**Project Oceanology**

Bar and Line Graph Activity

**Learning Objectives:**

Students will be able to articulate why graphs are useful

Students will use data tables to construct column (bar) graphs and line graphs.

When presented with a new data table, students will identify which type of graph (line graph or bar graph) is most appropriate for those data

**NGSS Alignment:**

Science and engineering practices:

Developing and using models

*Students will construct and discuss graphical models that show the relationship between two variables.*

Analyze and interpret data

*Students will organize and interpret raw data by making graphs.*

Using math/computational thinking

*Students will use mathematical terminology and logic to explain the connection between the two variables.*

Engaging in argument from evidence

*Students will present and defend their graphical design choices and their interpretation of their datasets.*

Crosscutting Concepts

Patterns

*Students will use graphs to identify patterns in their data*

Cause and Effect: Mechanism and Explanation

*Students will use their data to develop hypotheses about causality.*

**Materials required:**

Large sheets of paper (or chalkboard space), markers

**Protocol & Teaching Notes**

**Engage:** Slide show of silly, eye-catching graphs. Prompt students: what does each graph say? What helped you understand the graph? What makes it hard to understand a graph? Discussion of why graphs are useful.

*Point out as they come up that the column graphs compare two categories, while the line graphs show a continuous relationship, but don’t give explicit instructions for the next step.*

**Explore:** Small groups receive a dataset (half receive continuous data, half receive categorical). Students work together with large sheets of paper and markers (or on board) to design a graph. Tell them to design a graph to show their data most effectively, but do not tell them what type of graph to use.

*Depending on the experience level of the class, students may or may not think of calculating averages for categorical data. Teachers may wish to guide them one direction or the other, or let them come up with solutions on their own and then discuss.*

**Explain:** Short lecture – categorical vs. continuous data, bar vs. line graphs. Graphs can be thought of as models for how variables relate to one another. Optional: slide show of datasets, class votes for bar vs. line graphs.

*This section can be highly customized based on the experience level of the students and the curricular goals of the teacher.*

**Elaborate:** New dataset. Tell them to first decide which type of graph they should use, then make a new graph.

*It may be helpful to mix up groups at this stage, because students from different groups will bring different experiences to the new graphing problem.*

**Evaluate:** Each group picks one of their graphs to present to rest of class. Presentation should include a discussion of why they chose that type of graph, other choices they made to effectively show the data.