Development of Educational Digital Games on Programming Logic

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# Background

In 2004, an American School used a popular modern, Real Time Strategy (RTS) computer game to assist in a History lesson (Squire 2006). The game they used was Civilization 3.The game represents the time line of human civilization, from primitive man to man launching rockets to the moon. It covers many subjects, including geographical setting of Europe and Diplomatic scenarios between governments. Such subjects in schools could prove useful to these students. There are many more games used to educate people , and even more with a funnelled approach toward specific subject’s. Game’s based on the use of programming , either with direct input of code , or basic commands that produce fully written code are becoming more popular. Primary schools across the county have begun introducing computer science as a module. Student’s will be able to complete exams in this area in secondary school as an elective. The interest and importance in learning a programming language is more important to the digital era. With these games, programming is given a visual representation through animation, therefore becoming more clear to the user. Considering programming itself is not straight forward and to a novice might be difficult to understand , these tools could be a benefit to a students education.

Throughout this paper the plans for the project are explained in greater detail. In the main research questions section the main concerns in terms of the project are queried there. Continuing on from the questions, the report follows with justification as to why the research is being carried out. This will continue on with feasibility and why i feel the project is within its scope in terms of a time frame and technical ability. The next section will explain my proposed methodologies as best as possible considering the infancy of the project. The proposal will continue with expected result’s which i will explain in that section. And finally, the conclusion and project plan. The project plan will be a break down of the tasks needed week by week to to complete the project.

# Main research question(s)

* With today’s student’s, are digital games a good platform for education?
* Considering programming education games . Who uses them as tools

for learning? What was the general approach for their use? What age group are using them? Are people using them for past times or for learning.

* How should this project be delivered? Is the game designed for mobile, desktop, console or TV?
* One of the issue’s educational digital games have in a learning environment is that they may not address the subject in full. How can this project be delivered so that it address’s the depth of that subject.
* What art direction has proven to work well to deliver these lessons?

# Justification/Benefits

As we progress in the digital age, programming is becoming a necessity for a percentage of people. It is an important tool for the progression of humanity. Digital Native users are more widespread then ever. This leaves a space in education. The understanding of programming before learning the syntax, see §6. The aim of this project is to teach the user programming logic. A student understanding the logic of programming would be advantageous as a foundation to their education. An educational digital game focusing on a depth of programming logic, with clear concise instructions, would give a user, a non-complicated way of understanding programming logic.

# Feasibility

I will use the skill’s and knowledge iv’e gained over my time spent in college. This project will be built over 8 months. With the supervision from Matt Smith. Each week there is a meeting to deliver and discuss goals. There will be a set milestone that will keep the project within the tended scope. After completing previous projects like this, I am confident it can be done.

# Proposed Methodologies

Gathering of information about games development and educational games will be through literary and reviews. This data will contribute to the project’s development. The project will implement past developers experience in building systems.

Unity is a cross platform 3d game engine that is used extensively for games development. As Unity has been used for previous projects with great success, this will be the chosen developing environment. The programming languages(or scripting languages) native to Unity are C#, Unity Script (also know as JavaScript for Unity) and Boo. The system will be built in C# and will consist of a Model View Controller (MVC) structure. This will keep the scripts cohesively high and will give the option for expansion in different areas.

To build the system a number of things need to be implemented:

* An organized file structure in Unity to begin the project
* The main menu
* Implementing a character and its controls
* Map Generation to house the player
* A UI system
* Menu system for mid game (Pause scene)
* Conditions for win and lose
* A points system
* Load and save
* End credits scene

As the system progresses more components will be added. The end game should have a look and feel similar to this:

# Expected Results

Through the game and research, i hope to achieve a game that will be efficient in teaching programming logic while being fun. The project should teach this logic without necessarily directing its message at programming. Understanding and recognizing a pattern before the user associates it with a language.

Introducing a language before understanding the algorithmic problem solving is seen as not a good practice(Shackelford and LeBlanc 1997). This project will shed more light on educational games and games development.

# Conclusion

The research into games development to have a deeper understanding on how the technologies work together. MVC is widely used for many applications and games. The implementation of MVC will be quite evident in this project as well a the exploration of Unity3d and its many tools . When building a game, level design, character development, character control, sound, light and many other aspects need to be addressed. As the games is educational, the projects is going to implement programming logic as the governing rule set. The research into educational games and education on the topic will be reviewed to keep up to date with current techniques.

# References

Shackelford, R. L. and R. LeBlanc (1997). Introducing computer science fundamentals before programming. In *Frontiers in Education Conference, 1997. 27th Annual Conference. Teaching and Learning in an Era of Change. Proceedings.*, Volume 1, pp. 285–289. IEEE.

Squire, K. (2006). Civilization iii as a world history sandbox. *Civilization and its discontents: Virtual history, real fantasies*.

# Project Plan

Each deliverable will be due per month over 8 months.

**Month 1-2 - Septeber&October** Research & literature review

* Research area surrounding games development in this genres area
* Research games and education , try to find success story’s
* Research code structures and best practices for Unity3d and C#
* Write literature review

**Month 3 - November** System Development - Prototype

* Design and create the look and feel for the game– Create a basic prototype - basic scripts written
* Character and controls
* Map and map generation
* UI
* Basic Menu

**Month 4 - December** System Development - Rules

* Implement Rules - Buttons to create movement/ Specific to pro-gramming logic
* Implement Rules - UI for programming logic

**Month 5 - January** System Development - Map Generation

* Map obstacles
* Next Level/Scene map generation

**Month 6 - February** System Development - Load and Save

* Main Menu and End Scene (credits)
* Mid scene between levels for congratulations you passed
* Load and save

**Month 7 - March** System Development - Scoreboard

* Scoreboard/ personal best
* Helpful tips- on the map and UI

**Month 8 - April** System Development - Sound Animation

* Sound
* Art/Animation

**Month 9 - May** System Development - Finalize System

* Finalize system
* Bug test
* Write tests