COASTLINE PARADOX EXHIBIT

Concept Design Plan

This document outlines the motivations for and design of our museum exhibit which is based on the Coastline Paradox. This project was completed as a part of the Communicating Maths course at the University of Bath.

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This exhibit is primarily designed to be featured in MathsCity, Leeds.

MathsCity - MathsWorldUK

MathsCity is a hands-on interactive experience to communicate maths to the public and is a MathsWorldUK production which is a step towards the UK's first Mathematics Discovery Centre. It is based in Trinity Leeds, the main shopping centre in the heart of Leeds and opened in October 2021.

The vision of MathsCity is "to excite and engage everyone with the fascination and power of Mathematics". They currently have exhibits covering the topics of geometry and problem solving.

Objectives

The main objectives of this exhibit are:
- To challenge the visitors with a real-life mathematical quandary
- To introduce visitors to the Coastline Paradox
- To create a fun, interactive, and inclusive exhibit

Audience

This exhibit is suitable for a wide audience but is specifically designed to be accessible for families with children in KS3 (ages 11 – 14), who are the intended audience of MathsCity. The main restrictions on the accessibility of the exhibit are the mobility and visual abilities of the visitor due to the physical design.

Delivery

Exhibit Displays – see page 4

The exhibit will have two main displays which are the instructions on how to investigate the length of the coastline and a brief explanation of the paradox. Both displays will be posters on boards next to the exhibit, with the instructions on the left-hand board. The displays are not detailed as to focus the visitors on the investigation, therefore a QR code is featured on the display for visitors to discover more.

Website – coastlineparadox.co.uk

The website works alongside the exhibit and features the sections: tasks, maths, task answers, fractals, history, people, applications and maths at home. The tasks are specifically designed to be done whilst at the exhibit, but the rest of the information is accessible whilst at the exhibit and later if a visitor wanted to learn more in the future.

Step-by-Step User Experience

1. Read the investigation instructions.
2. Follow the investigation steps and attempt to measure the coastline of the physical display with the measuring tools provided.
3. Observe that each string follows the whole coastline but are different lengths.
4. Follow the link to the website and complete the tasks as further investigation. Otherwise, consult the second display for a simple summary of the paradox.
5. If interested, do further learning via the website.

Physical Functionality

The exhibit is heavily reliant on its physical functionality as it is key to tangibly demonstrating the paradox. It has been designed to be as straightforward to use as possible whilst being able to clearly demonstrate the paradox.

Prototype – see page 5

This is the prototype made with the initial plans. It is 80cm X 55cm and is made from MDF. It can be used to demonstrate the paradox by winding each string around its respectively coloured pegs and comparing the lengths of the two strings.

Recommended Alterations for a Finalised Exhibit

When scaling up this exhibit to create a piece suitable for a museum, it is important to consider:

- The size of the exhibit – a large exhibit would be more dramatic visually, but the length of the string may become unmanageable as this will scale up with the exhibit size.

- The height of the exhibit – recommend that the exhibit is featured on a table that complies with the following: *"An accessible table has a surface height of no more than 34 inches and no less than 28 inches above the floor. At least 27 inches of knee clearance must be provided between the floor and the underside of the table."* (ADA Guide for Small Businesses, https://www.ada.gov/smbusgd.pdf).

- The number of strings – another set of pegs and string could be added to further demonstrate the idea of the paradox.

Risk Assessment

The main risks to take into consideration are:

- Users injuring themselves on the small pegs or items getting caught as they pass the exhibit.
- The strings hanging from the exhibit being misused, potentially being tripping, choking, or strangulation hazards.

- Users injuring themselves on the edges of the exhibit, particularly users for which the exhibit is at head height.

As risks that come with any exhibit these can be minimised through the room being supervised by museum staff to help prevent any incidents from happening.

Maintenance and Longevity

This exhibit does not rely on technology and so it only needs to be physically maintained. Physical maintenance would include repairing damage to the pegs, strings, and coastline as well as the display. Apart from the physical maintenance, there are no factors that impact the longevity of the exhibit as the mathematical ideas are rigorous and should not change in the future.

Inclusion and Accessibility

As an exhibit that requires physical interaction there are restrictions on the inclusivity of people with physical disabilities. The following should be adapted to make the exhibit more accessible:

- Colour scheme – the colours and patterns used across the exhibit should make the exhibit as clear as possible for people with visual impairments and colour-blindness.
- Method of measuring the coastline – strings and pegs should be easy to grip and manoeuvre.
- Dimensions and height of the exhibit – see Recommended Alterations for a Finalised Exhibit section on page 2.
- Language used in displays – basic and clear language suitable for the audience should be used throughout. An audio version of the displays and online information could also be made available via the website.

Transferable Aspect

This exhibit has been designed for a museum. However, it also has the capacity to be used as a stall exhibit because it can easily be made mobile to be taken to events. It functions when put on show with the displays it functions without a person attending it, but an attendee could easily take the role of explaining the exhibit making it an even more interactive demonstration.

Resources Used

https://www.mathsworlduk.com/exhibits/

https://www.mathematikum.de/en/

https://momath.org/

Prototype once strings have been weaved around the pegs (step 2 of the investigation)