University of Essex
Department of Mathematical Sciences

MA838: CAPSTONE PROJECT DISSERTATION

Communicating Mathematics and Data Science

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Abstract

Abstract (500 words roughly), brief rationale (meaning behind) why are you doing the study, method (explain audience, age, whatever, like experiment), results (data findings), discussions (conclusions, explain what the findings mean in context, how is it applied to the research project), limitations (what would you do to improve, or further research)

Contents

Introduction

My project consists of two sections, the first is communicating mathematics to Year 9 students on the topics of Origami and Mathematics. The second is to communicate data science to Sixth Formers on the **topic of data science with the Spotify API.** (need to reword) **note: this might be better suited to another section such as abstract perhaps.**

To communicate mathematics and data science is to ask - how did I find mathematics in secondary school and how was it interesting to learn? Many have spoken about the difficulties of understanding mathematics as it can be too "logical" that the more creative students were unable to comprehend. However, I believe this to be **wrong** if the teacher was able to evidently show the similarities between the arts and sciences. As of this, I have chosen to put my dedication into mathematics education and specifically on combining and sharing to others the benefits and/of how similar arts and sciences are. In this case, it will be origami and mathematics to communicate mathematics and using the Spotify API to communicate data science.

Maybe put the bottom part of introduction into a new section known as Background?

Firstly, **(perhaps remove "Firstly", not sure yet)** prior to choosing the project, I was previously interested in learning new things to expand my horizon such as different maths topics. Hence, I spent a number of hours watching numerous YouTube videos in the background or sometimes more focused in the topic I was intrigued by. When the project briefs were shown, I had an interest in the project by Professor Abdel Salhi - "Error modelling in Origami construction". Consequently, I wanted to learn more about what origami maths was and

proceeded to conducting a research on the topic.

Unfortunately, I did not choose the project in the end as I realised there was another project that could enable me to show the creative side of maths through the project "Communicating Mathematics/Data Science" by Dr. Joe Bailey. This latter project would subsequently let me explore the different engagement methods of communication as well as showcase my knowledge and interest of creativity bonding with mathematics.

This latter project would subsequently hone my knowledge and connect with my musical side to mathematics.

Prior to applying for university, I was captivated by music and maths, which the composer John Cage had influenced me to this joint degree. His compositions were inspired by one number, or a set of numbers which would result in his piece showcasing that specific number. My interest for this topic further expanded when I came across the book "Music of the Spheres".

This book showed that the arts and sciences were undeniably closely related and similar before they diverged into their respective areas in this modern society. Those who are from either of the fields may have discrepancies, however they would not be able to work without the other. This **meant** (change the word) that to make the findings of science and logic required creativity and vice versa. In this modern society, many may believe this to be preposterous, it would be outrageous that they are linked. This project aims to **affirm** (change the word) that arts and sciences go hand-in-hand with each other.

Literature Review

Chapter 1 will detail the background research carried out in preparation for the project of communicating mathematics and data science. In order to teach mathematics, one must undertake preparation to fully understand **the aims of the project and how to proceed.** (how to teach and what is required before teaching a class.) As a result, the first preparation was a series of reviewing different academic journal, books, online media and personal experience on teaching maths.

2.1 Teaching styles

To understand the different teaching styles, I had been researching primarily on the resource of YouTube as well as from personal experience. As a result, it can be detailed that there are lectures, lessons, engagement activities, masterclasses, talks, summer schools, and workshops.

2.1.1 Delivering lectures

The term lectures is generally used for an educational talk to students who are on further study at university. This could be for undergraduates, postgraduates or doctorates. As of this, the

2.1.2 Teaching platform (Online vs face to face)

The definition of teaching screen in this instance is the platform. Depending on the location of the teaching, some **users** (change the word) opt to teach online and face to face, whereas others chose one platform.

2.1.3 Teaching methods

The teaching methods are variations of activities that are dependent on the preference of the teacher/presenter as well as the audience for the activity.

For example, for teaching schools, this could be a use of worksheets, whereas masterclasses and engagement days are hands-on interactive activities. Another method would be looking on the screen for talks, etc.

2.2 The relationship between the teaching style and method

2.3 Chosen method and style

After reviewing different teaching styles and methods, the style of communication for mathematics was a presentation. As for communicating data science was a blog.

2.4 Adapting to age groups and audiences

How to make the presentation flexible to suit different age groups and audiences.

Final Remarks

3.1   Project Findings

Talk about maths and data science

3.2   Conclusions

Conclusion restates the main arguments, tells about the consequences, and provides suggestions for future work.

3.3   Project Reflections

Talk about what you learnt and how you felt about the project

Appendix

Detailed Handover

Insert detailed table of lesson plan next to presentation slides

Lesson Plan

Insert lesson plan

Handout sheets

Insert handouts

Presentation

Insert presentation slides

Presentation video

Insert video link of presentation

Bibliography

[1] E. Noether. Invariante Variationsprobleme. *Nachr. d. König. Gesellsch. d. Wiss. zu Göttingen, Math-phys. Klasse, Seite 235-157*, 1918.

[2] A. M. Turing. Computing machinery and intelligence. *Mind*, 59:433–460, 1950.

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