Chapter 7

Preservice Teacher Perceptions on the Design of a U-Pace Online Course Compared to a Conventional Face-to-Face Mathematics Content Course

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ABSTRACT

This chapter examines preservice teachers’ (PSTs) perceptions on the design of both an online and face-to-face mathematics content course for elementary and middle school preservice teachers. The chapter describes the instructor’s design goals, considerations, and describes PSTs’ experiences in the process of completing the course. Further, the chapter describes the features of the course that provided productive learning opportunities for PSTs. Drawing from PSTs’ reflection after completing an online course and face-to-face course, the chapter compares PSTs’ experiences and learning outcomes from the online course compared to a traditional face-to-face course. Finally, the authors explicate the affordances and constraints encountered by both the instructor and the students as they completed the online course.

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INTRODUCTION

Indicator C.1.1. Know Relevant Mathematical Content

Well-prepared beginning teachers of mathematics have solid and flexible knowledge of core mathematical concepts and procedures they will teach, along with knowledge both beyond what they will teach and foundational to those core concepts and procedures. (Standards for Preparing Teachers of Mathematics [AMTE], 2017 p.8)

Mathematics content courses are typically required course work for PSTs seeking teaching licensure for K-8th grade classrooms in the U.S. (Conference Board of Mathematical Sciences [CBMS], 2012; National Research Council [NRC], 2001; AMTE, 2017). Importantly, mathematics content courses should help PSTs develop a deeper and more comprehensive view and understanding of the mathematics that they will teach in order to be well prepared beginning teachers. Over time, researchers have offered insights on the nature of learning opportunities that teacher educators should give PSTs in mathematics content courses for elementary teachers. (Castro Superfine & Wagreich, 2010; Castro Superfine & Li, 2014a, b; Gichobi, 2018, 2019; Li & Castro Superfine, 2018; Masingila, Olanoff, & Kwaka, 2012; Thanheiser, 2015; Thanheiser, Browning, Moss, Watanabe & Garza-Kling, 2010). For example, the work done by Thanheiser and colleagues examined how teacher educators can use current understanding of mathematical knowledge for teaching to design mathematics content courses for elementary teachers. Similarly, Castro Superfine and colleagues have focused on articulating general design principles and models for designing mathematics content courses that can provide productive learning opportunities for PSTs. In addition, other studies (e.g. Gichobi, 2018, 2019) demonstrated that PSTs can critically think about multiple ways of solving mathematical problems when given the opportunity to learn.

Furthermore, other existing research studies have provided insights into what happens in the content courses from the perspective of textbooks used in the courses (McCorry and Stylianides, 2014) and from the perspective of learners who take such courses (Hart and Swars, 2009; Hart et al. 2013). In particular, Hart and colleagues indicated that PSTs who participated in the study reported that their mathematics content courses did not support their development of a positive attitude towards mathematics learning and/or teaching. Other researchers have explored the design of innovative mathematics content courses and their effect on PSTs learning (Laursen, Hassi & Hough, 2016; Philipp et al. 2007). Using an inquiry-based approach, Larsen et al. (2016) reported that PSTs viewed their learning gains as relevant to their future teaching work. However, although significant progress has been made in providing insights into the nature of learning environment in mathematics content course (e.g. Gichobi, 2018, 2019; Larsen et al. 2016; Li & Castro Superfine, 2018), as yet there is little research that has focused on the extent to which online mathematics content courses can provide opportunities for PSTs to strengthen subject-matter knowledge and pedagogical skills.

Furthermore, with the evolution of web-based technologies and technology-based instruction, online education has partially become an integral part of higher education teaching (Sonmez & Koc, 2018; Law, Ng, Goh, Tay, & Sek, 2012; O’Malley & McCraw, 1999) Specifically, prior research has shown students’ perceptions on online learning had significant advantages such as saving them more time, helping them to plan their schedules better and enabling them to take more courses (O’Malley & McCraw. 1999). Similarly, Sonmez and Koc (2018) investigated pre-service teachers’ lived experiences in taking courses through the Moodle learning management system (LMS). Most of the participants in the study indicated that Moodle was user–friendly, beneficial, and enhanced interaction with both instructor and