

Project Title: Evaluating Serious Games as a Valid Method to Teach Children Statistics**Project Description**

My proposed project plan is to investigate and evaluate the effectiveness of using serious video games as a alternative method for teaching the subject of mathematical statistics, including averages and percentages, to young children. I will evaluate the results of this project by viewing them in contrast to the results of how children learn the same subjects using traditional teaching methods, such as rote learning and memorisation, and gathering feedback from students regarding their experience with the game.

My proposal is to develop a 2D Visual Novel in which the player will adopt the role of a police detective. The game will teach the player the material required to solve basic statistics questions, such as averages and percentages, by providing them with examples and instruction of how to solve problems before progressing towards minigames which require the use of their newly learned skills to progress.

Project Aims and Objectives

Minigames include:

- Suspect lineups: players will be presented with a lineup of suspects and their physical attributes such as height, weight and shoesize before being asked to identify which suspect's attribute is equal to the mean, median and mode values in different circumstances.
- Shooting range: players will fire at moving targets and at the end of the game be asked to calculate the percentage of targets that they successfully hit.

I will create all of the artwork for the game myself by hand before scanning and refining using GIMP, including characters and some complex assets, and record my own audio assets for the game's sound effects. Aside from the player, the game will only have at most 2 other characters.

After development, I will organise a group of young school children to play my game, each of whom will have no prior experience with the statistics it teaches but have some strength with mathematics. I will evaluate the effectiveness of the game in a controlled trial with follow up interviews and a short test. The results of their tests would then be compared to those of another group who are taught using traditional classroom methods. Aside from direct test results, I will also analyse the feedback from the test group, including how much they enjoyed the game, how well they feel they learned from the game, and whether they would be interested in playing other games in the future that teach other subjects in a similar way.

The dialogue and interactive elements of the game will be written and created with careful consideration of pedagogy and the results of similar studies into the use of serious games. In the instance of this project, I expect dialogic and student-centred learning to take place throughout the game since players will be taught lessons through example before being required to solve problems on their own to progress and solidify their understanding.

I hypothesise that serious games will provide students with a more engaging experience in a less rigid and potentially stressful environment than a classroom in which topics are taught in a traditional manner, and as a result, yield better results from a subsequent test. Thus, the results of a controlled trial, student interviews, and test results will be used to evaluate the accuracy of my hypothesis.

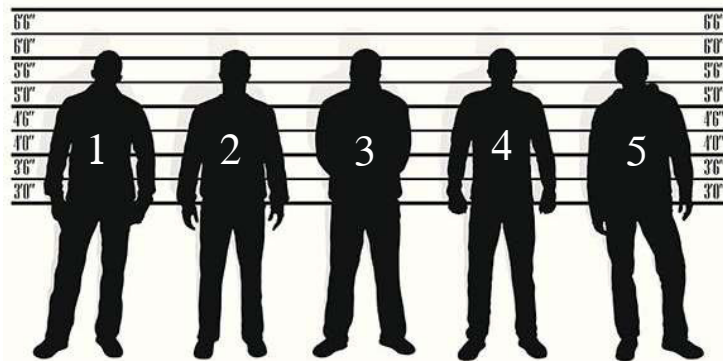
Similar articles and studies regarding the subject of teaching using games include:

- Literature Review: Effectiveness of Gaming in the Classroom, Karen A. Milczynski
- Learning through Games: Essential Features of an Educational Game, Kannan Amr
- Playing to learn, R. F. Mackay
- Gaming to Learn, Amy Novotny
- A Meta-Analysis of Use of Serious Games in Education over a Decade, Yu Zhonggen



Captain Bloggs

So, you're the new cadet? Alright, Kid, let's get you in the classroom and teach all of the basics you'll need to catch some bad guys!

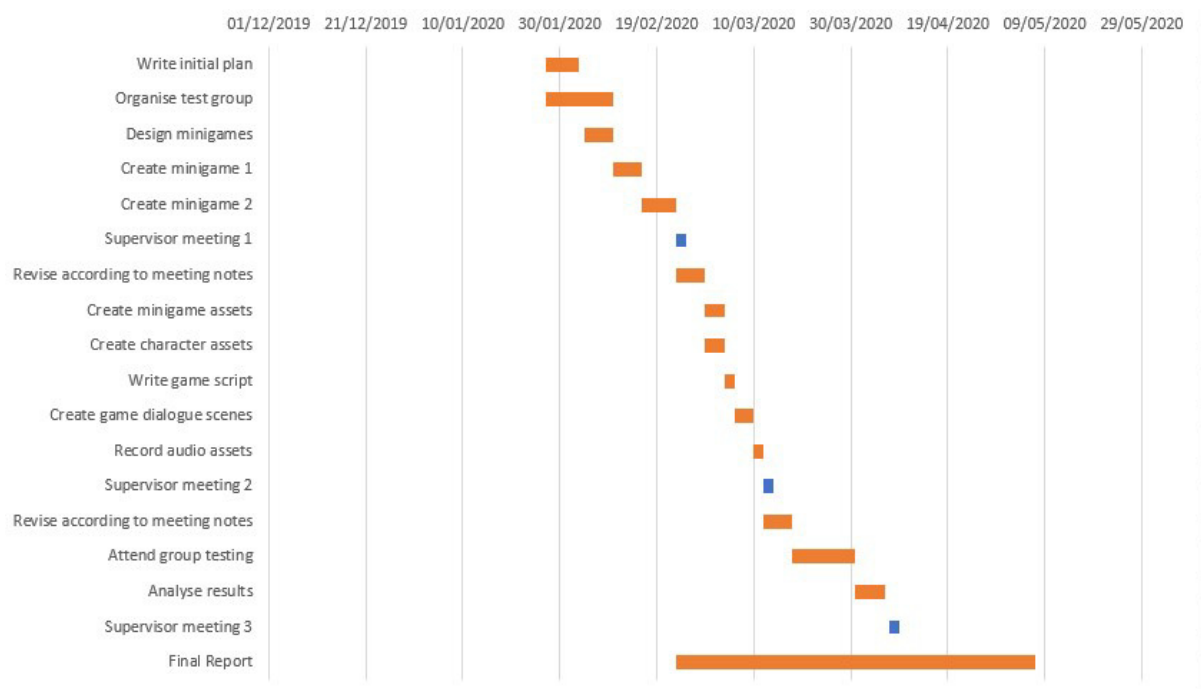


Captain Bloggs

Okay, Cadet, now that you've learned all about averages it's time for you to put those skills to good use!



Work Plan



Throughout the project I will be maintaining a diary that documents details such as completion dates for tasks and milestones, any issues I have encountered, changes to my plan, references used, asset sources, feedback from my peers and supervisor, notes from supervisor meetings, and images of the project as it develops.

During the completion of my initial plan I will also be working to establish contact with a primary school that I can collaborate with in order to organise a test group to play my game. This process may take some time and is a task that I can perform in the background while I work to develop other aspects of my project.

Since they are the most important aspect of the game, I will begin my project with the design of the minigames while determining the best way they should work so as to effectively teach the methods required for students to learn, but also hold their attention and remain engaging. This phase of development will likely take longer than other tasks since there will be some logic behind the games and a degree of player interaction involved. Scenes will also be in motion, particularly the target practice minigame.

Once the development of my minigames is complete, I will have a meeting with my supervisor in order to demonstrate them in their current state, noting any potential for improvement and bugs that need addressing. Since there are likely to be issues that require my attention, I have allowed about a week in which I can see to them before proceeding with other tasks.

Until this point the games will have been developed using placeholder imagery, and so I will now create all of the visual assets for my characters and minigame props. Many of the characters are already drawn, and so I will only need to tweak and refine existing assets, such as drawing new expressions for different scenarios and reactions to events in the game. Most, if not all of the minigame props, will be static. As such, they will not require the same variation as character faces and will take less time to create. Backgrounds for different scenes will mostly be made up of stock imagery.

Next I will write the first draft script for all characters in all scenes within the game, including lessons and examples of solving questions.

Next will be the development of the dialogue scenes. These scenes are static and serve as the primary means of communicating information to the player and connecting each aspect of the game. With all of the art assets and script prepared beforehand, I can create the majority of the game's structure rather quickly, and with the structure in place I need only insert the required textual and artistic assets that I have prepared in beforehand. Aside from effects such as scene transitions, these scenes will be essentially finished.

The final touches for the game will be audio assets. These will mostly include sound effects for minigames and vocal cues for characters in game when they enter a scene or begin a new line of dialogue. These will be recorded by myself and volunteers from among my friends and family. This task will not be of absolute importance and will mainly help to achieve a higher level of polish. As a contingency, I will instead use free sound assets.

With the first versions of the mini games complete I will have another meeting with my supervisor, in which he should be able to play them. Together we will note any discovered bugs or areas for improvement, all of which will be fixed and updated in the period of time I have allowed after this meeting.

Once the game has been polished and the bugs fixed, I will ask some of my friends and other students in my year to play the game and provide feedback. Then I will attend the group testing and gather my results and findings from the students, interviewing them to receive their feedback and note the aspects of the game that seemed to be most effective and resonate with them, and likewise, those which were not so effective.

With all of my results and findings gathered, I will have another meeting with my supervisor to discuss my conclusions and the next steps I will take with regards to finishing my final report.

Assuming that my plan has been executed according to the Gantt chart I have created, I should have approximately 1 month to complete what remains of my final report. I will make amendments to this report throughout the duration of my project, using the notes from my diary as a skeleton for the report. I will not be writing the entire report from scratch in this period of time.