Chapter 12
Supporting Elementary Mathematics Teacher Candidates' Use of Divergent Formative Assessment

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ABSTRACT

In this chapter, the authors consider the purposeful design of two mathematics content courses (Content 1 and Content II) and one methods course (Methods) as a means of helping teacher candidates (TCs) learn about divergent formative assessment (DFA), which seeks to explore what students understand rather than only if they understand a concept or skill. The authors leverage the research of groupworthy tasks and the Rights of the Learner to describe three tasks they use to help TCs learn mathematics through problem-solving and to learn to teach through problem-solving. The chapter outlines three commonalities across the courses: 1) Shifting from implicit to explicit and informal to formal practices of DFA that reflects teaching through problem-solving; 2) Using DFAs to transition TCs' identities from learners to teacher-learners; and 3) Supporting TCs' self-assessment through DFAs in multiple ways.

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INTRODUCTION AND PURPOSE OF CHAPTER

Now more than ever, teachers need to be prepared to see the humanity in their students (Aguirre, Mayfield-Ingram, & Martin, 2013) and to believe students can solve challenging problems if given the opportunity to show their thinking. When teachers design and create opportunities that help students to learn through problem-solving and not simply to replicate the steps to solve a problem, students have potential to learn more mathematics (Sengupta-Irving & Agarwal, 2017; Warshauer, 2015). Seeing the humanity in students also means that teachers center their practice in multiple forms of assessment that elicit students' thinking and emphasize strengths rather than deficits (AMTE, 2017). Preparing teachers to use formative assessments to encourage students to share their thinking, however, is challenging work, since current traditional schooling practices are pervasive, and they overvalue speed, accuracy, replication of algorithms, and high performance on standardized testing over all (Featherstone et al., 2011; Horn, 2012). We need more teachers who design and implement assessment practices that value the thinking of each student, and the research is clear that teacher candidates (TCs) cannot be expected to adopt these complex practices on their own—they need support at multiple stages of their teacher preparation program (Turner et al., 2012). As such, teacher preparation programs need to use a consistent, clear framework that aligns with the practices that they hope their teachers will adopt in the future (AMTE, 2017; Feiman-Nemser, 2001).

This chapter seeks to contribute to the greater objective of the book about formative assessment in elementary teacher education programs. More specifically, we the authors intend to discuss how purposeful design and alignment of the elementary mathematics content and methods courses can support teacher candidates (TCs) as they learn to teach mathematics. The chapter addresses both program design (e.g., alignment of content and methods courses) and specific frameworks (e.g., Rights of the Learner (Kalinec-Craig, 2017a, 2017b); problem-solving, group worthy tasks (Lotan, 2003); and divergent formative assessment (e.g., Pryor & Crossouard, 2008) that support TCs' in building practices that seek to find the humanity and brilliance in children's thinking about mathematics (Aguirre, Mayfield-Ingram, & Martin, 2013).

Underpinning Theoretical Frameworks

In this section, the authors will outline in detail the specific theoretical frameworks that they use to design the elementary mathematics sequence of coursework (Content I, Content II, and Methods). In the first section, the authors foreground the notion of divergent formative assessment (versus convergent formative assessment) with a specific focus on the audience of mathematics teacher educators who are preparing future teachers (AMTE, 2017). Subsequent sections will show the authors' conceptualization of how group worthy tasks and the RotL support teaching through problem-solving with the ultimate goal of divergent formative assessment. This theoretical framework begins with an overview of the research about formative assessment and a discussion of the distinction between convergent and divergent formative assessment.