Chapter 4
Leveraging Asynchronous Online Instruction to Develop Elementary School Mathematics Teacher–Leaders

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ABSTRACT
This chapter describes how the author leveraged asynchronous online instruction to develop elementary school teacher-leaders’ knowledge of elementary school mathematics content and pedagogies in a graduate program in the United States. This chapter provides the theoretical framework of learner-centered professional development and explains how the six courses in the program embody the framework and support teachers’ development of knowledge and skills related to mathematics teaching and learning. This chapter also shares the findings of a study that evaluated teacher-leaders’ performance on five student-learning outcomes in the program as well as feedback on course evaluations and end-of-program surveys. Data analysis indicated that every teacher-leader demonstrated proficiency on each student-learning outcome. Implications for the design of asynchronous online programs are also shared.

INTRODUCTION
The Need for More Elementary Mathematics Leaders
Internationally, there have been recommendations to develop and employ school-based personnel that have the knowledge and skills related to leading and supporting efforts related to mathematics teaching and learning (Bay-Williams, McGatha, Kobett, & Wray, 2013; Polly, 2012; U.S. Department of Education [USDE], 2008). This need is especially prominent in elementary school settings (Ages 5-11), as teachers commonly are responsible for teaching multiple subjects and hence, do not have the opportunity to focus more deeply on only one or two subjects (Bay-Williams et al., 2013).

In some schools, resources have been provided to hire faculty members to hold mathematics-specific jobs and positions, such as mathematics
Regardless of the job title or specific job requirements, there is a need to provide specific types of support to faculty in elementary school settings to develop the skills and knowledge related to leading and supporting efforts related to mathematics teaching and learning.

**North Carolina’s Response to a Need for Elementary Mathematics Leaders**

In a response to these calls and recommendations, a group of mathematics educators and mathematicians in North Carolina convened with other mathematics leaders from across the United States for a week-long conference. The purpose of this meeting was to study and explore the potential content of professional learning activities that would develop knowledge and skills related to the duties of elementary school mathematics leaders.

As a result of that meeting and extensive discussions about potential ways to design these learning experiences, a group of faculty from across the state convened in order to create a graduate program of six mathematics education courses focused on mathematics content and high-leverage teaching practices (pedagogies). Those individuals who complete all 6 courses successfully would earn an additional teaching license in Elementary School Mathematics. The program was designed for individuals that already had initial teaching credentials and teaching experience in elementary school classrooms. This working group originally included 13 faculty from 7 universities who synthesized the AMTE Standards and applied their expertise from the fields of mathematics education and mathematics to design the program. These faculty initially taught the courses in face-to-face settings to 2 different cohorts of teacher-leaders across the state. Through feedback from elementary school partners and North Carolina’s university administration, the working group was advised to create online formats of the course in order to increase...
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