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Standard Deviation and Standard Error – Telling the Story of Data

Engagement: Watch the Standard Deviation – Explained and Visualized Video: http://bit.ly/StandardDeviationVideo

Exploration: Choose a measurable variable which does just that – varies. Have students collect at least five data points or five trials measuring that variable. Students will then hand calculate the standard deviation and Standard Error for each data point. Students can also learn how to calculate standard deviation using Excel and also learn how to show error bars on data points or bars.

Standard Deviation from Bozeman Science: http://bit.ly/BozemanStandardDeviation

Standard Error from Bozeman Science: http://bit.ly/BozemanStandardError

Explanation: Students will apply their knowledge of the normal curve to answer questions about the story their data is telling.

Elaboration: Students will be asked to apply this new data analysis to the data they collect for their science fair projects. All data will have standard error bars included with them.

Evaluation: As evidenced by standard error bars which vary and accurate calculations of the standard deviation of their collected science fair data, students can demonstrate understanding of these analysis tools. One also expects to find reference to these statistics in the analysis and conclusion sections of their projects.

Additional Resources:
Standard Deviation and Variance
http://www.mathsisfun.com/data/standard-deviation.html
Standard Deviation and Error Bars
https://labwrite.ncsu.edu/res/gt/gt-stat-home.html
Standard Deviation – population vs. sample
https://statistics.laerd.com/statistical-guides/measures-of-spread-standard-deviation.php
Why There is a Minus One in Standard Deviations
http://duramecho.com/Misc/WhyMinusOneInSd.html
Continuous vs. Discrete Data
https://www.youtube.com/watch?v=6IdJ1aPFDCs