Interim Report for
A Role-Playing Game for Learning Moral Values

Member: Chong Yuk Chun 3035275824
Supervisor: Dr. T.W. Chim
Abstract
With the development of technology, educational games have become popular and crucial in modern education. They help to motivate students and increase their concentration and engagement in class. The team has realized the great potential of educational games and the fact that the number of moral educational games is few. This gives the incentive and interest to the team to start this project. The team has done some research on theories and the current trend of the educational gaming industry. The storyline of the game has been finalized. Modeling and the implementation of game logics are in progress. The purpose of this project is to develop a moral educational game that teach the children some moral values.

Acknowledgement
The team sincerely thanks the supervisor Dr. T. W. Chim for the guidance and supports in this project.
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1. Introduction

This section includes four parts: motivation, objective, target audience and scope of work. In the first part, the team covers the information of the educational gaming industry and VR technology which give the motivation to the project. In the second part, the importance of moral values that introduces the objective is included. In the third part, the team shows the underlying reason of the chosen target audience. In the last part, the team illustrates the content of the project.

1.1 Motivation

Serious games are games that are designed for training and education. The number of serious games has increased steadily since 2008 [7]. The executive director of the Serious Games Association, Sue Bohle [2], commented that the revenue of serious games was increasing on a five-year compound annual growth rate of around 20% globally and that of the industry was expected to be more than double by 2022. According to the results of the systematic mapping study done by Vargas [1] on serious games quality, around 60% of serious games belongs to the educational sector. Educational games become more popular and has a great potential. However, most educational games focus on the knowledge of subjects. For instance, vocabularies in English, formulae in Mathematics, and historical facts in History. The number of educational games that relates to moral values is insignificant.

Virtual Reality (VR) is an experience of being involved in a simulated environment. With the use of VR headsets or multi-projected environments, current VR technology can simulate users’ physical movements like turning their heads around and shaking their hands and generate sounds and images accordingly. This technology is used widely in different industries like gaming and medical as with the appropriate hardware, users can immerse themselves in a virtual environment that reacts to some of their physical actions. They will be more focus and engaged in working, learning, or playing in such environment.
Engagement is the key to facilitate learning. The use of VR technology in education is believed to catalyze the learning process.

These facts give the interest and incentive to the team to develop a 3D role-playing game to help the children to learn moral values.

1.2 Objective

Moral values are vital to everyone as they are the principles that guide us to behave and make decisions throughout our lives. Developing moral values brings us advantages, including building up good personal and professional relationships, dealing with challenges in life, and motivating ourselves and others. Moral values are as critical as knowledges to one’s development.

This project is developing using Unity, which is a cross-platform game engine, with the objective of teaching the children some moral values.

1.3 Target Audience

This project targets at the children. Developing moral values from a young age is more effective because their values of life are usually not shaped and are often highly moldable.

1.4 Scope of Work

This project develops a role-playing game that runs on the Personal Computer (PC) client. The game is avatar-based and with the theme of respect and politeness. It covers one story with three scenes. The game is about an animal racing competition. Scene one includes an animation which introduces the background of the competition. Scene two is dialogue-based where players will communicate with different animals who are non-player characters. Scene three is the racing part where players will compete with another animal and attempt to win the race. In scene two and scene three, players are required to answer questions related to moral values to earn credits which bring favorable effects to the main character. The details of the story and mechanics will be discussed in the methodology section (section 3).
The project is proposed to incorporate with VR technology if the game is fully developed and can run on PC successfully by the end of February. Otherwise, new features are proposed to add and the game is proposed to solely run on PC client.

The document is organized as follows. Section 2 covers the background of the project which includes theories studied, previous educational games evaluated and the current trend of the educational gaming industry. Section 3 is about the methodology which introduces the story, aesthetics, mechanics and technology of the project. Section 4 presents the preliminary results in the area of game design, modeling, and controller. Section 5 illustrates the difficulties encountered and this document closes with a conclusion (section 6).
2. **Background**

This section includes three parts: theories, previous work and the current trend. In the first part, the team mentions the Flow Theory and Experiential Learning Theory. In the second part, the team includes some previous educational games. In the third part, the current trend of the educational gaming industry is revealed.

2.1 **The Flow Theory and Experiential Learning Theory**

The Flow Theory, named by Mihály Csíkszentmihályi in 1975, describes the mental state of a person being involved in an activity. According to Csíkszentmihályi, an experience of flow is enclosed by six aspects which can be dependent or independent of each other [3]. Designing and building a game based on the Flow Theory could create an environment that changes one’s subjective experience of time which is one of the six aspects. For example, majestic and realistic or elementary sceneries with warm colors can comfort the players and draw their attentions. This helps them to immerse themselves to the game environment. These environments could help players to concentrate and engage in the game.
Experiential Learning Theory, proposed by David Kolb, focuses on the learning process of an individual through experiences which covers many factors like cognitions and emotions. In Kolb’s experiential learning model (Figure 1), Kolb suggested that one can grab experiences from concrete experience and abstract conceptualization. He also pointed out that reflective observation and active experimentation are the ways of transforming the experience [4].

This 3D role-playing educational game will be designed based on the features of the Flow Theory and Experiential Learning Theory so that players can engage and learn through experiences effectively and efficiently.
2.2 Previous educational games in teaching

Educational games need to be designed in a way that integrates with learners’ engagement.

Get Water! (Figure 2) is a 2D endless runner mobile gaming application developed by Decode Global Studio and released in 2013. This game is about the scarcity of water in India and how does it influence children’s education. Players can control the character, Maya, to collect water for her family so that Maya can go back to school and learn. The game conveys the message that we need to treasure not only water but also the stable learning environment. Moreover, endless runner games are usually addictive as players would like to pursue a higher score. This provides engagement.
WolfQuest [5] is a 3D role-playing wildlife simulation video game developed by the Minnesota Zoo and Eduweb and released in 2007. This game aims to help players study the wolf ecology and understand the role that wolves play in nature. The scenes and graphics (Figure 3) are realistic which may increase players’ engagement.

The proposed 3D moral educational game will be developed to run on the PC client and the details will be described in section 3.

2.3 Current trend of the industry

The popularity of educational games has risen in recent years. They have been useful and successful teaching tools in many subjects and courses. For example, 97% [6] of teachers polled reflected that their students were motivated to read more by the gamified reading platform Whooo’s Reading. Moreover, 70% [6] of teachers perceived that educational video games increased students’ engagement. These data may indicate that teachers are satisfied with the positive impacts of educational games and are willing to use them as a teaching tool.

Although educational games prevail, the number of educational games for delivering moral values is insufficient.
3. Methodology

This section includes four parts: story, aesthetics, mechanics and technology. In the first part, the team demonstrates the storyline and the details of each scene in the game. In the second part, the team introduces the art style adopted with justifications. In the third part, the mechanics and in-game features are revealed. In the last part, technologies used are included.

3.1 Story

The game is about an animal racing competition with the theme of respect and politeness. Three scenes are covered.

Scene one is the scene for introducing the story background through an animation. In this scene, players will be informed that they were one of the members in the animal village and they were chosen to be a contestant of a racing competition to compete for a fruit, named Flying Fruit, given by a celestial panda. They will be notified that they could bring one equipment in the race and the race is from the village to the celestial panda’s house. Then, players can choose one animal out of four and scene one ends.

Scene two is dialogue-based. Players need to communicate with different non-player characters to get more information. For instance, who is the opponent, what tool is suitable to the chosen animal, and the strengths and weaknesses of the opponent and the chosen animal. Scene two ends when players decide the equipment they want.

Scene three is the racing part. Players need to compete with their opponent. Scene three ends with an animation when the race is finished.
3.2 Aesthetics

Low-poly is the art style adopted. Creating low poly assets is easier and faster as texturing may not be required. The number of vertices that need to consider in low-poly models is much smaller than that of realistic models. This may prevent spending too much time on modeling which may lead to inappropriate scheduling. Moreover, low poly games would not look outdated as they do not focus on looking realistic but showing the contour of objects (Figure 4 and Figure 5). The game could be used as a teaching tool in moral education even technology on computer graphics advances.

Figure 4. Screenshot of CARTOON LOW POLY FOREST ISLAND 2.0 BY ANTON MOEK. Retrieved from https://shop.bitgem3d.com/products/cartoon-low-poly-forest-island-2-0-anton-moek

Figure 5. Screenshot of Low-poly Alpine Woodlands Low-poly 3D model By CHAssets Retrieved from https://www.cgtrader.com/3d-models/exterior/landscape/lowpoly-alpine-woodlands
3.3 Mechanics

3.3.1 Dialogue

Scene two is dialogue-based (mentioned in section 3.1). Players can communicate with different non-player characters in the game by choosing the response they like in the dialogue box. Some conversations give advice on which equipment players should choose based on the chosen animal.

Scene three contains two dialogues that have the same mechanics in scene two which will be introduced in section 3.3.4.4

3.3.2 Control

Players can control the character by the following keys.

W key and up arrow key are for moving forward. S key and down arrow key are for moving backward. A key and left arrow key are for turning left. D key and right arrow key are for turning right. Space bar is for jumping. F key is for starting a conversation with a specific non-player character. Z key is for acceleration and it consumes the energy point bar, which will be introduced in section 3.3.4.1. This key is only available in scene 3.

Players can use the mouse to choose the response they like in the dialogue box.

3.3.3 Racing

Players need to bring the features of the chosen animal into full play, utilize the equipment and make use of the blessings given by the celestial panda, which will be introduced in section 3.3.4.2 and 3.3.4.3 respectively, in order to win the race.
3.3.4 In-game features

3.3.4.1 Energy point bar

Energy point bar is an attribute assigned to the game characters. It shows the time that a character can accelerate. The time available for acceleration can be visualized by the length of the bar. When the players press the Z key, the character accelerates and the length of the energy point bar decreases gradually. If the Z key is not pressed, the length of the energy point bar increases slowly. The maximum length and recovery rate of the energy point bar are different for animals and can be increased through blessing and conversation which will be introduced in section 3.3.4.3 and section 3.3.4.5 respectively.

3.3.4.2 Equipment

Equipment is a game object that a character can use in scene three. Four equipment are available, which are balloon, float, elastic ball and rock. Each of them has its own usage. For example, a balloon can lift the character up to a higher place, a float can carry the character to pass through the river, etc. Players have to decide one equipment in the end of scene 2.

3.3.4.3 Blessing

Blessing is an item given to the character at the beginning of scene 3. It contains several situational questions related to moral values. Energy point bar will be full if players answer them correctly. Players can decide when to use the blessings.
3.3.4.4 Shortcut

Shortcut is the shortest path in a segment of the full route. There are two shortcuts in scene 3. Time can be saved if the character passes through it. A path-keeper is located near to each shortcut. To enter a shortcut, players need to answer a question raised by the path-keeper correctly. These questions are about moral values.

3.3.4.5 Conversation

Some dialogues between the players and non-player characters in scene 2 contains moral values. For instances, in the conversation with friends, they may ask the players if they want to know the opponent. The players can reply “I want to know”, or “I do not care who I will face”. This is a question about respect. If the players choose the second option, the non-player character will reply the players with some extra feedback like “do not be arrogant”. If the players choose the first option, some credits will be given to the character. For example, the energy point bar can be lengthened by a small amount. The amount will be highlighted in scene 3 and players will know their performance in scene 2.

3.3.4.6 Animal Characteristics

Players can choose one animal out of four, which are cat, wolf, bear and deer. The movement speed and jump height varies in different animals. Animals have their own characteristics. For examples, a bear can break thin woods, a cat has a smaller body size, etc. These characteristics are useful to find potential hidden paths and save time.
3.4 Technology

Unreal Engine 4 and Unity are the popular game engines in game development. The team uses Unity as the game engine because it has experiences in Unity and the graphics and lightening of the game are not the priority. The programming language used will be C# as it has better supports and the team has learnt some C# before. For modeling, the team uses Blender as it is free and has many supports and tutorials. The project will incorporate with VR technology if all the game elements are included and can run on PC successfully by the end of February.
4. Preliminary results

The team has finished the game design and working on the modeling part and game logics. This section includes the ideas of the game design, the progress of modeling and designing terrain, and controllers.

4.1 Game Design

The storyline of the game has been finalized. However, the words used and the tone of dialogues need adjustments.

The mechanics of the game have been designed. In scene 1, players need to choose the animal they would like to play which decides some content of scene two. In scene 2, decision made on what equipment to be used and responses to non-player characters’ questions bring significant impacts to the performance of the character in scene 3. Through the linkage between scenes, players will have a stronger feeling of engaging in an event which is good for teaching.

This game teaches players moral values through dialogues. In scene 2, players are the participant of the dialogues and their responses may reflect what they behave in daily life. In scene 3, the questions raised by the path-keepers and blessings are situational. Players need to evaluate if a character perform morally good under certain situation. Instant feedback will be given by the non-player characters so that players know what is right and wrong. The response of the non-player character in the case described in section 3.3.4.5 is an example.
4.2 Modeling

Figure 6. Screenshots of the rig of a wolf

The team is working on the rig of low-poly animal models (Figure 6) so that animations (Figure 7) can be created easier. Some free low-poly environmental models have been downloaded from the Unity Asset Store.

Figure 7. Screenshots of wolf idle and walk animations
The design of the terrain (Figure 8) is in progress.

4.3 Controllers

The team is working on the controller for the game character. Animator controller (Figure 9) has been added so that when the character idles, walks, or runs, corresponding animation clip will be played.
The progress is behind schedule. The team is still in Phase 2 which is modeling. The team will finish Phase 2 by the end of January and start working on Phase 3 which is the implementation of game logics.

5. Difficulties encountered

5.1 Low-poly Terrain

The terrain tool in Unity cannot create low-poly terrains. In order to create terrain with hard edges, the team first created a terrain in Unity and added a script named ExportTerrain.cs in the Editor folder. Then, the team exported the terrain created as a .obj file and imported this file in Blender. Next, the team added two modifiers, decimate and display, to the terrain and modified it to a low poly terrain by adjusting the ratios of the two modifiers (Figure 10).

Figure 10. Screenshots of the terrain (original and modified)
5.2 Modeling

The team has limited experiences and knowledges on modeling. The models created in Blender are not satisfactory (Figure 11). The team eventually decided to use free low-poly animal models from the internet.

Figure 11. Screenshots of the self-made models
5.3 Looping animation

Animations like idling and walking are looping if the actions continue. The team discovered that there are some small delays for these animations and realized two mistakes were made after some research. The first problem was that the first and last frame shared the same values, which implies the location and rotation values are the same. A delay of one frame was therefore resulted. The second problem was that the team used Bezier curve for the keyframes rather than linear curve. Since Bezier curve in Blender ease-in and ease-out of the first or last frame, a small delay will be resulted (Figure 12).

![Set Keyframe Interpolation](image)

**Figure 12. Screenshot of setting keyframe interpolation**

5.4 AI system

Players need to compete with an opponent in scene 3. However, the pathing and speed of the opponent has not been decided. The team will address the problem in Phase 3 which is the implementation of game logics.
6. Conclusion

This interim report introduces the motivation of developing a 3D role-playing game that runs on PC client. The game aims at teaching the children moral values, especially respect and politeness. Three scenes are included.

The Flow Theory and Experiential Learning Theory are studied and previous educational games for teaching are reviewed. The growing trend of educational games is illustrated with some facts.

The storyline of the game is covered which is about an animal racing competition. The game is developing in low-poly style and the game engine used is Unity. All the scripts are written in C# and Blender is used as the modeling software. The game has three mechanics: dialogue, control and racing. Control and racing are related to the control of the character and dialogue is the teaching part. Players learn moral values through dialogues with non-player characters and earn credits if their choices are correct. In-game features like energy point bar, shortcut, and blessings are introduced.

This document illustrates the difficulties encountered which are low-poly terrain, modeling, looping animation, and AI system. The team modified the target audience and mechanics in order to write a storyline that can achieve the objective of the project. Moreover, the team has used some free low-poly assets in the Unity Asset Store. The problem of the AI system persists, and the team will attempt to tackle it in Phase 3.

Preliminary results of the project are demonstrated. The game design has been finalized. The modeling part and the development of the character controller are in progress. The progress is behind schedule and the team will attempt to catch up with it.
Schedule (rescheduled)

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<td>1</td>
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<td>2</td>
<td>Modeling and Designing Game Area</td>
<td>31-01-2018</td>
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<td>3</td>
<td>Implementation of Game Logics</td>
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<td>Save and Load System</td>
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<td>5</td>
<td>Sound and Visual Effects</td>
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<td>6</td>
<td>Incorporate with VR technology</td>
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<td>New features and bug fixes</td>
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References


