STEAM EmbRaCe

A STEAM project for Empathy, Resilience and Creativity

BIG DATA & ANALYTICS

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Summary
This course will cover the basics of Big Data and Analytics for processing and visualization purposes. Students will become familiar with the basic concepts around data collection and processing through various examples of recent advances in the field and learn about the relative fields. They will have the opportunity to gain hands on experience and become familiar with the SQL language. This seminar is ideal for students who are interested in pursuing careers in engineering, technology, or related fields.

Key elements	
Keywords	Big Data / Data Engineering / SQL / Visualisation / Plot / Data Processing
Subject	Computer Science / Mathematics / Statistics
Age of students	12 - 17
Preparation time	10 hours
Teaching time	4 - 6 hours
Online teaching material	-
Offline teaching material	Steam EmbRaCe "Big Data & Analytics" presentation
Resources used	-

Trends

Big Data Processing / Weather Data / Weather Analysis / Data Visualization

21st century skills

Creativity / Critical Thinking / Problem Solving / Collaboration and Teamwork / Technology Literacy / Information Literacy

Lesson Plan

Activity	Description	Duration
Introduction to Data	Using the Steam EmbRaCe "Big Data & Analytics" presentation, guide your students through the basic concepts regarding data definition and data utilization. Connect these concepts with familiar examples of everyday use of data for decision making.	30 min
Examples of Big Data use	Explain the reasons that led to the introduction of big data and the needs that have emerged due to the ever - increasing generation of data. Provide several real - world examples of how big data are exploited in many fields.	30 min
SQL Demonstration	Explain the basic programming skills that are required to process and visualize data using the most widely used programming language for data analysis, SQL. Familiarize students with the basic SQL commands and how each one of them is used.	60 min
SQL Examples	Hands on demonstration of data analysis examples using given data sets where the students have the opportunity to think, collaborate and solve given challenges exploiting previously acquired knowledge.	60 min

SEL practices

The following techniques support self-awareness and self-management which are the two main domains of the CASEL model in social and emotional learning.

At the beginning of the course we identify students' emotional state by following the activity "Practice for identifying emotional state".

At the end of the lesson students reflect upon their work by following the activity of Reflection.

After the reflection they practice the square breathing technique and the aim is for them to learn to practice this every time they are about to begin a challenging activity.

Assessment

Use the following exercises of graded difficulty for student assessment:

1. Create an interactive trivia using Kahoot! on the concepts discussed in class.
2. Create an interactive hot spot exercise using H5P where the student is required to identify syntax errors in given SQL commands.
3. Create an interactive missing word exercise using Wordwall where the student is required to type in the missing keywords (reserved words), special symbols, and/or operands in order for given SQL commands to function properly.
4. Require students to manipulate a small given data set using SQL and deduct meaningful assumptions.
5. Allow students to choose a data set of their own liking and formulate specific research questions that could be investigated through its manipulation.

About STEAM EmbRaCe project

This Learning Scenario has been created in the framework of the STEAM EmbRaCe project.

STE(A)M EmbRaCe aims to promote inclusion by engaging and inspiring students from different backgrounds. Students work on real-world STE(A)M problems, which will help develop their cultural empathy, resilience, and creative thinking. The idea is to create digital content which will be ready to be used by teachers in any classroom setting. More specifically, the project will allow the development of a 7-week course and teacher training on how to use the developed material with students.

Find out more about the STEAM EmbRaCe project:

https://steamingthefuture.gr/steam-embrace/

Annex 1
Use the following SQL tutorials to familiarize yourself and your students with typical SQL commands: https://www.w3schools.com/sql/ https://www.tutorialspoint.com/sql/index.htm https://www.sqltutorial.org/

Annex 2
Repositories of freely available data sets (csv files): https://datasetsearch.research.google.com/ https://www.kaggle.com/datasets https://catalog.data.gov/dataset/?q=&sort=metadata_created+desc&res_format=CSV https://www.earthdata.nasa.gov/ https://apps.who.int/gho/data/node.home