

Abstract of Dissertation Presented to the Graduate School  
of the University of Florida in Partial Fulfillment of the  
Requirements for the Degree of Doctor of Philosophy

HIGH SCHOOL STUDENTS' UNDERSTANDING OF VARIABILITY

By

Steven J. Foti

August 2017

Chair: Tim Jacobbe  
Major: Curriculum and Instruction

Variability is often considered a central concept in the subject of statistics. This dissertation presents a large-scale snapshot of United States high school students' understanding of variability. Over seven hundred secondary students in high-performing districts from 6 different states, with statistics topics included in their high school standards, participated in the study. Data were collected from the participants using existing instrument designed to measure overall conceptual understanding of statistics through multiple-choice (MC) and constructed response (CR) items. These data were collected in the participants' classrooms during one 90-minute or two 45-minute testing sessions.

Responses to CR items were of primary interest to this study. The items were coded based on how they addressed variability, per an existing framework for understanding statistical variation. Using a procedure developed as part of the study, student responses were scored according to whether the response displayed evidence of understanding of variability. Through quantitative methods, this study was able to identify and utilize trends and patterns in response data to (a) evaluate students' understanding of variability and (b) empirically analyze the role of variability in the overall understanding of statistics. Responses showed strong evidence of understanding how to anticipate variability when collecting data through surveys. However,

there was a glaring lack of evidence of understanding the role variability plays in designing studies and analyzing data. Evidence of understanding of variability found in the CR items was a significant predictor of an overall understanding of statistics. The lack of evidence of strong understanding of variability among secondary students in high-performing districts raises concerns about how high school students, in general, understand the concept.