ASET Science & Engineering Practices (SEP) Tool: Analyzing & Interpreting Data

Reviewer Name or ID:
Science Lesson/Unit Title:
Intended grade:

SEP 4	**Analyzing and Interpreting Data:** Scientific investigations produce data that must be analyzed in order to derive meaning. Scientists use a range of tools-including tabulation, graphical interpretation, visualization, and statistical analysis- to identify sources of error in investigations and calculate the degree of certainty in the results. Engineering investigations include analysis of data collected in the tests of designs. This allows comparison of different solutions and determines how well each meets specific design criteria. Like scientists, engineers require a range of tools to identify patterns within data and interpret results.

Components of SEP **In this lesson/unit plan, it is clear that *students* have a structured opportunity to:**	**Mark with "x" if present in lesson**	**What teacher actions were taken to facilitate this component for students?**	**What are the students doing?**
1) Clearly organize and display data to represent phenomena.			
2) Identify and describe relevant and meaningful patterns and relationships in data.			
3) Use statistical techniques to analyze data to address a scientific question or design solution			

 Project Next Gen ASET is supported by a grant to the California State University East Bay by the National Science Foundation Discovery Research K12, Award No. DRL-1418440. PI: michele.korb@csueastbay.edu or contact corinne.lardy@csus.edu, michelle.sinapuelas@csueastbay.edu

4) Interpret data to provide evidence for, predict, and/or draw conclusions about phenomena.			
5) Analyze and interpret large data sets.			
6) Identify and address variation and uncertainty in data sets.			
Notes on Context/Special Considerations (part of school year, differentiation, student developmental considerations, etc.):			

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ASET Grade Band Criteria *(Grade Band: 6-8)*

Science & Engineering Practices	
SEP 4: Analyzing and Interpreting Data: Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.	
*By the end of the grade band **students** will have had a structured opportunity to develop an understanding of each of these. Individual lessons or units should include opportunities for **students** to practice one or more of the following components ……*	
1) Clearly organize and display data to represent phenomena.	a. Organize data in a clear way that i. facilitates analysis and interpretation of relationships. ii. highlights patterns and relationships that are relevant and meaningful to a scientific question. b. Generate visual displays (e.g. tables, graphs, charts, images) that are i. Interpretable and clear ii. Appropriate to the data. iii. Connected to the phenomenon c. Students clearly **describe how** the visual displays represent each data set.
2) Identify and describe relevant and meaningful patterns and relationships in data.	a. Identify and describe patterns and relationships (similarities and differences, causal and correlational, linear and nonlinear) that i. Are relevant and meaningful ii. Address a natural phenomenon. b. Distinguish between causal and correlational relationships in data. c. [Engineering] Analyze data to define an optimal operational range for a proposed object, tool, process, or system that best meets criteria for success
3) Use statistical techniques to analyze data to address a scientific question or design solution	*a.* Use appropriate descriptive statistics to summarize data in a way that addresses a scientific question. *b.* Apply concepts of statistics and probability (including mean, median, mode, minimum/maximum values, and variability) to analyze and characterize data, using digital tools when feasible.
4) Interpret data to provide evidence for, predict, and/or draw conclusions about phenomena.	a. Make predictions based on evidence. b. Make a claim about a phenomenon, based on relevant and sufficient evidence c. Determine, describe, and provide evidence for phenomena. *d.* Draw conclusions about phenomena.
5) Analyze and interpret large data sets.	a. Use graphical displays (e.g., maps, charts, graphs, or tables) of large data sets to identify and describe temporal and spatial relationships. b. Construct, analyze, and/or interpret graphical displays of large data sets to identify linear and nonlinear relationships.
6) Identify and address variation and uncertainty in data sets.	a. Compare results from different trials and/or different groups and describe variations in findings b. Identify relevant sources of measurement variation and determine how to address them. c. Seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials). d. Identify relevant sources of measurement error and describe how they limit interpretations of the data. e. Apply basic statistical techniques of error analysis.

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