Chapter 6

Learning to Unpack Standards-Based Mathematics Teaching through Video-Based Group Conversations

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ABSTRACT

Research that focuses on understanding pre-service teachers’ learning processes as they engage in video-based activities is still limited. This study investigates pre-service teachers’ group conversations around videos of mathematics teaching. Conversations of two groups attending a ten-week video-based course introducing standards-based instruction were videotaped, transcribed, and analyzed. Pre-service teachers’ discussions included elements of an analysis framework used to guide their viewing: mathematics content, analysis of teaching and of student thinking and learning, and suggestions for instructional improvement. Analyses became more elaborated over the duration of the course. In addition, pre-service teachers discussed standards-based mathematics teaching by increasingly valorizing its characteristics. Findings highlighted important dimensions for working with video in teacher collaborative settings: the purpose, viewing lens, group dynamics, and facilitator role.

INTRODUCTION

Digital video is gaining attention as a tool for teacher learning. Advocates of a practice-based approach to teacher preparation have found in the use of digital video a series of important affordances. Video recordings of teaching can be viewed multiple times, allowing for decomposition of complex practices into smaller components that can be articulated, unpacked and studied, thus facilitating novice teachers’
learning (Hatch & Grossman, 2009). Video is also used to develop beginning teachers’ abilities to attend to the details of student thinking (Santagata, Zannoni, & Stigler, 2007; Santagata & Guarino, 2011; Sherin & van Es, 2002), to analyze the effects of teaching on students’ learning (Santagata & Angelici, 2010), and to develop self-reflection abilities (Davis, 2006; Lee, 2005). The positive effects of video use in teacher preparation have been documented by studies that have investigated pre-service teacher (PST) development of various abilities and dispositions, such as noticing skills (Star & Strickland, 2008, van Es & Sherin, 2002), analysis and reflection abilities (Santagata & Guarino, 2011; Stockero, 2008) and knowledge of equitable practices (Park, 2008; McDuffie, et al., 2013). Research that focuses on understanding PSTs’ learning process as it is facilitated by video-based activities is instead still limited. Attention needs to be given not only to outcomes measured at the end of PSTs’ learning experiences, but also to their learning processes as evidenced by the content of their collaborative discussions around videos and how these change through the course of learning experiences (LeFevre, 2004). These investigations can provide both a theory of technology-enhanced teacher learning and practical implications for the design of teacher preparation interventions.

This study contributes to closing the gap in this research area. It is part of a larger project that investigates the impact of a video-enhanced teacher education course designed to encourage specific dispositions, knowledge, and practices for teaching mathematics for understanding and for learning from mathematics teaching.

BACKGROUND

In the United States new curriculum standards for the teaching and learning of mathematics were recently introduced (National Governors Association for Best Practices, 2010). The Common Core Standards for Mathematics present an ambitious vision for high-quality mathematics instruction and include Mathematical Practice Standards that support the development of students’ understanding of central mathematical ideas (as delineated by the Mathematical Content Standards). This vision of mathematics instruction proposes, for example, that students develop conceptual understanding of core mathematical ideas as well as procedural fluency in a range of domains. Additionally, students should construct increasingly sophisticated forms of mathematical argumentation as well as critique the reasoning of others, learn to communicate their reasoning effectively using multiple representations, and make connections between different representations. Student thinking and mathematical learning practices clearly play a fundamental role in this vision.

The course studied here was designed to prepare teachers for a standards-based approach to mathematics teaching. Designed as a supplement to math methods instruction, this required 10-week course met once a week for a total of approximately 25 hours and focused on analysis of student thinking and learning and discussions of instructional effectiveness. It used a framework, the Lesson Analysis Framework (Santagata, Zannoni, & Stigler, 2007; Santagata & Guarino, 2010) to guide PST analysis of videos of classroom teaching. This framework is intended to develop routines to systematically observe, analyze, and reflect on classroom instruction, specifically as it pertains to student mathematics thinking and the interrelation between pedagogical decisions and student learning.

Through this process of analysis pre-service teachers also develop new knowledge about students’ mathematical understandings, questioning strategies that open windows into student thinking, mathematical tasks that push students’ reasoning as well as knowledge of teaching methods and discourse
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