ABSTRACT. This report presents an account of one teacher’s mathematics teaching and a perspective that underlies his teaching. Nevil was a fifth grade teacher participating in current mathematics education reforms in the United States. Through the account, we make distinctions about teachers’ thinking and practice that can inform teacher education efforts. We constructed an account by analyzing four sets of classroom observations and interviews. We observed that Nevil decomposed his understandings of the mathematics into smaller components and connections among those components. He created situations that he believed made those components and connections transparent and attempted to elicit those connections from the students. This account illustrates a practice that is different both from traditional practice and the type of practice that we would envision as a goal for teacher development. We contribute two important aspects of mathematics teacher development from traditional to reform-oriented teaching. In particular, we describe teachers’ perspectives – assimilatory structures that constrain and afford (a) the sense they make of professional development opportunities and (b) their potential learning in teacher education settings.

Mathematics teacher education is a primary force in current efforts to reform mathematics teaching. Ball (1988) pointed out that for mathematics teacher education to be effective, teacher educators must understand and be responsive to teachers’ thinking. Based on an analysis of case study data from work with a fifth grade teacher, Nevil, we postulate perspectives that underlie the practice of teachers participating in current reforms. We then examine how these perspectives define the challenges facing teacher education and how understanding these perspectives can inform teacher education efforts.

Reform documents (National Council of Teachers of Mathematics, 1989, 1991, 2000) in the United States encourage mathematics teachers to decrease traditional activities of telling and showing the mathematics students need to know. Instead, teachers are encouraged to increase learning experiences that promote problem solving, reasoning, communicating, and making meaningful connections among mathematical ideas. However, these documents “do not provide guidance on the specifics of day-to-day, minute-to-minute practice” (Ball, 1996, p. 502). Quite the
contrary, the “vision of the mathematics curriculum and the goals in the Standards are offered by NCTM without a prescription for achieving them. The approach taken is one that will empower teachers . . . to make the changes” (NCTM, 1989, p. 251). Thus, teachers are challenged to adapt their mathematics teaching by creating alternative, reform-oriented practices. This study is part of research efforts to understand the perspectives of teachers in transition from traditional to reform-oriented teaching.

CONCEPTUAL FRAMEWORK

Because this research involved an investigation of a teacher’s perspective on mathematics, mathematics learning, and mathematics teaching, we briefly describe our conceptual framework in these areas. In the context of our research, this framework affects what we notice (Mason, 1998), what we take to be significant, and what we identify as challenging our current understandings. For this same reason, we also articulate our understanding of teacher education and of teaching the particular mathematical content involved in the case study data that we present.

A Perspective on Knowing and Learning

Our conceptual framework is based on a social constructivist perspective, a coordination of cognitive and social perspectives on knowing and coming to know (Cobb & Yackel, 1996). From a social perspective, learning is a process of enculturation to the communities in which one participates (Cobb & Bauersfeld, 1995). We use this perspective to identify norms and practices in mathematics and mathematics teacher education classrooms and to understand how new and modified norms and practices are constituted. Understanding norms and practices helps us explain the interplay between the nature of the classroom microculture (Voigt, 1995) and students’ learning.

Our cognitive perspective draws on a constructivist epistemological stance and theory of learning (Dewey, 1938; Dewey & Bentley, 1949; Piaget, 1970; von Glasersfeld, 1995). In particular, we conceive of knowledge as a person’s conceptual structures and operations that are used to make sense of and organize her or his experiential world. For abbreviation purposes, we refer to both conceptual structures and operations as conceptions. We use the term perspective to postulate a broad pedagogical structure composed of multiple conceptions that collectively organize some aspects of a teacher’s practice. In characterizing a teacher’s pedagogical perspective, we make no claim of having analyzed the component