

The Pennsylvania State University

The Graduate School

College of Education

**DEVELOPING AN UNDERSTANDING OF VARIATION: AP STATISTICS
TEACHERS' PERCEPTIONS AND RECOLLECTIONS OF CRITICAL MOMENTS**

A Dissertation in

Curriculum and Instruction

by

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ABSTRACT

This phenomenological study investigates conceptions of statistical variation that secondary mathematics teachers who are recognized leaders in AP Statistics exhibit. This study also investigates perceptions and recollections of activities and actions that teachers who exhibited robust understandings of variation suggest contributed to their current understandings of variation. The data include questionnaires, event history calendars, critical incident descriptions, resumes, course syllabi, content-focused interviews, and two learning-context interviews for each teacher. Constant comparative analysis (Glaser & Strauss, 1967) of content-interview data and syllabi yielded three distinct types of teachers' conceptions of variation: Expected but Explainable and Controllable (EEC), Noise in Signal and Noise (NSN), and Expectation and Deviation from Expectation (EDE).

The teachers' responses to variation-related tasks were used in conjunction with the SOLO Model, research results about students' learning related to variation, and expositions on what it means to understand statistical variation to develop a framework for robust understandings of variation. The framework consists of two cycles of levels of reasoning in the formal mode. Robust understanding of variation is indicated from integrated reasoning about variation across three perspectives—design, data-centric, and modeling—in the second cycle of levels. Teachers' understandings of variation were assessed using the framework. Five teachers exhibited reasoning about variation that was consistent with robust understandings of variation.

Analysis of learning experience-related data for these five teachers followed protocol for phenomenological studies. Factors that may have contributed to these five teachers' developments of robust understandings include their interests in the field of statistics, their desires to have an overarching content framework for themselves and for their students, their foundational knowledge upon which they built deeper understandings, their propensities for

critical reflection, and their acting on opportunities to engage in learning activities and rational discourse with more knowledgeable others. The extent to which they embrace these opportunities may distinguish them from other teachers.