Close Reading for component 1 in GAISE Framework

The Difference Between Statistics and Mathematics

"Statistics is a methodological discipline. It exists not for itself, but rather to offer to other fields of study a coherent set of ideas and tools for dealing with data. The need for such a discipline arises from the omnipresence of variability." (Moore and Cobb, 1997) A major objective of statistics education is to help students develop statistical thinking. Statistical thinking, in large part, must deal with this omnipresence of variability; statistical problem solving and decision making depend on understanding, explaining, and quantifying the variability in the data. It is this focus on variability in data that sets apart statistics from mathematics." (P.6 GAISE Framework)

1) Statistical thinking must deal with the omnipresence of

2) How is statistics and statistical problem solving and decision making set apart from mathematics?

The Role of Mathematics In Statistical Education

The evidence that statistics is different from mathematics is not presented to argue that mathematics is not important to statistics education or that statistics education should not be a part of mathematics education. To the contrary, statistics education becomes increasingly mathematical as the level of understanding goes up. But data collection design, exploration of data, and the interpretation of results should be emphasized in statistics education for statistical literacy. These are heavily dependent on context, and, at the introductory level, involve limited formal mathematics. (P.9 GAISE Framework)

3) When working with statistics what is it that is heavily dependent on context?

4) What is some formal mathematics that may be necessary to engage in statistics at the introductory level?

The Role of Variability in the Problem Solving Process

The formulation of a statistics question requires an understanding of the difference between a question that anticipates a deterministic answer and a question that anticipates an answer based on **data that vary**. The question, "How tall am I?" will be answered with a single height. It is not a statistics question. The question "How tall are adult men in the USA?" would not be a statistics question if all these men were exactly the same height! The fact that there are differing heights, however, implies that we anticipate an answer based on measurements of height that vary. This is a statistics question. The poser of the question, "How does sunlight affect the growth of a plant?" should anticipate that the growth of two plants of the same type exposed to the same sunlight will likely differ. This is a statistics question. The anticipation of variability is the basis for understanding the statistics question distinction." (P.11 GAISE Framework)

5) To ask statistical questions requires one to understand the difference between

Questions anticipating deterministic answers	vs. Questions anticipating answers based on data that varies
How many teachers are in this room?	How many teachers are in each room at this conference?
How much does your home cost? What is your zip code?	How does the location of a house affect its cost? What is the typical cost of a home in the US?
At what age did Aretha Franklin die?	What is the typical life expectancy for a US citizen? How does ethnicity or gender affect life expectancy?

6) In what ways are these question types different from each other (use evidence from the text to support your explanation?

The Guidelines for assessment and instruction in statistics education (GAISE) Framework

I. Formulate Questions

→ clarify the problem at hand
→ formulate one (or more) questions that can be answered with data

II. Collect Data

→ design a plan to collect appropriate data
→ employ the plan to collect the data

III. Analyze Data

→ select appropriate graphical and numerical methods
→ use these methods to analyze the data

IV. Interpret Results

→ interpret the analysis
→ relate the interpretation to the original question

Time to generate your own statistical question

1. Our problem at hand?   The Opportunity Gap

2. What is a question that anticipates a deterministic answer? _____
_____
_____

3. What is a question that anticipates answers based on data that varies? _____
_____
_____
_____

4. If time allows: What might be another question that anticipates answers based on data that varies? _____
_____
_____
_____

Prompts to consider as you develop your statistical question:
- Big Question- What do you want to know?
- What information (data) will you need to answer your big question?
- How can you use (this) information to help answer questions?
- Variety- Show or describe the variety within the data
- Explain how this information (data) will (help) answer your big question.