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Serious Games report

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# Literature Review

Games for the purpose of education is not a novel concept. The application of educational serious games can be seen within a variety of different sectors for example in medicine (Tsopra et al. 2020; Hannig et al. 2012), aviation (Chittaro, Buttussi 2015), and even linguistics (Alyaz et al. 2017). Sustainability is no exception to this as can be seen in games like Imagine Earth (Serious Brothers 2022) and Crabby’s Reef (SeriousGeoGames Lab 2022).

This raises the question of what serious games can achieve that other more traditional methods of education cannot. Research into the use of gaming in education found that it can make “learning easier”, “student-centred” and “engaging” and thus, more effectively deliver the subject matter (Rossano et al. 2017, p.49). Serious games have also been noted to facilitate knowledge and skill acquisition in learners (Papastergiou 2009). Moreover, it’s been found that the gaming dimension can also assist learners in developing their “cognitive abilities” and help some “step beyond the boundaries of conventional learning” (Ullah et al. 2022, p.202).

From the perspective of biodiversity, conservation, and climate change there are a few different ways in which a serious game can contribute to the cause. The study by Sandbrook et al. identifies the primary three mechanisms by which games could aid in biodiversity conservation efforts: education and behaviour change, fundraising, and research promotion (Sandbrook et al. 2014).

## User Analysis

Through an understanding of the client’s (Nottingham Trent University 2022) requirements, this project’s game leans towards the education and behaviour change mechanism. The client’s needs denote the need for a game that can be used to facilitate discussion in classrooms and that would equip players with a more detailed understanding of the chosen United Nation’s Sustainable Development Goals (UN SDGs) (United Nations Department of Economic and Social Affairs 2022). Thus, the project’s target audience would be university students. The goals of the game being to educate and potentially influence a change in behaviour with regards to the relationship between biodiversity and climate change in ‘winterbourne’ chalk streams.

*A common concern when developing games for sustainability and conservation is whether it is able to capture the interest of the player* ***[SOMETHING HERE?]****.*

*There are currently numerous educational games for biodiversity and conservation, a particularly relevant one that matches the subject matter of this project*

*In the study by () wherein they implement and trial a serious game for the purpose of educating teens on XYZ they found that the game resulted in an overall increased levels of interest in the subject matter. Participants also found the gameplay process to be rather enjoyable and thus, were more open and perceptive to the material they were being taught through the game.*

## Task Analysis

Based on this understanding of the impact serious games has on sustainability education, the next factor to consider are the relevant guidelines involved in ensuring that the game’s objectives and tasks are designed in a manner that best communicates and educates individuals on the relevant subject matter.

UNESCO’s guidelines on Education for Sustainable Development are one such example. It outlines several different competencies that could be potentially covered and taught by a serious game. To ensure that the users come away from the game with a base understanding of the issues surrounding the battle between climate change and the chalk stream biodiversity, the game needs to ensure that it facilitates the critical thinking, anticipatory and self-awareness competencies. By developing a sense of self awareness within the game, the player will slowly begin to understand the ways in which their actions can impact the surrounding world. This understanding can then translate outside

## Environment Analysis

# Design Matrix

|  |  |  |  |
| --- | --- | --- | --- |
| **Source** | **Observations** | **Requirement** | **Ideas** |
| User Analysis | | | |
| Client notes based on Green Academy’s briefing  Literature Review findings | Players are university students | Game should present information in a unique way so that those who are either new to the material or quite knowledgeable on it are able to enjoy the gameplay experience | The game will incorporate a visual novel style of storytelling that involves the player in the narrative’s events |
| Players might not be experienced ‘gamers’ | Game must include a tutorial | The game will include a brief trial level that walks the player through key mechanics |
| Players might be uninterested in a sustainability centred game | The game must convey information in a method that captures a player’s sense of intrigue and is memorable | The game is set in a high fantasy allegorical scenario to drive interest in the subject material |
| Task Analysis | | | |
| Client notes based on Green Academy’s briefing  Literature Review findings | Encourage critical discussion and exploration of learning | The game must help players facilitate one or more of the UNESCO ESD Competencies | The game will develop a player’s self-awareness, critical thinking, and problem-solving competencies through its ‘questing’ mechanic |
| Promote a wider understanding of sustainability in relation to existing | The game should reference the UN Sustainable Development Goals (SDGs) | Player interaction with characters will include discussions on the ‘life below water’, ‘responsible consumption’, and ‘climate action’ SDGs |
| Designed with a clearly defined ending | The game should be designed for short-term development and include a definitive ending instead of being an open-ended simulation | The game will end once the player fails to complete all their quests within the allocated time limit. The game will also point out that the reduced time limit is a result of climate change’s influence on the biodiversity |
| Offers critical perspectives on the topic area | The game must involve discussion on climate change’s influence on the biodiversity in chalk streams | The game’s questing mechanic will include tasks based on combating the influence of climate change within the chalk stream fantasy village. It will also include NPC’s (the wildlife) commentary on the negative impact climate change has on their lives |
| Environment Analysis | | | |
| Client notes based on Green Academy’s briefing  Literature Review findings | Limited time allocated for gameplay | The gameplay time should run for a maximum of 10 – 15 minutes | The game’s core functionality is the initial introduction of the story, each time the seasons loop back the timeframe to complete tasks is reduced significantly |
| The game will be played on a variety of devices | The game must be easily accessible | The game will be browser based so that it can run on any device |
| Parallel Products | | | |
| Products that address a similar topic or are included within the sustainability and climate change area | Sustainability Games – it’s a quiz-based system that teaches players about the SDGs with a quantifiable outcome after each quiz round | The game must include a scoring system that allows users to compare and discuss their performance post-game | The game will include a timer to denote how fast quests were completed in each run of the game’s levels. In addition to this it'll also include a display at the end that highlights how many levels a player lasted for. |
| Crabby’s Reef – Classic arcade style game that explores the impact of ocean acidification on marine wildlife. |  |  |
|  |  |  |
|  |  |  |
| Design Guidelines | | | |
| Literature Review findings | Users may be colourblind |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# Design Document

## Game Overview

The Winterbourne Babysitter is a single-player web-browser-hosted game set in an allegorical fantasy village scene based on the winterbourne chalk streams. The village residents are made up of the whimsical biodiversity that can be found in such a place. Players enter the game as a tiny humanoid dragon, a Kobold, that’s been enlisted to help take care of the villager’s eggs during the drought season. However, when climate change begins to negatively impact the weather conditions, the player must begin to battle against the unpredictability of nature to ensure the community continues to thrive.

## Core Objectives

The core objective of Winterbourne Babysitter is that the player aids the community in surviving and thriving for as long as possible. To achieve this, the game mechanic is broken down into two different elements. The first being the questing mechanic that occurs in the ‘non-drought’ period of the game. Players will have the opportunity to either accept or decline quests provided to them by the village head, Mr Trutta. These quests will influence how many relevant resources they’re able to gather during the non-drought phase of the game to then later be used during the drought phase. These quests also give the player the opportunity to involve other NPC members of the community. The more people they enlist the more resources they can gather in that period. This feature of the game will encourage players to understand that there is power in local action. Moreover, it will subtly hone their self-awareness competency as they begin to see the impact they can have within the community at a local level and of how this could translate into real-life actions.

The other mechanic is the resource management mechanic which occurs in the ‘drought’ portion of this cyclical game. During the drought period of the game, players will be tasked with caring for the eggs within the village’s nursery. This nursery will contain an assortment of eggs with unique comfort thresholds based on their species. The goal of this section is to have the player manage and utilise their resources to ensure the highest number of eggs survive the unpredictable drought conditions. As players must be strategic with how they use their resources this feature will encourage them to develop their critical thinking competency.

## Gameplay Theme

The most prominent gameplay theme of the Winterbourne Babysitter can be seen through its use of visual novel style elements to push forth the fantasy storyline. In addition to this, the game utilises themes surrounding urgency and the strength in numbers concept to further denote the ongoing concerns at a global scale of how climate change is rather quickly negatively impacting the biodiversity of chalk streams. By emphasising the importance of strength in numbers, players are introduced to the idea that by banding together at a local level, there is still an opportunity for them as individuals to rise to the call to action and positively impact their community.

## Game Structure

Winterbourne Babysitter is cyclical in nature. It moves between two distinct phases: drought and non-drought periods. The non-drought periods are an opportunity for the player to connect with the community and gather resources through a series of quests provided to them by the village leader, Mr Trutta. The quests will involve knitting blankets or making fans. To create more of them in a shorter time span, players can speak to other NPC villagers to get a helping hand in building up their resources.

The drought period will have the player stationed within the village nursery. This is where they’ll spend the entire duration caring for the village eggs. Each egg has a comfort threshold wherein they have specific temperatures that when exceeded could result in them being too hot or too cold. The player needs to use their resources (i.e., the fans and blankets) to ensure the eggs remain at a comfortable temperature. Each species egg will have a different threshold and thus will react slightly differently to the ever-changing weather conditions.

The game increases in difficulty as time progresses, with each passing phase, the drought periods will become less predictable in when they occur, they will also become more frequent and hotter. This is designed to represent the ongoing influence climate change has on existing real-world drought conditions. Thus, simulating the conditions within the game and further highlighting the impending importance of local action to combat the influence of climate change on the winterbourne village’s biodiversity.

## Distinctive Features

To successfully evoke a sense of concern and sadness in the player when they interact with the community, the game carefully places the responsibility for the community’s survival in the players hands. Eggs will represent their species and in the case that no egg of a specific species survives the drought period it was in then the game will dynamically respond to this and cause the ‘extinction’ of the species within the community. Thus, the player will no longer see that species amongst the rest of the community members again.

However, to ensure that the player doesn’t come away from the game feeling defeated, the game provides them with the opportunity to rely on the community for support through the questing mechanic. As mentioned previously, by reaching out to community members for help, players can gather a greater number of resources during a non-drought period than they would have if they’d done it on their own. The more resources a player gathers before the drought period, the more likely they are to ensure the survival of all the eggs. This in turn will evoke a desire for action within the player outside of the game and ultimately further develop their self-awareness competency.

## Important Assets

As Winterbourne Babysitter will move between two distinct periods, it will also utilise two different locations that the player will be based in. This will be the nursery and the workshop. Both scenes will be designed using ‘DungeonDraft’ (Megasploot 2022), a fantasy map creation tool so that its aesthetics are in line with the rest of the game’s fantasy elements.

Within the visual novel inspired user interface (UI) for conversations and quest decisions, the game will utilise a 2D simplistic rendering of its characters i.e., the player and Mr. Trutta (see Figure 1). These will come with an additional set of design variations that will be used as part of the conversation animations to provide a bit more variation to the game scene. For the moveable player character within the nursery scene so that they may interact with the eggs, a pixel art sprite sheet will be designed in Photoshop to compliment the other UI elements.



Figure - Mr Trutta's 2D Design

The other UI elements will be designed with the fantasy theme in mind so that all the different aesthetic choices fit together cohesively.

With regards to music, the game will employ the use of audio tracks such as ‘River Town’ and ‘Hidden Valley’ from ‘Tabletop Audio’ (Tabletop Audio 2022) to further build upon the fantasy village’s ambiance so that the player is immediately transported and immersed into the allegorical fantasy world as soon as they hit play.

## Reward and Scoring Mechanism

Each egg a player is tasked with caring for over the drought period represents the future of its species. In the case a player is unsuccessful in maintaining the comfort threshold of an egg within its boundaries, the egg will die, thus, resulting in the specific species ceasing to exist amongst the community.

For every egg that a player successfully cares for up until the end of the drought period, this will increase the chances of them having more than one egg of a particular species to care for in the next drought period. More eggs of different varieties signify a thriving community that the player has been responsible for.

## Control Mechanism

Winterbourne Babysitter is controlled via a ‘point and click’ navigation and interaction system using a mouse.

## Interface Mechanism

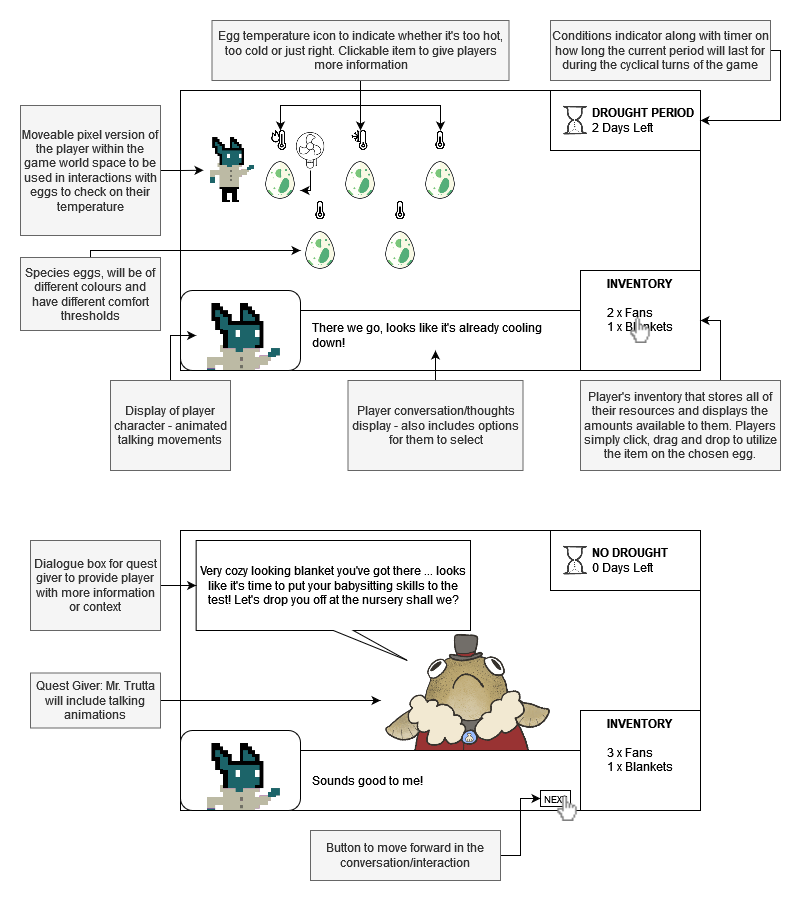
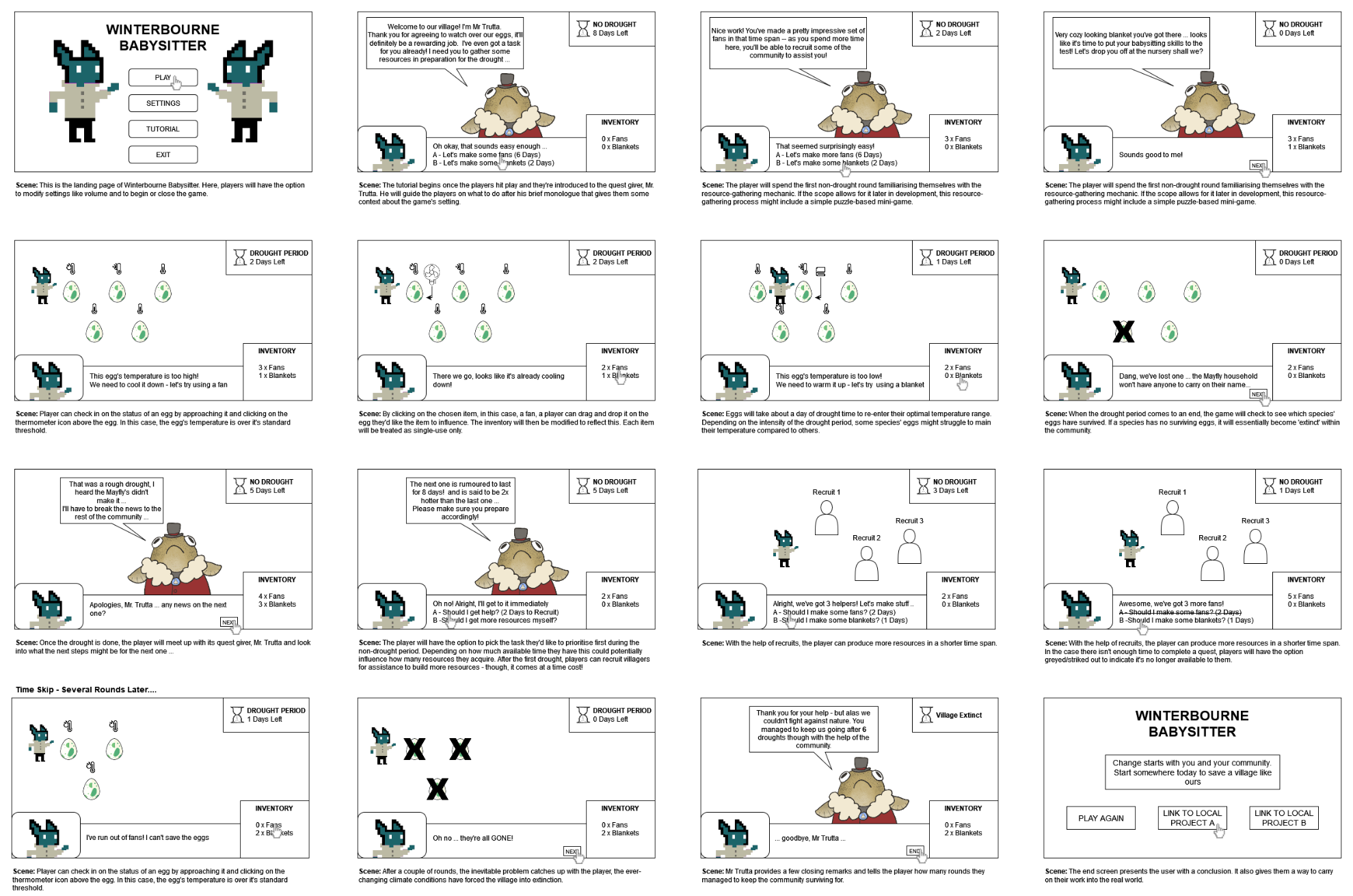


Figure - Interface breakdown of different screens based on the two distinct periods of the game

# Storyboard



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