Chapter 9
Analyzing Prospective Mathematics Teachers' Development of Teaching Practices in Mathematics: A Lesson Study Approach

Lutfi Incikabi
Kastamonu University, Turkey

Ahmet Kacar
Kastamonu University, Turkey

ABSTRACT

This study analyzed the changes in mathematics teacher candidates' teaching processes in terms of content of lesson plan, pedagogy aspects, and classroom management based on the evaluations of the experts, peers, and their own. The results indicated that experts, peer, and self-evaluation of the teaching processes signaled positive changes in teacher candidates' pedagogical content knowledge in mathematics after the lesson study process. Further, the study also demonstrates that teacher candidates acknowledged lesson study as a tool for providing slight improvement in teaching practices while experts and peers provided evidence for impressive improvements in teaching experiences.

INTRODUCTION

Everyday teachers enter classrooms for delivering some contents to teach. Most teachers are (institutionally or intuitively) governed for teaching to fulfill some pedagogical goals and objectives in a limited period of time. However, teachers typically work alone when planning instructional activities and assignments. Such isolation limits efforts to improve teaching on a broader scale, both within and across disciplines. Improvement in teaching practice, most of the time, is aligned with the expertise (that improves with

DOI: 10.4018/978-1-5225-3832-5.ch009

experience) and (sometimes) teachers' interactions with their colleagues about what they discover about teaching and learning (Cerbin & Kopp, 2006; Mercimek, 2013). Sharing ideas about teaching likely takes the form of knowledge that teachers develop from their experiences in the classroom. This kind of knowledge is referred to as practitioner knowledge, and this knowledge is converted into the professional knowledge when it is made public, shareable, and verifiable (Hiebert, Gallimore, & Stigler, 2002).

Putnam and Borko (1997) emphasized that teachers' teaching knowledge and beliefs are the critical components that determine their practice. Shulman (1987) outlined the knowledge base for teaching that consisted of various categories but hold a special interest on the pedagogical content knowledge. In Shulman's view, pedagogical content knowledge is a form of practical knowledge that is used by teachers to guide their actions in the contextualized setting (Shulman, 1987). It can be referred to as teacher's interpretations and transformation of the subject matter in the context of facilitating student learning (Wilson, Shulman, & Richert, 1987).

Mathematics teachers with deep understanding of subject matter tend to value conceptual understanding, problem solving and are able to facilitate students towards improved mathematical knowledge and problem solving performance (Fennema et al., 1996; Incikabi & Kılıç, 2013; Incikabi, Tuna, & Biber, 2012, 2013). This conceptualizes the importance of teacher's content knowledge in teaching practices, that is also defined as pedagogical knowledge. Although teachers could enhance their knowledge on their own, Ball and Cohen (1999) argued that teachers' pedagogical knowledge will be enhanced through a community of teachers working together to design a learning task for the actual teaching. They proposed that a learning environment should be created for teachers to discuss and analyze students' learning by working in collaboration with others. This perspective of learning is also parallel to Vygotsky's theory of sociocultural learning.

In the lesson study process, teachers collaborate and cooperate to share, discuss and analyze teaching practices with a spot on student learning while working together to design a lesson plan. Through such practices, they are able to enhance their pedagogical knowledge by working together with their peers as propagated by Vygotsky. Formalized in Japan (Fernandez, 2005) but mostly practiced in the USA since 1999 (Stigler & Hiebert, 1999), lesson study is a method of professional development to help teachers carefully examine their practice (Lewis, Perry, & Murata 2006). During the lesson study process, groups of teachers articulate a problem in their classrooms that they study via carefully designed lessons and collaborative evaluation using data collected by their colleagues (Fernandez & Yoshida 2004; Lewis, Perry, & Murata, 2006). It is a form of collaborative teacher research, where teachers explore and improve their knowledge of content and pedagogy by learning from daily work (Fernandez, 2006; Lewis et al., 2006).

BACKGROUND

West-Olatunji, Behar-Horenstein, and Rant (2008) provides a definition for lesson study as "a form of reflective teaching that uses collaborative dialogue to engage teachers in a collective assessment of their classroom practices" (p. 97). Lesson study has emerged as one kind of professional development that has produced results in Japanese schools and is emerging as a practice with promise for success in U.S. schools (Chokshi & Fernandez, 2004, 2005; Fernandez, 2005; Fernandez, Cannon, & Chokshi, 2003; Fernandez, & Chokshi, 2002; Hurd & Licciardo-Musso, 2005; Kolenda, 2007; Lewis, 2000; Masami & Reza, 2005; Matoba, & Mohammed Sarkar Arani, 2006; Weeks & Stepanek, 2001). Lesson study embody many characteristics that have been linked to effective professional development including