

Educational Cycling Game for Younger Audience

Final Year Project



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# ABSTARCT

# ACKNOWLEDGMENTS

# INTRODUCTION

## Problem Definition

According to statistics (Ukie, 2018), more than 32 million of the United Kingdom residents regularly played video games in 2017, making UK the 5th largest game market in the world. Children form a significant part of this phenomena. 66% of 8-11-year-olds play console games at home on weekly basis (Statista, 2018) and even more participate in PC and mobile gaming (Prigg, 2014).

It is debatable whether playing video games has positive (Tsung-Yen Chuang, 2009) or negative (Marko M. Skoric, 2009) effect on children, however criticism often stresses that gaming prevents children from getting “enough active play and exercise” and negatively affect “how well kid does in school” (Kids Health, 2014).

The aim of this project is to create a video game demo, which would tackle those issues. A prototype must be fun to play as well as provide exercising opportunities and learning outcomes. The game will be aimed at Key Stage 2 school children.

## Problem Justification

## Scope

* Not testing with children
* Aim is to combine all three aspects rather than maximise all one

# METHODOLOGY

## Tools

### Hardware Overview

The set of equipment consists of a Windows 10 tablet (Currys, 2018), mini exercise bike (Oypla, 2018) and a sensor with appropriate SDKs (Cyberbiking, 2016). Available output includes pedalling information of going forward, but not backwards. Controller, mouse or keyboard can be used in parallel with the sensor.

### Software Overview

* Unity – C#
* Adobe Photoshop
* GitKraken – source control

## Process

Literature review

Design

Defined programming challenges

Check against deadline

Implement

Talking to a client

Object oriented

Rough plan

Iterative

Refactoring after the finished project

Source control

Hardware?

Top-down modular approach

Initially the problem was broken into smaller self-contained modules which were then broken again. This approach was synonymous with object oriented paradigm and unity component system.

Pretty diagram GOES HERE

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# RESEARCH

## Introduction

## Educational Games

## Exercising Games

## Games for Children

# DESIGN

## Concept

The game is aimed at 7-9 year old children to use at home or at school.

## Avatar Creation Component

## Maths Quiz Component

# IMPLEMENTATION

## Overview

* Unity
* C sharp

## Extensibility

* Avatar elements loaded
* Procedural question simulation

## Persistence

* Between scenes

# EVALUATION

## Prototype evaluation

The final product was analysed using an Activity Theory-based Model of Serious Games (ATMSG) to provide a comprehensive view of the structure of the game, including both its high-level purpose and concrete implementation. The original model was modified by adding an “exercise” category to match project’s goals. Figure BLAH represents the game sequence and implemented components. Table BLAH shows the way gaming, learning and exercising are integrated into the key stages of the game in a greater detail.

No

Yes

More rounds?

More

puzzles?

More

levels?

No

Yes

No

1. Main Menu

2. Avatar Creation

3. Puzzle

4. Reward

5. End of round

6. End of level

Anytime

Yes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Game Node | Gaming | Learning | Exercise | Comments |
| 1. Main menu | Standard game element. Provides access to options, credits, start of the game and exit from the application. | - | Player navigates through the menu by cycling from one option to another. This provides a warm-up prior to any gameplay. | Main menu is a safe place to adjust the equipment and ensure that player’s position is comfortable. |
| 1. Avatar Creation | Player creates a character by choosing elements from given categories, such as hair colour or face shape. Unlocking new elements requires spending in-game currency. Avatar is visible in later stages of the game. | Game simulates real-life shopping experience. Player has a limited amount of money and can choose how to spend it. Interface prevents players from purchasing items unless they have enough coins. | To apply a new element to the avatar, player must deliver it by bicycle. Bicycle moves as the player cycles forward. | Interest to avatar creation among children and teenagers is outlined by multiple researches (Kafai, 2009). |
| 1. Puzzle | Player answers a series of quiz questions. If the answer is incorrect, the player has to try again. | Puzzle after puzzle, player’s arithmetic skills are testes. Questions gradually become harder with each level. | The question is only visible if the player is cycling. If cycling is stopped, then the questions fades away. | Questions are procedurally generated, which aids replay ability. |
| 1. Reward | Correct answers open treasure chests which contain a certain number of coins and a quest item e.g. part of the map. Sound and visual effects empathise the importance. | - | - | Rewards vary depending on the player’s level. |
| 1. End of round | Chests change colour and become are harder to open, more correct answers are required. Player’s progress is saved. | Player is pushed to solve multiple questions at a time before taking a break. This is similar to test considitions. | - | Difficulty is increased via gaming rather than learning element. |
| 1. End of level | At the end of the level player is offered to level up by completing a special challenge. Player can choose when to do it. Successful completion grants great rewards and story progression. Background picture, music and the quest change. | After answering ten questions player is offered to complete a test. The same skill is tested as during normal puzzles, but the wording of the question is different. There is a 30 second time limit. If unsuccessful, the player can try again. | - | Wording of the questions is taken from the student book. REFERENCE |

There is a number of conclusions which can be made based on the ATMSG diagram.

## Future work

# CONCLUSION

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# APPENDICES