SREE Fall 2011 Conference
Symposium Submission

Title: Examining Relationships between Instructional Quality in Mathematics, Contextual Factors, and Student Achievement

Session Chair: Thomas Smith, thomas.smith@vanderbilt.edu

Papers & Authors:
1. Impact of Organizational Supports for Math Instruction on the Instructional Quality of Beginning Teachers
   Authors: Thomas Smith & Laura L. Neergaard*, Vanderbilt University; Eric Hochberg, University of Pennsylvania

2. School District Curriculum Implementation: Explaining Differences in the Cognitive Demand of Mathematical Tasks
   Author: Anne L. Garrison*, Vanderbilt University

3. Examining Relationships between Instructional Quality and Student Achievement in Middle-Grades Mathematics
   Authors: Glenn T. Colby* (Vanderbilt University), Melissa D. Boston (Duquesne University), Thomas Smith (Vanderbilt University)

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Justification (500 words)

Current priorities evident in recent mathematics instructional reform include an emphasis on students’ conceptual understanding of mathematics content beyond procedural proficiency and a focus on overarching concepts rather than disconnected skills. Specific aspects of classroom instruction that have been identified in the literature as supporting these priorities include the use of mathematical tasks for which there are multiple solution strategies classroom discussions of mathematical ideas and processes that prompt students for reasoning and justification of solutions. (Cohen & Ball, 1990; Hiebert, 2003; NCTM, 2000). The papers in this session consider the associations between teacher, school, and district characteristics and both teachers’ implementation of these kinds of instructional practices and student achievement.

The studies in this session draw on data from two longitudinal National Science Foundation funded studies of middle grades mathematics teachers. The first includes a four year panel study of 120 teachers in four large urban districts that have adopted and inquiry-oriented curriculum in middle school mathematics (e.g., the Connect Mathematics Project). The second is
a longitudinal study of beginning middle school mathematics teachers’ and their induction and mentoring experiences conducted across 11 urban, suburban, and rural districts in two southern and two eastern states. This study was designed to examine the relationship between teachers’ induction, mentoring, and professional development experiences with improved (a) knowledge for teaching math, (b) alignment and quality of instruction, and (c) student achievement. Both projects are currently in their final year of data collection.

Both of these projects use the Instructional Quality Assessment (IQA) to measure the quality of individual teachers’ mathematics instruction. The IQA, a classroom observation protocol developed at the University of Pittsburgh’s Learning Research and Development Center (Junker et al., 2006), is closely aligned with the vision of teaching and learning advocated by the National Council of Teacher of Mathematics (NCTM, 2000) and is intended for use with math lessons that involve students in a problem-solving activity and subsequent whole-class discussion (Matsumura et al., 2006). The IQA was designed to assess the quality of classroom instruction and we use the instrument to observe classroom instruction and assess the following: (1) rigor of lesson activities and the ensuing class discussion (e.g., the degree to which students are supported to build deep conceptual understanding and engage with the demands of high-level tasks); and (2) the quality of class discussion (e.g., the extent to which teachers press students to build deep conceptual understanding in mathematics and engage with the demands of high-level tasks).

To design supports for teachers’ development of instructional practices that are likely to increase student achievement, we must first gain a better understanding of which instructional practices are best associated with student achievement gains and then consider what types of supports can help teachers develop these practices. The studies included in this session take an important step in investigating these relationships in various settings for veteran and beginning teachers using the same measure of instructional quality.