Journal of Mathematical Behavior xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

The Journal of Mathematical Behavior

journal homepage: www.elsevier.com/locate/jmathb

# Answering the call by developing an online elementary mathematics specialist program

Rachel A. Harrington*, Laurie Burton, Cheryl Beaver

*Western Oregon University, United States*

ARTICLE INFO

*Article history:*
Received 23 July 2016
Received in revised form
22 December 2016
Accepted 5 January 2017
Available online xxx

*Keywords:*
Coaching
Inservice teachers
Online instruction
Mathematics education

ABSTRACT

The Association of Mathematics Teacher Educators adopted Standards for Elementary Mathematics Specialists calling for structured preparation of math coaches, specialists, and instructional leaders across the country (AMTE, 2013). The purpose of this paper is to illustrate the structure and design of our fully online Elementary Mathematics Instructional Leader (EMIL) graduate program for inservice teachers aiming to answer the call. Our graduates are teacher leaders and coaches who are responsible for supporting effective mathematics instruction and student learning at the classroom, school, district, or state levels. We will review formative data from our first cohort of graduates, the benefits and drawbacks to providing online (and grant-funded) courses, and the impact of participant attrition. Our goal is to offer guidance and information to other organizations as they move to develop programs of their own.

Published by Elsevier Inc.

## 1. Introduction

In 2012, the Association of Mathematics Teacher Educators adopted the Standards for Elementary Mathematics Specialists (AMTE, 2013). Since that time, states have begun to develop standards-based programs for preparing mathematics specialists. Today, 16 states have developed mathematics specialist certification programs (EMS & TL, 2016). Of the remaining states, eight are currently in the design process. Campbell and Malkus (2011) demonstrated that when mathematics specialists are prepared in programs with rigorous graduate level mathematics and leadership coursework, they have a positive impact on student achievement. As a consequence, it is no surprise that so many states are looking for ways to develop mathematics specialist preparation programs.

The purpose of this paper is to provide an overview for the structure of, and lessons learned from, an online graduate certificate program for elementary mathematics instructional leaders. Our goal is to provide a relevant and timely resource to others that are in the process of defining or expanding their certification programs to include teachers who do not have easy access to professional development. This paper will describe the history and overview of one online, standards-based program. We also present a description of preliminary data surrounding student experiences with the program requirements, as well as reflective commentary about lessons learned, and planned next steps.

* Corresponding author.
*E-mail addresses:* harringr@wou.edu (R.A. Harrington), burtonl@wou.edu (L. Burton), beaverc@wou.edu (C. Beaver).

http://dx.doi.org/10.1016/j.jmathb.2017.01.001
0732-3123/Published by Elsevier Inc.

## 2. A brief history of program development

Before the adoption of the Standards for Elementary Mathematics Specialists (SEMS), there was little direction in Oregon for school districts on the role of a mathematics leader. Districts called them Teachers on Special Assignment (TOSAs), leaders, coaches, or specialists and gave them a variety of roles in the buildings. There were no state approved criteria for these positions and qualification processes were often varied and unclear. However, in 2014, using the AMTE Standards as a framework, the State of Oregon provided the option of adding an Elementary Mathematics Instructional Leader (EMIL) specialization to a current teaching license. This specialization includes three requirements: Three years of successful mathematics teaching at the elementary level, a passing score on a state approved Multiple Subjects Examination, and demonstrated competency of the SEMS as determined by successful completion of course work in through a state-approved program.

With the adoption of the state EMIL specialization, districts looked to the regional universities to provide programs to prepare teachers for this specialization. While, Western Oregon University has had a Master of Science in Education degree for many years, there was no specific coursework to prepare elementary mathematics leaders. So in 2014, Western Oregon University developed an Elementary Mathematics Specialist (EMS) standards-based program to prepare mathematics leaders. Oregon is a state with many rural districts that lack easy access to a university. It became clear that if we were to develop a program that would serve all of the state, it needed to be offered fully online.

The graduate Western Oregon University Elementary Mathematics Instructional Leader (WOU-EMIL) certificate program described in this paper was the first approved EMS program in Oregon and the first to recommend teachers for an EMIL specialization. In November 2014, Western Oregon University was awarded a Department of Education grant to fund the preparation of up to 60 teachers as Elementary Mathematics Specialists through the WOU-EMIL program. The Developing Mathematics Instructional Leaders in Oregon (DEMILO) grant includes funds for WOU-EMIL coursework, monthly webinars, and summer workshops. All WOU-EMIL courses were delivered online for the first time starting in the winter of 2014. Currently enrolled teachers include participants in the DEMILO grant as well as non-grant funded inservice teachers who are pursuing the specialization. For the purposes of this paper, we have labeled faculty who teach courses as "instructors," adults enrolled in our program as "teachers," and the children they teach in K-8 schools as "students."

## 3. Overview of our program, courses and philosophy

The SEMS outline the knowledge, skills, and leadership qualities necessary for the roles and responsibilities an EMS professional may assume (AMTE, 2013). At their core, these standards define the knowledge and skills that a specialist needs (Ball, Thames, & Phelps, 2008; Ma, 1999). The SEMS are framed in three domains:

I. Content knowledge for teaching mathematics:
   a. Deep understanding of mathematics for grades K – 8.
   b. Further specialized mathematics knowledge for teaching.
II. Pedagogical knowledge for teaching mathematics
   a. Learners and learning.
   b. Teaching.
   c. Curriculum and assessment.
III. Leadership knowledge and skills.

Campbell and Malkus (2011) identified a correlation between the presence of an elementary mathematics specialist in an elementary school and increased student achievement in mathematics. However, they cautioned that for this correlation to occur, specialists must be well prepared which included extensive training beyond workshops and short professional development experiences. Instead, the authors, along with Campbell and Malkus, contended that an EMS must have successfully completed rigorous, graduate level coursework that addresses the three domains described by the SEMS.

With this research in mind, a collaborative team of three mathematics and mathematics education faculty at Western Oregon University developed a 24-quarter hour graduate EMIL program aligned to the SEMS and to the Common Core State Standards for Mathematics (CCSSM). The WOU-EMIL program consists of eight, 3-credit graduate level courses:

- Mathematics coursework (five courses)
- Counting and Whole Number Operations
- Fractions and Proportions
- Geometry and Measurement
- Statistics and Probability
- Patterns and Algebraic Thinking OR Algebra and Functions

Education coursework (three courses)

- Advanced Content Pedagogy: Mathematics

Please cite this article in press as: Harrington, R. A., et al. Answering the call by developing an online elementary mathematics specialist program. *Journal of Mathematical Behavior* (2016), http://dx.doi.org/10.1016/j.jmathb.2017.01.001