

Coursework Submission Cover Sheet

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Student Number	<input type="text" value="C1618004"/>
Module Code	<input type="text" value="CM3203"/>
Submission Date	<input type="text" value="03/02/2020"/>
Hours spent on this exercise	<input type="text" value="9"/>
Special Provision	<input type="checkbox"/>

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Group Submission

For group submissions, *each member of the group must submit a copy of the coversheet*. Please include the student number of the group member tasked with submitting the assignment.

Student number of submitting group member	<input type="text"/>
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By submitting this cover sheet you are confirming that the submission has been checked, and that the submitted files are final and complete.

Declaration

By submitting this cover sheet you are accepting the terms of the following declaration.

I hereby declare that the attached submission (or my contribution to it in the case of group submissions) is all my own work, that it has not previously been submitted for assessment and that I have not knowingly allowed it to be copied by another student. I understand that deceiving or attempting to deceive examiners by passing off the work of another writer, as one's own is plagiarism. I also understand that plagiarising another's work or knowingly allowing another student to plagiarise from my work is against the University regulations and that doing so will result in loss of marks and possible disciplinary proceedings.



Initial Plan

A Serious Game for Children to Learn Basic Statistics

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Supervisor

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Project Title

A Serious Game for Children to Learn Basic Statistics

Project Description

Serious games are growing rapidly as a gaming industry as well as a field of academic research. Researchers predict that technology-enhanced learning will increase with educational computer games [5] (serious games) playing an important role. The debate has moved from should teenagers play digital games to how to gain benefits from this gameplay. Currently some of the more popular maths games among primary school students and teachers are TTRockstars [1] and Squeebles [2], which both combine the aspect of speed and maths. Games where you can collect and use coins or in-game items have proven to be very popular among the young students and combining that with the aspect of speed (how fast can you answer the question) gives it that competitive advantage and feeling. In this initial plan I will share some of the ideas I have in developing my own serious game around the subject of statistics and also talk about some of the initial background research I did into the idea.

Project Aims and Objectives

Aims

I want to study how serious gaming impacts the learning curve of students compared with traditional methods of teaching. more specifically when applied to mathematical concepts such as median, mode, and mean.[4] Traditional method of teaching being when a teacher is directing students to learn through memorization and recitation techniques and therefore not developing their critical thinking, problem solving and decision-making skills. This proposal involves the conception, design, development, and evaluation of a serious game that will teach young children basic statistics. The design principles which will be used during development are: Engage the students with a story and a hero, employ familiar game mechanics from popular video games, and provide constructive trial and error gameplay for learning.

My initial idea would be to use Java based programming, because it supports features like multithreading and sockets which make it easier to ensure that the game has low system requirements considering that most schools operate on older systems. Doing this proposal, I am hoping to improve and learn new skills in Java as well as project management and problem-solving. I believe these skills are well valued within the industry and are very important to have going forward.

Objectives

The project objectives being aware of the current space of serious games (identifying market leaders and evaluating their process), Gathering more detailed user requirements alongside core functionality that the game must have, Designing Game UI, Core functionality implementation, Creating a number of test cases, performing a case study, and Evaluating on the progress in the end.

Alongside the project objectives I would also like to highlight some personal ones as well. At present I would only consider myself a beginner Java Programmer and therefore I would like to use this opportunity to learn and understand Java programming in much more depth as well as complete a certification course in the process. I also look forward to developing my problem-solving skills as I am sure there will be plenty of barriers along the way as well as potential failures to deliver the exact specification.

CM3203: One Semester Individual Project – 40 Credits

Initial Game Requirements

Requirement	Reasoning
The game must keep a total score during the game.	In order to sustain motivation, feedback needs to be aligned with reward mechanisms in games. Moreover, having the right reward is key to making sure players feel there is value to their actions. There are different ways of rewarding players, such as increasing a score, collecting tokens in exchange for things, or changes in the avatar or virtual world in response to actions. [6]
The game must have a Teacher reporting feature.	The teachers can also get some feedback on the progress of their students. Once data is collected as part of the game statistics, it is easy to make reports of them for the teacher to outline the strengths and weaknesses of each student.
The game should have some kind of bonus material.	In order to maintain the motivation to collect points or tokens, they can be associated with bonus material. For instance, the player can have access to tools that assist them in their goals, collector items for their avatar, ability to unlock games, or upgrades to the graphics.
The game should have a break timer.	Apart from the score, the system should indicate if the player has played too long and encourage them to take a break for their own wellbeing. One way to do this for example is for the character to have an energy meter.
The game must feature a storyline.	A good game, like a good movie, has a gripping storyline. When creating a serious game, the game's story can be used to reinforce the core values and add an additional level of learning.
The game must have an effective user experience.	In order for the game to be engaging it should of course have a user interface in order to provide some sort of visual feedback during the game. This could feature a number of different locations in order to keep the player motivated to keep playing and exploring. These locations can also be unlocked throughout the game by completing different levels.
The game should feature a Competition/ Challenge aspect.	All games involve an element of challenge. At its simplest form, the player's main challenge is to beat their high score. Keeping also in mind the target audience a natural competition between the pupils is bound to occur as to who can get the highest score possible.

Initial Background Research

Serious games are growing rapidly as a gaming industry as well as a field of academic research. The term serious game has developed because people wanted to make a clear distinction between games for entertainment, fun and enjoyment and games that have a serious outcome perhaps a learning message. A game that allows people to learn, one of the most successful serious games being the Microsoft Flight Simulator (the grandfather of serious games) [7]. When designing a serious game around mathematics there are a number of key principles I believe one should follow:

1. Engage the students with a story and a hero.
2. Employ familiar game mechanics from popular video games.
3. Provide constructive trial and error gameplay for learning.

Despite the compelling evidence for the effectiveness of serious games as teaching resources [3], not all educators are on board. The majority of the studies about teachers' attitudes regarding serious games as educational tools find that teachers are often sceptical.[3] One of the key complaints is that it is often difficult to track learning progress within the game.[3] Success in tracking learning progress could obtain immediate feedback for teachers to moderate teaching material and objectives. Therefore, as mentioned in the requirements table I will attempt to build in some sort of a reporting tool that will help teachers evaluate the effectiveness of the game.

My initial idea would be to use Java based programming. Java runs on a number of virtual machines, so your game will be easier to distribute which will be key if we are to test it among a number of primary schools. Doing it in Java will also help me tremendously develop my own skills in the language as it is a very well sought out for skill to have and is well valued with in the industry.

Initial Work Plan

Week Number	Work Progress	Milestones
Week 1	Complete the Initial Plan Initial Research into Java Game Development and Serious Games.	Complete and Submit Initial Plan
Week 2	Gather more detailed requirements of the game as well as potential UI mock-ups. Meet with Supervisor.	Agree with Supervisor on the main requirements and core functionality.
Week 3	Complete a Java Certification Course (on Udemy)	Receive a Java Developer Certificate
Week 4	Create a more detailed UI Interface Mock-up and a Story line.	Have all the required material and ideas to start development.
Week 5	Start Implementing the Core functionality of the Game. Meet with Supervisor to show progress.	Have a working game to show to the Supervisor get his feedback.
Week 6		
Week 7		
Week 8	Feedback Response along side further testing and bug fixes.	Have all the core functionalities implemented.
Week 9	Adding any additional features. Ready for the Case Study.	Have all the code finished and ready for submission.
Week 10	Report write up. Create First Draft. Meet with Supervisor for feedback. Evaluate the project in general.	By the end of Week 11 have the report ready to submit.
Week 11		
Week 12	Submit the Final Report.	Finish

For more specific dates please refer to the Gantt chart at the end. Figure 1

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Risk Analysis

Risk	Risk Severity	Risk Likelihood	How to void it.
1. Loosing progress	High	Low	Ensure that backups of all data are taken regularly and stored in a different location.
2. illness	Medium	Low	Ensure sufficient time is allowed for setbacks and illnesses within the work plan.
3. Scope Change	High	Low	Make sure to keep work plan up to date and be able to reallocate time as soon as any change is introduced.
4. Learning Curve Delays	Medium	High	Start learning Java as soon as possible with in the project to give a better understanding of all the functionality.
5. Delays in Schedule	Medium	Medium	Ensure all tasks are started as soon as possible. If ahead of schedule start early on the next task.

Risk Matrix

Severity	Likelihood of Occurrence		
	Low	Medium	High
Low	(3)		
Medium	(2)	(5)	(4)
High	(1)		

References

- [1] TimesTables Rockstarts. 2020. *Homepage*. Available at: <https://trockstars.com/> [Accessed: 30 January 2020]
- [2] Practise your multiplication. 2013. Squeebles Times Tables [iOS App] Version 4.0. KeyStageFun. [Accessed: 30 January 2020]
- [3] Michael J. Katchabaw. 2019. *A Meta-Analysis of Use of Serious Games in Education over a Decade*. Available at: <https://www.hindawi.com/journals/ijcgt/2019/4797032/> [Accessed: 25 January 2020]
- [4] BBC Bitesize. 2020. *How to find the mean, median, mode and range*. Available at: <https://www.bbc.co.uk/bitesize/topics/zm49q6f/articles/z99jpbk> [Accessed: 30 January 2020]
- [5] Tilburg University / TiCC, 2Dutch Open University. 2011. *Serious Games in Education - Serious Games*. Available at: <https://pdfs.semanticscholar.org/2d7f/20b98562caa2e27952c2319976bb2112b285.pdf> [Accessed: 30 January 2020]
- [6] Sharon Boller. 2013. *Learning Game Design: Rewards and Scoring* Available at: <http://www.theknowledgeguru.com/learning-game-design-rewards-scoring/> [Accessed: 30 January 2020]
- [7] GrowthEngineering. 2016. *10 SERIOUS GAMES THAT CHANGED THE WORLD* Available at: <https://www.growthengineering.co.uk/10-serious-games-that-changed-the-world/> [Accessed: 30 January 2020]

Figure 1:

