

## ABSTRACT

An abstract of the dissertation of Daniel Lee Canada for the Doctor of Philosophy in Mathematics Education presented May 4, 2004.

Title: Elementary Preservice Teachers' Conceptions of Variation

Recent research has been aimed at finding out how precollege students think about variation, but very little research has been done with the prospective teachers of those students. Absent from the literature is an examination of the conceptions of variation held by elementary preservice teachers (EPSTs). This study addresses how EPSTs think about variation in the three contexts of sampling, data and graphs, and probability situations.

A qualitative study was undertaken with thirty students in an elementary teachers' mathematics course. The course included three classroom interventions comprised of activities promoting an exploration of variation in each of the three contexts. Written surveys were completed by all students both before and after the class interventions, and six students participated in pre and post interviews.

Collective results from the survey data, interview data, and class observations were used to describe components of an *evolving framework* useful for examining EPSTs' conceptions of variation. The three main *aspects* of the framework address how EPSTs reason in expecting, displaying, and interpreting variation. Each of the three aspects is further defined by different *dimensions*, which in turn have their own

constituent *themes*. The depth in describing the evolving framework is a main contribution of this research.

Particular tasks created or modified for this research proved useful in examining EPSTs' conceptions of variation. One kind of task asked students to evaluate supposed results of experiments and decide if the results were genuine or not. Another kind of task provided specific arguments to which subjects could react. A third kind of task involved a comparison of data sets that were displayed using different types of graphs.

The framework was used to compare the thinking of the six interviewees from before to after the class interventions. Changes included richer conceptions of expectations of variation, more versatile understanding about displays of variation, and better interpretations of variation. The most notable changes were the overall depth in maturity of responses and an increased sophistication in communication during the post interview. Evidence suggests that the class interventions, and the survey and interview tasks, stimulated changes in the way students thought about variation.