Sustainable Development Goal Scatter Plot - Project

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for the STEM Education Center at WPI's Summer 2022 Research Experience for Teachers program

Subject: Mathematics
Grade Level: 8
United Nations Sustainable Development Goals:
This project ties to the 17 U.N. Sustainable Development Goals as a broad overview, with specific examples focused towards the first 8 goals.

1. *No Poverty* - To end poverty in all its forms everywhere by 2030.
2. *Zero Hunger* - To end hunger, achieve food security and improved nutrition and promote sustainable agriculture.
3. *Good Health and Well-Being* - To ensure healthy lives and promote well-being for all at all ages.
4. *Quality Education* - Ensure inclusive and quality education for all and promote lifelong learning.
5. *Gender Equality* - To achieve gender equality and empower all women and girls.
6. *Clean Water and Sanitation* - To ensure access to safe water sources and sanitation for all.
7. *Affordable and Clean Energy* - To ensure access to affordable, reliable, sustainable and modern energy for all.
8. *Decent Work and Economic Growth* - To promote inclusive and sustainable economic growth, employment and decent work for all.

Overview

You are a data scientist for the Division for Sustainable Development Goals (DSDG) in the United Nations. This is the group that provides support for the 17 Sustainable Development Goals (SDGs).

Your team has been assigned to one of the goals. Your job is to interpret the scatter plots for your goal area and present your findings at the next High-level Political Forum on Sustainable Development, which serves as the central UN platform for the follow-up and review of the SDGs. Your data analysis will be used to help update the UN about the goals and inform them of ideas about how to address the issues.

Standards & Learning Targets

8.SP.A. *Investigate patterns of association in bivariate data.*
1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

Vocabulary	**Tier 1**	**Tier 2**	**Tier 3**

	Data Measurement Quantities Describe	Construct Interpret Investigate Patterns of Association	Scatter Plots Bivariate Clustering Outliers Positive/Negative Association Linear/Nonlinear Association
What do students need to **KNOW**?	1. Students will use the following vocabulary words in context: Bivariate, Scatter Plots, Clustering, Outliers, Positive/Negative Association, Linear/Nonlinear Association. 2. Students will be able to describe how scatter plots are used for bivariate measurement data. 3. Students will be able to explain patterns of association between two quantities. 4. Students will be able to describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.		
What do students need to **DO**?	1. Students will construct and interpret scatter plots for bivariate measurement data. 2. Students will identify patterns of association between two quantities. 3. Students will identify patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.		
What will students **CREATE**?	1. Students will complete a template and use it to create an individual slide, where they have constructed and interpreted a scatter plot, using specified, individually-assigned, real-world data points from a table. 2. Students will compare their graphs with real-world graphs from the UN Sustainable Development Goal records. 3. Students will create a group presentation to share their interpretations of their scatter plots and connections to their UN Sustainable Development Goal.		

ELA Standard: 8.SL. Presentation of Knowledge and Ideas
4. Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate vocabulary, eye contact, volume, and pronunciation. (See grade 8 Language Standards 4–6 for specific expectations regarding vocabulary.)

Vocabulary	**Tier 1**	**Tier 2**	**Tier 3**
	Present Findings Emphasize Details Vocabulary Eye Contact Volume	Claims Relevant Evidence Valid Reasoning Pronunciation	Gross Domestic Product (GDP) Sustainable Development Goal (SDG) United Nations Data Science
What do	1. Students will use the following vocabulary words in context: Gross		

students need to **KNOW**?	Domestic Product (GDP), Sustainable Development Goal (SDG), United Nations, Data Science. 2. Students will be able to emphasize salient points in a focused, coherent manner. 3. Students will be able to recognize relevant evidence.
What do students need to **DO**?	1. Students will coherently present claims and findings. 2. Students will use sound, valid reasoning, and well-chosen details. 3. Students will use appropriate vocabulary, eye contact, volume, and pronunciation.
What will students **CREATE**?	1. Students will create a group presentation to share their interpretations of their scatter plots and connections to their UN Sustainable Development Goal. 2. Students will present their SDG Scatter Plot presentations to the class.

Prior Knowledge

Scatter Plot Standard Unit

- Day 1: Scatter plot vocabulary, introduction to and practice creating scatter plots, and introduction to and practice interpreting scatter plots.
- Day 2: Practicing interpreting scatter plots, introduction to SDG Scatter Plot Project (includes background to U.N., SDGs, data science), starting individual scatter plot creation and interpretation, starting to create group slides.
    - Homework - Individual template creating and interpreting their scatter plot from assigned, specified, real-world data points given in a table. They will upload a picture scan of their graph into their individual slide(s) and add their interpretations.
- Day 3: Practicing the group presentation and class presentations.

Materials/Resources

Google Drive Folder with SDG Project Materials

- Contents: 8 Presentation Templates, Project Overview Document, Zip File with pictures/infographics.
- Students will work on teams of 3-4.

Timeline of Activities

Day	Duration	Activity	Instructions	Product
1	10 min.	Warm-up and Vocabulary	Individual work and class discussion.	Completed warm-up.

1	20 min.	Intro to and practice creating scatter plots	Class discussion and independent/partner work from the general curriculum.	Completed classwork practice.
1	19 min.	Intro to and practice interpreting scatter plots	Class discussion and independent/partner work from the general curriculum.	Completed classwork practice.
2	10 min.	Warm-up and review practice interpreting scatter plots	Class discussion and independent/partner work.	Completed warm-up. Completed classwork practice.
2	10 min.	Intro to project expectations and groups	Class discussion, project intro and rubric resources.	
2	19 min.	In-class Individual scatter plot creation and interpretation Starting group slides	Students will work on their independent component (creating and interpreting a scatter plot from an assigned data set) following instructions detailed in their project rubric document. Students will discuss their individual work with their teammates, to give and receive feedback. Teams will begin to generate ideas for their group slide structure and towards their SDG goals.	Individual template for scatter plot creation and interpretation. Individual slide. Team Intro, Goal, and Ideas slides.
2	HW	Finish individual components from class.	Instructions per the project rubric document.	Individual scatter plot outline slides.
3	5 min.	Warm-up	Class discussion.	Completed warm-up.
3	15 min.	Finish group slides.	Instructions per the project rubric.	Completed group slides.
3	5 min.	In-class Practice presentations.	Team practice.	
3	19 min.	Presentations.	Team presentations. (Presentations can be no shorter than 3 minutes and no longer than 5 minutes.)	Team Presentations. Feedback forms for other teams.

3	HW	Feedback forms.	Complete the feedback forms for other teams.	Feedback forms.
(4)	(As needed)	Finish remaining presentations.	(Remaining team presentations and feedback forms as needed).	Team Presentations. Feedback forms.

Culturally Responsive Teaching Strategies

Word bank for vocabulary terms to include in presentations	*The word bank will help to provide recognition and practice in understanding/interpreting the vocabulary terms related to scatter plots within the context of real-world data.*
Guided template to creating scatter plots	*The guided template will allow students to follow a scaffolded process to create a scatter plot using their real-world dataset.*
Guided outline to interpreting scatter plots	*The guided outline will provide students with a scaffolded process and reminders on how to interpret a scatter plot, based on the scatter plot that they have created.*

Career Connections

Data Scientist - Students will act as a team of data scientists working for the U.N. in this project to interpret scatter plots and present their findings.

Researchers - Connections to researchers interpreting their collected data.

Data analysts/Statisticians/Mathematical Science careers - Connections to these careers analyzing trends in data, creating graphs, and interpreting graphs.

Computer Science careers - Connections to how computer softwares/programs may be used as tools for helping to interpret and analyze data graphs (e.g. trends, lines of best fit, etc.)

Assessment

Project Rubric