



3D Unity Game

Sweet Dreams

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Statement of Originality

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Signed:

A handwritten signature in black ink, appearing to read "Taylor Bromley". The signature is fluid and cursive, with "Taylor" on top and "Bromley" below it.

Acknowledgements

I would like to thank Dr Paul Newbury for supporting me throughout the development of my entire final year project. I would also like to say thank you to Dr Dmitrijs Dmitrenko for his feedback from the interim report.

Abstract

There is a gap in the market for originality in zombie survival style games. Research has shown that traditional gun play has a dominant role in these games such as Call of Duty, Left 4 Dead, Killing Floor, DayZ and many more. This project aims to explore a new approach to the traditional overused style to target an audience that is interested in magical weapon combat instead. Sweet Dreams is a 3D first-person round based survival game with magical weapons. Players need to survive a series of rounds against enemies and are able to spend points gained in these rounds to upgrade in the shop at the end of each level. The development of the game was in C# using Unity along with GitHub for version control. Through extensive background research, project aims and objectives were formed by knowing what previous games failed at and what they succeeded at. Online user testing with several individuals that matched the target audience was conducted which helped bring guidance on what the people wanted. Development testing was completed throughout the project whenever something was being worked on to ensure it was working as intended. Often, rough test creations were used early on to determine if there would be any issues, potentially saving a large deal of time. The project was an overall success with a complete and playable game being implemented as envisioned with slight changes in plan along the way. Further development is intended to extend the game so there is more content.

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1 Introduction

1.1 Introduction to 3D game development

When first moving to game engine-based programming, people discovered some of the many pluses to using such tools. One of the key areas introduced was the ideology of “don’t reinvent the wheel” (Atwood, 2009). With game engines, there is a lot of content readily available for all users such as collision detection, the assets store, particle systems and tools like timeline which not only speed up the development process but reduce costs.

1.2 Game description

Sweet Dreams is a fast-paced survival game filled with fantasy aspects to fuel the player’s curiosity and excitement. The player enters the “Secret Worlds” book of dream worlds and must use magic to defeat the waves of mysterious creatures to unlock the truth behind their grandfather’s coma-like state. The player can explore different areas of each level, and purchase and upgrade magical abilities to help them survive the night without being woken by fear.

1.3 Objectives

The objective of this project was to design, develop and evaluate a video game. The game was created with the Unity 3D game engine.

1. The player must survive waves of Shadow Keepers which progressively get harder
2. Magical weapons will be available in the shop for the player to buy and upgrade between levels
3. Before each level begins, the player can also decide if they want to buy more health or mana for certain weapons if they feel it is necessary
4. When the player’s health bar, which is known as his fear bar, reaches zero, they wake up from fear and will have to start again by re-entering the page’s dream
5. Collect pickups that have a chance of dropping from enemies on death to replenish some mana or health
6. The goal is to complete each of the pages in the book
7. The end goal is to free your grandfather from being trapped in his own dream
8. Gear gained within the level other than the shop’s currency will not stay with the player
9. On each level’s completion, more of the book’s secrets will be revealed by the words on the page becoming visible
10. Attempt to complete the level as fast as possible to beat their previous quickest time saved on record

1.4 Motivations

The motivation of this project was that it will give both experience at developing all aspects of a complete video game and give a leading portfolio piece to show potential employers. This project also allowed content from modules on the course to be put into practice. Examples include Project Management techniques from Software Engineering which was heavily relied upon to ensure the project was on track. Aspects learnt from Human-Computer Interaction were very useful in both the interactive design of the game and the user evaluation. Most importantly, Games Design and Development was taught in year 1 which used Unity and C# to create games. C# is very similar to Java, a language which most of the course has used. Use of a similar language means the programming concepts which needed to be applied to the project were understood. As well as personal motivational reasons, background research indicates there is a gap in the market for a different approach to the typical zombie style game. Therefore, creating a game like this will appeal to a particular group of individuals that might be looking for a zombie style game, but without the use of guns.

1.5 Problem areas

There were multiple pieces of work on this course outside this project that need to be completed simultaneously; also, the time it took to finish each development task was hard to accurately predict as problems could always arise. These challenges apply to everyone in the coding industry as they are impossible to completely avoid

Another significant challenge was the skill set. If the developer did not understand how to perform a particular task, then they needed to spend time learning it first. Also, the solution could have later been discovered to either not work exactly as intended or that there may have been a far better and more efficient solution that they were not aware of.

Other challenges were the appropriate asset findings for the game (game models and music). Due to difficulties in creating such assets, they needed to be found elsewhere. However, companies will typically have their own or employ a third-party company to create the assets they want, and this will be down to the last detail as they have the financial budget available. Therefore, it was difficult to acquire assets which all match each other's art style. As time was limited for this project, caution was needed to not take too much time making design decisions.

During this time of COVID, receiving any face-to-face feedback on the game was not an option, so other means such as live video streaming with face cams was needed. This way it was still possible to pick up on every detail of the users' live reaction.

The design was another fundamental area which can be a weakness of any game no matter how rich in other features it may be. As suggested by "The Design Gym" (Stillman, 2014), the Seven Principles of Game Design must be carefully considered and monitored when making decisions. Even if a game is lacking in one of fidelity, objectives, constraints, success criteria, reward, play or competition, this could be disastrous. However, these principles could not be followed

blindly as they may have not been the best for the game to ensure it was as enjoyable as possible for the player.

For the story to stand strong, it needed to be intriguing and believable in a fantasy way. “Good gameplay and storytelling are now considered to follow hand in hand in the industry. They are essential ingredients for creating an engaging, highly interactive game.” (Thompson, 2020). A gripping story and concept greatly enhance a player's investment in a game. Some games however are successful without a background story but it was important for this game and therefore the story had to be thoroughly polished (*What Makes a Good Game?*, n.d.).

1.6 Report overview

From this point in the report, there will be consideration for the ethics of this project and how it may have affected those who used it. Due to the nature of the project, this was straight forward. In chapter 3, research on other titles that have aspects which are relevant to this project will be conducted. These aspects may range from the style of sound they use to the visuals. Consideration will be made on why these were chosen and critiqued. With this knowledge, discussion of the requirements for the game shall be produced in chapter 4. Chapter 5 will then go into details about the design of the project and chapter 6 will discuss the key implementation. The games testing and evaluation shall be presented in chapter 7. Finally, a conclusion on the project in chapter 8.

2 Practical and Ethical Considerations

2.1 BCS Code of Conduct

For Sweet Dreams, only the first two main categories apply of the total four. The third does not apply as it is regarding employers which this project does not include. The fourth does not apply as there are no colleagues in the project. For the two categories that do apply, only some of it has relevance. The relevant BCS Code of Conducts are the following:

I shall:

1.1 have due regard for public health, privacy, security and wellbeing of others and the environment.

Though the game involves fighting monsters, no blood or wounds are displayed to the player and the player does not die on level failure. There is no personal data being held regarding the player. As this game is played by an individual, no other person will be affected during the user testing.

1.2 have due regard for the legitimate rights of third parties.

Third party assets will only be taken from the Unity Asset Store, the content will be free to use and all legal obligations have been met and all content is appropriately credited.

1.3 conduct your professional activities without discrimination on the grounds of sex, sexual orientation, marital status, nationality, colour, race, ethnic origin, religion, age or disability, or of any other condition or requirement.

Only 2 humans are ever discussed in the game. No discrimination will be promoted or exercised due to the very simple nature of the game (save your grandfather from Shadow Keeper monsters).

1.4 promote equal access to the benefits of IT and seek to promote the inclusion of all sectors in society wherever opportunities arise.

The game shall use dialogue to allow for fair use by users with specific disabilities such as deafness.

2.4 ensure that you have the knowledge and understanding of legislation and that you comply with such legislation, in carrying out your professional responsibilities.

The guidelines produced by the Pan European Game Information (PEGI) will be consulted to regulate the appropriate age rating for Sweet Dreams.

2.5 respect and value alternative viewpoints and seek, accept and offer honest criticisms of work.

All feedback from user testing will be respected and will not be altered in any way or undermined to push my own opinion.

2.7 reject and will not make any offer of bribery or unethical inducement.

No external factor shall interfere with the integrity of the feedback that is given by others.

2.2 Ethical Review

As a result of this project going through user testing, it needed to go through an ethical review process. The following subsections come from the ethical review form.

1. Participants were not exposed to any risks greater than those encountered in their normal working life.

Though there is some degree of fantasy violence, the participants are at no risk when playing during the user evaluation.

2. The study materials were paper-based, or comprised software running on standard hardware.

Participants will first play the game on their home computer and will then fill in the answers to any questions on the feedback form from their own home computer.

3. All participants explicitly stated that they agreed to take part, and that their data could be used in the project.

Prior to the participants deciding to take part in the user test, they shall be briefed on the contents of the activities that they will be conducting and the data that will be collected.

4. No incentives were offered to the participants.

Participants will be people that volunteer and have the suitable equipment and basic knowledge of video games to successfully carry out the requested tests.

5. No information about the evaluation or materials was intentionally withheld from the participants.

Certain information about the game like the story's ending will need to be withheld to ensure all reactions are genuine and that the chances of the player getting bored does not increase due to the whole game being spoiled. However, any information that is important for the user to know prior, will be explained in its entirety.

6. No participant was under the age of 18.

As the participants will all be 3rd year students from the University of Sussex, everyone will be at least 20 years old.

7. No participant had a disability or impairment that may have limited their understanding or communication or capacity to consent.

If a participant for example is dyslexic and struggles to understand or process the information given, further explanation shall be provided to ensure complete understanding by all users. In addition to this, the time of when the testing will take place will be decided by the participant, ensuring they feel comfortable.

8. Neither I nor my supervisor are in a position of authority or influence over any of the participants.

The students/testers will have the same level of authority as the interviewer and their identity will remain anonymous to the supervisor of this project.

9. All participants were informed that they could withdraw at any time.

When briefed about the upcoming tests, information regarding the users right to withdraw shall be made known

10. All participants have been informed of my contact details, and the contact details of my supervisor.

An email containing all contact details for both the interviewer and the corresponding supervisor will be provided before the test, allowing for any questions well in advance.

11. The evaluation was described in detail with all of the participants at the beginning of the session, and participants were fully debriefed at the end of the session. All participants were given the opportunity to ask questions at both the beginning and end of the session.

Both a brief and debriefing script will be created and presented to the users. This will ensure they are fully aware of what is happening and are then able to ask any questions.

12. All the data collected from the participants is stored securely, and in an anonymous form.

All data gathered from observing the users and their own feedback will be stored securely on my personal computer that only I have access to. Due to lockdown, all the participants will be people that I already know and in regular contact with, so there is no need to store their contact information on any of the user testing information.

The project meets the 12 criteria listed in the Ethical Compliance form. A signed copy of this form is included in the appendix.

3 Background Research and Inspired Works

3.1 Game inspirations

The Call of Duty: Zombies franchise has been one of the top zombie games (Petite, 2020) (Chitty, n.d.). However, for the style of the game, this was the best. The main title that was reviewed is Call of Duty: Black Ops 3 (abbreviated to Bo3), as this is regarded as the best among the fans (*R/CODZombies - Best CoD for Zombie?*, n.d.).

The layout of the zombies' maps is very important which is something Bo3 has executed well. Not only are the maps very interesting to explore but the balance of the different area spaces is well done. If there is too large an open area, it becomes too easy for the players to exploit, and avoid the zombies, which also means that players will not move to other areas of the map. There will always be parts of the maps that people prefer - for instance, as shown in Figure 3.1 below of the map "The Giant", one of the preferred spots was the courtyard but there were other viable options too.

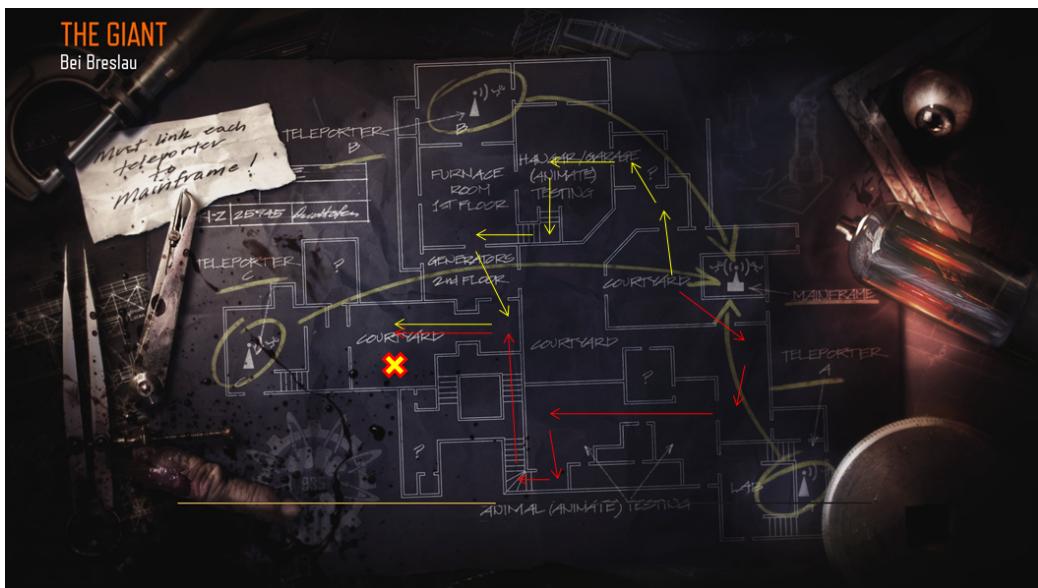


Fig 3.1 - *The Giant* map (Phil, 2015)

However, there was one part of the map which was poorly designed as displayed in Figure 3.2 below. It was in the teleport room on the left-hand side of the map. The player could sit at the end of a platform and the zombies could only attack from the other end which made for an easy and dull survival.



Fig 3.2 – Map exploit area (Katame, 2020)

As the player makes their way through the waves of zombies, the rounds get progressively harder to survive. Therefore, to give the players a better chance at survival, they would try to travel to other parts of the map collecting parts to upgrade their gear and stats. This is a great way to give players motivation to explore. A physiological analysis lead to the conclusion that “playing at the same level of difficulty several times elicits boredom. Emotion assessment from physiological signals was performed using a SVM (Support Vector Machine)” (Chanel et al., 2008). The Flow Model shows the relationship between task complexity and perceived skill level. Figure 3.3 below is a flow model and the suggested automatic adaptation to emotional reactions which demonstrate the need for games to become more challenging the better the player becomes:

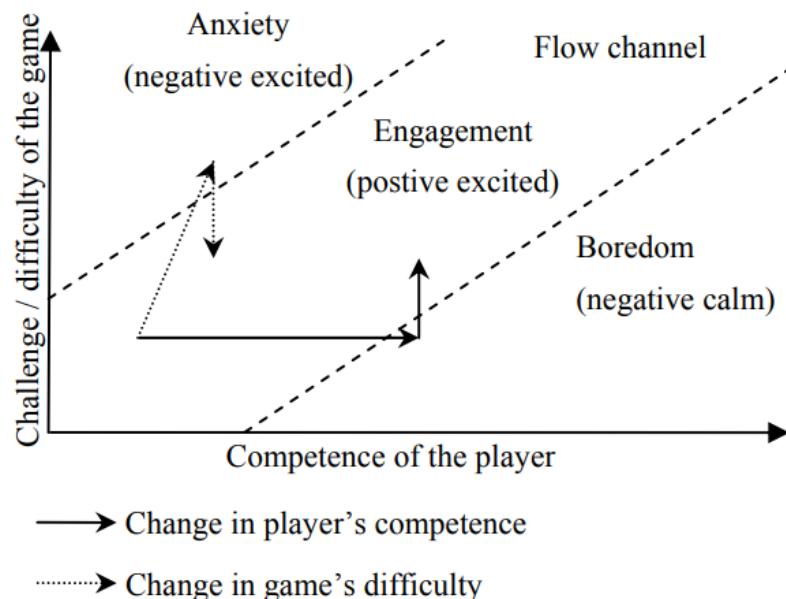


Fig 3.3 - Flow chart of emotional reaction (Chanel et al., 2008)

Bo3 is an action game that is intended for people over the age of 18. A self selected sample online poll was conducted to find the average player ages of Bo2 (the previous title) which found the average player age of 20-27. This is the target audience age that Sweet Dreams will also be targeting.

Ziggurat 2 is another game that inspired Sweet Dreams. It is a fast paced action game with the use of different magical spells (*Ziggurat 2 on Steam*, n.d.-a).

There are plenty of interesting weapons that the player can unlock over time. Some of these weapons are presented below in Figures 3.4, 3.5 and 3.6. With every weapon being so different, players will enjoy playing the game to try and obtain these new weapons which can bring a new element of fun to their experience: “The spells/weapons are really fun and varied!” (KratomGamingTTV, 2020). In addition to bringing new elements of fun, it also supports the player's own free will to play the game how they want. A journal by Andrew K. Przybylski and Richard M. Ryan conducted research on “The Motivating Role of Violence in Video Games” where they stated that “as predicted, results from all studies showed that enjoyment, value, and desire for future play were robustly associated with the experience of autonomy and competence in gameplay. It thus appears that although violent or gory games can offer challenges and options that foster autonomy and competence, so can equally option-laden and competence-challenging nonviolent games. At the same time, we did detect a weak effect for more mature or violent games to engender feelings of presence, suggesting that such contents can at times pull players into somewhat greater immersion in the game experience” (Przybylski et al., 2009). This shows how autonomy (own free will) and competence are important for game immersion rather than violence.



Fig 3.4 – Example weapon (*Ziggurat 2 on Steam*, n.d.)



Fig 3.5 – Example weapon (*Ziggurat 2* on Steam, n.d.)



Fig 3.6 – Example weapon (*Ziggurat 2* on Steam, n.d.)

There is an incentive to explore and take over other areas of the map to find chests like Figure 3.7, which could contain powerful loot to improve the player's gear.



Fig 3.7 – Example weapon (Ziggurat 2 on Steam, n.d.)

The two above-mentioned games had provided a great deal of inspiration for Sweet Dreams. Only a few of the main areas had been mentioned here although there are a great many more aspects. These have not been discussed otherwise this section would be too drawn-out.

3.2 Software

3.2.1 Game Engine

When it comes to creating games, there is no denying that the use of a pre-made game engine speeds up the production drastically. Coding the entire project alone would have taken far too long for the time designated. The initial launch of Unity for example was in “June 2005” (Technologies, n.d.-b) and has been receiving updates ever since, and that is the engine that was used to create Sweet Dreams. Reasons for this decision are as follows:

- In the games industry, it is one of the most popular engines to use (*What Are the Most Popular Game Engines?*, 2020) because the “assets store is also reportedly great” and “is also easier to use compared to many other technologies” (Anurag, 2018). Some popular examples of games created with Unity are “Escape from Tarkov”, “Hollow Knight”, as shown in Figure 3.8 below, and “Cuphead” (Technologies, n.d.-a).
- With the engine’s large popularity, there also comes large amounts of support online from other developers learning the engine.
- Unity utilises the programming language C# which closely resembles Java, the main language taught on the course.



Fig 3.8 – Cover image for Hollow Knight (*Hollow Knight* on Steam, n.d.)

An alternative option that was considered is the Unreal game engine. In the games industry, Unity and Unreal are often compared with each other as to which is the better option. To summarize, as detailed by “Creative bloq staff” (*Unity vs Unreal Engine*, 2019):

The quality of visuals the company wants in their game can heavily sway their choice. “Unreal offers high-fidelity visuals straight out of the box, whereas Unity – while still able to produce high-quality visuals – takes a lot more work to get your assets looking close to the same level as Unreal. And even then, it won’t produce quite the same quality”.

The size of the team can also impact the decision. If they have a very small team then Unity will be more viable than Unreal which typically works best with “a large and specialist team”.

As this is a 1-man project, where visuals are not the key aspect, it makes sense that Unity would be the better option when only considering the software, not past experiences and skill set.

3.2.2 Other software

Due to COVID, the ability to conduct face-to-face testing is not viable as stated in the problem area section of this report. Therefore, either Discord (*Discord | Your Place to Talk and Hang Out*, n.d.) or Zoom (*Zoom Video*, n.d.) will be used instead depending on which software the user would prefer.

For additional project management, a progression table was utilised to ensure the tasks were monitored effectively. All upcoming tasks are laid out in sections and completed work can be shared.

3.3 Visuals

3.3.1 Art style

The section 1.5, titled “Problem areas”, mentions that acquiring visual assets was one of the main difficulties. Creating assets by hand is not only difficult but can be very time consuming. Therefore, all of the assets were gained from the Unity Assets Store. The assets that were best for the game, was also the drive for which art style the game would have. Due to the game being based in a dream world, it made sense for the environment to have a surreal theme.

3.3.1 Assets

Asset flipping is something that must be considered in the gaming industry when producing a new title. “Asset Flipping” is a term that refers to the practice of building a game almost entirely out of premade assets with little original work. They are more commonly found on Steam^{AGW} being sold for cheap prices. Valve Corporation^{AGW} refers to asset flips as ‘Fake Games’” (*Asset Flipping - Crappy Games Wiki*, n.d.). Not only does this lead to ethical issues, but also the fact that the game's visuals can look displeasing to the eye. One such example was PUBG, displayed below in Figure 3.9.

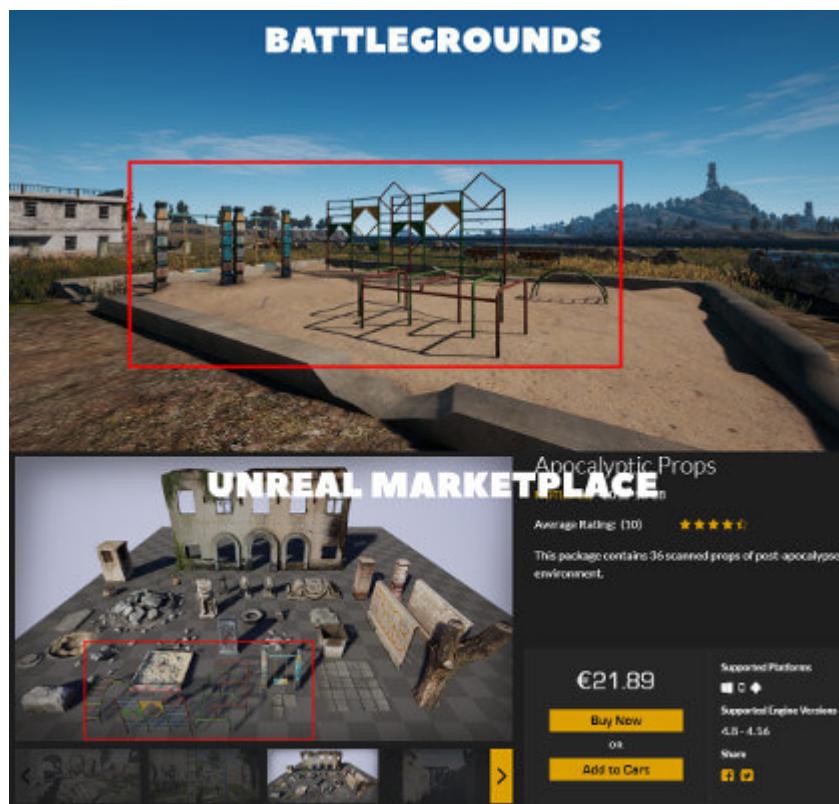


Fig 3.9 – Game using unoriginal assets (Armstrong, 2018)

3.4 Coding

3.4.1 Idea practicality and method

Due to the time scale of this project, serious consideration had to be given when deciding how to implement certain features into the game. Therefore, the features needed to be implemented as quickly as possible while also ensuring possible bugs would not arise.

3.4.2 Architecture

As a project gets larger in size, the architecture of the code becomes increasingly more important “It’s the base of all the projects” as stated by Lea Karam (Karam, 2016). Not only does it make it easier to understand and therefore add additional features, but to also help reduce possible mistakes with how the code communicates as stated by Lea Karam “It makes it easier to understand the whole system and makes the decision-making process more efficient” (Karam, 2016). Due to being a more visual understander, simple sketches and diagrams were used to help keep track of the project's coding architecture to best understand the communications for all sections.

3.5 Sound

Sound is a huge topic for game creation that can often be overlooked when appreciating a game. “Music is a tool that can control emotion and can establish the tone of story being told” as stated by Anara Publishing (*The Importance of Music in Video Games*, 2018). Horror games rely on the effects of the soundtracks heavily to intensify the fear the player feels by creating a terrifying atmosphere that keeps the player on edge. A guest author on “Morbidly Beautiful” mentions “game's soundtrack is an essential component to creating the atmosphere and tension that make these games so terrifying and exciting to play” (‘The Sound of Fear’, 2020) when describing games such as Resident Evil.

However, the creation of this music can take a long time to make which is why companies will often have their own dedicated team for the creation of original pieces. This can be a more difficult option but if the team is skilled then the process could be faster and more accurate than trying to source it from somewhere else.

As well as making their own original pieces, companies will use a sound library to decrease the workload of creating sound effects. This is when people will mix clips to create new sounds from a library of different sounds in files which are already saved in storage. An example of this would be if a company wanted to simulate a sword fight so they could use a mixture of different

clanks of metal then a squashing of fruit to simulate someone being impaled with the sword. People can buy these sound libraries that contain the sound effects they want or use ones already purchased. A sound library looks like Figure 3.10 below.

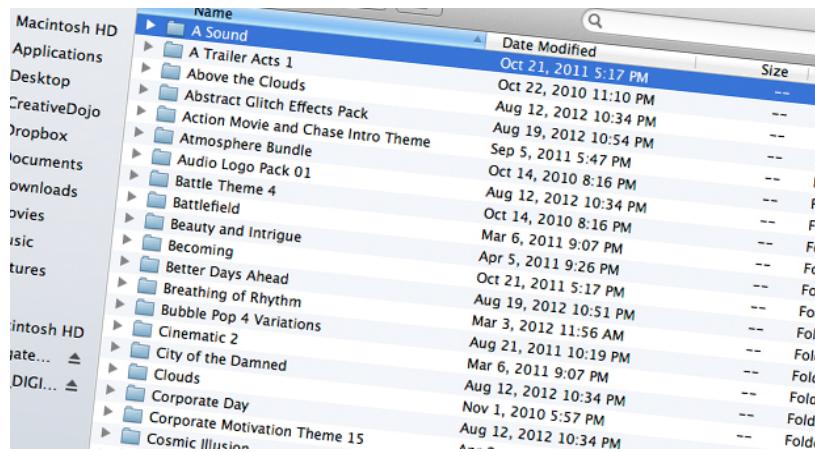


Fig 3.10 – Example sound library (Nguyen, 2012)

3.6 Narrative

“In the game development process, narrative game design defines the game’s story structure and core emotional elements including theme, plot, character, and dialogue.” (Lionbridge, 2020) is expressed by Lionbridge. Pace (2004), Agarwal et al. (1997), and Agarwal and Karahanna (2000) cited by Hua Qin, Pei-Luen Patrick Rau & Gavriel Salvendy (2009) show that curiosity and interest played a vital role in the flow experience of Web users. This study found that the curiosity of the players also could be extracted as a common factor influencing player immersion in the story world (Qin et al., 2009). Some games focus on a narrative more than others. Games such as The Witcher 3 has been greatly praised for its story “The core game of Wild Hunt was a masterclass of storytelling” (*The 30 Best Video Game Stories Ever*, 2018) and because of this is arguably one of the best games of the 21st century - ranked 5th on The Guardian (Stuart & MacDonald, 2019). However, number one on that list and the most sold game of all time is Tetris with over 500,000,000 copies sold (Sirani, 2021) but has virtually no plot. Sweet Dreams is in the middle of these two in terms of the story's strength.

3.7 Design

3.7.1 How the game plays out

The intended playstyle for a game can have a significant impact on how the player enjoys the game. For example, if the intended strategy for the game is for it to be played very slowly and

strategically, then this may not be enjoyable for some players who enjoy the game but do not wish to play that way. However, some games have found a way around this issue. One such example is Borderlands (*Borderlands 2*, n.d.), they have done this by allowing the player to select a character which has different characteristics. For instance, if the player enjoys a crazy in-the-face character that rewards a hands-on play style, then they may choose “Krieg” who has super strong melee attacks and high-risk high reward perks as displayed in Figure 3.11 below. Alternatively, if the player enjoys keeping their distance and using guns, then “Zer0” could be the most enjoyable choice for them, due to his sniping perks and the ability to go invisible when enemies get too close.

Allowing the player to make their own decisions and not force them into a single fixed playstyle will ensure more players are able to enjoy the game to the fullest.



Fig 3.11 – Image of ‘Krieg the Psycho’ (Gaskill, n.d.)

3.7.2 Difficulty

In games, there will always be a gap in abilities, so the difficulty of the game is normally decided by the player with a difficulty option at the start of the game. This may be an effective solution, but some older games do not allow the level of difficulty to be changed later. “Y2Kev” on a forum stated that “Ace Combat 7 makes you pick a difficulty level to start the game and says you can't change it ... What is the point of this feature? It's purely punitive and damaging to people enjoying the product.” (Y2Kev, 2019). The issue with this is that if a player finds the game becomes too easy or too hard, they cannot change the difficulty mid-game without needing to start from the beginning again. This kind of development decision will have caused some players to drop a game altogether, if for example they cannot beat a level or are bored with everything being too easy. Figure 3.12 below shows what a difficulty menu could look like.



Fig 3.12 – Example difficulty menu (*Difficulty Level (Concept)*, n.d.)

A common feature included in games are challenges that reward the player for being able to complete. These are optional extras which are traditionally much harder to complete but can reward the player for their skills with prizes. Not only does this allow some players that are interested to sink their teeth into a challenge, but they also get the satisfaction of knowing they completed something most players cannot, which they will remember fondly. Drawing on the flow model in section 3.1 regarding emotional reactions, this additional factor could change the conclusion. Though it will still be true that players prefer a difficulty similar to their competence, having optional challenges that are very difficult could be something people enjoy as there would be no personal reward factor if it was not challenging. In terms of gameplay for Sweet Dreams, an example challenge could be to take no damage during the first round. The psychological effect of this further challenge may improve some players' overall enjoyment, therefore increasing their engagement and keeping them in the flow channel as it will not increase their anxiety.

4 Requirements Analysis

4.1 Usability

The usability of a game can be broken down into many sections. In a post by Alita Joyce, one example is “Consistency and standards”. When playing games of similar style, e.g. first-person shooter, the player will be familiar with the standard button layout for such games. On PC, the player will expect the movement to be done via WASD and for the console they expect the left analogue stick. If this were to be different then people may complain. One such example is with Mirror’s Edge where its jump control was different on console from the usual “A” button and instead was “LB” - “I am really enjoying this game and my only real complaint is the jump button ... why would they give the jump function to such an awkward button...” -stabstone” (Joyce, 2019). Therefore, the button layout for Sweets Dreams is consistent with what people expect.

Visibility of system status describes the visual feedback for the player. One key example in most action games is the health bar which displays how much health the player has left before they die. Some games like “Call of Duty: Zombies” do not specifically have a health bar because the player's total health can only take a few hits from zombies. Like Figure 4.1 below, when a player is struck, they will have red markings around the screen where the intensity of the red indicates how close to death they are. After a few seconds of not being hit, the player's health will reset back to full so there is no need for a health bar (*Where Is the Health Bar? - Call of Duty: Black Ops*, n.d.). This was something that needed further consideration for Sweet Dreams as it too is a zombie game. However, the player can increase their protection with a higher health capacity so this red feedback would have become confusing for the player over time. Therefore, a numerical value was used so the player knew their current total health and their capacity. Also, so it is clear when the player is hit, a visible scratch effect appears on the screen for a second. This way, instant and overall feedback is provided for the player.



Fig 4.1 – Red markings instead of health bar (UV, 2005)

4.2 Accessibility

In more recent years, accessibility considerations have increased dramatically when it comes to creating games. With almost 14 million people in the UK with a disability, efforts must be made to accommodate them. However, some disabilities cannot be resolved through the game itself and result in the need for specialised hardware. One example of a person with a disability is Rocky Stoutenburgh, aka “RockyNoHands” (Wood, 2017) who is paralysed and uses a mouthpiece (QuadStick) to play as shown in Figure 4.2 below. “11 years ago ... there weren’t a lot of great options available for disabled gamers at the time” as stated by Rocky.



Fig 4.2 – *Rocky using QuadStick* (Meshulam, 2020)

Where there are other disabilities concerning vision and hearing that require external equipment for example, all the dialogue will be displayed in text format for Sweet Dreams.

4.3 Gameplay

At the end of the day, games are made to be fun so if a game is not enjoyable for the player then they will probably stop playing. “What makes a game fun, I would say it is how everything comes together, and the overall style the game creates” stated David Maletz on Gamasutra (Maletz, 2012). For that reason, there is a strong design, art and story aspects that all work together well to form a strong game. If certain areas were lacking, then the enjoyment of the game would have been affected.

4.4 Original Requirements Analysis

4.4.1 Functional Mandatory

R:

1. The player shall be able to navigate the map in a 3D movement
2. The game shall have a traditional style of zombie survival
3. The game shall be played in 1st person perspective only
4. The player will only be able to see their character's hands
5. Enemies models shall dissolve after dying to ensure the map does not get cluttered over time
6. The player shall be able to go back to old levels that have been completed
7. Sound effects shall be added to the game for all moving game objects
8. The game shall have magical weapons that use different elements and have different properties like fire, ice, earth, poison, explosives
9. There shall be a shop for the player to purchase/upgrade items and stats for their character
10. There shall be a zombie waves system, getting progressively harder to beat
11. The player shall be able to buy temporary in-game boosts for the player (e.g. more health, mana capacity, agility)
12. There shall be 1 main style of enemy that the player will need to kill
13. There shall be an interface that is intuitive for the player to understand and be familiar with
14. There shall be lots of maps with unique layouts
15. The game will not have any game-breaking bugs
16. The player shall be able to collect in-game points from killing Shadow Keepers to unlock other sections of the map
17. The game shall have multiple themed levels, but some levels take place in the same area but with a different layout

18. The loot and location shall change every time the player retries the level
19. The game shall be accessible to people with certain disabilities
20. The game shall have music for the menu, dialogue page, round end, boss fights and credits

4.4.2 Functional Extensions

R:

1. There should be a system where the player can find extra objects around the map to unlock bonus secret items
2. There should be a database that collects different players time records for each level
3. There should be the ability to move certain objects in the world with a magical tool
4. There should be a helper NPC that you can interact with to get information on how to play if they want help
5. The games story should be enjoyable, so the player wants to learn more about it
6. There should be a fast travel vehicle to get from one side of the map to the other for a cost
7. The game should be accessible to more disabilities than hearing and vision
8. There should be a settings menu for the player to customise their keybinds

4.4.3 Non Functional Mandatory

R:

1. The game shall have an average frame rate of at least 30 frames per second
2. The maximum number of clicks for any function in the system shall not exceed five clicks
3. The average response time of the system between the user click and response shall be less than 0.1 seconds, excluding level loading time

4. The game shall run PC using keyboard and mouse input
5. The game shall be reliable and not crash
6. The game shall be written in C# using Unity 2019.4.11f1 (64-bit)

4.4.4 Non Functional Extensions

R:

1. The game should use less than 5GB of storage space
2. The game should support console controller use
3. The game should be playable on other platforms such as Xbox and PSN

5 Game Design

5.1 Game space

“Game space is the abstract construction of a game's space; what is left over when all visuals are stripped away” (*Mechanics*, n.d.). In the case of Sweet Dreams, it uses a continuous space and is set in a 3D dimension.

5.2 Environment

The environment was created using objects from the asset pack “POLYGON Prototype - Low Poly 3D Art by Synty” (Synty, 2020). Figure 5.1 below showcases the type of map that was made using this asset pack. Following the inspiration from the Call of Duty: Black Ops 3 zombies maps (*R/CODZombies - Best CoD for Zombie?*, n.d.), the level creation is a similar size and the spaces are not too open. However, due to the type of weapons and more casual play style of this game, larger areas of space were created.

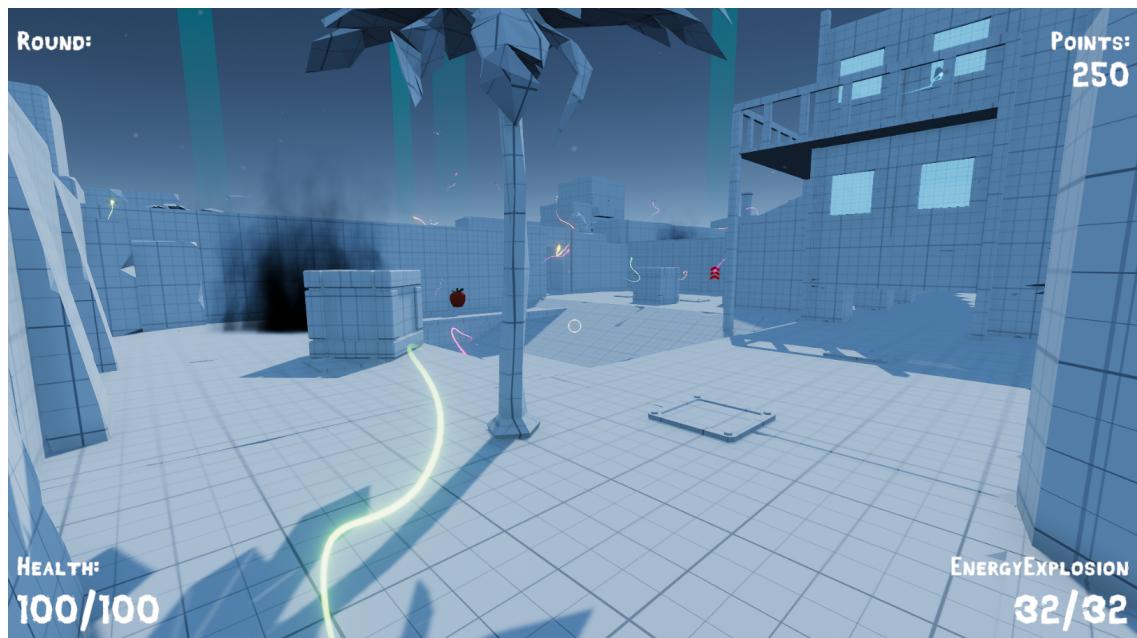


Fig 5.1 - Demonstration of the type of made that was made using an asset pack

For each level, the size of the map has stayed the same and the number of open areas is consistent, but the overall map has noticeable differences with new routes and areas to use. The overall theme was kept the same to continue the surreal feel the players will have during the playthrough. Some degree of varying elevation was implemented throughout the maps so that the game levels have more character. The world's surfaces are mostly without curves, to help maintain and reinforce an artificial impression.

There were two reasons for the colour choice of the environment. The first being that as the game is set in a dream-like world, there needed to be something obvious to remind the player that this is not the real world. Inspiration was taken from the game “Super Hot” (*SUPERHOT*, n.d.-a). “Super Hot” uses 3 colours: white for the environment, red for the enemies and black for everything that the player can interact with. Figure 5.2 below is from the game “Super Hot” and demonstrates the colour theme. For Sweet Dreams, the world is kept white, but the enemies are black as they represent the embodiment of darkness within dreams. However, the interactables use a variety of different colours so they are easier to identify. Finally, when experimenting with different atmospheric additions, the coloured fireflies worked really well and added an additional layer of beauty to the simplistic elegance to the game’s environment. The other reason for this colour choice was that there needed to be an easy way for the players to identify all the interactable locations on the level. In addition to the colours, a beacon was created above each so finding these areas was made easier.



Fig 5.2 - Demonstration of the inspired colour choice (*SUPERHOT*, n.d.-b)

5.3 Code structure overview

Figure 5.3 below is a general overview of some of the main parts of the gameplay's code design:

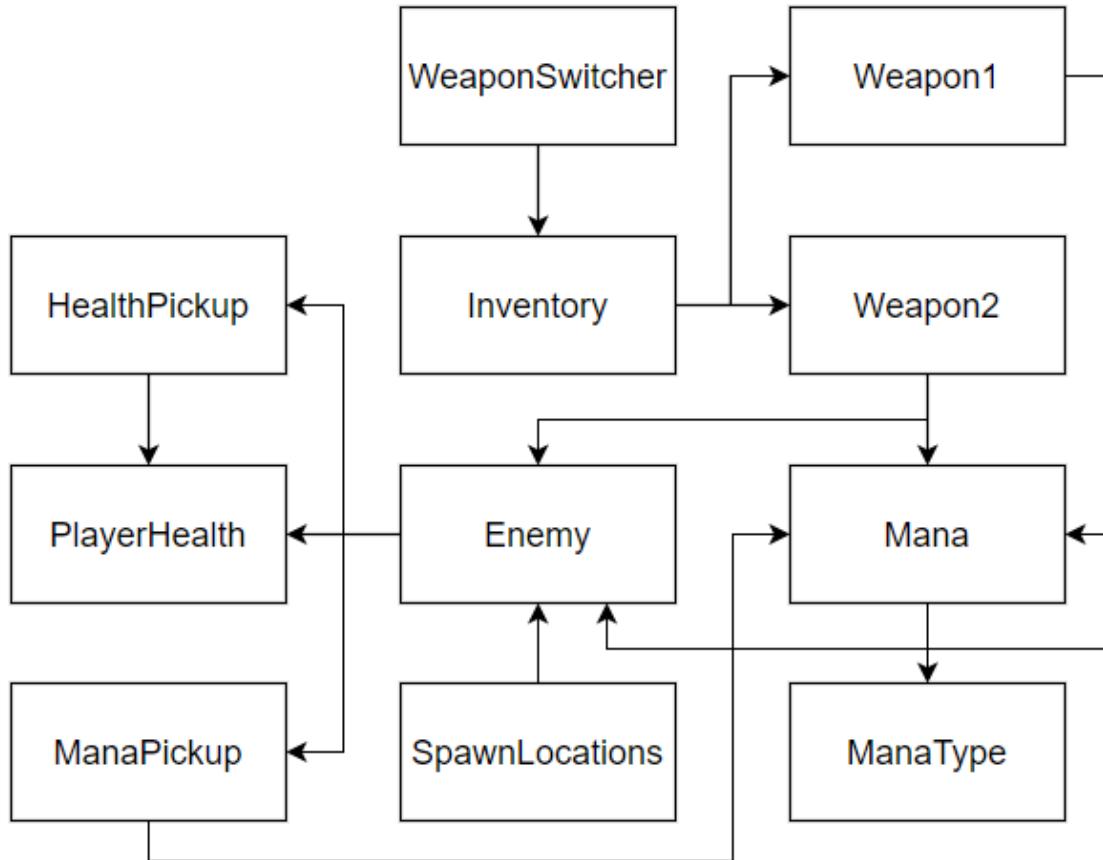


Fig 5.3 - Shows the overview of the main parts of Sweet Dreams' code design

Starting from the WeaponSwitcher script, this can interact with the player inventory which can hold two weapons at once. Each of these two weapons communicate with the Mana script which has a nested class which it uses to find information about the specific weapon ManaTypes. In addition to this, the weapons (including trap) also affect the specific enemies that are hit by its attack. The SpawnerLocations decide on how many, how often and where each enemy will spawn. The HealthPickup increases the PlayerHealth and the Enemy decreases the PlayerHealth as well as dropping the Pickups. Finally, the ManaPickup increases the mana for all types through the Mana script.

Most of the data to do with the player and their weapons/mana is located on the player object; this is because it makes it easier to get all the shops to work correctly.

5.4 Audio

A fantasy ambience audio file was used for the game's music. As this was going to be background music for the menu and level, it needed not to be distracting to the player so an audio piece that was fairly consistent in pitch was the goal. Also, due to the surreal dream world setting, fantasy based audio was prioritized.

Other than the basic player footsteps audio, there are also audio clips for all the weapons and trap. Due to having no experience in sound creation, these audio clips were sourced online. For the trap, an ice cracking noise felt the most fitting for the audio style envisioned. The Ice Lance used a woosh sound and the flamethrower was a blowtorch. Finally, the big explosion used a bomb sound and the energy explosion was from a glitch sound effect pack.

The Shadow Keepers make a short attack noise whenever they try to hit the player and there are 5 different audio sounds for the different groans it can make whilst moving around the map. It was important to have the attacking noise as it gives feedback to the player. The audio sounds were actually zombies noises, but because the Shadow Keepers behave similarly to a zombie, this was suitable. This means it is easily recognisable to the player. If only 1 audio clip was used for the enemy's movement, then this would become very repetitive for the player, sound very strange and become annoying.

All of these sounds were played through the Audio Mixer using 3D space (besides the music) so it was easy to control and adjustable by the player from the settings. Figure 5.4 below are all of the audio clips used within the game.

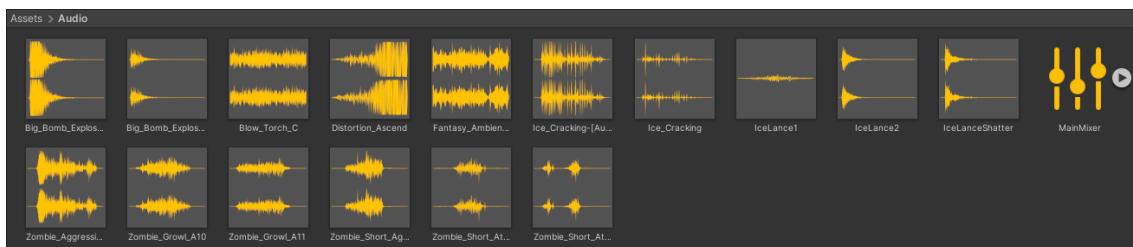


Fig 5.4 - Demonstration of the audio files used in Sweet Dreams

6 Game Implementation Key Complexity

6.1 Camera control and movement

The core camera control and movement was provided by the Unity “Standard Assets” pack (*Standard Assets (for Unity 2018.4) | Asset Packs | Unity Asset Store*, 2020). A lot of values and conditions were later changed to best suit Sweet Dreams. For instance, extra conditions were added for the character to be able to run, i.e. only if the player was currently pressing the “W” key (move forward) and not pressing the “S” key (move backwards) as well. This meant the player could not run backwards while attacking the enemy as this would have made the game too easy. The “S” condition was included later in the game’s development as it was discovered there was an exploit where the player could theoretically be holding “S”, then start holding “W” as well which allowed the sprint condition to be met, causing the player to run backwards.

The player movement speed was changed often during the development of the enemy movement. As a foundation value, the enemy’s speed had to match its animation and what appeared most natural. If the player walked too slowly for the animation, then it would appear that the enemy is slipping and vice versa. The player’s movement speed was based on this value. The player’s walking speed had to be slower than the enemy but the sprint had to be quicker.

The capsule collider had to be wide enough on the player to ensure that the camera did not clip into walls at certain angles. Also, for a while when testing the raycasting for the weapons, the detection did not work occasionally. It was then discovered that the raycast was hitting the player’s body when the camera was looking down, so the ignoreRaycast layer was applied to the player’s body to fix this issue. When first using the camera movement, the acceleration and smoothing was applied to the camera, this was instantly disabled. This is something that is always disabled in first person shooter games as it removes the player’s raw input and can interfere with muscle memory.

6.2 Combat

In this section, only the player’s combat will be discussed. Each weapon prefab has a “Weapon” script attached to it. This script contains all information about the weapon other than its mana and damage - further detail on this later. There is only one weapon active at a given time to ensure there are never multiple weapon fire activations at once. From the 4 weapons, there are only two types of fire, particle system play and raycast instantiation. All hit detection is implemented via particle collision on each enemy. The damage value applied in the particle collision is taken from the mana script via the weapon that made the impact.

When the “Flamethrower” is activated by pressing/holding mouse 0, a coroutine will start which will loop until the mouse 0 is released, or the mana count has reached 0. For every piece of mana, it represents a full second of activation. As a result of this, the mana usage will always have the same worth no matter when they release mouse 0 during that second. Repeatedly

spamming mouse 0 will not drain the mana capacity any quicker than holding the button. Figure 6.1 below shows the visuals for this particle system.



Fig 6.1 - Demonstration of the particle system for the Flamethrower

The “Ice Lance” particle system plays on the mouse 0 button detection. Due to the weapon fire delay being longer than the particle duration, the player can keep the button down to keep firing the weapon provided the mana count is above 0. Each particle play is worth 1 mana - this is the same for all weapons besides the “Flamethrower”. After a certain amount of time, the Ice Shard will shatter into pieces before disappearing which Figure 6.2 and 6.3 below shows.

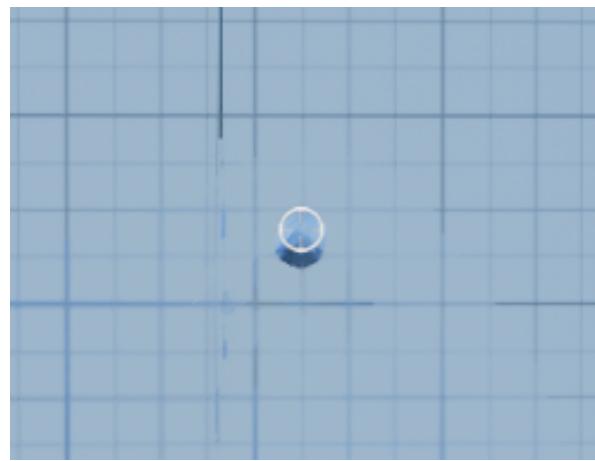


Fig 6.2 - Demonstration of the particle system for the Ice Lance ice shard



Fig 6.3 - Demonstration of the particle system for the Ice Lance ice shard shatter

Both the “Big Explosion” as seen in Figure 6.4 and “Energy Explosion” as seen in Figure 6.5 work in the same way. A raycast will instantiate the weapon particle system where the raycast hit. To ensure the explosion does not show half way into the object it hit, the prefab’s child (the particle system) is positioned a certain distance away from the centre towards the direction of the player.



Fig 6.4 - Demonstration of the particle system for the Energy Explosion



Fig 6.5 - Demonstration of the particle system for the Big Explosion

The “Trap” was originally intended to be used as another weapon but was not possible due to how the visuals work. The “Trap” visual is an area of hot rocks breaking up through the surface

of the ground before crumbling down again that can be seen in Figure 6.6 and 6.7. If the particle system was not played along a flat surface, it would not work correctly so had to be positioned in a fixed location. For the “Trap” to be activated, the player needs to be within a certain range of the button while the round is currently playing and have enough points to afford it. If the conditions are met while the “E” key is pressed, the particle system will play. As the “Trap” has no “Weapon” script, the enemy will first check if the particle collision was from the Trap, then it will take a very large amount of damage, confirming that the enemy will die from the Trap if hit.



Fig 6.6 - Demonstration of the particle system for the Earth Shatter Trap



Fig 6.7 - Demonstration of the particle system for the Earth Shatter Trap in the showcase scene

6.3 Enemy

The enemy prefab contains three scripts. The first script manages the enemyHealth. When the enemy first spawns, its health is calculated using the difficulty setting and current round. An OntriggerStay() method is used for the damage received by the “Trap” that is intended to kill any enemy provided that they are in contact with the “Trap” for more than half a second. For the damage from the player held weapons, an OnParticleCollision() is used which calls TakeDamage(), using the weapon’s GetDamage() as its parameter. If the enemies health reaches below 1, it will enter an isDead state where its death animation will begin and a coroutine for potentially dropping a collectable is called. Once the enemy has been dead for more than 5 seconds, the game object will be destroyed, removing the useless object from the hierarchy and scene.

The second script on the enemy is the EnemyAI. On Update(), provided that the EnemyHealth condition is not dead, the distance between the enemy and play is calculated and the EngageTarget() is run. In EngageTarget(), the code will first call FaceEnemy() which will ensure the enemy is always looking in the player's direction. It will then take a hitableRange bool to know if the player is within a certain range, this will be used later. If the player is not close enough to attack and the enemy has not yet stopped moving, ChaseTarget() will run. Now the enemy navMeshAgent destination shall be set to the player's position and this Update()'s call will end. However, if the player is close enough to be attacked and the enemy still has not stopped, then the navMeshAgent path is reset and the enemy will AttackTarget(). The AttackTarget() sets the stopped bool to true and starts the attack animation. It then waits 0.7 seconds, meaning that the animation is done. Then it will set stopped to false again so the EngageTarget() will start attacking or following the target again. During the attack animation, at the exact time where the enemy strikes, an Animation Event is called in the EnemyAttack script. EnemyAttack is a very small script, its only function is to do damage to the player and display the damage canvas image, provided that the hitableRange is currently true for that frame.

Back on the EnemyAI script, when the enemy spawns, a wait timer would begin that lasted between 4-11 seconds. For example, if the time it waited was 10 seconds, if it was either the number 6 or 8, no audio would be played this time around. However, as the number was 10, it would now play an audio clip at random from the 5 Zombie sound options available. Also, whenever the enemy attack animation would trigger, a short attack sound would play for information to the player and realism. It was important to have a good random separation between the zombie-like groan audio timings to make it more realistic for the player and impossible for there to be a noticeable pattern.

To avoid the visual issue of the enemy object suddenly appearing and disappearing when dead, particle systems and complex materials are used. With the visual aid from the “Unity Technologies Particle Pack” (Technologies, 2020), a teleport and dissolve effect was provided. When the enemy first spawns, the teleport effect will begin. Blue rings appear around the body of the enemy and a material script will start. This material script on the enemy is initially transparent, but will slowly and randomly start to reveal the enemy's body until they are fully visible - this can be seen in Figure 6.8 below.



Fig 6.8 - Demonstration of the particle system and material script for the enemy spawning

Once the enemy has died, the material will change to the dissolve effect. This all works similarly to the teleport effect except there are flakes and sparks as the body begins to dissolve, becoming transparent as shown in Figure 6.9 and 6.10.



Fig 6.9 - Demonstration of the particle system and material script for the enemy dissolving



Fig 6.10 - Demonstration of the particle system and material script for the enemy dissolving

While making the enemy, there were two issues which affected each other that were challenging to fix.

The first is that it was difficult to find the right balance for when the enemy can hit the player and the second issue was that the player was sometimes pushed through the walls by the enemies. There was a lot of trial and error so that when the enemy stops moving to attack the player which is currently walking, they are still close enough to hit the player if they do not instantly start sprinting away. This meant that the enemy needed to get very close to the player and its `hitableRange` condition needed to be true at a slightly longer distance to ensure the walking speed would still be hit. However, if the player was standing against the wall, the player would get pushed through the wall due to the enemy's capsule collider pushing against the players. The issue was that the enemies destination was the player's position, so when the `resetPath` was applied to the enemy once it was within range, this stopped the enemy straight away without pushing the player at first.

6.4 Environment

Located around the environment, there are multiple objects that the player can interact with. Those being the shops, trap and round start area. Whether something is interactable at that time depends on the current “`WaveSpawner.SpawnState`”. If the current enum state is `WAITING` then the shops and round start area can be used, but for the “`Trap`”, it needs to be in either `SPAWNING` or `FIGHTING`. On `Update()`, these interactable locations in the environment will check the distance between the player and object location, if it is closer than 3 then the UI interaction prompt will appear and its text will update. While within range and in the correct state, e.g. a shop, if the player presses “E” then the shop will open.

6.5 Collectables

When an enemy dies, a coroutine is called that will wait for a second then pick a random number between 0-20. If the value was 10, then it would instantiate a manaPickup in the enemy's position, but +1 on the Y axis so it is floating. If the value was 11, it will do the same thing but with a healthPickup. Both of the pickups have a script that does things when collided with, for example the manaPickup will increase the mana by 25% for all weapons. If the collectable has not been collected after 20 seconds, it will destroy itself.

6.6 Shops

There are 4 shops in total around the map that the player can interact with when the round is in WAITING state.

In the Mana shop, there are 3 buttons for each of the 4 weapons available as shown in Figure 6.11 below. The 3 buttons consist of a 25%, 50% and 100% buy. Provided that the player can afford the buy option, the button will get the current mana and the current mana capacity. It will then calculate the new mana to be added (if it is over the capacity then it will simply fill the mana to max). After this it will decrease the buttons cost from the total points.

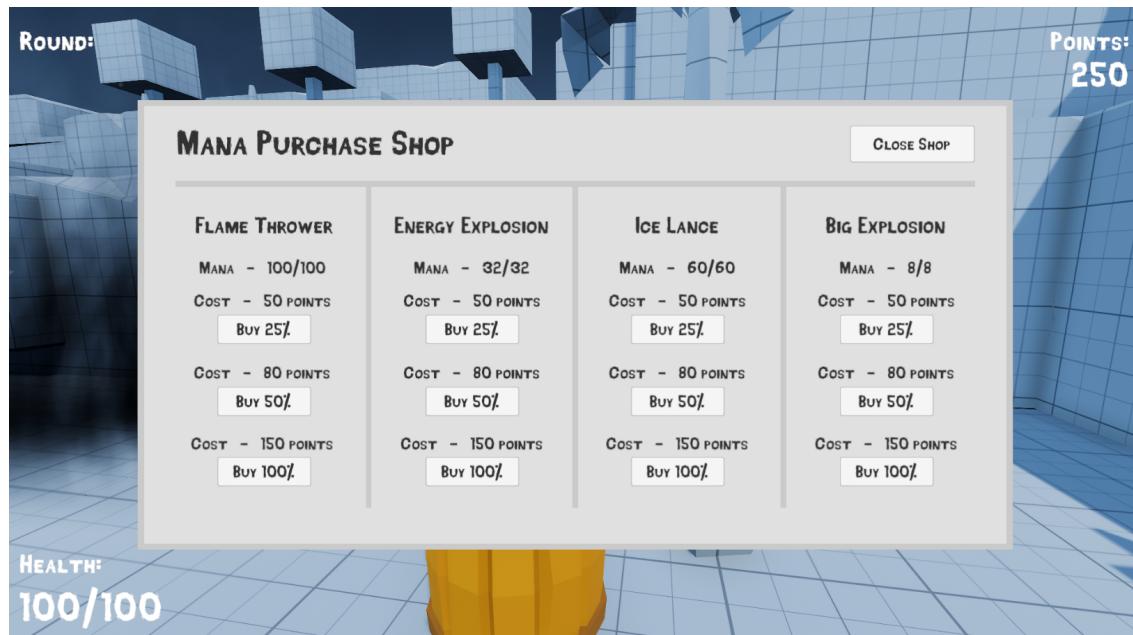


Fig 6.11 - Demonstration of the Mana shop UI

In the Upgrade shop, there are 2 upgrade options for each weapon as shown in Figure 6.12. Both the damage increase and capacity increase work in very similar ways. The upgrade amounts are based on its starting value, not 10% of the new damage after upgrading. Also, the price increases every time the weapon is upgraded. In the IncreaseDamage(), it will find the new damage to be added by multiplying the starting damage by the damage increase multiplier (0.1).

After this, it will round the value to an int and create the new damage by adding the previous with the increased value. Points will be withdrawn from the player and the cost will be increased by 25%.

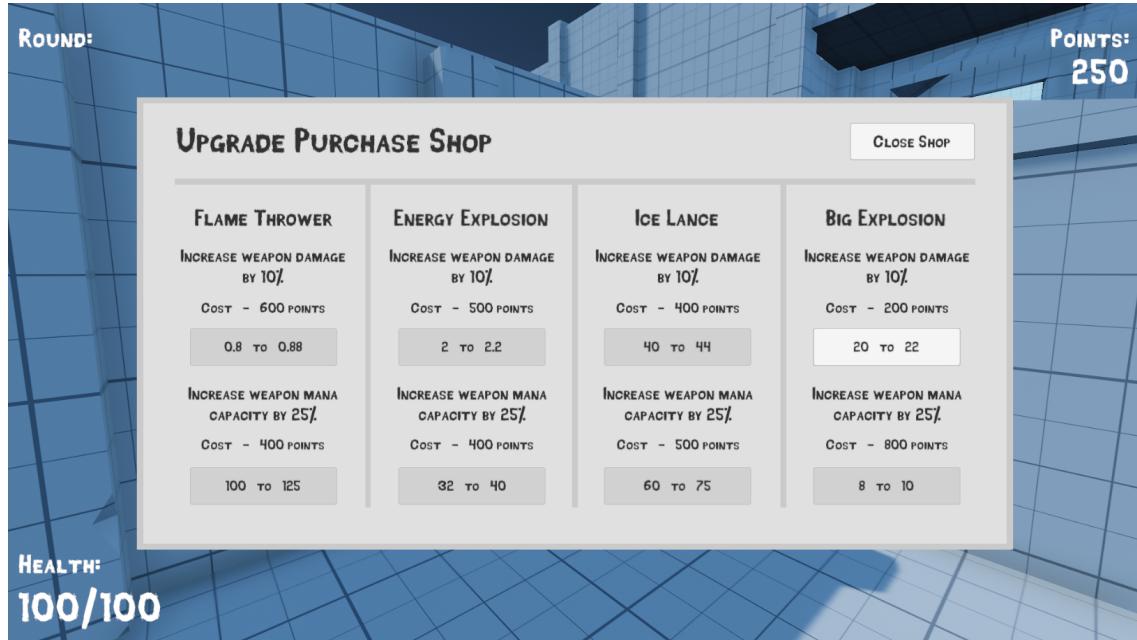


Fig 6.12 - Demonstration of the Upgrade shop UI

For the Health shop, the buy health buttons will take a percentage of the current capacity and increase the health by that amount. However, if the new health goes above the capacity, then it will give the player the max health value for the current capacity instead. The capacity increase button will simply add 10 to the current capacity. The UI for this shop is shown in Figure 6.13 below.

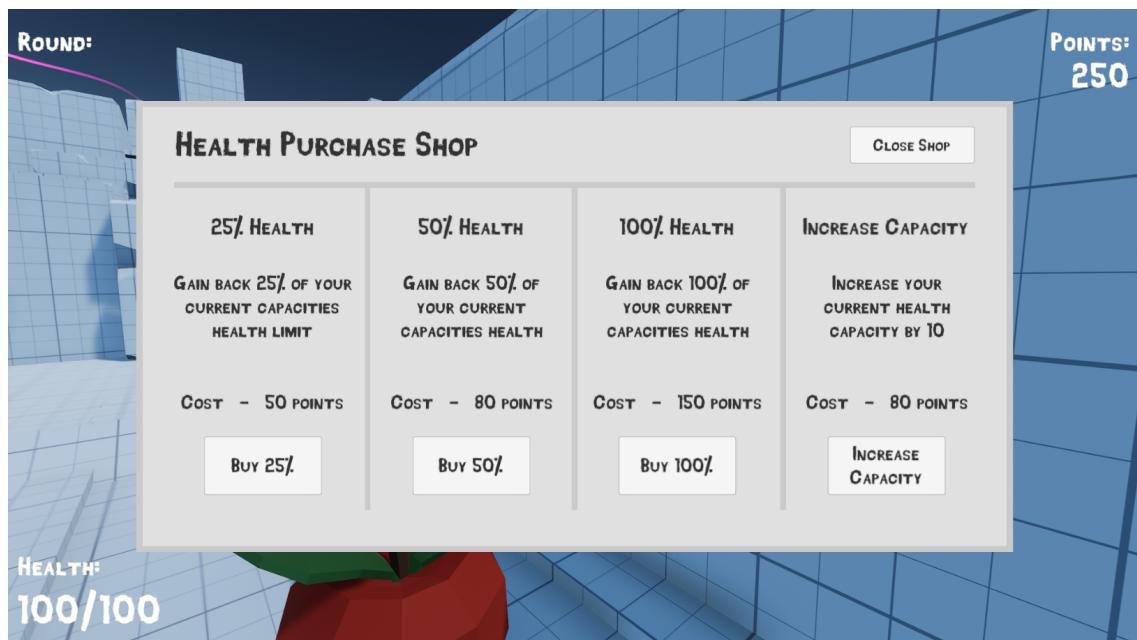


Fig 6.13 - Demonstration of the Health shop UI

There are 2 types of buy buttons in the weapon purchase shop. Firstly, there are the buy buttons that when pressed, will update the switch buttons' weapon cost and weapon to buy parameters as seen in Figure 6.14. The second buttons are the switch buttons as shown in Figure 6.15 below. These 2 buttons will have the names of the current weapons that the player has. This is done by using the 2 variables in the “WeaponSwitcher” script that is located on the player which handles the swapping of weapons in the inventory. The “WeaponSwitcher” script has references to its 2 children which are the weapons the player currently owns. This information is then used in the buttons to know which weapon to remove and which weapon to add. If the player picks a weapon to switch, the switcher UI will close and the points will be withdrawn from the player.

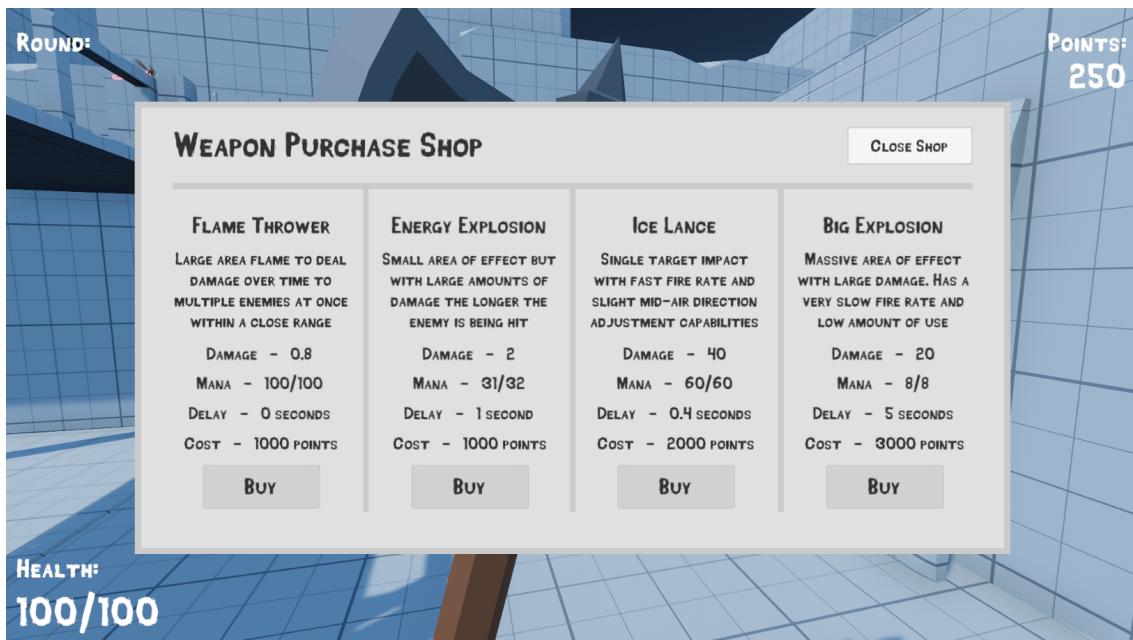


Fig 6.14 - Demonstration of the Weapon shop UI

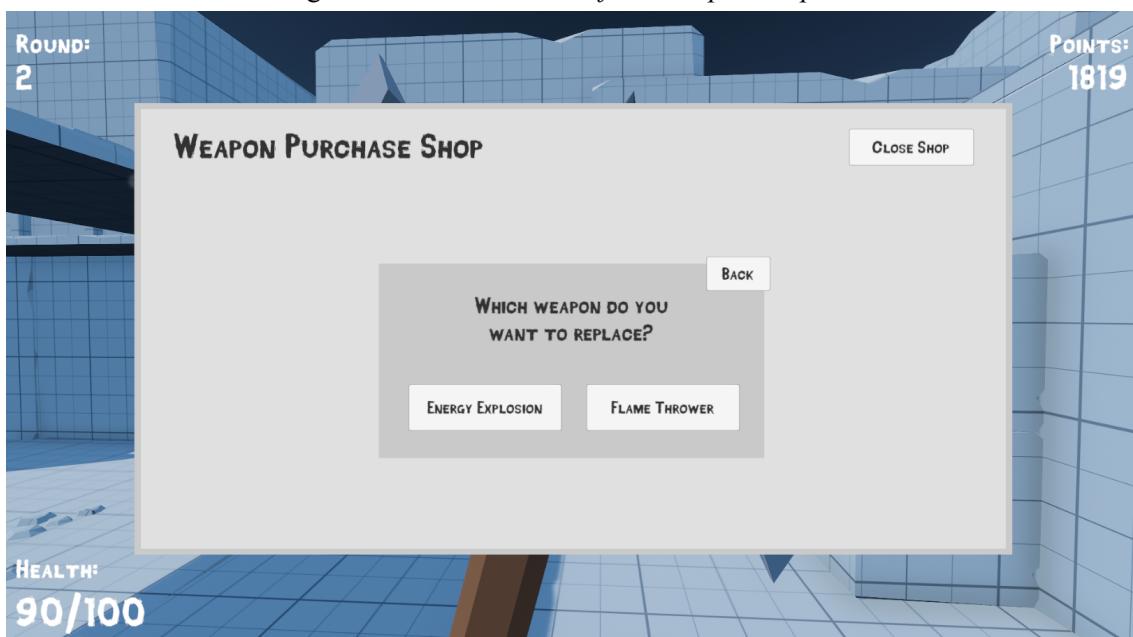


Fig 6.15 - Demonstration of the Weapon shop switch UI

7 Testing and Evaluation

7.1 Feedback

Throughout the development of this project, feedback was taken from the supervisor. This process of checking work and relaying findings happened multiple times from start till finish via the organised Zoom calls. Every time feedback was received, before the changes were made, there was further discussion to see whether there were any questions. After this, the changes were then shown to the supervisor again in the following session to confirm the changes were correct for what they had in mind.

7.2 Development Testing

Whenever something new was implemented into the project, big or small, it was tested. If something being implemented was going to have a significant influence over various aspects of the project, it was important to test early on to ensure the concept was viable before continuing. Examples of this included setting a keyboard key press to run a piece of code to see if a shop's interactions would work. Also, simple “Debug.Log()” statements were used to check that each code step’s logic was working as intended. For the “Debug.Log()”, it was used when checking the weapon collision. Before starting the implementation of the enemies, a simple particle collision script was added to an object that simply called Debug.Log(“Enemy hit”) when it detected a collision with a particle system. Following this, all the particle system weapons were used to see how the different damage values would work. Another example is when the shops’ UI opening was being tested. Simple Debug.Log(Distance) calls were being made to ensure the shops’ openable distances would work as intended. This helped find an issue with the shop closing distance. If the player was within a certain range, the interaction prompt would appear, but if they were further away, it would be disabled. The issue was that the other shops were disabling the prompt even when the player was close enough to a certain shop. If the Debug.Log() was not still outputting the Distance, it would have taken a long time to realise why it was not working. A simple fix for this was to have the disable prompt only be called when the player is within a certain range just outside of the openable range. E.g. < 3 will open, > 3 and < 6 will close - this way the disable call will not interfere once the player has gone more than 6 away from the shop object.

7.3 User Testing

User testing is another form of evaluation that was carried out. User testing is not as frequent as the supervisor feedback so it was only completed when the game was in a good position where

most implementation had been finished. Players were given a copy of the game to download at home. This was to grasp any issues they may have felt while playing the game.

After they had played the game, they were interviewed via a video call to discuss specific areas. They were asked both quantitative (“From the range of 1-5, how enjoyable was the gameplay?”) and qualitative (“What are your opinions on the different weapons available?”) questions (Pickell, 2019). After the interview questions had been asked, any further input they would like to share was encouraged in case there was something not covered in the questions. The ethical compliance form ensured that the content being exposed to the users had no negative impact.

7.3.1 User Testing findings

The majority of the feedback was very positive, with only some areas which users suggested changing. Below is a summary of the key parts of the questionnaire that had changes suggested:

When asked how the balancing of the weapons felt, one user said that the Ice Lance damage felt a bit underwhelming so it was increased. Another user said that the weapon damage for all the weapons felt a little too strong for there to be an incentive to use the upgrade shop, so all the weapons starting damage value was decreased slightly and a feature where the enemy health increases with each round was introduced.

One user believed the rate at which the points were gained during the rounds was too generous. This meant that it was not important to manage your points spending. As a result of this, the rate and points bonus for each round was reduced.

A few individuals had similar responses when asked about their enjoyment of the game. They said that on all the levels, the interactable locations were difficult to find. Not only have beacons been added to the map, but in the environment of all white colours, the areas that are interactable now have a unique colour.

When asked about the User Interface, one user said that in the purchase shop, it would be useful to know what the fire rate for each weapon was, so this was included. Another user said it was not intuitive what each of the pickups did, so the affected player stat would now flash the colour of the pickup flame for a second.

8 Conclusion

8.1 Self evaluation

Overall, this project was a success. The core game that was originally envisioned has been created. The game as a whole is well rounded and does not appear to have any clear issues. New small bugs could still be discovered later on, but the game has been checked thoroughly so the small issues will be very uncommon and not pose any great damage to the game's overall play.

If this project could be started over from scratch, changes would have been made in the form of implementing something to give the player more incentive to move around the map during the rounds' fighting stage. This is because the current gameplay could become slightly repetitive to simply farm the enemies in 1 location during a round. This is something that the "Call of Duty Zombies" games also have not done, but there have been no complaints from the community over the years. For that reason, it may not be a necessary change, but it is something that would have been looked into had the project been restarted. One way of possibly achieving this was to have randomly placed chests around the map during each round that would contain some points for the player to collect. This idea was originally going to be added but due to time constraints and having balancing issues, this was not implemented at the time.

8.2 Changes from original plan

During the development of Sweet Dreams, time constraints were the main reasons for changes to the plan. The entire premise of the game stayed the same, but areas that were not as important were omitted. One such example was the implementation of passive tools such as bubble shields and the ability to make the player invisible to enemies for a short duration of time. However, as a result of time constraints, it was not possible to implement these.

When the game was in its planning stages, where the assets intended to be used were found, a map called "Flooded Grounds" (T, 2019) was selected to be the perfect map. However, during the early asset testing phase for their viability, the pack was found to have a too detailed geometry, being too taxing for most computers. In some areas, as many as 10 million triangles were being rendered on the screen - even with render distance and culling being used to try and improve performance. As a result of this, another map needed to be found. There was a prototyping asset pack called "POLYGON Prototype - Low Poly 3D Art by Synty" (Synty, 2020) that had potential as long as the theme was changed to be more minimalist and very surreal in colour choices. This pack not only greatly improved the performance by an astonishing amount, but it was also very aesthetically attractive once all the colour changes and other visuals were implemented.

8.3 Requirements not met

Overall, a large amount of the original requirements were met. Below are a list of the Mandatory and Extension requirements that were not met and why:

Mandatory:

R:

1. The player will only be able to see their character's hands... This was not implemented because there were other areas that took priority and this requirement on reflection, should have been an Extensions instead.
2. The player shall be able to buy temporary in-game boosts (e.g. more health, mana capacity, agility)... It was decided that the health and mana capacity should not be temporary and the agility boost would have made it too easy to avoid the enemies.
3. There shall be lots of maps with unique layouts... This was not implemented because time was running out and functionality was more important than additional maps. To make up for this, replayability factors were implemented, such as the time record system.
4. The player shall be able to collect in-game points by killing Shadow Keepers to unlock other sections of the map... This was not implemented because having all the areas open from the start seemed like a better idea during the development stage. The maps were too small for this to be a worthwhile addition to the gameplay.
5. The game shall have multiple themed levels, but some levels take place in the same area but with a different layout... This was not implemented because the asset pack for the game levels was changed so this was no longer possible.
6. The loot and location shall change every time the player retries the level... This was not implemented because it was left too late to be developed as other areas took longer than previously anticipated. There were potential balancing issues where if this did not give many points then the player would not bother risking their life to find it, but if this was too generous then the game would become too easy to collect points. Also, the player could theoretically just leave 1 enemy alive and then explore the map to collect all of the chests.

Extensions:

R:

1. There should be a system where the player can find extra objects around the map to unlock bonus secret items... This was not implemented because there were not enough items in the game to justify hiding some as secret items. Having 4 purchasable weapons instead of 2 purchasable and 2 hidden is better.
2. The game should be compatible with different devices such as Xbox and PlayStation... This was not implemented because the game would have been too difficult on the controller without any aim assist. Also, the menu navigation and shops would have needed to be changed heavily to accommodate for the new input
3. There should be a database that collects different players' time records for each level... This was not implemented because most likely each person that has the game will only be playing it themselves so this did not feel like a good use of time.

4. There should be the ability to move certain objects in the world with a magical tool... This was not implemented because this would increase performance issues as the navigation for the enemies will need to constantly be updated to ensure they do not walk through moved objects and avoid places that no longer have an object blocking it.
5. There should be a fast travel vehicle to get from one side of the map to the other for a cost... This was not implemented because the maps were made small enough, so fast travel is not helpful.
6. There should be a settings menu for the player to customise their keybinds... This was not implemented because there is only the “E” button that is not the standard keybind that everyone uses.

8.4 Future development

In future development for Sweet Dreams, the following would be implemented:

- More levels
- Boss battles after each chapter
- More incentive to travel the map during the rounds
- More weapons
- Visual hands for the player to see
- Save player progress when the game application is closed and relaunched

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10 Appendices

10.1 Meeting Log

Meeting #1 (2.10.2020):

Group meeting with all the other students to ask any early questions we may have about the project

Meeting #2 (12.10.2020):

First 1 to 1 meeting where we discussed how my Project Proposal was going so far

Meeting #3 (26.10.2020):

Talked about the layout of the interim report, background research and possible music opportunity

Meeting #4 (9.11.2020):

Discussed further questions regarding the interim report contents such as the ethical consideration and objectives vs requirements

Meeting #5 (16.11.2020):

Talked through the few final questions regarding the interim report before submission

Meeting #6 (30.11.2020):

Asked some questions regarding the project before beginning

Meeting #7 (14.12.2020):

Discussed intended progress to be made over the Christmas break

Meeting #8 (11.2.2021):

Caught up on current progress and discussed if the project was on track. Also talked about the issue with an intended asset pack

Meeting #9 (25.2.2021):

Talked about what had been achieved the past few weeks

Meeting #10 (8.3.2021):

Discussed current game features and asked for some feedback

Meeting #11 (22.3.2021):

Showcased progress made on project

Meeting #12 (31.3.2021):

Talked about user testing plans

Meeting #13 (14.4.2021):

Discussed feedback that was received from user testing

Meeting #14 (28.4.2021):

Showed the final complete version of the game with audio. Asked questions regarding the report and presentation session

10.2 Project Proposal

Sweet Dreams

Zombie survival game with the use of magical weapons in a fantasy dream world, creating a different and refreshing approach to the typical 'Zombie shooter' game that gets repeated too often.

What if there is more to your dreams and they aren't just made by your imagination? What if dreams have more consequences than we assume if not kept in order?

Student name: Taylor Bromley **Candidate number:** 198703 **Supervisor:** Paul Newbury

Narrative

The game starts when you go to the hospital after hearing your grandfather has suddenly fallen into a coma. Later that night, you fall asleep beside his bed and wake up in your dream where you're met by your grandfather who tells you to find the book called the 'Secret Worlds' located in his home bedside drawer. Shortly after this he disappears before he can answer any of your questions. When you wake from the dream, you try to think nothing of it, but your curiosity gets the better of you and you find the book. However, when you open it, it is blank.

When night arrives again, you fall asleep with the first page open and you awake in a dream again and are greeted by a strange being that briefly introduces you to the page's dream world, Shadow beings and your task. You want to decrypt your grandfather's book, an empty book entitled 'Secret Worlds' that only reveals a page when you complete its level. The levels happen in your dreams where you must survive the night and explore various areas of the map. Each level has different rules and characteristics created by the book's pages. The Shadow Keeper and his minions are strange beings that have taken control of the dream world and try to corrupt your dreams and trap you like they did your grandfather. To fight these beings, you use different magic elements that you have gained throughout the levels. There are also passive spells like shield, physical enhancement, world object movement etc.

You must complete the level to reveal the page's contents, otherwise you will wake up due to fear and must re-enter the dream. Whenever you awaken after completing the level, you use the message you found to uncover the next part of the truth behind your grandfather's mysterious secrets. Each page of the book is a level. You are sitting in bed with the book and you flick the page and play that level by going to sleep. You cannot skip levels, but you are able to go back to previous levels if you missed something or want to loot. At the end of each chapter in the book, you will fight the final boss of that chapter. Once you've reached the last page, a golden page, you meet grandfather in his own dream where you find the truth that he's the keeper of all dreams, leader of the Sleeping World but he's been captured by the Shadow Keeper King. Your grandfather has been captured because he was much weaker in his old age.

You must fight the Shadow Keepers to release your grandfather from his coma. Your grandfather explains that he created the book so only the worthy could enter his dreams if the Shadows Keepers ever overpowered him. After this, he passes the responsibilities on to you as you could control the dreams and fend off the Shadow Keepers from taking over - Shadow is a physical representation of nightmares - and maintain the balance of the night. When you wake up, you find your grandfather awake in his hospital bed next to you. The book is blank again and he tells you that the book belongs to you now for the next generation.

Game idea reasoning

There are many zombie games already existing in the game industry that only revolve around the use of guns. This can make it difficult for similar games to stand out against the already existing most popular titles. However, some players may like the aspect of zombie survival style but are not keen on first person shooter games. This leaves them in a position where they must compromise. I will be exploring what factors the users wish to experience in games.

Aims and objectives

Primary

- Design a project that meets the needs of a player base by keeping the traditional style of zombie survival with progressively difficult rounds but with a more fantasy-based side with a unique and fascinating story behind it.
- Develop magical weapons that use different elements and have different properties like fire, ice, earth, poison, explosives etc
- Create a shop to purchase/upgrade items and stats for their character
- Implement a zombie waves system, getting progressively harder to beat
- Fast travel vehicle to get from one side of the map to the other for a cost
- Enable the player to buy temporary in-game boosts for the player (e.g. more health, mana capacity, agility)
- Design a graphical interface that follows all the design principles expected from a game
- Create enemies that have the level of movement and behaviour as appropriate for a high-end game
- Research existing games to find where I could make improvements for my game
- Conduct user testing to get feedback from my target group to make changes where needed
- Have complete player movement where the players will not feel anything is wrong or different from what they expect from a game
- In-game points to unlock other sections of the map which are necessary to surviving the progressively difficult waves of zombies and to find hidden items
- Multiple themed levels but some levels take place in the same area but with a different layout

Extensions

- Have a system where the player can find extra objects around the map to unlock bonus secret items
- For completing each level in under a certain time, you get 1-3 stars
- A level farming system that the player is willing to follow to unlock the best equipment
- Ability to move certain objects in the world with a magical tool
- A helper NPC that you can interact with to get information on how to play

- A story that the player will enjoy and want to learn more about
- Change the location of the loot every time the player retries the level

Relevance

This project brief is very open, leaving me total control over what 3D game I wish to create. There is numerous functionality I have planned for my project which I believe ties in well with the whole story and playstyle.

This project will test my skills in all aspects of game development to ensure that I can bring everything together to create a well-rounded quality project - this strongly backs my career plan. In addition to the game development skills that will be tested and improved, I will be putting to work other areas such as my planning and writing ability for my report.

In the current situation of the world (COVID), my independence as a future employee is challenged as I will not be able to always rely on others and will need to find things out myself.

Resources Required

This project will be made mainly in Unity (Anurag, 2018), with the use of 3D modelling software such as C4D (Fram, n.d.). It will also require the use of online meeting software like Discord or Zoom to conduct user research and play testing. This will also require them to have the version of Unity that I will be developing my project in.

Similar games for inspiration

For the zombie side of the game, I will be getting most of my inspiration from the Call of Duty Zombies franchise which has been one of the leading styles for zombie games for many years. (*Zombies - Call of Duty*, n.d.)

When it comes to the magic that will be used as an alternative to guns, one that caught my eye is Spellbreak where the user can use different magic elements to fight their enemies in a more fast paced environment. ('Gauntlet Guide', 2019)

I had stated that I wish to have a loot farming element to my game to increase replayability of the levels that have already been made. An example of a game which I have played where I have voluntarily farmed certain missions was GTA 5. In GTA 5 online there were certain missions which would give you a large amount of money so I would play those levels over and over so that I could buy a car that I really wanted - I had no complaints about doing this as the reward was worth it. (August 18 & 2020, n.d.)

Project plan (around academic timetable) - Timetable & Gantt chart

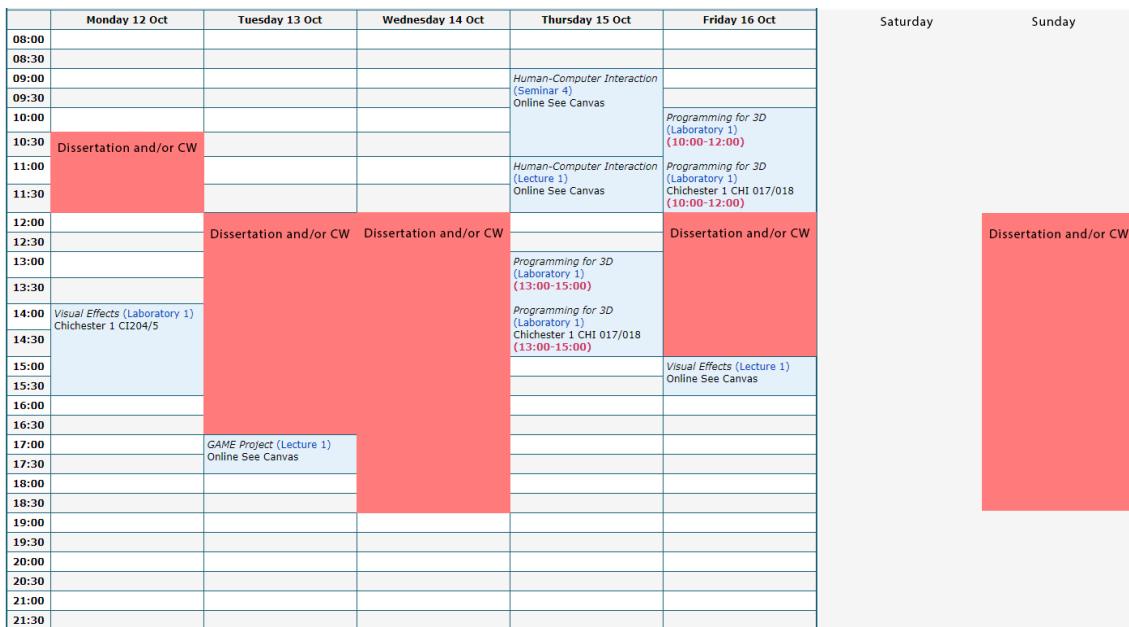


Figure 7.1

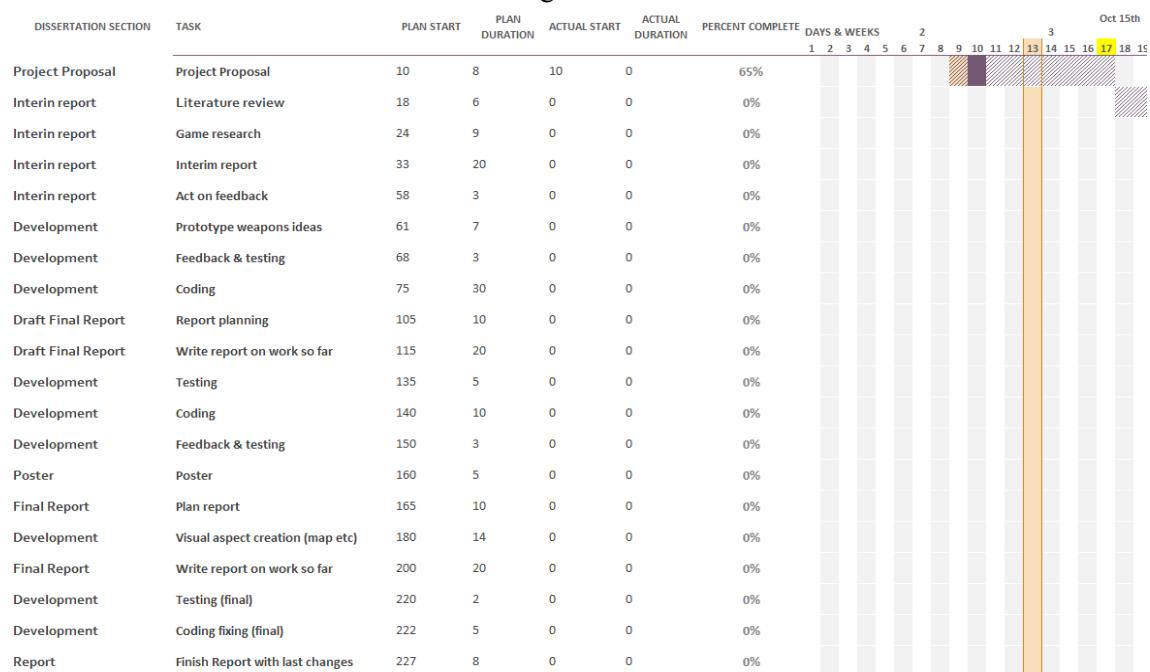


Figure 7.2

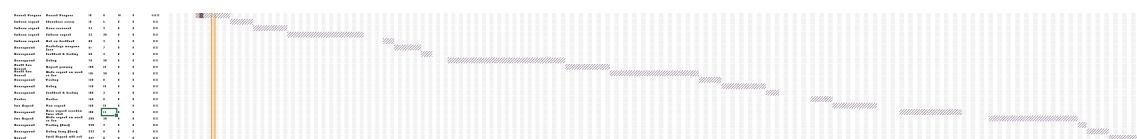


Figure 7.3

Interim log

Meeting #1 (2.10.2020):

Group meeting with all the other students to ask any early questions we may have about the project

Meeting #2 (12.10.2020):

First 1 to 1 meeting where we discussed how my Project Proposal was going so far

10.3 Ethical compliance form

Ethical Compliance Form for UG and PGT Projects*

School of Engineering and Informatics

University of Sussex

This form should be used in conjunction with the document entitled “Research Ethics Guidance for UG and PGT Projects”.

Prior to conducting your project, you and your supervisor will have discussed the ethical implications of your research. If it was determined that your proposed project would comply with all of the points in this form, then both you and your supervisor should complete and sign the form on page 3, and submit the signed copy with your final project report/dissertation.

If this is not the case, you should refer back to the “Research Ethics Guidance for UG and PGT Projects” document for further guidance.

1. Participants were not exposed to any risks greater than those encountered in their normal working life.

Investigators have a responsibility to protect participants from physical, mental and emotional harm during the investigation. The risk of harm must be no greater than in ordinary life. Areas of potential risk that require ethical approval include, but are not limited to, investigations that require participant mobility (e.g. walking, running, use of public transport), unusual or repetitive activity or movement, physical hazards or discomfort, emotional distress, use of sensory deprivation (e.g. ear plugs or blindfolds), sensitive topics (e.g. sexual activity, drug use, political behaviour, ethnicity) or those which might induce discomfort, stress or anxiety (e.g. violent video games), bright or flashing lights, loud or disorienting noises, smell, taste, vibration, or force feedback.

2. The study materials were paper-based, or comprised software running on standard hardware.

Participants should not be exposed to any risks associated with the use of non-standard equipment: anything other than pen-and-paper, standard PCs, mobile phones, and tablet computers is considered non-standard.

3. All participants explicitly stated that they agreed to take part, and that their data could be used in the project.

Participants cannot take part in the study without their knowledge or consent (i.e. no covert observation). Covert observation, deception or withholding information are deemed to be high risk and require ethical approval through the relevant C-REC.

If the results of the evaluation are likely to be used beyond the term of the project (for example, the software is to be deployed, the data is to be published or there are future secondary uses of the data), then it will be necessary to obtain signed consent from each participant. Otherwise, verbal consent is sufficient, and should be explicitly requested in the introductory script (see Appendix 1).

4. No incentives were offered to the participants.

The payment of participants must not be used to induce them to risk harm beyond that which they risk without payment in their normal lifestyle. People volunteering to participate in research may be compensated financially e.g. for reasonable travel expenses. Payments made to individuals must not be so large as to induce individuals to risk harm beyond that which they would usually undertake.

5. No information about the evaluation or materials was intentionally withheld from the participants.

Withholding information from participants or misleading them is unacceptable without justifiable reasons for doing so. Any projects requiring deception (for example, only telling participants of the true purpose of the study afterwards so as not to influence their behaviour) are deemed high risk and require approval from the relevant C-REC.

6. No participant was under the age of 18.

Any studies involving children or young people are deemed to be high risk and require ethical approval through the relevant C-REC.

7. No participant had a disability or impairment that may have limited their understanding or communication or capacity to consent.

Projects involving participants with disabilities are deemed to be high risk and require ethical approval from the relevant C-REC.

8. Neither I nor my supervisor are in a position of authority or influence over any of the participants.

A position of authority or influence over any participant must not be allowed to pressurise participants to take part in, or remain in, any study.

9. All participants were informed that they could withdraw at any time.

All participants have the right to withdraw at any time during the investigation. They should be told this in the introductory script (see Appendix 1).

10. All participants have been informed of my contact details, and the contact details of my supervisor.

All participants must be able to contact the investigator and/or the supervisor after the investigation. They should be given contact details for both student and supervisor as part of the debriefing.

11. The evaluation was described in detail with all of the participants at the beginning of the session, and participants were fully debriefed at the end of the session. All participants were given the opportunity to ask questions at both the beginning and end of the session.

Participants must be provided with sufficient information prior to starting the session, and in the debriefing, to enable them to understand the nature of the investigation.

12. All the data collected from the participants is stored securely, and in an anonymous form.

All participant data (hard-copy and soft-copy) should be stored securely (i.e. locked filing cabinets for hard copy, password protected computer for electronic data), and in an anonymised form.

Project title: 3D Unity Game

Student's Name: Taylor Bromley

Student's Registration Number: 21802513

Student's Signature:



Date: 16.11.2020

Supervisor's Name: Paul Newbury

Supervisor's Signature:



Date: 16.11.2020

Appendix 1: Introduction and Debriefing Scripts

If you intend to obtain verbal consent from your participants, you need to create an introduction script, to read out at the start of the study, and a debriefing script, to read out at the end of the study. You should get your supervisor's approval for your introduction and debriefing scripts before commencing your study. NB: When submitting the signed Ethical Compliance form, you do not need to include this Appendix.

Introduction Script

The introduction script must:

- state the general aim of the study
- explain why you need the involvement of other people
- describe what will happen in the study
- describe what data will be collected
- reassure the participant that any data collected will be stored securely, and in an anonymous format
- explain what interaction the participant may have with you during the study
- reassure the participant that this is not a test of ability
- state that the participant may withdraw at any time
- seek explicit consent
- allow the participant to ask questions

An example introductory script (italics indicate required information, some of which will be specific to your project):

Web Interface Investigation
Final Year Project, 2014-15
Jane Student

The aim of this study is to investigate the suitability of a new website [state the general aim of the experiment]. We cannot tell how good this website is unless we ask those people who are likely to be using it, which is why we need to run studies like these [explain why you need the involvement of other people]. I will give you some time to browse the website, before asking you to answer some questions [describe what will happen in the study].

I will be observing you while you perform the tasks [describe what data will be collected]. If you have any questions, please ask me, and please let me know when you are finished [explain what interaction the participant may have with you during the study].

I will ask you some questions at the end of the study [describe what will happen in the study]. Please remember that it is the system, not you, that is being evaluated [reassure the participant that this is not a test of ability].

You are welcome to withdraw from the study at any time [state that the participant may withdraw at any time]. Please be assured that any data collected will be stored securely and in an anonymous form [describe how the data will be anonymised and stored].

Do you agree to take part in this evaluation? [seek explicit consent]. Do you have any questions before we start? [allow the participant to ask questions].

Debriefing Script

The debriefing script that is used at the end of the study must:

- restate the main aim of the experiment
- if applicable, explain any other, related aims of the experiment, and any particular data collected
- allow the participant to make comments or ask questions
- give contact details for the student and supervisor
- thank the participant

An example debriefing script (italics indicate required information, some of which will be specific to your project):

Web Interface Investigation
Final Year Project, 2014-15
Jane Student

The main aim of the experiment was to investigate the suitability of this website [restate the main aim of the experiment]. In particular, I was looking to see whether you made use of the site map, and whether any of the links on the website seemed to be confusing. I wanted to know how easy the pages were to navigate [if applicable, explain any other, related aims of the experiment, and any particular data collected].

Do you have any comments or questions about the experiment? [allow the participant to make comments or ask questions]. Here are my contact details, and those of my supervisor, and please let us know if you have any further questions about this study [give contact details of student and supervisor to participant]. Thank you for your help [thank the participant].

10.4 Project Plan

DISSERTATION SECTION	TASK	PLAN START	PLAN DURATION	ACTUAL START	ACTUAL DURATION	PERCENT COMPLETE
Project Proposal	Project Proposal	10	8	10	8	100%
Interim report	Literature review	18	6	18	6	100%
Interim report	Game research	24	9	24	9	100%
Interim report	Interim report	33	20	33	20	100%
Interim report	Act on feedback	58	3	0	0	0%
Development	Prototype weapons ideas	61	7	0	0	0%
Development	Feedback & testing	68	3	0	0	0%
Development	Coding	75	30	0	0	0%
Draft Final Report	Report planning	105	10	0	0	0%
Draft Final Report	Write report on work so far	115	20	0	0	0%
Development	Testing	135	5	0	0	0%
Development	Coding	140	10	0	0	0%
Development	Feedback & testing	150	3	0	0	0%
Poster	Poster	160	5	0	0	0%
Final Report	Plan report	165	10	0	0	0%
Development	Visual aspect creation (map etc)	180	14	0	0	0%
Final Report	Write report on work so far	200	20	0	0	0%
Development	Testing (final)	220	2	0	0	0%
Development	Coding fixing (final)	222	5	0	0	0%
Report	Finish Report with last changes	227	8	0	0	0%

Figure 6.1

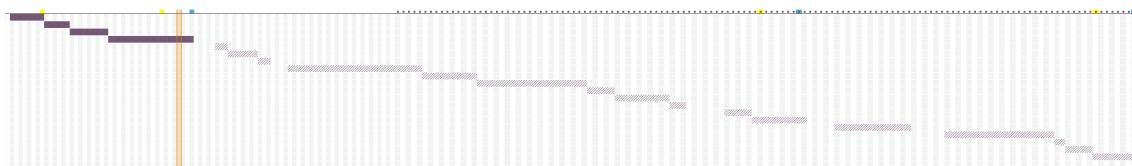


Figure 6.2

Below is a list of the different tasks that shall be completed in order. The critical interdependencies of each phase are the tasks listed above it. Next term is when most of the development will be done and the final report will be carried out.

1. **Project proposal** - Brief overview description of details of proposed project, submitted via email to supervisor. Estimated completion time of 8 days.

2. **Interim report** - More in-depth plan of game backed up by research conducted on all areas of production. Estimated completion time of 29 days.
3. **Development** - Work on producing music for the game, prototype weapons and code other aspects of the game revolving around weapons. Gain feedback from the supervisor and test for any problems. Estimated completion time of 40 days.
4. **Draft final report** - Begin work on final draft including development work already completed and any findings. Estimated completion time of 30 days.
5. **Development** - Continue working on implementing features while testing and doing user testing. Estimated completion time of 18 days.
6. **Poster** - Design a poster on Sweet Dreams for the poster event. Estimated completion time of 5 days.
7. **Draft final report** - Continue working on the report and adding new elements. Estimated completion time of 10 days.
8. **Development** - Create the visual aspects of the game (maps). Estimated completion time of 14 days.
9. **Final report** - With feedback from draft, make improvements. Estimated completion time of 20 days.
10. **Development** - Final testing and user testing before fixing final minor bugs coding fixing. Estimated completion time of 7 days.
11. **Final report** - Finish the report. Estimated completion time of 8 days.

10.5 User Testing questionnaire

INTRODUCTION

The aim of this study is to create a new 3D game with a good range of meaningful functionality. I cannot tell how good this game is unless I ask those people who are likely to be playing it, which is why we need to run user tests like these. I will give you some time to play the game, before asking you to answer some questions about your experience.

I will be observing you while you play the game to see if areas are less intuitive than assumed. If you get stuck and cannot progress, please ask me for assistance, and please let me know when you are finished.

I will ask you some questions at the end of the study. Please remember that it is the system, not you, that is being evaluated.

You are welcome to withdraw from the study at any time. Please be assured that any data collected will be stored securely and in an anonymous form.

Do you agree to take part in this evaluation? Do you have any questions before we start?

	QUESTION	ANSWER	WHAT I WILL DO
1	From a range of 1-5 (5 being best), how balanced were the weapons and if there was something you didn't like, what would you change and why?	4, the ice lance needs a higher damage as it felt like a downgrade to the flamethrower and energy explosion in comparison	I have made the starting damage 3 hit enemies instead of 4 and increase the fire rate to 0.5 seconds to 0.3 delay between each shot
2	How did you find the rate of which you gain points to e.g. buy more health or mana?	You got points too easily, you could buy the best weapons and upgrades after almost just 1 round	I have decreased the starting points from 500 to 250 and decreased the points for each kill from 50 to 20. Also, the point bonus multiplier starts at 50 * enemy count instead of 75 * enemy count. This should mean there's now more importance on the point spending management
3	What were your thoughts on the user interface? Was there anything you would like changed/added?	Good, extremely clear as to how to purchase and what you had	
4	Was the game's overall difficulty good in your opinion?	Yes, but as I like more difficult games, I may be biased to liking more challenging games.	
5	Did your interest in the game change at any point during your play?	Nope. I enjoyed every second equality	
6	Could you see yourself potentially being interested in this game once it's in a finished state?	Yes of course.	
7	From a range of 1-10, how much replayability do you	10. Make sure there's an instruction page	

	think this style of game has		
8	What are your thoughts on the variety of weapon choices, does each weapon have a purpose or are some obsolete?	They all have equal purpose and I like the variety of elements to make them visually unique as well. And the fact that you have to play differently with each.	
9	Do you like the fact you can only use the shop between rounds or do you think this should be different/changed in any way?	Yes, because it adds a level of strategy to it	
10	From a range of 1-10, how would you rate your enjoyment of this game, bearing in mind it's lack of story and map design/levels at this stage?	7, there's always things to improve. Like make it easier to find the shops and a level counter to know which level I am currently on.	The shops areas have been made more clear to the player as to where they are and a round counter has been added to the UI

	QUESTION	ANSWER	WHAT I WILL DO
1	From a range of 1-5 (5 being best), how balanced were the weapons and if there was something you didn't like, what would you change and why?	4.	
2	How did you find the rate of which you gain points to e.g. buy more health or mana?	Think it was alright. Seemed balanced, not able to buy everything in one round but is enough to keep playing	
3	What were your thoughts on the user interface? Was there anything you would like changed/added?	Add a fire rate stat to the weapon buy shop	I have added this stat
4	Was the game's overall difficulty good in your opinion?	Seemed fine to me	
5	Did your interest in the game change at any point	Was constant throughout	

	during your play?		
6	Could you see yourself potentially being interested in this game once it's in a finished state?	Maybe	
7	From a range of 1-10, how much replayability do you think this style of game has	3, because I'm not too interested in these types of games so I wouldn't want to replay the same levels again.	
8	What are your thoughts on the variety of weapon choices, does each weapon have a purpose or are some obsolete?	Yes, every weapon has its own purpose. Each weapon could be preferable to different individuals.	
9	Do you like the fact you can only use the shop between rounds or do you think this should be different/changed in any way?	Yes, it would make it too easy if you could buy during a round	
10	From a range of 1-10, how would you rate your enjoyment of this game, bearing in mind it's lack of story and map design/levels at this stage?	8, seemed enjoyable	

	QUESTION	ANSWER	WHAT I WILL DO
1	From a range of 1-5 (5 being best), how balanced were the weapons and if there was something you didn't like, what would you change and why?	4, because the weapons without upgrades are still good so there's not much incentive to use the upgrade shop (besides the ice lance as it's a noticeable difference)	I have decreased the starting damage a little bit for each weapon besides the ice lance
2	How did you find the rate of which you gain points to e.g. buy more health or mana?	Good.	

3	What were your thoughts on the user interface? Was there anything you would like changed/added?	It seems to provide enough information to understand everything around you.	
4	Was the game's overall difficulty good in your opinion?	Could be a little more difficult, so health upgrades are more incentivised.	Most participants liked how it currently is so I wont be changing it. There will be a difficulty option though
5	Did your interest in the game change at any point during your play?	Same.	
6	Could you see yourself potentially being interested in this game once it's in a finished state?	Yes, I think if the story is well developed the games suspense will be increased and keep the player interested.	
7	From a range of 1-10, how much replayability do you think this style of game has	Add some more upgrades every once in a while will make it more replayable	
8	What are your thoughts on the variety of weapon choices, does each weapon have a purpose or are some obsolete?	Yep, they present a different variety	
9	Do you like the fact you can only use the shop between rounds or do you think this should be different/changed in any way?	Yep, makes the decisions between rounds more important	
10	From a range of 1-10, how would you rate your enjoyment of this game, bearing in mind it's lack of story and map design/levels at this stage?	7.5	

	QUESTION	ANSWER	WHAT I WILL DO
1	From a range of 1-5 (5 being best), how balanced were the weapons and if there was something you didn't like, what would you	5	

	change and why?		
2	How did you find the rate of which you gain points to e.g. buy more health or mana?	Pretty good.	
3	What were your thoughts on the user interface? Was there anything you would like changed/added?	I think it would be good to have a UI icon for the health pickup and mana pickup so the player knows what they do. You could also change the text colour for a second. When doing the tutorial screen, you can use this icon again.	When the player picks up the pickup, the related stat will flash the colour of the pickup flame to indicate that it has changed. Also, the tutorial screen will explain what the pickups do
4	Was the game's overall difficulty good in your opinion?	Yep	
5	Did your interest in the game change at any point during your play?	Yeah. But if there will be lots of rounds per level, make sure the map is big enough to explore so it doesn't get too repetitive.	I will make sure the maps are big enough and that the levels don't have too many rounds
6	Could you see yourself potentially being interested in this game once it's in a finished state?	Yes. I want to play more	
7	From a range of 1-10, how much replayability do you think this style of game has	7, you are unlikely to pass it the first time so you will need to retry. But once the game is done, you might only be interested in playing again to just challenge yourself or friends to complete it quicker. Maybe you could add a timer to get 3 stars for completing the level under a certain time.	
8	What are your thoughts on the variety of weapon choices, does each weapon have a purpose or are some obsolete?	It's a good progression from energy explosion to ice lance, but then with the fireball, I would prefer to keep the flamethrower instead so I would never buy that weapon.	This is down to person opinion so I won't change anything
9	Do you like the fact you can only use the shop	Nah, I think it's good that you can't use the shops in	

	between rounds or do you think this should be different/changed in any way?	way games as you are too busy fighting enemies	
10	From a range of 1-10, how would you rate your enjoyment of this game, bearing in mind it's lack of story and map design/levels at this stage?	8 - I would improve it by having more world integrated UI, like showing where to start the waves or find the shops (like cod zombies mystery box location beacon)	I have created the location beacons to make it easy for the players to know where everything interactable is located

	QUESTION	ANSWER	WHAT I WILL DO
1	From a range of 1-5 (5 being best), how balanced were the weapons and if there was something you didn't like, what would you change and why?	5, completely balanced. You can clearly see the progressions going through the shop weapons. The delay helps balance out the big explosion from being too strong.	
2	How did you find the rate of which you gain points to e.g. buy more health or mana?	Seems quite efficient. Easy to understand	
3	What were your thoughts on the user interface? Was there anything you would like changed/added?	Nope, seems to cover everything and isn't too overwhelming at the same time.	
4	Was the game's overall difficulty good in your opinion?	Yep, overall it seems good	
5	Did your interest in the game change at any point during your play?	No, I don't think it would. All good	
6	Could you see yourself potentially being interested in this game once it's in a finished state?	Yep, absolutely once it is in published state and has been tested fully.	
7	From a range of 1-10, how much replayability do you think this style of game has	8. It's similar to cod zombies, but with a timer instead of unlimited rounds.	
8	What are your thoughts on	None are obsolete	

	the variety of weapon choices, does each weapon have a purpose or are some obsolete?		
9	Do you like the fact you can only use the shop between rounds or do you think this should be different/changed in any way?	Nah, good as it is. Shouldn't be used during the round.	
10	From a range of 1-10, how would you rate your enjoyment of this game, bearing in mind it's lack of story and map design/levels at this stage?	Would be cool if the black smoke did a little bit of damage if you're standing in it.	Due to how players receive damage usually, this will likely cause confusion unless lots of other aspects of the games combat system was changed. So I won't be adding this.

DEBRIEFING

The main aim of the experiment was to investigate the game and its functionality. In particular, I was looking to see whether you made use of all the features, and whether any aspect of the game seemed to be confusing. I wanted to know how balanced the weapons were and the shop prices.

Do you have any comments or questions about the experiment? Here are my contact details, and those of my supervisor, and please let us know if you have any further questions about this study. Thank you for your help.