CHAPTER 10

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A FOUR YEAR FOLLOW-UP STUDY OF TEACHERS’ BELIEFS AFTER PARTICIPATING IN A TEACHER ENHANCEMENT PROJECT

Abstract. Beliefs as a practical indicator offer insight into a person’s previous experience and a “method for indirectly evaluating the instruction he has received” (Pehkonen & Torner, 1999). Using this meaning of beliefs, research was carried out to examine the beliefs teachers hold about their own change process. Four years after participating in a teacher change project designed to provide teachers in grades three through nine with experiences that encourage reflection on teaching and learning and to highlight methods that are consistent with a constructivist theory of learning, 37 teachers participated in a research study that asked them to share their beliefs about the experience. Twenty-nine of the 37 teachers were active in a teacher group that continued the mission of the project. Eight were no longer participating. In both groups, the teachers’ believed three factors were instrumental in their change process: collaboration, colleagues in the project, and modeling of thinking and behaviors advocated. Three factors were believed by both groups to have had very little effect or actually hindered their change: the principal or school administration, colleagues in their school, and their day-to-day working conditions. These beliefs provide useful information in “understanding the nature of teachers’ professional development” (Cooney, 1999) and can help us frame future professional development models.

1. INTRODUCTION

For more than a decade the mathematics education community has made recommendations for reform in curriculum and pedagogy based on theoretical work coming out of cognitive science. Through this reform lens the teacher in the mathematics classroom has a different charge. Students are not seen as empty vessels waiting to be filled up, and teaching is not perceived as a set of routines and scripts to be followed. The teacher is asked to be a facilitator of learning and to engage students in discussions that require explaining and justifying their thinking. This type of mathematics classroom looks and sounds very different from a conventional lecture-oriented classroom. Teaching from this perspective feels very different and requires fundamental change in how teachers behave and perhaps in what they believe.

In the United States, this movement was spearheaded by the National Council of Teachers of Mathematics [NCTM] (NCTM, 1995, 1991, 1989). Curriculum developers built programs that, to various degrees, supported the recommendations of reform. Individual teachers, schools, and entire school systems sought teacher
development models and methods to assist them as they attempted to respond to these recommendations; and numerous projects were initiated to support teacher change consistent with the recommendations (Annenberg Foundation, Guide, 1996; Grouws & Schultz, 1996; Ferrini-Mundy, 1997). Yet change is difficult and far from universal (Cooney & Shealy, 1997; Pehkonen, 1999).

Why are some teachers reluctant to change and hold fast to their traditional methods while others are embracing reform practices and changing the environment of their mathematics classrooms? Why are some projects able to impact classroom teaching in significant ways? There is a large body of literature that points to teachers' beliefs about teaching and learning mathematics as driving pedagogical behavior. In order to change teaching, teachers often must examine and change their beliefs (Richardson, 1996; Thompson, 1992). If we continue the logic, however, we must ask another question. Why are some projects, courses, experiences, etc., able to impact teachers’ beliefs about teaching and learning mathematics and others are not? And, to continue, what beliefs do teachers hold about their change process? What do they believe has impacted change in their teaching? To understand teacher development and change (and eventually to impact that change) a critical piece of the puzzle is teachers’ understandings of their own change process.

A variety of definitions exist around beliefs (Furinghetti & Pehkonen, 1999), even among researchers within the field. To situate my research let me begin by sharing my understandings. I interpret beliefs to be part of our subjective knowledge with a strong affective component. This is different from knowledge which can at some level be socially agreed upon as true or false. For example, I may have a belief that addition of fractions is hard (based on my unsuccessful and stressful experience as a student standing at the front of the room), but I can say I know that $\frac{1}{2}$ plus $\frac{1}{2}$ is 1 with some certainty. From a constructivist perspective this is as close as we come to reality since reality at its best is the creation of a viable model (von Glasersfeld, 1983; Wilson & Cooney, this volume). Whether I am able to articulate my belief (that fractions are hard) or not, it drives my behavior and I may avoid situations where I have to perform operations on fractions. In this case my belief acts as a regulating system (Pehkonen & Törner, 1999) influencing my behavior. But taken from the perspective of the researcher looking at the individual who holds the belief, knowledge of that belief informs our interpretation of the actions of the subject and provides a window of understanding into a person's experiences. If we observe behavior (avoidance of fractions) we may intuit the related belief. If the individual further confirms this, it provides a window of understanding into past experiences and helps frame our understanding of a person's mathematical development.

At another level, suppose the fraction avoider is a teacher of fifth grade students and limits her instruction of fractions to a minimum. If at some later time the teacher is seen teaching fractions with confidence and enthusiasm, one must ask questions. Have the teacher’s beliefs about fractions changed? What impacted that change? And, equally importantly we must ask: What does the teacher believe impacted the change? To describe fully the story of a teacher’s change we must understand the beliefs she holds about her change process - about why she has (or has not) changed her practice. This deeply held subjective knowledge is an indicator of the experiences teachers have had (Pehkonen & Tomer, 1999) and can be used to