Major Project Portfolio

Video link: <https://youtu.be/TgEbTSh44bc>

# Project Proposal

This project proposal is a brief section that outlines the aim, scope, and rationale of the project.

* The title of your project

I have decided to name this project “Fruit Frenzy Dash”. This is because it encapsulated the concept of collecting fruit in a speedy efficient manner.

* Brief summary

Fruit Frenzy Dash presents an engaging cooperative gameplay experience, where players must work together as two brothers tasked by their mum to collect specific fruits for a fruit platter at an upcoming pool party. This mission, however, is full of traps that threaten the player’s safety and success. The game pushes players to navigate these challenges while carefully managing the quantity of fruit collected. Because if they exceed the amount required, their mum will kick them out of the house.

These gameplay mechanics encourage young learners to engage in a basic level of counting, teamwork, and strategic thinking, as players must communicate and make collective decisions to balance fruit collection with the need to avoid traps. As a result of this, it will create an experience that tests users’ ability to plan and to learn to count under pressure, which will set Fruit Frenzy Dash apart in the cooperative education gaming genre.

* The pain points

One of the biggest challenges that will be faced when developing this project is the management of time while other subjects also have assessment tasks. As a result of this, the development of this project will require me to schedule my time to ensure everything gets completed.

Additionally, making sure that each section of the game functions smoothly and as intended is crucial. This involves integrating different game mechanisms seamlessly. To further add to this point, my current laptop is not suited for running game development software effectively.

Another pain point in this project would be ensuring that there is a visual consistency of the spites used. This can be challenging to create a unified look because finding consistent styles of assets can be challenging on the Unity Asset Store.

Finally, my eagerness to include too many features in the project may be problematic. It could result in making the game too complicated for the intended audience, while also taking too much time to add it effectively into the game.

* The type and purpose of your project (e.g., website, animation, game, etc.)

This project is an educational game that aims to teach young students the foundation of counting, through cooperative gameplay. This project will aim to encourage children to learn numeracy skills while collaborating with peers, which will combine fun with early education. This approach enhances mathematical understanding while also promoting teamwork and planning skills, which aims to make learning fun for younger students.

* The target audience and context of your project

Fruit Frenzy Dash is specifically designed for teachers teaching kindergarten to year 2, aiming to be a useful tool to introduce and reinforce foundational counting skills playfully and engagingly.

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* The main features and functions of your project

There are several features that I want to include in this educational game such as:

* Two players moving independently.
* Camera follows both players.
* Collectable fruits.
* A HUD (Heads Up Display) that displays how much fruit you need and have collected.
* Jump pads / Trampolines.
* Buttons and Levels that open doors.
* Teleporters that can move you from one location to another.
* Start and end screens.
* Smooth animations
* Background music and sound effects
* The software and hardware tools you will use to create your project.

The software application that will be used to create this project is Unity, as well as its online asset store for all the assets. The hardware tool used will be a MacBook Air with a 2020 M1 chip.

* The sources of information and inspiration for your project

The information that will be collected to learn how to create this game will be found on YouTube. By following multiple tutorials explaining how they have incorporated one component, I will then follow a similar style of code used in their videos.

The inspiration for this project is combining two of my favourite games called “Fireboy and Watergirl” and “It Takes Two”. These games are both multiplayer games that require players to work together to achieve a goal. Additionally, I have a personal desire to create a tool that could potentially be used by mathematics teachers in early education within my school.

* The ethical and legal issues related to your project

Some legal implications that could arise from my educational game are:

* The creators of the inspiration games mentioned above do not approve of how similar my creation is to theirs.
* Users from the Unity Asset Store need correct credibility for the assets and images used in the project.

Some ethical implications that could arise from my educational game are:

* There is a general idea that iPad kids exist, and creating another game for kids to play on their iPads or laptops is creating another pathway for kids to be on their devices, which is not good for long-term social and physical health.
* Additionally, there is the ethical consideration of protecting children’s data privacy online.

# Project Management Plan

This project management plan is a detailed section that describes how I will plan, organise, and monitor my multimedia project.

**Project Objectives and Deliverables**

**Objectives:**

The main objective of Fruit Frenzy Dash is to create an interactive, educational experience that helps basic counting skills for children in early primary school. Specifically, kindergarten to Year 2. By playing the game, players will enhance their mathematical skills in a challenging and enjoyable way.

**Features and Functionality:**

The game will contain several features designed to educate but also provide a smooth player experience.

* **Independent Player Movement:**

Two players can control different characters independently. This feature will encourage cooperative gameplay and encourage communication between students.

* **Camera System**

A camera that follows both the players. This will help ensure everyone can see their players and no player is left behind.

* **Collectable Fruits:**

These are the game’s central interactive concepts. These will be designed to be collected while reinforcing counting skills.

* **HUD (Heads Up Display):**

This will display the fruit count objectives and progress. This is helpful for younger students because it provides feedback on how they are doing in the game.

* **Jump Pads / Trampolines:**

These objects will introduce a way for players to jump even higher to collect fruits from hard to reach places.

* **Interactive Buttons and Doors:**

Encourages problem-solving, cause and effect, and collaboration between players.

* **Teleporters:**

Offers a fun way to move around the level, improving a student’s special awareness within the level.

* **Start and End Screens:**

Provides a clear beginning and end to the gameplay.

* **Smooth Animations and Engaging Sound Effects:**

Enhances the sensory feedback for the students, as well as immerses the player in the game.

Each of these features will be attempted to be developed to provide an educational value to the game.

**Deliverables:**

Once this project is complete, the project will have the following deliverables:

* **Final Game:**

A fully functioning and completed Fruit Frenzy Dash, ready to be played.

* **Project Diary:**

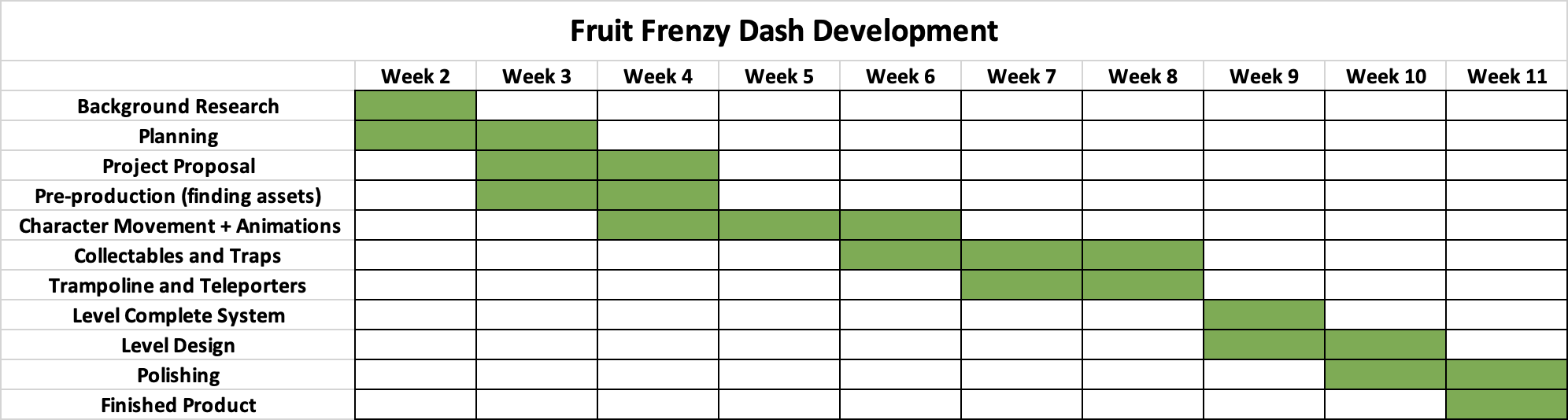
A record of all work progress and reflections throughout the multimedia project

* **Project Proposal:**

A section that outlines the aim, scope, and rationale of the project.

**Project Timeline and Milestones**

**Timeline:**

The development of Fruit Frenzy Dash has been planned out in a Gantt chart to ensure that a structured approach is used to meet the project’s milestones. The timeline used according to the Gantt chart showcases each phase and the expected time to complete each milestone.

* **Background Research (Week 1):**

Looking at the existing market to see what sort of games already exist and where there are holes to be filled in the market. Asking myself questions like: What worked well in these games? What sort of mechanics make players keep coming back?

* **Planning and Project Proposal (Week 2):**

Writing up the project proposal. Setting out the main objectives, features, and purpose, as well as writing this management plan.

* **Pre-production (Week 3-4):**

Finding useful assets from the online Unity Asset Store that fit the aesthetic and functionality I am looking for.

* **Character Movement + Animations (Week 4 -6):**

Programming the player controller to make responsive controls for character movement. Also creating individual animations for these character movements.

* **Collectables and Traps (Weeks 6-8):**

Programming the central ability for the player to collect the fruits and die when they hit any of the traps. As well as their animations and the movement of some traps.

* **Trampoline and Teleporters (Weeks 7-8):**

Programming more interactive elements for players to move around the levels. As well as individual animations.

* **Level Complete system:**

Writing the game’s central system that counts how many fruits the users have collected, creating a collective inventory for both the users. Then dying if too many are collected.

* **Level Design (Weeks 9-10):**

Combining all of the components already created and placing them in a way that is challenging, and helps students think quickly about “Do I need to collect that fruit?”

* **Polishing (Week 11):**

Refining the bugs in the game to make it bug-free and ensure an enjoyable interactive experience is created.

* **Finished Project (Week 11):**

Ready for presentation and submission

An important thing from the Gantt chart is that some of the milestones overlap over the weeks, this is to help maximise efficiency and productivity. Flexibility is also included in the timeline to make sure the priorities of a finished product over smaller features of the game.

**Project Budget and Resources**

**Project Budget:**

Since Fruit Frenzy Dash is for a school project, I have decided to have a budget of $0. With no funds available to spend, I will have to be highly resourceful with the resources I use. I leverage freely available tools and services for developing the game.

**Resources:**

Due to Unity’s no-cost license, Unity will be the selected software design application used. Additionally coming with the online Unity Asset Store, I can access the free assets to help construct the game’s visual and audio elements. Additionally, my preexisting laptop – which is somewhat capable of running Unity – means there is no need for additional purchases.

**Project Risks and Contingencies**

**Risks:**

The clearest risk when developing a game is time management. As the project timeline overlaps with other subject’s assessments, there is a possibility that demands from other subjects could impact progress. Additionally, while considering the target audience, the addition of trampolines and teleporters makes the game have too many hard-to-grasp components.

**Contingencies:**

To reduce these risks, a flexible development approach has been partly adopted. This means that I will still follow the structured timeline, however, priority will be given to the essential game functions that directly relate to solving the problem – the need for better educational maths games. If time constraints become tighter, features like the trampolines and teleporters may be omitted. This in turn will allow me to work on the remaining sections and focus on the educational value of the game.

**Project Quality and Evaluation Criteria**

**Quality Benchmarks:**

This project will follow specific quality benchmarks to make sure a successful education game has been developed.

* The game must run without any crashes or bugs from the starting screen to the final screen.
* There must be a smooth user experience to make users feel like the game is responsive and not slow.
* The game should engage and help the intended audience of young students.

**Evaluation Criteria:**

The effectiveness of this project as an educational tool in early education should be put against these criteria:

* + **Enjoyability:**

The game should capture and hold a student’s interest, which will make the learning process fun.

* + **Educational Value:**

The game can teach foundational counting skills, spatial awareness, and cooperation between students.

* + **Trusted by Teachers:**

The game should be trusted by teachers as they will think it can help with early education.

# Project Diary

This project diary is a record of my work progress and reflections throughout my multimedia project.

**Weekly Summaries:**

* **Week 4: Tile Mapping**

This week I discovered a technique called tile mapping. This is where your scene can be split into individual cubes, and you can draw parts of your levels using pixels, you can draw you background and walkable terrain using this. I chose to prioritise tile mapping for this week so I could create a trial level where I could trial all of the game’s features. This also let me learn the skills of how the individual tools that were offered, which I’m sure will come in useful when designing each level.

* **Week 5-7: Player Movement + Animations**

Over these last few weeks, I have been trying to perfect my player movement and the animations of each character. This was a difficult process as getting the animations to switch correctly was hard to get working. However, I now have two players that can either be controlled using the WASD keys (player 1) or the arrow keys (player 2) and can jump. I have created 4 animations for each of these; idle, running, fall, and jump.

Additionally, I have received some feedback from a friend spotting a bug where the players rolled off the side of the map as well as them being able to jump multiple times. However, there was a quick and simple fix with the help of some research. This was solved by making the character have a fixed Z rotation and then doing a process called ground checking in the player movement script.

* **Week 6-7: Traps + Death**

Over the last two weeks, I set out to get traps working. I have resulted in creating two traps. A general spike and a moving saw. These both kill the players if the player’s collider collides with the trap’s collider. The challenge faced with this feature was getting the saw to go between two paths. However, I also discovered that that same process could be used for a moving platform. So created a new script where both the saw and moving platform go between 2 or more waypoints.

Additionally, this week I added a death animation where the players look like they explode and then disappear. Then at the end of the animation, it calls an event trigger, which resets the scene from the start, allowing the players to restart the level.

* **Week 8-10: Items + Music**

These weeks were the hardest to get work done since I had other assessments due. However, over the last 3 weeks, I incorporated a system where if the players collide with fruit, it gets added to a collective inventory. However, with this inventory, if a player collects too much of one type of fruit they die. Additionally, if the players collect the right amount of fruits, they will be able to progress to the next level.

The other addition I made to the game this week was introducing player and item sound effects, and background music. This was a simple task that I would fit in easily around other external pressures.

* **Week 11: HUD, Title / How-To-Play / End Screens**

This week was a pretty relaxing week with just adding the finishing touches to the game. I added a general HUD that displays the fruit icon, how much you have collected, and how much you require.

This week I also added the features of a title screen and end screen. Since I already had experience using Unity buttons, this was a quick and easy process to switch between the scenes with the press of a button. Additionally, my teacher recommended to me that I include a How-to-Play screen, which also got added.

**Problems and Challenges faced:**

Over the course of this project, there were numerous amounts of things going wrong when coding, but the most standout ones were:

* Getting the character animations to remain consistent, and to appear at the correct time. This does not seem like much of a challenge at first, however, getting the correct animation to show up correctly was harder than I initially thought. To solve this issue, I had to use an integer system to switch between each state.
* For example; idle = 0, running = 1, jumping = 2, and falling = 3. Then the script would change the value of a variable that the animator followed.
* The next biggest challenge I faced was when I was trying to get the saws and moving platforms to go steadily between the two points. This was challenging because it is surprisingly less complex than it sounds. To solve this, the waypoints transform (position) is stored in an array, then – depending on which waypoint you are moving towards – you can use a built-in function called “MoveTowards” which makes an object transform move smoothly towards another
* Finally, the last major challenge that I came across was finding a way to get a collective inventory to work. This was a crucial part of the game because it impacted so two main components (player death and the HUD). The solution to this was to create a reference within each of the player’s collection scripts to the collective inventory, this would then allow me to change a global variable integer stored within that script. Finally, this collective inventory had to be attached to ONE GameObject (otherwise it would create two inventories), so it made sense to be attached to one of the players

**Changes / Modifications to the initial design plan:**

In consideration of my initial plan, most things have remained relatively similar to how things started. However, as mentioned in the risks section of my project management plan, there were some omissions from the project. Sadly, I could not find enough time to incorporate switches that opened doors, trampolines, and teleporters. However, this did help reduce the pain points in the project and left me with more time to make sure game smoothness was achieved. Additionally in consideration of the educational value, fewer features could potentially be better for younger students.

**Feedback and Suggestions from Teachers or Peers:**

Over the course of this project, I had numerous people look over the game and comment on things that needed fixing, or suggested a helpful addition.

* In the first instance, a friend found a bug during the player movement development stage, this was where you could continuously jump when the character was not on the ground. To solve this I found a YouTube video that explained a concept called ground checking. This was implemented which fixed the bug.
* Next, during the trap development stage, a friend pointed out that on level 2 some traps would not kill you. This was a simple fix by changing the shape and size of the box collider of the trap
* The last bug was found in the final days of polishing, where a friend told me I should use different characters so fit better with the style of game I have built.
* A suggestion from my teacher was to include a “How to play screen”. This was a helpful suggestion because it helped to give context to my game as well as let players know how to properly play the game.

**Skills and Knowledge Learnt:**

Due to writing so many scripts in C#, the project has helped me improve my understanding and ability within C# for the use of Unity. I have learnt the structure of how the code works, and I am now able to look at someone’s code and be able to tell roughly what it does. As a result of this, I have been inspired to continue and add more features to this game, or even create a new game with a brand-new idea.

Another key thing that I have learnt from this project is how to write clean and efficient code – not spaghetti code. This is due to me watching so many YouTube videos and learning how to use fewer lines of code to make the game run faster. As a result of this, I am more competent to write efficient code in C#.

Lastly, from writing numerous scripts, I have learnt how to quickly debug using Debug.Log()’s as well as the Unity error consoles. This has helped me become more efficient in locating errors in my code but has also made me more aware of the simple typos I make when writing code.

**Strengths and Weaknesses:**

**Strengths**

* I believe that the quality benchmarks and evaluation criteria set out in the project management plan have been met.
* The design of the levels and the choice of the images are visually appealing.
* The game has the potential to have many other levels due to its simplicity.

**Weaknesses**

* I am sad that some of the intended components could not have been added because I felt as if they would have made the game more unique.
* The levels that have been created may be a little too difficult for younger kids to complete.

**Future Improvements:**

If I were to continue with this project, there would be many things I would either add or improve:

* Firstly, I attempt to resolve the bug with how players can grip onto walls as they hold the movement key. This could come in handy if you are trying to avoid a trap and could serve as a possible addition to then include wall jumping and sliding. However, to not go over the top, simply removing that accidental feature would be the better option.
* I would then move on to implementing switches/buttons that open doors. This is because it increases cognitive problem-solving skills making the game have a nostalgic Fireboy and Watergirl feel to the game. Possibly even introduce the concept of collecting a key and having to avoid a bunch of traps and fruit to unlock a secret fruit hidden away. This would be for a final level.
* Next, I would attempt to fix the camera issue where it doesn’t display both characters effectively. This could be done by watching how other people on YouTube have solved this problem.