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I've Collected Some Data…Now What?
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Statistical problem solving process:

1. Formulate a question that can be answered with data.
2. Design a plan and collect appropriate data.
3. Analyze the collected data by graphical and numerical methods.
4. Interpret the analysis with respect to the original question.

Guidelines for Assessment and Instruction in Statistics Education (GAISE)
http://www.amstat.org/education/gaise/GaiseCollege_full.pdf

A Progression of Statistics from CCSSM Grades 6-7

Domain: Grade 6 - Statistics and Probability

Cluster: Develop understanding of statistical variability.

Standard: 6.SP.A.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages*.

Standard: 6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

Standard: 6.SP.A.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

Cluster: Summarize and describe distributions.

Standard: 6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

Standard: 6.SP.B.5 Summarize numerical data sets in relation to their context, such as by:

a. Reporting the number of observations.
b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

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Domain: Grade 7 - Statistics and Probability
Cluster: Use random sampling to draw inferences about a population.
Standard: 7.SP.A.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
Standard: 7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*
Cluster: Draw informal comparative inferences about two populations.
Standard: 7.SP.B.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*
Standard: 7.SP.B.4 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*

Mathematical Practices Through a Statistical Lens

Reason abstractly and quantitatively.

Statistically proficient students understand the difference between mathematical thinking and statistical thinking. Students engaged in mathematical thinking ask, “Where’s the proof?” They use operations, generalizations, and abstractions to prove deterministic claims and understand mathematical patterns free of context. Students engaged in statistical thinking ask, “Where’s the data?” They reason in the presence of variability and anticipate, acknowledge, account for, and allow for variability in data as it relates to a particular context.

Although statistical thinking is grounded in a concrete context, it still requires reasoning with abstract concepts. For example, how to measure an attribute in answering a statistical question, selecting a reasonable summary statistic such as using the sample mean (which may be a value that does not exist in the data set) as a measure of center, interpreting a graphical representation of data, and understanding the role of sampling variability for drawing inferences—all of these require reasoning with abstractions.

The Statistical Education of Teachers (SET)
http://www.amstat.org/asa/files/pdfs/EDU-SET.pdf

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