

Chapter 8

Facilitating Active Learning and Collaboration in Online Mathematics Content Courses for Secondary Teachers

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ABSTRACT

This chapter reviews teachers' perceptions of the collaborative learning experiences when enrolled in an online course to determine strategies for engaging teachers in active learning and meaningful collaboration in an online learning environment. A survey was designed to solicit feedback from mathematics teachers of Grades 6-12 who have completed online mathematics content courses at the University of Nebraska – Lincoln (UNL) for professional development or for graduate credit. The survey specifically addresses the teachers' perceptions of the collaborative learning experiences during their online course. Combined with feedback from numerous course evaluations and the experiences of several online mathematics instructors from UNL's Department of Mathematics, results of the survey are utilized to determine strategies for engaging teachers in active learning and meaningful collaboration in an online learning environment.

INTRODUCTION

In the spring of 2013, the University of Nebraska-Lincoln (UNL) launched a fully online degree program through which certified middle-level or secondary mathematics teachers can earn a Master of Arts for Teachers (MAT) degree from the Department of Mathematics. Prior to this date, this degree was available to teachers only via in-person courses, which initially were developed for programs funded through a series of grants from the National Science Foundation (2004-2013). These courses are uniquely designed for teachers of mathematics, offering rich, active learning experiences in which teachers collaborate to learn mathematics content that connects to or underlies the 6-12 school mathematics curriculum (Hea-

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ton, Lewis, Homp, Dunbar & Smith, 2013; Heaton, Lewis & Smith, 2013; Smith, Graupner, Hayek & Welker, 2012). To make the MAT program available online, instructors faced the challenge of transferring these courses to an online setting in a way that preserves the important features of the in-person learning experience.

BACKGROUND

The primary goal of courses in UNL's MAT program is to strengthen 6-12 teachers' mathematics content knowledge for teaching. Though there are many aspects of educational systems which are important to students' education, research shows the single most important variable is the quality of the instruction received by the students (Wenglensky, 2002; National Math Advisory Panel, 2008). In light of this, teachers need ongoing professional development throughout their careers in order to continue to improve their capacity to be effective teachers of mathematics (Conference Board of Mathematical Sciences [CBMS], 2012). In particular, professional development coursework that focuses on the mathematics teachers teach is especially important for maintaining relevancy to their professional lives (CBMS, 2012). Along with participant feedback, research on constructivist instructional approaches and the value of engaging students in active group work (Good & Brophy, 2004; Richardson, 2003) confirmed MAT program coordinators' beliefs that these components of the in-person courses are worth replicating in their online counterparts. Furthermore, collaborative properties of online learning have been found to be well-adapted to deep approaches to learning (Garrison & Cleveland-Innes, 2005). This chapter will discuss strategies for engaging teachers in active and collaborative learning which have been found to be successful in UNL's professional development mathematics content courses for secondary (6-12) teachers.

Methods

To avoid confusion, throughout this paper the term "students" will refer to the 6-12 in-service teachers of mathematics who have enrolled in UNL's online mathematics courses. Feedback from 206 students was solicited through a survey created in Qualtrics which was emailed to students who have completed one or more of UNL's online mathematics courses for teachers. Sixty-three students completed the survey. Questions on the survey focused on the students' experiences collaborating with peers while completing their courses, particularly in the context of group discussions and group tasks. The term *discussion* is defined as those experiences where students post thoughts or comments in response to a given topic or in response to one another. Although students must interact with one another in the discussion, participation is generally assessed by the quantity and quality of individual posts. The term *task* is defined as some type of assignment which results in a product that is submitted to meet course requirements. Collaborative tasks, then, are assignments in which one or more students must work together to contribute to and complete the product for a common grade. Twelve survey items utilized a Likert-type scale (from 1 strongly disagree to 5 strongly agree), two items were multiple choice, and the other six items were open-ended. Responses to each open-ended question were grouped thematically in order to extract representative quotations to convey respondents' thoughts and opinions. Results of the online collaboration survey are cited throughout this chapter. Data from final course evaluations (separate from the online collaboration survey) also are cited as noted. Although this chapter is written by a single author, the information shared is the result of the collective efforts of several instructors who have taught MAT

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