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Author
Crockett, Michele D.

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Recursive Reviews of Math Lessons: A Mechanism for Improving Instruction

Michele D. Crockett (mdcrockett@ucr.campus.mci.net)
Graduate School of Education and Information Sciences, Box 951521
Los Angeles, CA 90095-1521 USA

Interest in teachers' cognitive processes emerged as information-processing and cognitive sciences research critiqued behavioristic methods of research on teaching (Shulman, 1986). In a review of the teacher thinking literature, Clark and Peterson (1986), describe it as an eclectic genre of research with its roots in teacher-effectiveness research, primarily focusing on some aspect of teacher thinking like lesson planning, decision making, judgment, implicit theories and beliefs, expectations, and attributions. According to Clark and Peterson, "[t]he ultimate goal of research on teachers' thought processes is to construct a portrayal of the cognitive psychology of teaching for use by educational theorists, researchers, policymakers, curriculum designers, teacher educators, school administrators, and by teachers themselves."

Research on teachers' beliefs, for example, indicate the relationship between belief and practice is not clear and that the correspondence between teachers' espoused beliefs and instructional practice is not always high (Hashweh, 1996; Thompson, 1992). Pre-service training and in-service intervention studies produce an increase in teachers' content and pedagogical knowledge, but have less effect on teachers' classroom teaching (e.g., Knapp & Peterson, 1995; Wilson, 1994). Such studies point to both the complexities of teaching and the difficulties of improving teachers' instructional practices.

What is missing from the literature is knowledge about how teachers *learn* to improve their instruction *in* school contexts. This study employs a model called "lesson study" that starts with teachers' most immediate curriculum and instructional concerns and embeds teacher learning in everyday activities (Tharp & Gallimore, 1988). Mathematics lessons are the objects of intellectual inquiry. "Lesson study," fashioned after the Japanese approach to professional learning, requires that teachers meet weekly for 1 1/2 hour sessions. In these sessions, teachers collaboratively develop mathematics lessons, teach these lessons to their students, and assess the products from these lessons. A distinguishing feature of "lesson study" is its recursiveness. Teachers refine lessons according to student achievement results. More broadly, the research effort seeks to document how engagement around mathematics lessons enhances teachers' knowledge about what constitutes (1) the "good" math lesson, (2) students' conceptual understanding, and (3) "good" instructional practice. More specifically, this study seeks to document if such engagement induces a change in teachers' relatively undifferentiated notions of students' thinking and conceptual understanding to more differentiated representations of students' thinking and understanding.

The study began in mid-January 1998. There are four participants: one fourth-grade, one fourth/fifth-grade, and two fifth-grade teachers. Data collection methods are as follows: Weekly sessions are audiotaped. Each teacher will participate in 2 or 3 interviews. Classroom observations will be conducted. Each teacher's collaboratively-developed lessons will be videotaped. Students' work products from these lessons will be collected and assessed. Protocols will be used to sort and analyze data.

At the time of this writing, preliminary analysis of audio-taped sessions indicate that teachers have limited understanding of what math reformists mean by conceptual understanding. While they describe "concepts" as the meaning behind "facts" and "skills," the examples they provide to illustrate conceptual understanding are little more than definitions of mathematical terms.

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