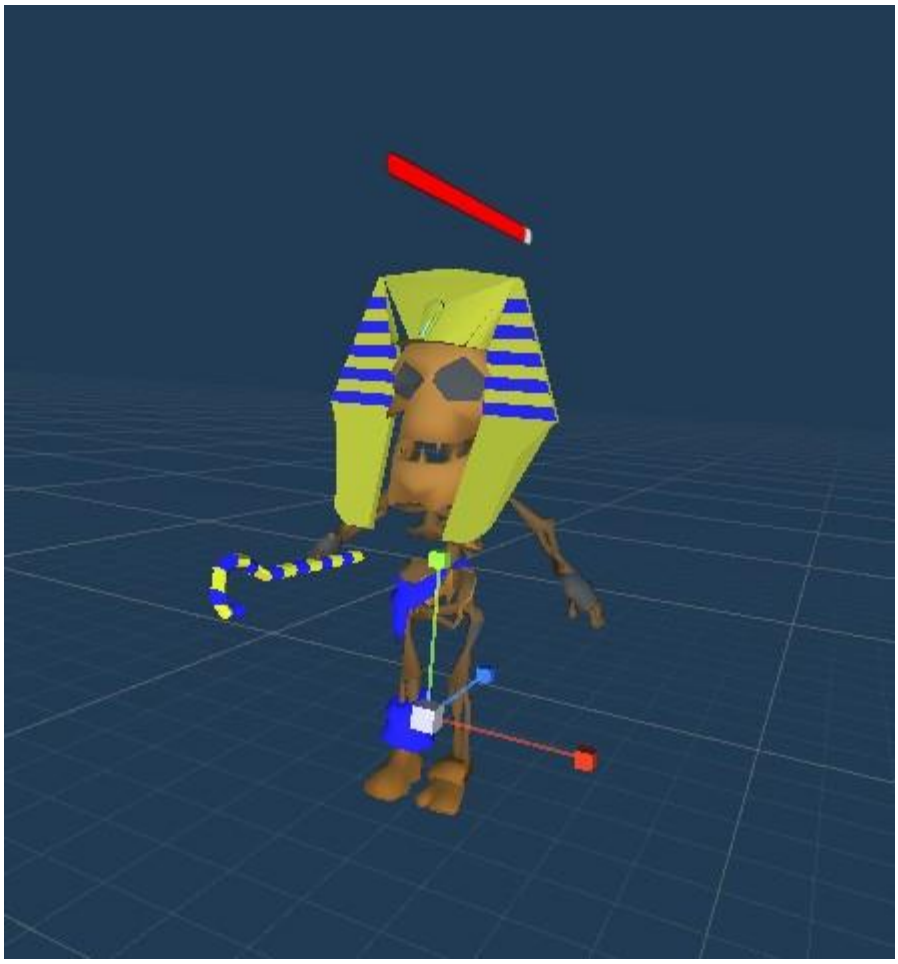


Figure 30. *Model of Mummy Pharaoh*

The Wicked Forest is inhabited by Skeleton Mages, their design is identical to the normal Skeleton but are now immobile and shoot magic projectiles at the player. The enemy projectile is spherical in shape and has a purplish magenta color, the specific choice in color was for the player to clearly differentiate the projectile from other projectiles. The brightness of the color would also condition the player to associate the projectile as harmful.

Figure 31. *Model of Skeleton Mage*

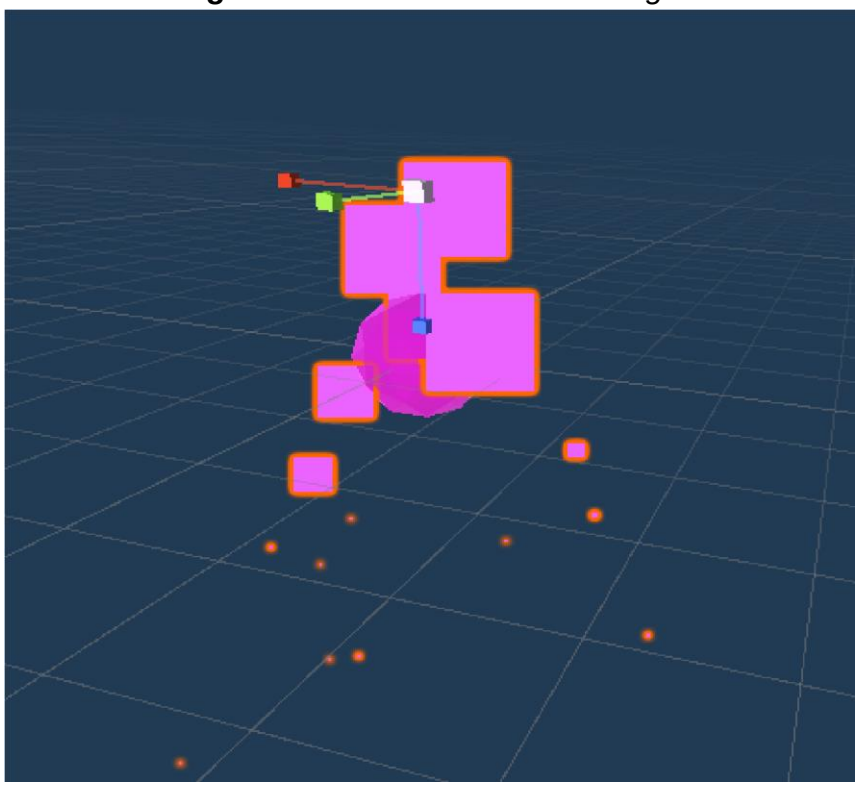


Figure 32. *Model of Enemy Projectile* The boss of the Wicked Forest is the Witch and appears on the Witch's Hut, the witch

fires magic projectiles at the player and summons other skeleton mages once her health become less than half of her max health. She is designed to have green skin similar to witches in other pop media and wears a pointy black witches hat.

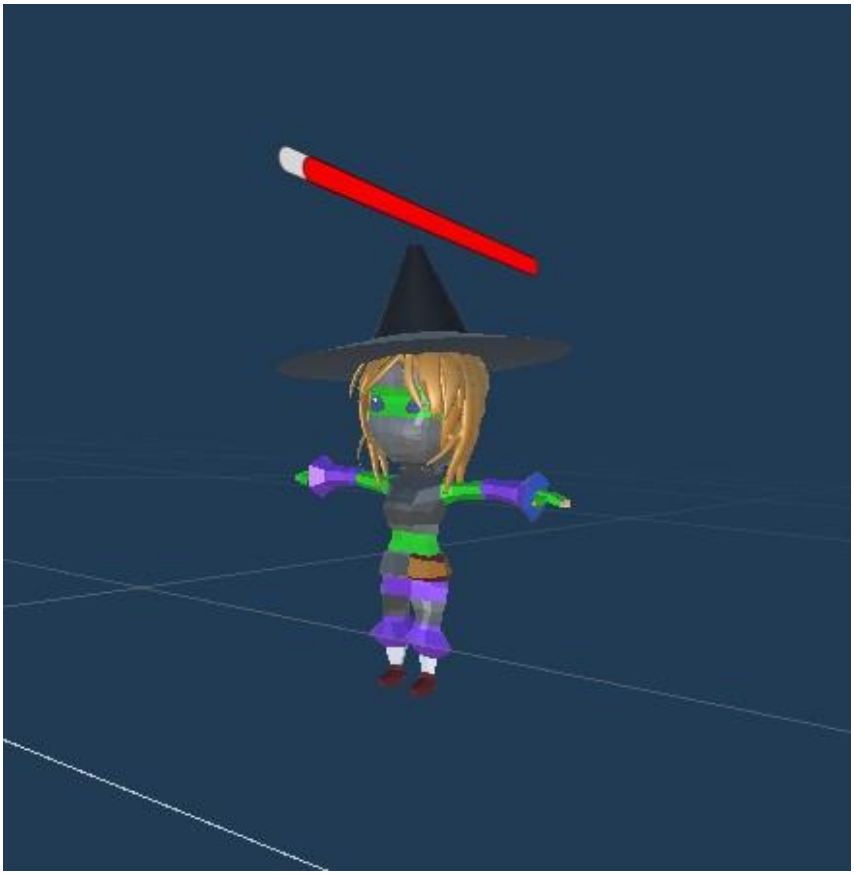


Figure 33. *Model of Witch*

The Volcano Area is occupied by rock golems, the are of brown color with red and pink assets to fit the volcanic theme. The do melee attacks by swiping down on the players direction once the player is close enough.

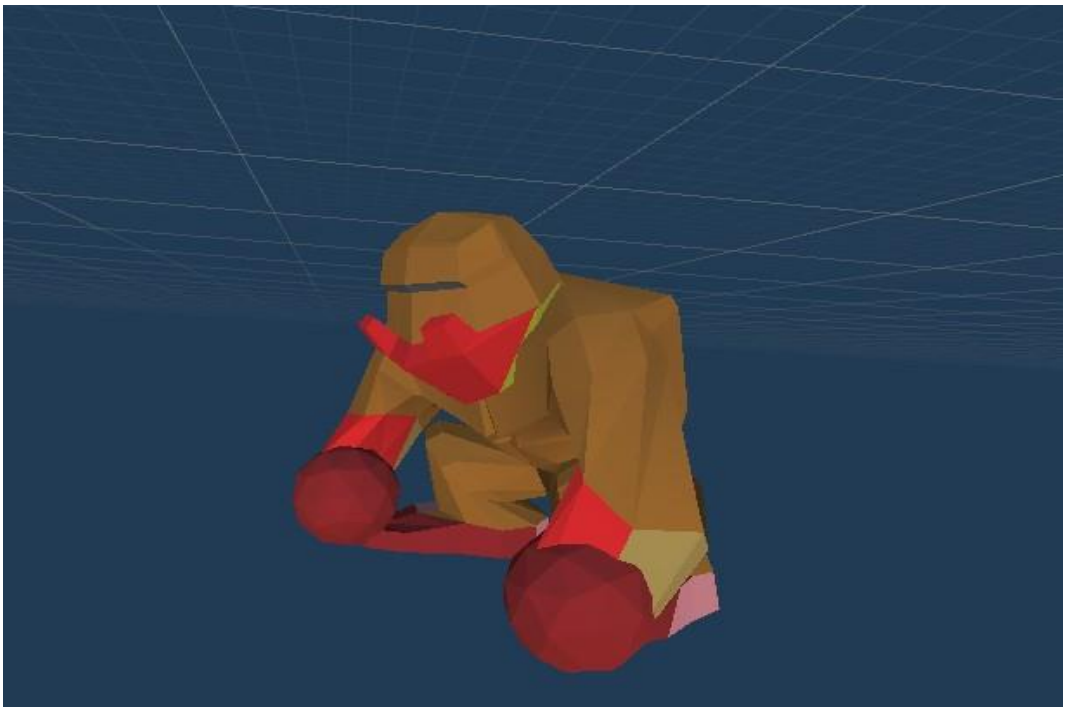


Figure 34. *Model of Rock Golem*

The final boss of the game is the Evil Wizard which is the main antagonist featured in the game's storyboard and opening scene, similar to the witch, the Evil Wizard shoots magic projectiles at the player and summons skeletons once his health become less than half of his max health. The Evil Wizard is equipped with a staff and his outfit is mostly purple and black.

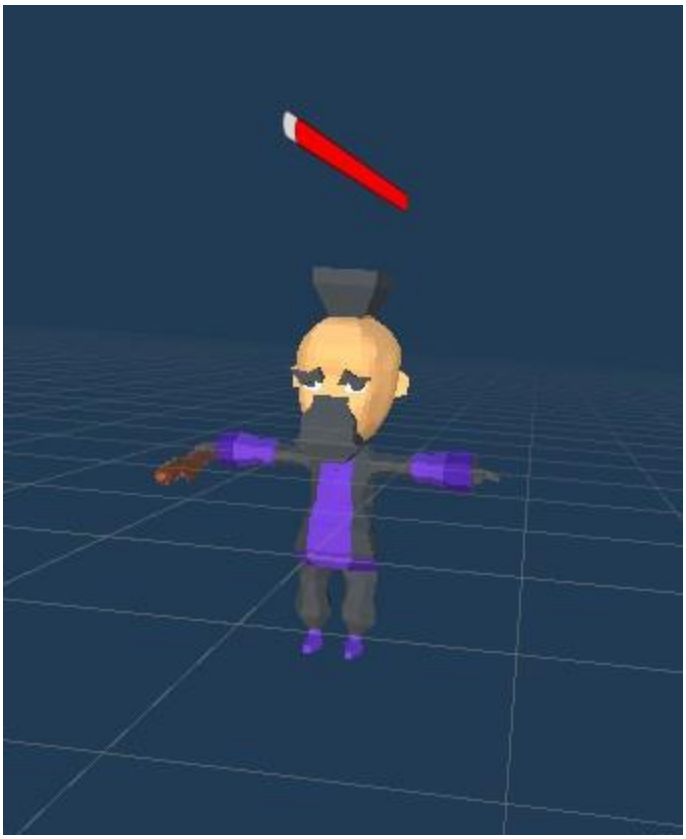


Figure 35. *Model of Evil Wizard*

PRODUCTION

Unity 3D is the game engine of choice, and C# is used to develop the game. Other multimedia tools and programs such as Adobe Photoshop, Blender, and Mixamo were used for the creation of assets and animations.

Cutscenes

There are two (2) cutscenes that are available in game. The first cutscene shown is the opening cutscene that shows some infographics and text that give context about the game's world and story.

Figure 36. *Part of Opening Scene*

The second cutscene in the game is the ending cutscene and is triggered when the player finishes the game. It shows a background image and provides some text pertaining to the story's resolution.

Figure 37. *Closing Scene*

Enemy Hit

It is the Player's hit script; it will be activated when the player slashes the body of the enemy, and it counts and deducts the life of the enemy.

```
}

0 references
void OnTriggerEnter(Collider other){
    if(other.tag == "playerAttack" && PlayerController.attacking == true){
        Debug.Log("Hit");
        //health - playerStats damage
        rb.AddForce( -transform.forward * 1000f * Time.deltaTime);
        health -= PlayerStats.damage;
        Debug.Log(health);
    }

}

1 reference
void UpdateHealth(){

    if(health<=0){
        Die();


    }
}

1 reference
void Die(){
    //check if array is empty
    if(dropables[0]!=null){
        //random number generator
        var i = Random.Range(0,10);
        Debug.Log(i);
        if(i<=dropables.Length){
            var dropSpawn = (GameObject) Instantiate(dropables[i],dropPosition.transform.position,dropPosition.transform.rotation);

        }
```

A

Figure 38: this code snippet triggers when the players hit the enemy and trigger death when the value of health is 0 or below

Abilities script

Here is the script that enables both the warrior and the mage class to do basic attacks and abilities. Each ability has cooldown values and expends mana upon use.

```
else if (attackButton.Pressed)
{

    PlayerController.attacking = true;
    attackTimer = 1.2f;
    canMove=false;

    animator.SetBool("MOVING", false);
    animator.SetTrigger("Fireball");

}
 else if (burstAttackButton.Pressed)
{


    if(canBurstAttack && playerStats.mana>=50){ //not on cooldown
        PlayerController.attacking = true;
        playerStats.mana-=40;
        attackTimer = 2f;
        burstAttackCooldown = 7f;
        canMove=false;
        animator.SetBool("MOVING", false);
        animator.SetTrigger("Burst Attack");
    }

}
else if(slowAttackButton.Pressed){
      if(canSlowAttack && playerStats.mana>=50){ //not on cooldown
        PlayerController.attacking = true;
        playerStats.mana-=40;
        attackTimer = 2f;
        slowAttackCooldown = 7f;
        canMove=false;
        animator.SetBool("MOVING", false);
        animator.SetTrigger("Snowball"); //Same animation as normal attack
    }
```

```
//attacking

if(specialAttackCooldown<=0){
    canSpecialAttack = true;
}
else{
    canSpecialAttack = false;
}

if(dashCooldown<=0){
    canDash = true;
}
else{
    canDash = false;
}

if (PlayerController.attacking)
{
    attackTimer -= Time.deltaTime;
    if (attackTimer <= 0)
    {

        PlayerController.attacking = false;


    }
    canMove=false;

}
else if (attackButton.Pressed)
{

    PlayerController.attacking = true;
    attackTimer = 1.2f;
    canMove=false;
```

Figure 39. *this code snippet shows how the player attack and uses abilities*

Enemy AI

Here is the enemy AI script which gauges the distance between it and the player to decide whether to chase and attack the player.

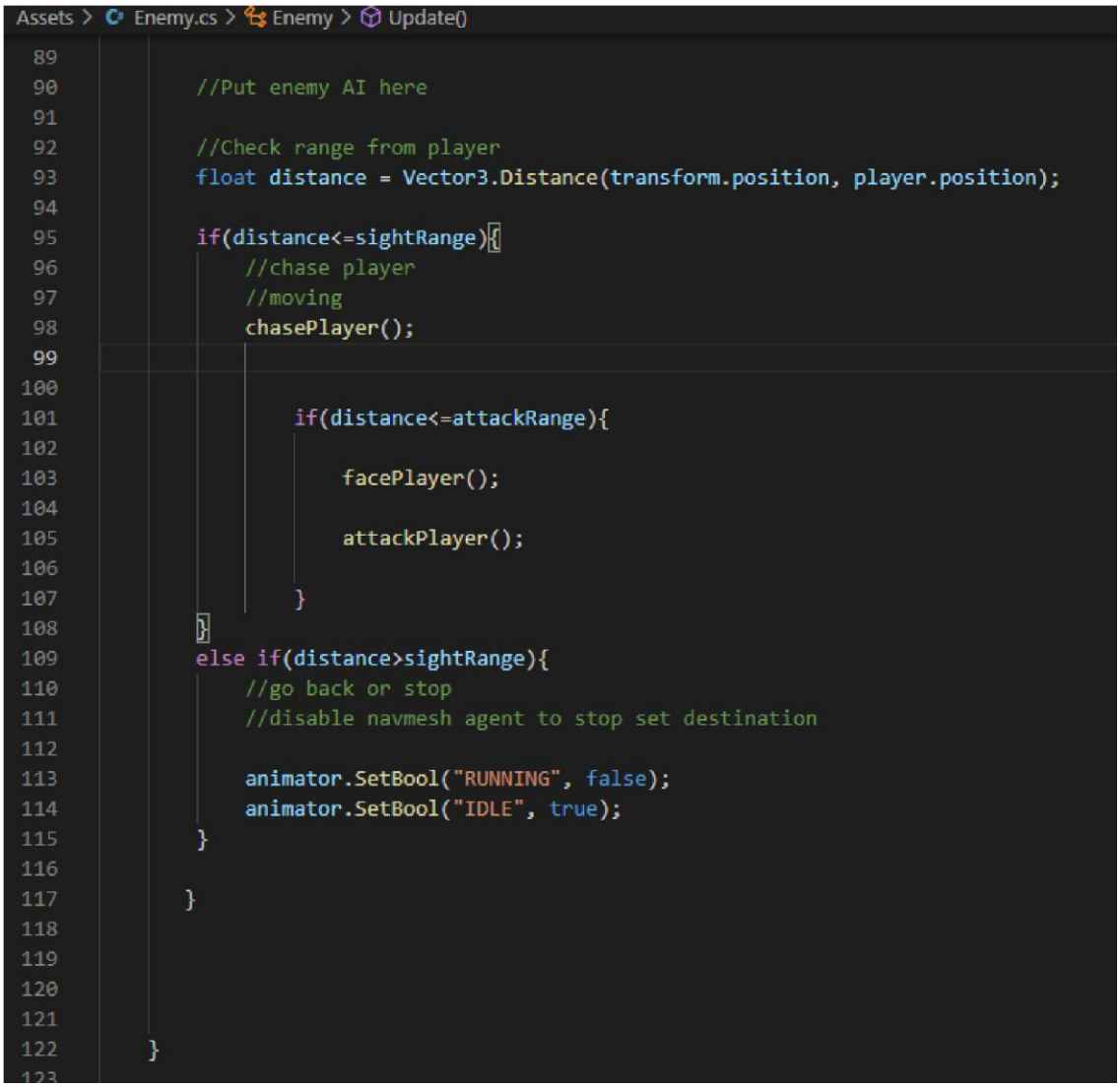


Figure 40. this code snippet shows how the enemy decides when to chase the player or attack the player

Slow Areas

Within the 3rd level of the game where the environment has a snow/winter theme, there are certain areas in the terrain that are darker and slow the player when the player is in contact with said area.

Figure 41. Slow Areas within the Snow Fields level

Usage of Navmesh on Enemy AI

Navmesh Agent is used for an enemy's way of chasing the player and avoiding obstacles. Navmesh is also being disabled temporarily whenever the enemy is hit with by the mage's snowball attack, after the duration the Navmesh agent is re-enabled allowing the enemy to move once again.

```
void Update()
{
    if(isSlowed){
        agent.enabled=false;
        slowDuration-=Time.deltaTime;
        //slow attack stops enemy for 5 seconds
    }
    if(slowDuration<=0){
        isSlowed = false;
        agent.enabled=true;
    }
```

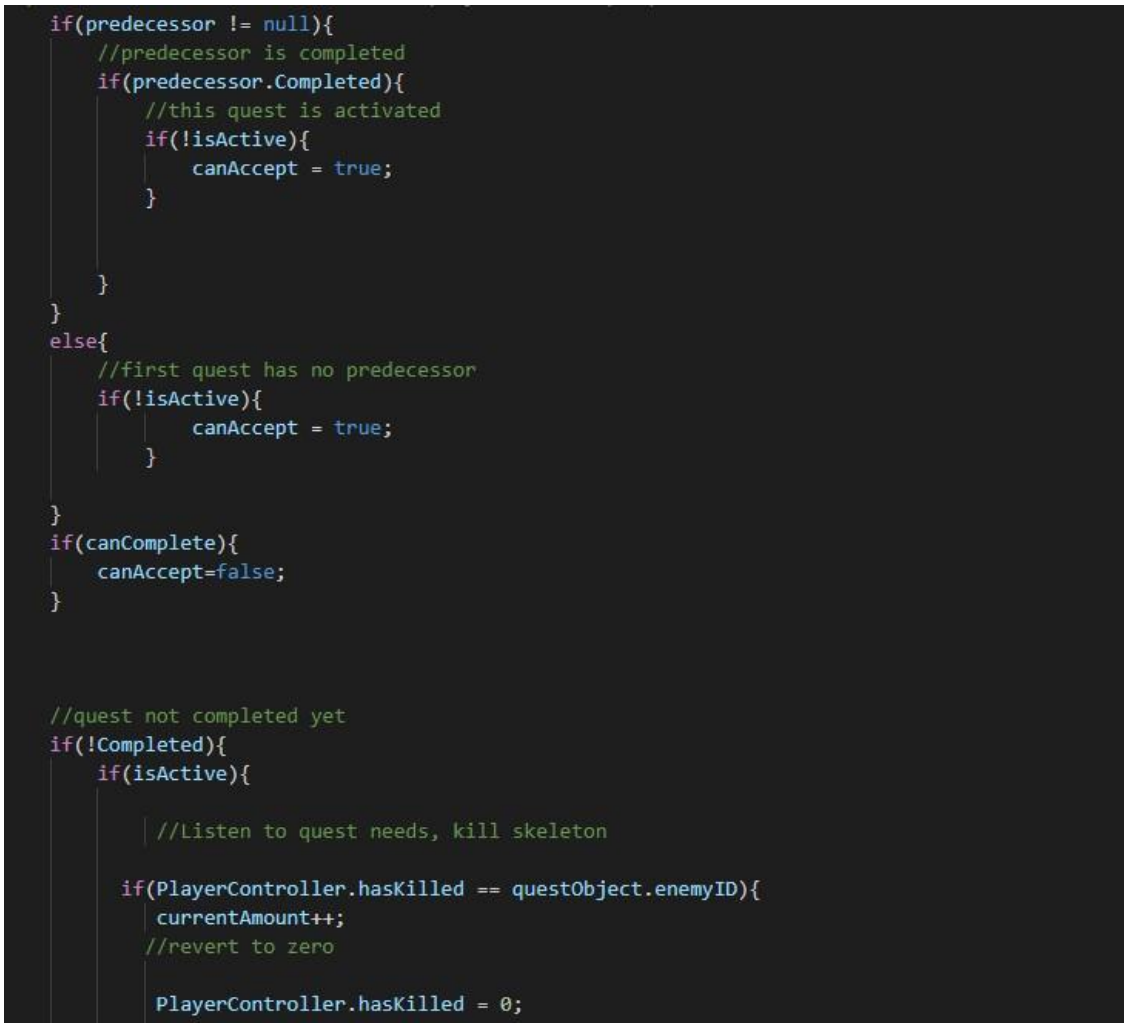
Figure 42. this code snippet shows the snowball attack affects the navmesh component of the Enemy AI

```
1 reference
void chasePlayer(){

        animator.SetBool("IDLE", false);
        animator.SetBool("RUNNING",true);
        agent.SetDestination(player.position);

}
```

Figure 43. this code snippet shows how the setDestination() method is used in the chasePlayer() method

Quest

Here is the quest script that the players must complete to proceed with the game. A quest can only be accepted by the player if it's preceding quest has been completed. While the quest is active, the quest script tracks the progress of defeated enemies by the player and updates the progress correspondingly.



```
if(predecessor != null){
    //predecessor is completed
    if(predecessor.Completed){
        //this quest is activated
        if(!isActive){
            canAccept = true;
        }


    }
}
else{
    //first quest has no predecessor
    if(!isActive){
            canAccept = true;
        }

}
if(canComplete){
    canAccept=false;
}



//quest not completed yet
if(!Completed){
    if(isActive){

        //Listen to quest needs, kill skeleton

      if(PlayerController.hasKilled == questObject.enemyID){
        currentAmount++;
        //revert to zero

        PlayerController.hasKilled = 0;
```

Figure 44. Code snippet of quest script

Quest Categories and Structure

The game utilizes the quest system as a medium to present mathematical problems to the player. Each level's quest is representative of each level in elementary school, Meaning, A level's quests are based out of expected learning outcomes gathered from Elementary Math Workbooks.

The quests in the game have two (2) categories: Counting/Calculation Quests and Word Quests that utilizes word problems in the quests.

Figure 45. *Example of Counting Quest in game*

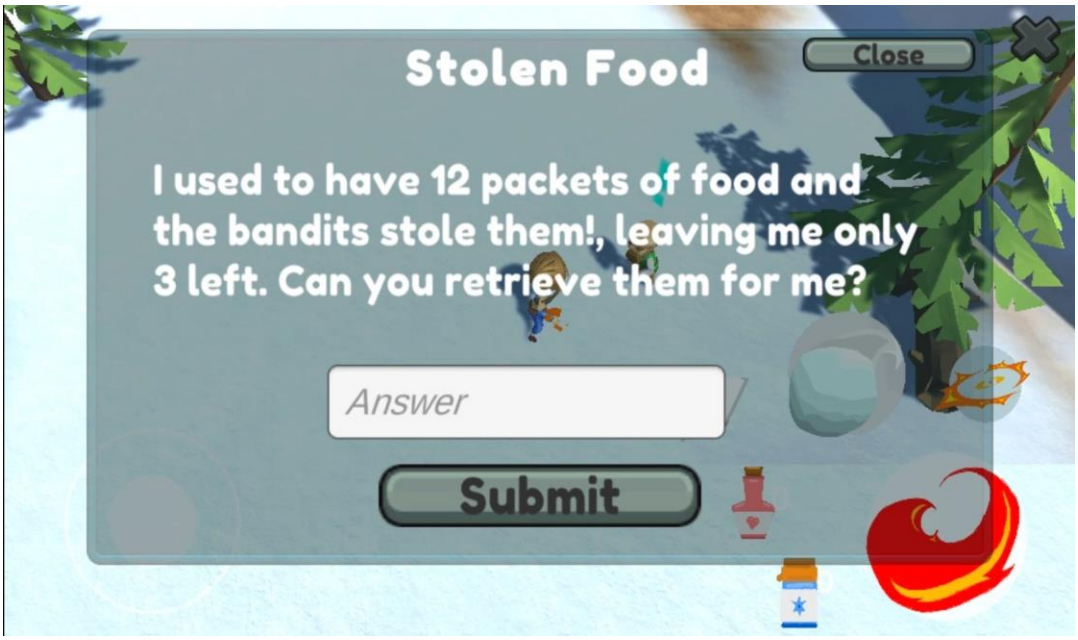


Figure 46. *Example of Word Quest in game* The quest title and description, along with other necessary details such as the quest's correct answer, are gathered from text files that

correspond to the level of the game. When a scene is loaded, the details of the quest are randomly selected from the text files in order for the quest to not be repetitive throughout the player's playthrough. The text file's content is formatted in JSON and are stored in the Resources folder.

Each quest is based on a learning outcome from each grade level in Elementary Education, an example of this is quests for level 1 mainly focus on counting problems where the answer of a problem results in a value below the number 5, compared to further levels where the learning outcomes focus more on word problems, comprehension and more complex operations such as multiplication and division.


```
"qL": [
        {
                "title": "Defeat Rock Golems",
                "questDetails": "Defeat the sum of six and two Rock Golems for me",
                "category": "Counting",
                "answer": 8
        },
        {
                "title": "Rocks to Cook",
                "questDetails": "Rocks from Rock Golems can be used as fuel for stoves! If I can three rocks
                "category": "Word",
                "answer": 9
        },
        {
                "title": "Defeat More Rock Golems",
                "questDetails": "Defeat seven subtracted from fifteen Rock Golems for me",
                "category": "Counting",
                "answer": 8
        },
        {
                "title": "Defeat Even More Rock Golems",
                "questDetails": "Defeat three times two Rock Golems for me",
                "category": "Counting",
                "answer": 6
        },
        {
                "title": "Defeat Rock Golems",
                "questDetails": "Can you defeat the quotient of sixteen and four Rock Golems for me?",
                "category": "Counting",
                "answer": 4
        },
        {
```


Figure 47. *Snippet of the content of text file*

Level Progression

Once the player finishes a level, portals appear beside a last quest giver of the level. Portals have 2 types, an orange portal that takes the player to the next level and a green portal that takes the player to the previous level.

Orange portals will only be available once two (2) conditions are met:

1. Player has completed the final quest of the level, which also indicates that the player has defeated the boss of the level.
2. Player has reached the level necessary to proceed.

Figure 48. *Orange Portal within game*

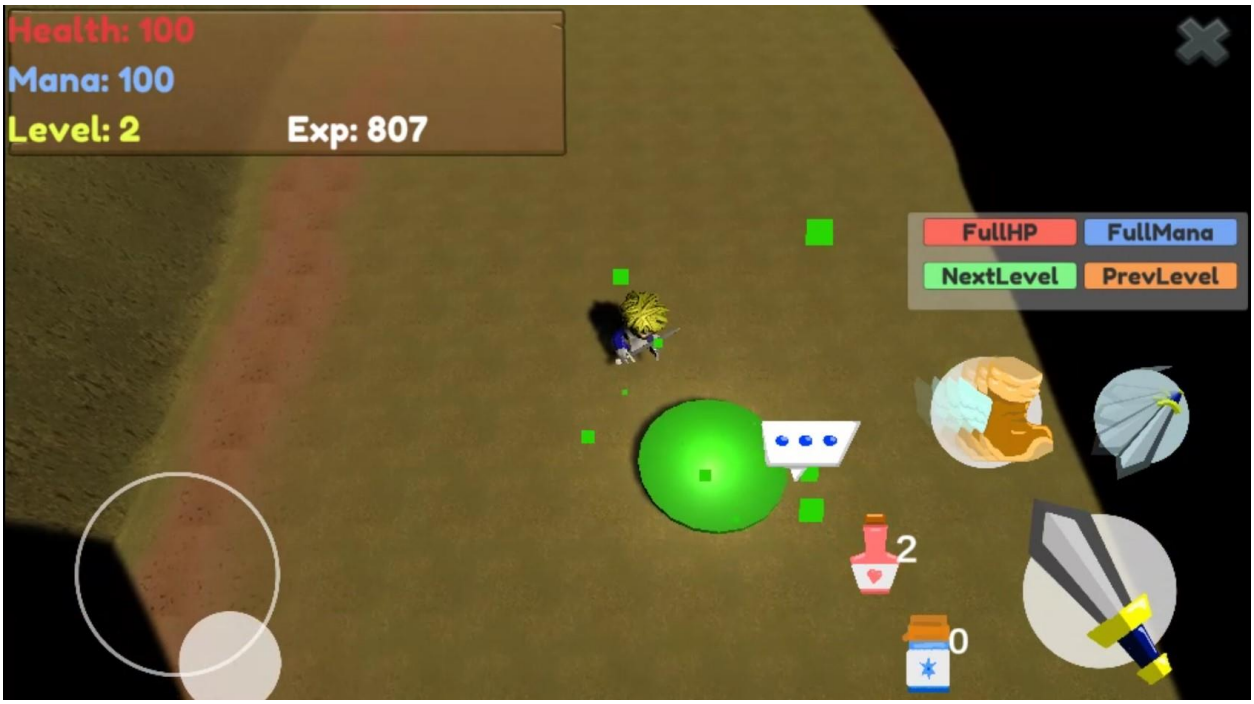


Figure 49. *Green Portal within game*

Player Death

Once the player's health has become below or equal zero (0), the player is defeated and plays a death animation. A window then appears with a button to trigger player respawn.

On respawn, the player is handed consequences such as:

1. Player experience is deducted by 10%
2. Player loses 5 health and 5 mana potions

Damage Calculation Text and HP Bars

When the player registers a hit unto an enemy, a small text appears above the enemy that shows how much damage was done. This also applies to the player as a similar text in red font also appear above the player whenever the player takes damage.

HP bars above the enemies represent how much health it currently has, the fill level of the HP bar reflects on how much health an enemy currently has.

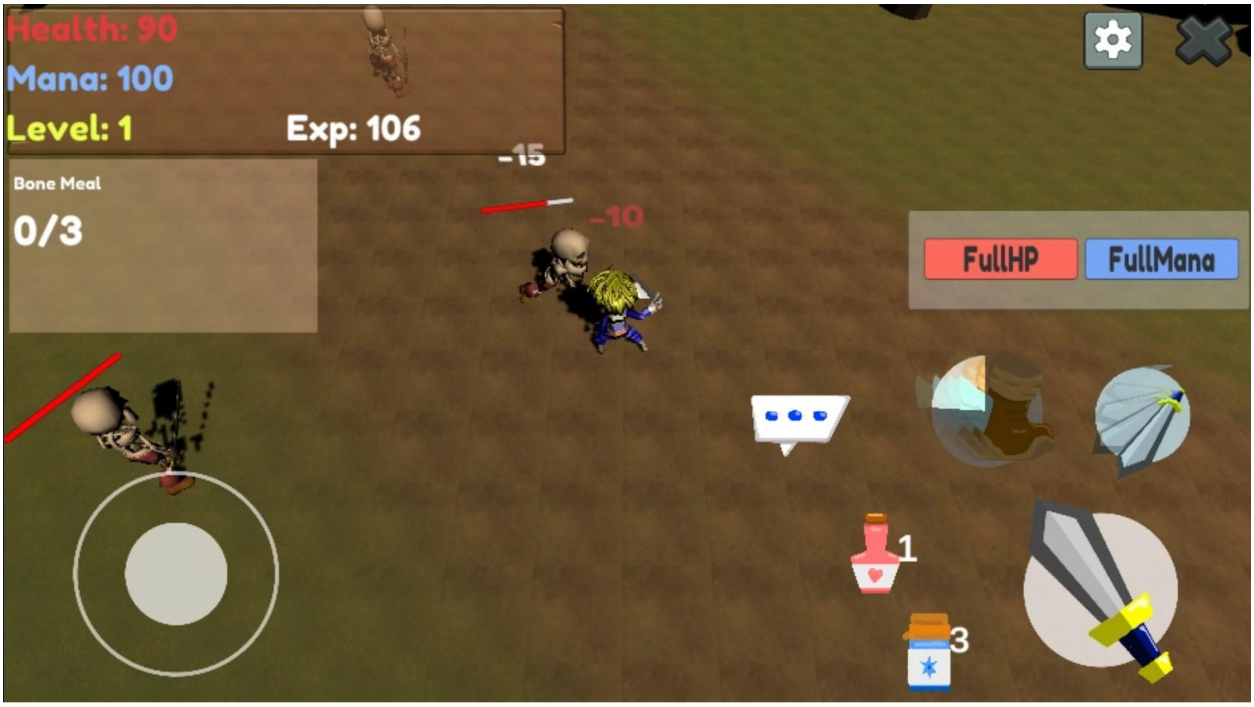


Figure 50. *Damage Text and HP Bars in game*

Player Save and Load

On a successful login by the player, the username and password inputted by the player is temporarily saved into the PlayerPrefs. Two (2) text files are then created into the persistent data path of the user's device, these text files are named "saveFile.txt" and

“questProgress.txt” and hold data that represent the player’s saved statistics, such as health and mana, and quest progress respectively. Both of the files hold text in JSON format.

Using the saved username and password in the PlayerPrefs, the data from the “playerprogress” and “questprogress” are retrieved and written into the text files in the persistent data path.

```
public IEnumerator retrieveSaveFile(){

    string username = PlayerPrefs.GetString("username");
    string password = PlayerPrefs.GetString("password");

    WWWForm Saves = new WWWForm();
    Saves.AddField("username", username);
    Saves.AddField("password", password);

    using (UnityWebRequest www = UnityWebRequest.Post("http://localhost/Reschool/retrieveSaveFile.php", Saves))
    {
        yield return www.SendWebRequest();

        if (www.downloadHandler.text != null)
        {
            Debug.Log(www.downloadHandler.text);


            BinaryFormatter formatter = new BinaryFormatter();
            string path = Application.persistentDataPath + "/saveFile.txt";
            FileStream stream = new FileStream(path, FileMode.Create);

            if(File.Exists(path)){
                //overwrite/create on path
                PlayerData playerData = new PlayerData();
                playerData = JsonUtility.FromJson<PlayerData>(www.downloadHandler.text);

                formatter.Serialize(stream, playerData);
                stream.Close();
            }
            else{
                Debug.Log("File not found");
            }

        }
        else
        {
            Debug.Log(www.downloadHandler.text);
            //SceneManager.LoadScene("HomeScreen");
             //StartCoroutine(Leaderboard());
        }
    }
```

Figure 51. *Code Snippet of Loading Player and Quest Progress*

```
public void loadGame(){
    string path = Application.persistentDataPath + "/saveFile.txt";
    if(File.Exists(path)){
        BinaryFormatter formatter = new BinaryFormatter();
        FileStream stream = new FileStream(path, FileMode.Open);

     PlayerData loadedPlayerData = formatter.Deserialize(stream) as PlayerData;

     playerStats.health = loadedPlayerData.playerHealth;
     playerStats.maxHealth = loadedPlayerData.playerMaxHealth;
     playerStats.mana = loadedPlayerData.playerMana;
     playerStats.maxMana = loadedPlayerData.playerMaxMana;
     playerStats.level = loadedPlayerData.playerLevel;
     PlayerStats.experience = loadedPlayerData.playerExperience;
     playerStats.healthPotions = loadedPlayerData.playerHpPotions;
     playerStats.manaPotions = loadedPlayerData.playerMpPotions;

     stream.Close();

    }else{

        Debug.Log("Save File not found in "+ path);

    }

}
```

Figure 52. *Code Snippet of Loading Player Stats from saveFile*

```
TextAsset newqList = Resources.Load<TextAsset>(questFileName);
myQuestList = JsonUtility.FromJson<QuestList>(newqList.text);

string path = Application.persistentDataPath+"/questProgress.txt";

//get progress from json

if(File.Exists(path)){
    string json = File.ReadAllText(path);
    myQuestDataList = JsonUtility.FromJson<QuestDataList>(json);

}else{

    myQuestDataList = JsonUtility.FromJson<QuestDataList>(qdList.text);

    var someString = File.ReadAllText(Application.dataPath + "/Khe Assets/JSON FILES/questProgress.txt");

    //no file
    FileStream stream = File.Create(path);
    stream.Close();
    File.WriteAllText(path, someString);


}
// myQuestDataList = JsonUtility.FromJson<QuestDataList>(qdList.text);


Completed = myQuestDataList.qdL[questID - 1].questDataCompleted;
```

Figure 53. *Code Snippet of Loading Quest.Completed from questProgress* Before the player begins playing, the players statistics are loaded from the values found in “saveFile.txt”. Similarly, all quests in each level gather data from “questprogress.txt” and determine whether that specific quest has already been completed by the player.

When the player logs out, the data found within both save files are uploaded to the databases to the “playerprogress” and “questprogress” columns of the database to the corresponding user.

```
public IEnumerator sendSaves(){

    string savePath =  Application.persistentDataPath + "/saveFile.txt";

    BinaryFormatter formatter = new BinaryFormatter();
    FileStream stream = new FileStream(savePath, FileMode.Open);

    PlayerData loadedPlayerData = formatter.Deserialize(stream) as PlayerData;

    var saveString = JsonUtility.ToJson(loadedPlayerData);


    stream.Close();

    string questPath = Application.persistentDataPath + "/questProgress.txt";

    var questString = File.ReadAllText(questPath);



    string testPass = PlayerPrefs.GetString("password");
    string testUser = PlayerPrefs.GetString("username");

    WWWForm Saves = new WWWForm();
    Saves.AddField("saveFile", saveString);
    Saves.AddField("questFile", questString);
    Saves.AddField("username", testUser);
    Saves.AddField("password", testPass);

    using (UnityWebRequest www = UnityWebRequest.Post("http://localhost/Reschool/sendSaves.php", Saves))
    {
        yield return www.SendWebRequest();

        if (www.downloadHandler.text == "Success")
        {
            Debug.Log(www.downloadHandler.text);
            yield return new WaitForSeconds(3);

        }
        else
        {
            Debug.Log(www.downloadHandler.text);
            //SceneManager.LoadScene("HomeScreen");
             //StartCoroutine(Leaderboard());
        }
    }
}
```

Figure 54. *Code Snippet of Saving Player and Quest Progress*

When the player exits the game, the text files found in the persistent data path are deleted and the data within the PlayerPrefs are cleared.

Character Rigging and Animation

The 3Dmodels are rigged using the simple humanoid skeleton bones largely used in many low-poly games and is implemented in Unity. The 3D animations used in the game are gathered from Mixamo, which is a free repository for 3D animations and models.

Animations are controlled by Unity's Animator Component and Animator Controller.

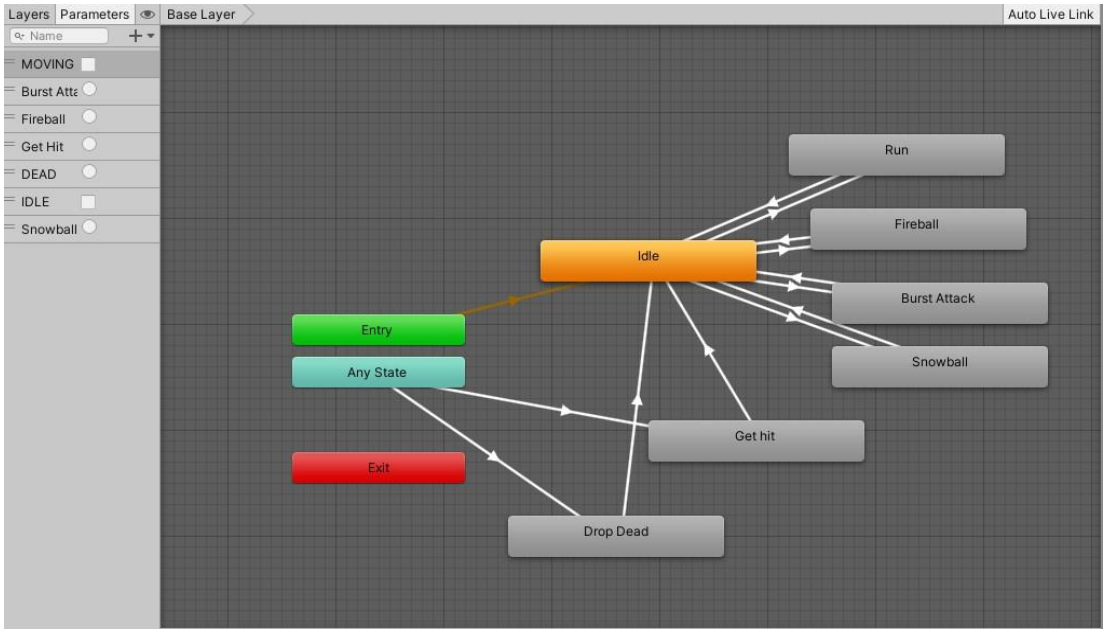


Figure 55. Shows animation controller for mage

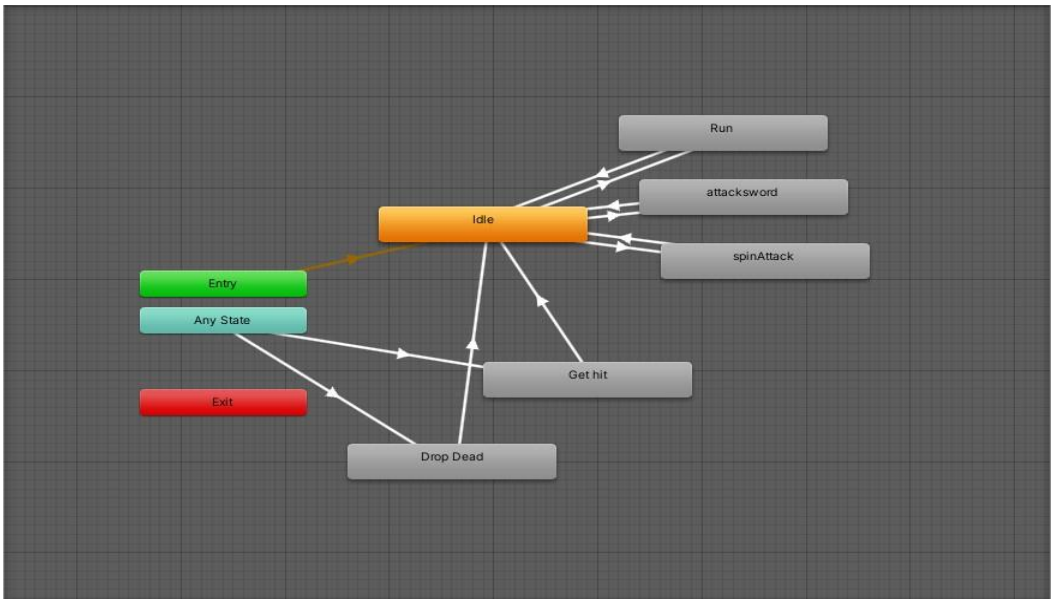


Figure 56. shows animation controller for warrior

Particle Effects

The proponents have decided to used much more primitive and low-poly aesthetic toward particle effects within the game, in view that the primitive aesthetic of the particle effects would be coherent with the low-poly aesthetic of the 3D models.

Figure 57. Low poly fire effect shown on the mage's hand

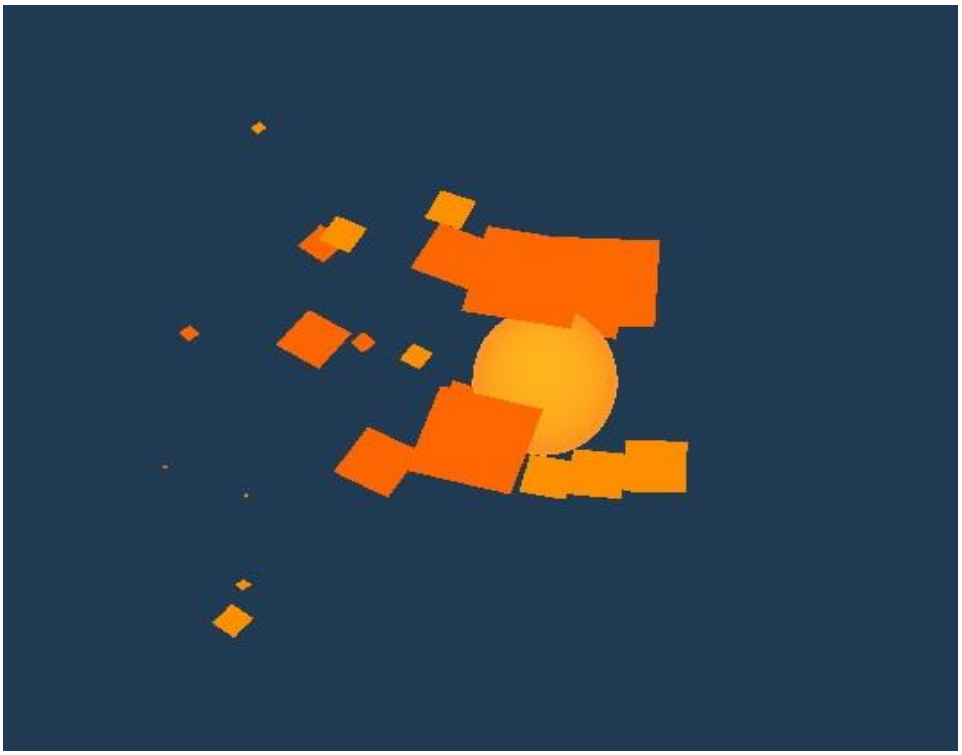


Figure 26. Low poly fire effect shown on Fire Ball object

Sound

All music and sound resources used in ReSchool are royalty-free and gathered from royalty-free websites and repositories.

Building the Game for Android Platform

With the Android Platform in mind, the developers implemented touch controls instead of traditional keyboard or controllers. Icons and buttons are displayed on the screen and each one serves a different purpose, whether it is to attack, use abilities, use potions etc. The use of low-poly graphics and particle effects are also in consideration of the limited rendering power of Android devices.

TESTING PROCESS

User Experience Satisfaction

Initial Usability Testing – Game Users Satisfaction Scale

The researchers conducted a survey called Game Users Experience Satisfaction Scale (GUESS), to determine the user's experience satisfaction among the 18 gathered respondents. Given the age range of the players, the age range of 6-12 will help us determine the playability and user's experience because the respondents fit the age demographic set by the researchers. The respondents/players will then put a checkmark on a particular value in the 7-point liker scale.

Respondent Gender/Age	Total
Female (5-12)	7
Male (6-11)	11
Grand Total	18

Table 1: *Respondent Table*

Table 1 shows the respondent's gender: there are 18 respondents in all

The user's testing is one way to test the game appearance, playability, and entertainment level. The researchers conducted a survey to the users with the use of GUESS rating wherein the researchers scale the games UI, Audio, Enjoyment etc.

Interpreting Survey Response

The table Below are the survey results interpretation of the initial testing to record the result of the survey. The developers used the Percent (%) Agree counts the number of respondents that agreed with the statement .The table shows the scores for the question:

Item	%of Agrees	Construct
I think it is easy to learn how to play the game.	100%	Usability/Playability
I enjoy the sound effects in the game.	89%	Audio Aesthetics
I find the controls of the game to be straightforward.	72%	Usability/Playability
I feel successful when I overcome the obstacles in the game.	94%	Personal Gratification
I think the game's audio fits the mood or style of the game.	83%	Audio Aesthetics
I feel the game constantly motivates me to proceed further to the next stage or level.	94%	Personal Gratification
Whenever I stopped playing the game I cannot wait to start playing it again.	83%	Play Engrossment
I enjoy the game's graphics.	83%	Visual Aesthetics
I enjoy the fantasy or story provided by the game.	83%	Narratives
I feel I can explore things in the game.	83%	Creative Freedom
I find my skills gradually improve through the course of overcoming the challenges in the game.	78%	Personal Gratification
I do not need to go through a lengthy tutorial or read a manual to play the game.	94%	Usability/Playability
I can block out most other distractions when playing the game.	93%	Play Engrossment
If given the chance, I want to play this game again.	94%	Enjoyment

I feel the game's audio (e.g., sound effects, music) enhances my gaming experience.	94%	Audio Aesthetics
I find the game's menus to be user friendly.	89%	Usability/Playability
I like to play this game with other players.	89%	Social Connectivity
I am likely to recommend this game to others.	83%	Enjoyment
I think the game is visually appealing.	78%	Visual Aesthetics
I am able to play the game with other players if I choose.	94%	Social Connectivity
I feel the game provides me the necessary information to accomplish a goal within the game.	89%	Usability/Playability
I think the graphics of the game fit the mood or style of the game.	89%	Visual Aesthetics
I think the game is unique or original.	89%	Creative Freedom
I can clearly understand the game's story.	89%	Narratives
I enjoy playing the game.	94%	Enjoyment

Table 2: *Initial Usability Testing: % of Agrees per Item* The percent agrees for the percentage for that exact question in terms of rating

(5-7), they signify the number of high assessments for that questions (GUESS)

Row Labels	Average of Top 2 box	Average of %Agree
Audio Aesthetics	50%	88.88%
Creative Freedom	58.33%	86.11%
Enjoyment	62.96%	90.74%
Narratives	55.55%	86.11%
Personal Gratification	40.74%	88.88%

Play Engrossment	47.22%	83.33%
Social Connectivity	41.66%	91.66%
Usability/Playability	52.22%	88.88%
Visual Aesthetics	48.14%	83.33%
Grand Total	**50.88%**	**87.77%**

Table 3: *Percent Agree results and Construct*

The overall results show that 50.8% of the respondents agreed that the Game Users Experience Satisfaction Scale (GUESS), it showed the players enjoyed the game by giving them some degree of creative freedom as they uncover the plot of the game as well as providing them an immersive experience through background music and sound effects. Most of the respondents enjoyed the game due to gameplay with the Enjoyment, Social Connectivity, Audio Aesthetics, Personal Gratification, and Usability/Playability are the top five (5) features with scores of 92%,91%,89%,89%,89% correspondingly. The game fits the target audience set by the developers, However, Play Engrossment and Visual Aesthetic are the lowest, with scores of 83% and 89% respectively, because of the difficulty of the game which made the experience confusing for some respondents. The Narratives and Creative Freedom from the researchers gave a detailed explanation about how the game works and users agreed that the game's narrative and creative freedom are well executed with the result 86%. By giving the players quests or missions, users were eager to complete quests and progress through the game accordingly.

Throughout the survey, many of the users were confused because of the game given quests but by the guidance of the parents/guardians the users were able to

understand the game and what the game is all about. Although as the developers of the project, we need to improve our game by improving the aspects of the game where the score shows lower percentages based on the conducted survey. The results, However, were unexpected, from the perspective of the developers, getting an 88% over all user's satisfaction rate from the game. All the results above prove that respondents were satisfied when playing the game. Feedback was given after testing and the respondents wanted a few adjustments to be made regardless of the overall satisfaction rating.

Post Production

After receiving feedback, the developers were able to learn which aspects of the project to improve based on the results.

An Android build for usability testing was published on itch.io, this build featured the first three levels of the game, both of the available character classes along with cheats that would enable the players to have a less difficult time completing quests. The build only featured half of the levels so that the game would not take too much space on the user's devices.

After the build was finished, the developers created an account on itch.io to publish the game. The game was published under the educational game genre and was for the Android platform. The game was also free-to-play and the link of the itch.io page was used for the testing survey.

The respondents during the conducting of the survey were given the link of the build. The users would download the APK and install the game on their respective devices.

CHAPTER 4

Summary of Findings

This study was conducted in view that it would become a plausible solution or alternative medium to aid pupil's endeavor to learn elementary mathematics. The visuals and assets used by the game were inspired by several games that have similar characteristics and aesthetic. The developers implemented game mechanics that would balance introducing players to mathematical challenges and aspects of traditional Action Role-playing games.

During the development of the game, the researchers faced many difficulties just like any other first-time developers. The processes of focusing on game aspects, implementing game mechanics, 3D Modelling and Rigging, Particle and Sound Effects, Construction of Mathematical Problems and Database Implementations prove to be a challenge to the developers. The developers also considered the projected deployment

of the game on Android devices and used mechanics such as touch controls, and low poly assets that would not be taxing to a device's processing power.

During the brainstorming period, the developers decided ways to balance mathematical challenges and an entertaining Action RPG experience while considering the variables presented by the target audience. The developer decided that players would be presented mathematical problems in forms of quests, and players would have to provide the correct answer of said quest before defeating the needed number of monsters needed. Though the developers are not experts in primary education, the developers used workbooks used in public elementary schools as references to the construction of quests. The developers decided on learning outcomes per year level and designed the quests based off of said learning outcomes.

Conclusions

The developers aimed to create a game that would serve as an aid to pupils learning elementary mathematics, this was due to the pandemic inhibiting pupil's ability to absorb learning materials as the sudden shift to online-based learning was sub-optimal. The developers aimed to create a game that would use elementary mathematics as a core mechanic within the game while adding fantasy themes and traditional ARPG features. The project is yet another attempt to gamify learning within the game industry, especially in the realm of educational games.

The purpose of this game is to be an entertaining medium for players to test their wit on elementary mathematics at their own pace. The game uses a low-poly style in the assets and particle systems that would seem appealing to the tastes of the target

demographic of pupils ages 6 to 12 years old. The game introduces mathematical challenges as quests, the players must solve the question first before proceeding with the quests and defeating any monsters. The use of adventure and exploration alongside the use of mathematics as a progression mechanic prove to be slightly confusing to pupils playing the game, however effective in teaching mathematics once the players understand the game flow.

The researchers gained inspiration from several games such as Stardew Valley, Eternium, and Aron's Adventure, incorporating some aspects and aesthetics present from each game.

Throughout the game developing process, the developers discovered that game development requires a lot of work and commitment. The development process took a lot of time, skill, resources, and teamwork. Making a game requires all of those things to achieve the envisioned game, even much so if game developers aim to create a profit out of a game.

Like many modern games, the game utilizes the norm of 3D graphics. However, the game uses a low-poly style of 3D assets and particle effects for several reasons, such as the consideration of rendering power of Android devices, and to project a lighter tone and theme to the younger audience. These aspects combined would create an accessible, simple, and easy to access game.

Recommendations

The researchers would like to improve on the combat system more, there is more potential that can be added to skills and abilities the players can use.

The researchers would also like to improve on the animations and 3D modeling of the assets.

The researchers also explored the implementation of class switching compared to the game's players having an exclusive use to a single class, players may want to explore the use of other classes and the corresponding abilities.

Lastly, the researchers believe that the scope of each year level in elementary education is too vast, particularly during the writing of quests. For example, Grade 4 elementary mathematics and above uses large numbers that would go to the hundreds or thousands which the researchers believe to be too large a number to be used in quests. This, however, is subjective as the researchers are not well-versed in the field of Primary Education.

CHAPTER V

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Appendices

Player’s Feedback

Initial Testing Feedback

Learnings and Feedbacks about the game?	**Any comments and Suggestion?what are need to improve about the game?**
it's confusing at first but as time goes on it will be understandable	more quest question but easy to understand
confusing	skill or item to unlock
the game is good because there is something to learn	more skeletons or any
fun	n/a

the quest question needs to be changed to be understood by the children	more character to choose
nice for the children	n/a
confusing because no guide map where the character goes	maps to navigate the character
n/a	n/a
before the game need the toturial so we can understand what game is all about.. but the game is good for the 6-12 so they can learn how to solve basic problem	tutorial before the game
n/a	need more character so the user's not get boring
we learn how to solve a problem but the quest still confusing for the children	more levels and environment
n/a	collaboration of the user's
need a guid for the parents specially age 6 or 7 but the games still nice	n/a
none	black market/trade market

fun to play	skills in warrior

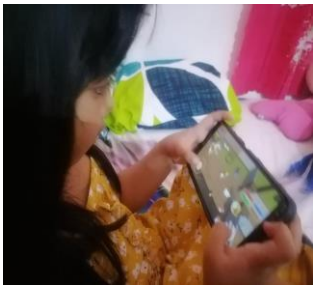
Documentation of Survey

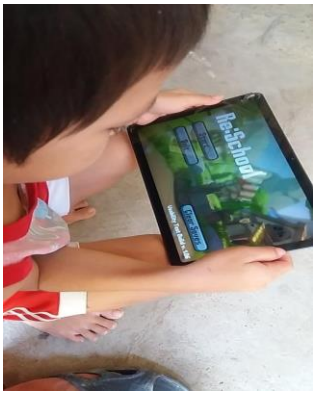








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