GOALS

1. Increase secondary teachers' statistics and probability content and pedagogical knowledge in order to implement teaching of statistics in Ms and HS.

2. Increase secondary students' opportunities to learn statistics and probability content in alignment with the Common Core State Standards for Mathematics and the GAISE Framework.

3. Provide a repository of peer-reviewed and piloted lesson plans for all teachers to access.

HOW IS STATISTICS DIFFERENT THAN MATH?

- Context is interwoven and important to the problem.

- Variation remains rather than being removed
  - Creates uncertainty in results.

- Final response should incorporate information from:
  - Visual representation(s)
  - Descriptive statistics (measures)
  - Context of the data
- Multiple valid conclusions depending on interpretation.

CORE STATISTICAL IDEAS

- Center
- Variation
- Spread or range
- Sample size
- Shape of the data distribution
- Potential outliers

- *Students formulate responses based on informal approaches through coordination of prior knowledge, statistical concepts, and problem context.*

GRADE 7 STANDARDS

Draw informal comparative inferences about two populations.

CCSS.MATH.CONTENT.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.

GRADE 7 STANDARDS

Draw informal comparative inferences about two populations.

CCSS.MATH.CONTENT.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.

HIGH SCHOOL STANDARDS

Summarize, represent, and interpret data on a single count or measurement variable

CCSS.MATH.CONTENT.HSS.ID.A.1

- Represent data with plots on the real number line (dot plots, histograms, and box plots).

CCSS.MATH.CONTENT.HSS.ID.A.2

- Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

CCSS.MATH.CONTENT.HSS.ID.A.3

- Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

HIGH SCHOOL STANDARDS

Make inferences and justify conclusions from sample surveys, experiments, and observational studies

CCSS.MATH.CONTENT.HSS.IC.B.5

- Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

GAISE FRAMEWORK

1. Formulate a question
2. Collect data
3. Analyze data
4. Interpret results

- ALL students should experience these 4 steps associated with a statistical investigation.
- Few textbooks offer opportunities for 1 & 2 above.

ELEMENTS OF THE LESSON PLANS

- Inferential focus
- Ill-structured
- Open-Ended
- Context
- Use of Visual Representation

HOW FAST ARE YOU?

- **S-ID.1.** Represent data with plots on the real number line (dot plots, histograms, and box plots).

- **S-ID.3.** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

ROCK-PAPER-SCISSORS

- **S-ID.1.** Represent data with plots on the real number line (dot plots, histograms, and box plots).

- **S-IC.1.** Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

- **S-IC.2.** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.

Questions?

Thank you!!!

RESOURCES & LINKS

STatistics Education Website (STEW)
http://www.amstat.org/education/stew/

Illustrative Mathematics
https://www.illustrativemathematics.org/

Inside Mathematics – Common Core Resources
http://www.insidemathematics.org/common-core-resources

Statistics & Probability, Content & Pedagogy, for Teaching Secondary Students
https://sites.google.com/site/iowastatsprob/home

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