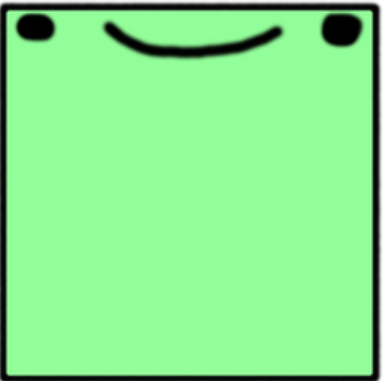




Created by Michal Emil Pfeiffer (2204569)
BSc Computing (Game Development)

Introduction

The project’s main purpose is to create a puzzle game that can help with the teaching of mathematics in an alternative way compared to the way that is taught in schools. The project itself has dove into researching the current problems with the education system and how it affects both students and teachers whilst also discussing the health of students. The project has done sufficient research in regards of designing good puzzles and how to go about

Objectives

There are 4 main objectives to achieve this goal:

- Understanding the basic concepts of mathematics
 - Be able to convey the basic understandings of **addition**, **subtraction**, **multiplication** and **division**.
- User friendly UI design
 - Ensure the UI is not clunky to use and is understandable with what it needs to convey.
- Rewarding to the player
 - Be able to reward the player via visual or audible affirmations for better engagement.
- Satisfying puzzles
 - make sure that the balance is tuned just right to ensure the puzzle difficulty is not too easy or too hard.

Development Methodology

Research and development was done using the **Agile Development Methodology**, its benefits outweigh the negatives;

- Adaptability
 - Able to adapt to whatever is needed during the process of development, be it fixing bugs or doing research, depending on what is needed more.
- Test and design interchangeably
 - You can both test and design, in this case, with puzzles! This is considered an **experimental** approach to designing puzzles.
- More focus on quality
 - You focus more on the work at hand rather than document every little change, which has its benefits and downsides.

Key Research Points

- Attainment score for KS2 was at 65% in 2018/19 before dropping to 59% in 2021/22 [1]
- 40% of the disadvantage gap for students that are 16, is evident by the age of 5 [1]
- Absence rates have risen to 7.5% in 2022/23 [1]
- Spending on a “per student” basis has decreased by 9% in the last decade leading to 2020 [1]
- Education for the age group of 16-19 has seen funding decrease at twice the rate compared to other age groups [1]
- Higher education has seen their relative spending per student decrease from 3.5 to ~1.5 in the last 3 decades [1]
- Teachers in their 30s have seen their pay be reduced by up to 10% compared to other professionals their age, with teachers in their 50s seeing up 3.5% decrease [1]
- 91% of UK adults have experienced high/extreme levels of stress in 2024 [2]
- 44% of undergraduate students (18-21) have suffered academic burnout in 2024 [3]
- There is a report regarding the game “PaGamO” that has a similar premise to this game [4]
- That same report has analysed a survey regarding 52 other educational games, with 60% effectiveness in higher education and only 40% in primary schools [4]
- “PaGamO” has seen an overall 6.3% of final exam marks be attributed to the usage of the game to improve [4]
- There are 2 main ways to designing puzzle games, **Linear** and **Non-linear**
- **Non-linear** focuses on creative freedom with multiple solutions to a puzzle with **linear** focusing on a singular solution

Game

Game was developed using GODOT v4.4.1, which is a very intuitive game engine with its coding language of **GScript** being similar to the likes of Python. You are able to not only create 2D games but also 3D games as well, with game engine having a massive focus on you being able to use **object oriented programming** to trivialise development.

Below is one of the levels in the game. The level was mainly used to test all the game mechanics that are in the game currently, to ensure that they all work individually and together at once. All game assets have been handmade by me.

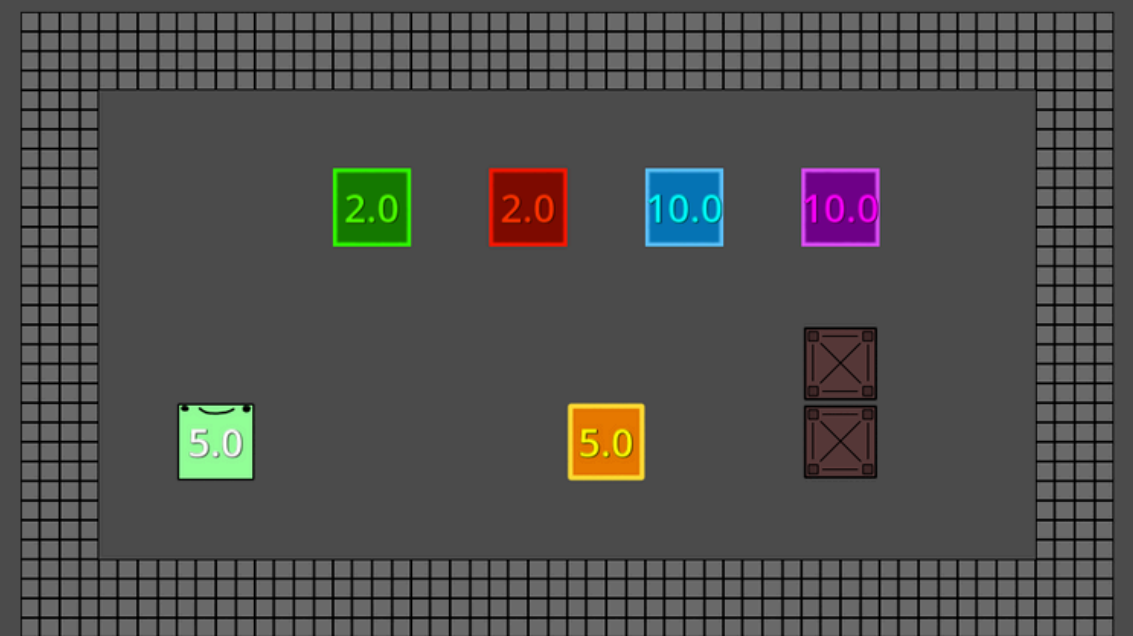
Level: 0 (Testing Level)

Moves: 0

Controls:

Arrows to move

[R] to reset



Evaluation

Overall, not all objectives have been met, like satisfying puzzles, user friendly UI design and being rewarding to the player. Many things can and will go wrong in life, as long as we can move onwards, then nothing is lost.

Future Work

For the future improvements, create better UI, make more appealing art and also create additional levels for players to enjoy.

References

- [1] J. Andrews, “Education: the fundamentals - Eleven facts about the education system in England,” Dec. 01, 2023. Available: <https://epi.org.uk/publications-and-research/education-the-fundamentals-eleven-facts-about-the-education-system-in-england/>
- [2] A. Allott, “UK students are struggling with their mental health - how we compare worldwide,” Jan. 28, 2025. Available: <https://www.yorkshirepost.co.uk/education/chegg-global-student-survey-2025-uk-students-struggling-mental-health-how-compare-worldwide-4963735>
- [3] M. H. UK, “Mental Health UK’s Burnout Report.” Available: <https://mentalhealth-uk.org/burnout/>
- [4] S. Y. Cheung and K. Y. Ng, “Application of the Educational Game to Enhance Student Learning,” vol. 6, Mar. 2021, doi: 10.3389/feduc.2021.623793. Available: <https://www.frontiersin.org/journals/education/articles/10.3389/feduc.2021.623793/full>