

Middle School Mathematics Task Force Subcommittee Report

Name of Subcommittee: Probability and Statistics
Name of Facilitator: Jerome Reyes
Date of Report: January 20, 2009

Current Course Overview:

This course provides an introduction to probability, data analysis, and descriptive statistics. The course has been designed to engage participants in developing a deeper understanding of the content covered in the K – 8 probability and statistics strand of the Virginia Standards of Learning. Emphasis is placed on the exploration of randomization, data collection, data representation, measures of central tendency, and dispersion. Special attention will also be given to children's thinking, how they learn, their problem solving strategies, and how they construct their understanding of the aforementioned mathematics concepts.

Current Goals of the Course:

- Read, construct, and analyze various graphical displays of data, including dot plots, stem-and-leaf plots, and histograms
- Plan and conduct a survey; and collect, organize, display, and analyze the corresponding data using the appropriate graphical representations
- Distinguish between empirical and theoretical probabilities
- Compute and distinguish between permutations and combinations, and understand their usefulness in constructing the sample space of an experiment.
- Understand the definitions, pros and cons of the various measures of central tendency and dispersion.
- Connect the course content to the classroom environment as to explore pedagogical approaches and challenges related to the aforementioned concepts.

Rationale for adaptations to accommodate the needs of Middle School Specialists:

Effective teaching requires a knowledge base that extends beyond the scope of the intended curriculum. Moreover, the absence of this knowledge inhibits the ability to answer questions pertaining to the connection and purpose of the content beyond the classroom. In other words, imagine teaching 3rd grade math with a 4th grade education. As impractical as this may seem, it is not far from what is occurring with probability and statistics. Our experience has been that probability and statistics are the content areas to which our math educators have had the least exposure beyond their own K-8 experiences. As a result, for those that teach this content, their knowledge of the curriculum does not tend to surpass the K-8 curriculum strands they are required to teach. This lack of global relevance promotes lessons that are driven by procedures and definitions rather than content depth and rationale.

We address these concerns for our K-5 teachers, as the Math Specialist course currently emphasizes the content strands from grades 6 – 8; hence provided them with adequate

vertical curriculum alignment. However, because of the wide scope of backgrounds that the 1st - 8th grade teachers bring to the table, the current course offering does little to empower middle school teachers with knowledge of the curriculum at higher levels. Implementing change to address these concerns would give the middle school teachers a better understanding of their content and subsequently give their students a more seamless transition from grade to grade.

Recommended Course Adaptations:

The current course provides an introduction to probability, data analysis, and descriptive statistics. With an audience of 6th – 8th grade instructors, a stronger knowledge base can be presumed; allowing us to spend more time on analysis and interpretation rather than definitions and procedures. More time will also be devoted to making connections between the K – 8 SOL content strands and the corresponding high school curriculum. This will be done via the inclusion of the following objectives:

- Incorporate concepts of control, randomization, and measurement of experimental error into the existing course project.
- Develop, interpret, and apply numerous probability distributions for discrete random variables (e.g., binomial, geometric, negative binomial).
- Given data from a large sample, find and interpret point estimates and confidence intervals for parameters.
- Further develop the ability to describe the relationship between two variables, using shape; strength of relationship; clusters; positive, negative, or no association; outliers; and influential points.