Chapter 12
Examining What Elementary School Teachers Take Away From Mathematics Professional Development

Drew Polly
The University of North Carolina at Charlotte, USA

ABSTRACT

The process of providing effective ongoing professional development to teachers is an arduous task for educational leaders. In areas, such as mathematics, professional learning opportunities must deepen teachers' knowledge of content, pedagogy, and other skills connected to teaching. This chapter provides an examination of what teachers learned during a professional development project that was designed based off of principles for Learner-Centered Professional Development and addressed components of the Mathematical Knowledge for Teaching framework. The project included 3 half-day meetings with classroom-embedded activities completed between workshops. An inductive, thematic analysis of workshop evaluations indicated that teachers' learning related to: a) a deeper understanding of the Common Core Mathematics Standards, b) exploring mathematical tasks, and c) planning lessons that start with mathematical tasks instead of direct teaching.

INTRODUCTION

Professional development has the potential to substantially impact the quality of teaching and learning in schools (Loucks-Horsley, Stiles, Mundry, Love, & Hewson, 2010). Yet, the literature base on teacher learning is full of a myriad of research studies that cite the importance and effectiveness of ongoing, intensive learning opportunities that last at least a year and require an investment of time and financial resources to develop teachers' knowledge and skills (Heck et al., 2008). In large-scale analyses of national professional development project grants, the duration and length that teachers are in professional development had a positive influence on teachers' enactment of new knowledge and skills (Banilower,

DOI: 10.4018/978-1-5225-3832-5.ch012

Boyd, Pasley, & Weiss, 2006; Garet, Porter, Desimone, Briman, & Yoon, 2001; Heck, Banilower, Weiss, & Rosenberg, 2008). Yet, school districts do not always have the resources or opportunity to provide lengthy professional development to their teachers. To this end, what is the benefit, if any, of less intensive professional development experiences for teachers that do not include as many hours of professional learning opportunities?

Learner-Centered Professional Development (LCPD)

In the past two decades much has been published about professional development for teachers (Loucks-Horsley et al., 2007; Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009). Still, there has not been a complete unanimous consensus about the specific components that are essential to provide the optimal learning experiences for teachers (Polly & Hannafin, 2010; Wei, et al., 2009). In 2000, educational leaders adopted the American Psychological Associations' research-based learner-centered principles (Alexander & Murphy, 1998; APA Work Group, 1997) and coined the term learner-centered professional development (LCPD; Hawley & Valli, 2000; National Partnership for Educational Accountability in Teaching, 2000a, 2000b). LCPD programs are designed around the teachers' individual and collective needs who are participating in the professional development.

In a synthesis of the LCPD Principles and research on teacher learning, Polly and Hannafin (2010) found that LCPD programs include the following components: a) emphasis on topics related to student learning or areas that students have difficulty learning (Hawley & Valli, 2000), b) teacher choice or selection of some of their learning activities (Loucks-Horsley et al., 2010), c) hands-on and active opportunities to develop knowledge of pedagogy and content (Garet et al., 2001; Loucks-Horsley et al., 2010), d) collaborative activities with others (Glazer, Hannafin, Polly, & Rich, 2009; Hawley & Valli, 2000), e) ongoing activities that occur multiple times (Heck et al., 2008), and f) experiences to reflect on their teaching and their students' learning after trying out pedagogies in their classroom (Borko, 2004).

Prior professional development projects that align with the components of LCPD have been empirically linked to teachers' enactment of pedagogies emphasized during the professional development (McGee, Wang, & Polly, 2013; Polly, 2011a; Polly & Hannafin, 2011; Polly, McGee, Wang, Lambert, Pugalee, & Johnson, 2013; Fennema, Carpenter, Franke, Levi, Jacobs, & Empson, et al., 1996; Garet et al., 2001; Heck et al., 2008), gains in teachers' content knowledge (Polly, Neale, & Pugalee, 2014; Wang, Polly, Lehew, Pugalee, Lambert, & Martin, 2013), and a positive impact on their students' learning (Polly et al., 2013; Wang et al., 2013; Carpenter, Fennema, & Franke, 1996; Fishman, Marx, Best, & Tal, 2003; Heck et al., 2008).

While LCPD programs can improve teaching and learning, each of the projects that aligns with LCPD have included ongoing professional development projects that have included at least 60 hours of workshops or learning experiences in teachers' classrooms. This chapter examines a professional development project aligned with LCPD, but with only 12 hours of professional learning experiences.

LCPD in Elementary School Mathematics

Professional development programs focused on elementary school mathematics must address the broad aspects of knowledge that teachers draw on when they teach mathematics (NCTM, 2014; Loucks-Horsley et al., 2010). Knowledge frameworks that have influenced the design of professional development in-