Creating a Serious Game

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Abstract

My research project focuses on the creation and the usefulness of serious games in our current daily lives. This serious game will provide education in its topic field toward the users playing the game. The importance of serious games and the use that they provide towards learning today is a large concept. There are some skills that are needed in the creation of a serious game, such as working with Unity, character and object design, game development, and much more. My approach focuses on gaining all necessary skills and then designing my game with my research and skills in mind throughout the creation of my game. Findings of research result in main elements in creating a serious game and as well as many positives when using serious games in today's education with very little negatives. There are also many reasons how and why serious game-based learning is so useful when teaching students compared to regular education systems. The finished project will educate youth and users while playing the game and it will leave me with crucial experience for future projects.

Keywords: Serious Game, Unity, Education, Learning, Motivation

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Introduction

My project will look to create a serious game while also researching and showing the importance that they can make in our current education system. Main ideas such as the importance of serious games, positives and negatives of serious games, and main elements of a serious game will all be key points in this project. My game will aim to educate users with the overall basics of programming which is intended for children and youth.

Project Overview

An important question people might be asking is what is a serious game? The quick definition is that it is a video game that's main focus is to educate the player. This topic focus is extremely important in today's education system since it allows for a completely different way of educating students. Due to so many students that have a vast range of learning styles this way of learning can benefit many students. The goals and objectives when creating my serious game will be the large number of challenges that I will face when creating my game. These challenges will branch off of the skills and knowledge that I have learned throughout this research project.

Definition of Terms

Serious Games: "Electronic **games** whose main purpose is "**serious**" and not to simply entertain. The primary "**serious**" purposes can be to teach or train in areas such as education, health care, advertising, politics, etc." ()

Unity: "Unity is a 3D/2D game engine and powerful cross-platform IDE that developers use to create video games." ()

Blender: "Blender is a free and open-source 3D creation suite that supports pretty much every aspect of 3D development. With a strong foundation of modeling capabilities, there's also robust texturing, rigging, animation, lighting, and a host of other tools for complete 3D creation."

Background

Even though my serious game will be created as a video game, this was not how serious games started out to be. The beginning of serious games came in the late 1900's where they started out as board games or sports.

Significance of the Project

This project is important due to not only providing users with education in different ways, but it is also important for my future goals due to the experience that I gain with a project like this to work in a game development job field. This work and research are extremely important for progressing in my interests and wanted job field since it will go over a major part of what I will be doing in a job like creating a game. The motivation that is behind creating this project is being a previous professional esports player where I played video games for a large part of my life. This experience made me become interested in game creation where I can use this interest to also educate many people through video games. This lines up extremely well with my major being computer science, where I can combine my love for coding with video game creation to create this project.

Theoretical Framework or Construct

Resources that I will need to focus/research on is the C# coding language, Unity, Blender And Photoshop. Using and gaining the skills from all these resources will allow to create my game and future projects as well. I will use the courses in LinkedIn learning to allow me to learn these skills necessary for creating my serious game.

Ethical & Legal Considerations

There would not be any ethical considerations that I would have to make since there is no use of research on people or animals. A legal consideration that could be made is if I would want to

publish my finished serious game, I would look at copyright to see if any legal altercations

would appear.

Project Topic Statement and Justification

Project Statement

For project 1 I will look to learn about serious games where I will also end up making my own serious game that would involve a puzzle coding game for pc. The game will involve many puzzling levels that involves coding a rat to move toward the level's objective. This serious game will look to educate the player through different puzzles that requires the user to make challenging decisions that would sharpen the players problem solving skills and cognitive abilities. The game will also teach users the basics of programming at a simple level.

Goal(s) and Objective(s) of The Project

- The main project question would be on how to make a game with unity.

I learned a fair bit of how unity works during the last summer, but never created a full functioning game. Due to this I will need to learn the many skills that come with game development and learn to complete the various challenges that I will face when creating my game.

- For secondary questions, I will look at how I would create different visuals or graphics like characters, background, UI.

Would I want to use an application like blender to animate and create different visuals or characters that are needed for my game.

- What story will I create to base this game off?
- What form of reward system will I chose to use in my game?
- How will I succeed with my goal to make users learn from my game|?
- How would I publish the game?

How would I animate different visuals or character movement in unity?

Deliverables

My project will deliver a finished game application that will help educate children and strengthen their problem-solving abilities while learning the basics of programming. The project will also give me skills and experience that are needed in the game design field which could help me in the future to obtain future jobs. I will also be able to create and animate different visuals and animations needed for a video game.

Problem Justification

I selected my project to be investigated since serious games are becoming more useful everyday day in our society. Due to various forms of media and entertainment, it is getting more difficult to educate children while keeping them engaged. Serious game solves this problem since it will keep children motivated and engaged to learning, without them even knowing. Creating a serious game will also give me crucial experience that is needed for a job field like game development, for which I want to get into after university.

Limitations of Your Project

Some limitations of the project could be time due to creating and animating different objects could take a very long time to do all by myself. Due to this me and my advisor talked about first creating my game in 2D although I would like it to be in 3D due to being able to add more mechanics to my game.

Literature Review

When talking about serious games the first question that comes up is what is a serious game? All authors in my literature have a very similar description which focuses on educating or learning through video games. Fields such as health, defense, education, policy training, ecology, and more, are all used through serious games to provide necessary education through these fields. With forms of education being so broad it is not surprising that video games have become a form of education. This is important since many people have different types of understanding information, making mastering all forms of education very important for our society. Due to the growing population being so familiar to gaming and technological environments, it would be easy to implement this form of education due to the familiarity of video games. The effectiveness of games come from learning an application and then demonstrating your knowledge in that environment. This makes serious games extremely useful due to people remembering information far more when engaging in a job, rather than reading or hearing the information. Serious games can use this amazing functionality of video games by educating the user, where the user can immediately demonstrate the information that they have learned. This can easily be improved due to video games being able to instantly give feedback to the players after doing an action. This is far better than a classroom setting in comparison since it could be a little difficult giving feedback on homework and exams depending on the size of the classroom in a quick timely manner. This will all allow for giving information, demonstrating said information, and finally receiving feedback on their demonstration, all within a quick amount of time, where the user will ultimately understand information at a high level.

When it comes to making a serious game however, it is a very difficult task in researching to develop an educational environment. One reason for the difficulty is to not only keep the user

focused and determined the entire time, but also educating the user. This comes with different game ideas and game development that can make learning fun and interactive for all ages. This is important since it is the drive behind motivating the players to keep playing in order for them to learn and retain the information given. I also came across literature that gave me general elements that make a serious game. The first main and most important element is to educate the player, without this one element a video game will not be a serious game, which is why it is so important to make sure this element is applied greatly. The second element is motivation, some examples of this can be reward systems or rankings, which both provide a large amount of motivation by either leaving the player with a sense of accomplishment or a sense of competitiveness where the player could strive to do better. The third element is individualized feedback, this is something I have covered in my introduction but as said it can be a very powerful tool when learning since it will instantly tell the player if they are doing said action correctly or wrong. The fourth element is a simulation, this will allow the player to practice and demonstrate their learnings in a virtual world, although said virtual world is also closely related to the real world to allow the player to apply their new found understandings to the real world. The final element in a serious game is a story, which will not only give me a structure to lead my game towards but also give the player motivation to complete the game. All these key elements put together will help create a solid and effective serious game that's main goal is to educate a user.

The positive and negative effects of learning through serious games came up in most of my literature, which is a very important issue when introducing a completely different way of learning. To start with the positives, firstly an extremely important topic is motivation when talking about educating and learning with serious games. This is due to motivation being a large factor behind what drives a student to excel in not only their learning but also performances throughout their

learning environment. Serious games provide motivation by giving the players opportunities to express their own ideas which allows them to be in control of their own learning. Motivation can also come from the rewarding feelings that come from progressing and completing tasks in serious games. In one of my literature articles it talks about the three main factors that enhance motivation when using games in education, which are, achievement, social, and immersion. Achievement is based on competitiveness, mechanics, and advancement. Social is based on relationships, teamwork, and socializing with others. Finally, immersion is based on role-play, discovery, and customization (Anastasuadis, T., Lampropoulos, G., & Siakas, K., 2018). Using these three main factors in my serious game, I can allow for motivation to thrive in my learning environment. Another large positive that serious games provide is improved mood and self esteem. These improvements allow for a highly positive and collaborative environment that will make learning and teaching a far easier action. Since communication is such a key factor in learning, this highly collaborative environment is an amazing tool when used for education. The final large positive factor in my research is improved cognitive abilities and digital literacy. These provide students with improved problem-solving skills and critical thinking, which will benefit science and math majors greatly due to the demand of cognitive abilities in these fields. Even though the positive effects of serious games are outstanding, it is important to show the negative effects as well.

The main negative effect found in my literature is the relationship between mental workload and learning effect. Serious games proved to lower attentive abilities which negatively effects learning and performance. This can change in different age groups and obviously can serve as problem for younger ages.

Research Design and Methodology

This project will involve the creation and skill-building of creating a video game. Specifically,

the video game will be a serious game that will aim to create a learning environment for the user.

The process will revolve around learning many different skills in game development regularly.

This will allow me to keep the focus on the most needed game development skills such as

programming, 3D modeling, story/object design, concept art, and much more. I believe the active

use of courses from LinkedIn Learning is a great use of resources in a field such as game

development since there is so much information available. I also believe the active use of my

adviser will be needed in the overall process due to the personal feedback and personal problems

that they will be able to help with. The technology that will be used is a game engine, which will

be Unity due to having a small amount of experience with it, which makes it my most

comfortable pick in terms of game engines. Another technology that will be used in my process

is Bender to create 3D modules that will be used in my game.

In terms of steps for my process I want to:

1. Be comfortable in Unity and the coding language C#.

2. Be comfortable in Blender and Photoshop.

3. Have a finished concept of how the game will look and be played.

4. Put all the skills gained from the previous steps and create my game.

For step 1, I want to be confident in my programming abilities in Unity, so I don't have too many

troubles when creating the final version of my game. To do this, I can use the large amount of

content in Linkedin Learning to get a good grasp of how Unity works and how to create my game.

I would also need to understand C# more since it is the language that Unity uses to create scripts

and programs. To achieve this, I can practice my skills by creating many different smaller-scale

versions of my ideal game which will give me a deeper understanding of how Unity works. I can validate the outcome of this step by using LinkedIn learning to deepen my knowledge of technology-based applications with great success in all my chosen fields. I have also already finished a course in C# and currently working on more courses on Unity.

Figure 1.1

The creation of smaller scaled games will also validate this step since it will give me the experience needed to complete my final goal. For step 2, I must create a good understanding of 3D modeling for me to create objects and models for my game. I believe creating concept art before working in Blender will help me create better results. I believe since this is my first time creating objects in Blender, I might have to swap to 2D-based objects to make it easier for me when creating my game. I will figure this out before project 2 starts which will give me time to adjust my plans. To help me create objects in Blender I can again use LinkedIn Learning courses to understand the basics of blenders and different concepts to create objects in my game. To help validate these

results I can again make concept art before starting to work in Blender and to create easier 2D designs in Blender to make it easier for me when doing this step. For step 3, I must have the theory of how the game will play and the story of the game before working on building my actual game. Even though I have a decent idea of how I want the game to look, I must have the full concept finished before I can even start on the project. I can use inspiration from many different video games that I have played for different ideas that I could use to make my video game not only educational but also entertaining as well. I can also use my advisor for help with the game concepts since they would know a lot more than me on this entire subject. I can also use one of the articles I found in my research which talks about the 5 main elements of a serious game for which I can base my game around (Gamelearn Team, 2017). The anticipated results from this step would be a complete view on how my game should look/play which will show all 5 main elements of a serious game and be approved by my advisor with his thoughts and opinions. These step results will be assured through having many different concept ideas that I can look through, and then choosing the best one that I and my advisor see fit. For the final step, I must complete all previous steps to even begin this final step. This step will combine all previous steps to allow me to complete my project. It will come with many challenges that come with the idea that I want to base my game off of. The game idea that I am most likely moving towards is a rat moving through the map to find and grab his cheese, I will call the game "Coding Rat". When creating my game, I will first have to deal with creating a 2D grid for the map that my character will move around on. The next step is to create the players hub which will consist of an action bar and a main function. The action bar is a list of actions such as move forward, turn left and right, jump (if the game is in 3D), and a grab feature. The player will then choice the actions for the rat to perform based on the way the map is created and where the block of cheese is located. The main function will make the rat move

based on the actions inputted into it going from left to right. Next will be creating the main menu or title screen where the player can choice to go into different menus like the level select screen or options menu. When I have my game working as intended, I will work on creating the 2D/3D objects such as the rat itself, a block of cheese, trees for the background, ect. Finally, I will need to create many different levels in my game where I can make different maps that will progressively make the levels tougher each time. Here is a sketch that shows most of what I stated about how I want my game to look.
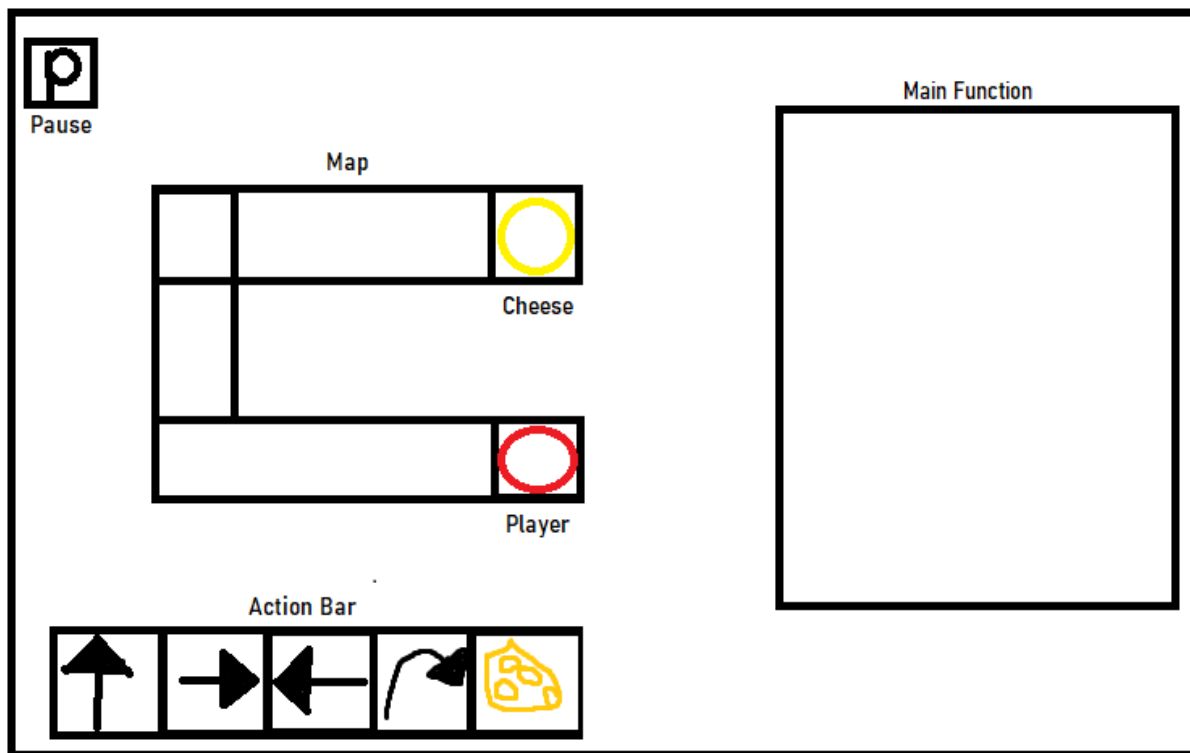

Figure 1.2

When talking to my advisor, we agreed on creating the game first in 2D and then look to make the game in 3D which will allow for far more complex challenges throughout creating my serious game. The results from this step will have a game that works for pc and be a proper serious game

that focuses on educating the user during playtime. To ensure these results will take place I can easily work on previous steps before I start project 2 to allow much-needed time to create my final step. The setting of this project will mostly be on my computer home setup with occasional learning on perhaps my laptop or in different places such as meetings with my advisor.

Conclusion, Summary and Recommended Future Work

In conclusion to my research, serious games serve a real and important service that benefit millions of lives around the world. The serious game that I will create in project 2 will look to complete the main goal of a serious game which is to educate the user when playing the game. This serious game will be based off the main elements of a serious game which I obtained from my research. My research also shows the importance of serious games which is to allow students to show their newly found knowledge by applying it to the in game "jobs" or actions. This learning will then allow for immediate feedback which will allow for a more motivating and educational environment for learning. Due to these past statements, learning through serious games is an extremely beneficial way of learning especially towards students that match its learning style. Along with an effective learning environment, serious games also have far more positive effects then negative effects with the information that I found. The main positive effects when learning through serious games was the increase of motivation, increased mood and self-esteem, and improved cognitive abilities. While the negative effect showed the decrease of attentive abilities when learning. My plan with creating a serious game is to learn all skills needed to create this game such as learning C#, learning Unity, and learning blender. Once completing these skills before project 2 I will then take on the many challenges that come from my game ideas such as creating a 2D grid for my character to move around on and complete its objective. When I complete this project, it will give me crucial experience with working in game development which will help with my future interested job field. Even with completion of this project there will always be more to do with making games such as moving the game to mobile or updating the game with more levels, which allows for future experience past my undergraduate degree.

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