Chapter 16
Reflections on a Course Designed to Encourage Technology Integration in Secondary School Mathematics

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ABSTRACT

Mathematics education is used as a context to demonstrate the types of learning experiences that can be provided to preservice secondary mathematics teachers as part of a teacher education program to encourage technology integration. Specifically, the author reflects on the design, development, and implementation of a mathematics-specific technology course and considers the extent to which this course provides prospective teachers experiences to achieve the goals identified in the Mathematics TPACK (Technological Pedagogical Content Knowledge) Framework developed by the Association of Mathematics Teacher Educators. In its current form, the course addresses most of the identified guidelines; however, after reflecting on the extent to which this course might satisfy all of the indicators, the author concludes that a single course on technology integration is not sufficient. Technology integration should be considered a programmatic teacher education goal across multiple courses, both content and pedagogy.

INTRODUCTION

Ubiquitous technology has altered our views about what it means to function in today's highly connected society. In fact, extant technology has provided global access to information and has facilitated communication between and among individuals who may be in opposite ends of the world. Because new technology continues to emerge, educators have to consider and grapple with ways to take advantage of available technologies and incorporate them in educationally productive ways. In order to determine whether to use technology, educators must address important questions that include: How does one learn about available technology? How does one obtain knowledge about emergent technologies and about the best ways to integrate them effectively to support learning? What technologies should be

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used? When and for what purpose should they be used? In addition to answering the aforementioned questions, those charged with preparing teachers must address additional questions that include: How do teacher educators prepare teachers to use technology effectively to support students' content development? What are design features of courses with a focus on preparing teachers to incorporate technology?

In this chapter, mathematics education is used as a context for demonstrating the types of learning experiences that can be provided to encourage preservice teachers (PSTs) to integrate technology. The chapter begins with a discussion about the various recommendations for technology use in education, in general, and in mathematics education, in particular. Then, research findings are presented to highlight affordances provided by the use of technology to support mathematics learning. The remainder of the chapter is used to reflect on the development and implementation of a mathematics-specific technology course designed to help PSTs consider their roles as instructional designers, decision-makers, and facilitators of students' learning via technology. Specifically, features of the course are highlighted to illustrate decisions made and the processes used to encourage PSTs to *learn about* and *learn to use* extant and emergent technologies to support mathematics teaching and learning. Then, the Mathematics TPACK (Technological Pedagogical Content Knowledge) Framework (AMTE, 2009) is used as a basis for reflecting on the extent to which the course meets the expectations of the mathematics education community.

RECOMMENDATIONS FOR TECHNOLOGY-USE IN EDUCATION

Teachers play a significant role in determining whether to use technology, how that technology is used, and in designing technology-enriched learning experiences for learners. Because of this, several organizations have developed standards, principles, position statements, or frameworks that encourage the use of technology to support students' learning. Addressing education broadly, the *International Society for Technology in Education* (ISTE) (2008b) released the next generation National Educational Technology Standards for Teachers (NETS•T) that encourages the use of technology to support learning and teaching of all subject matter. The NETS•T encourages teachers to use the National Educational Technology Standards for Students (NETS•S) (ISTE, 2008a) as they design, implement, and assess learning experiences to support students' learning. According to ISTE (2008b), teachers are expected to:

- *Facilitate and Inspire Student Learning and Creativity*: Teachers engage students in a variety of learning experiences that engage them in authentic problem solving.
- *Design and Develop Digital-Age Learning Experiences and Assessments***:** Teachers design learning experiences that incorporate 21st Century digital tools in ways that promote student learning and are assessed in meaningful ways.
- *Model Digital-Age Learning Experiences and Assessments***:** Teachers use and learn to use emergent technology to support their daily activity, the design of instruction, and communication with students, parents, and the broader community.
- *Model Digital-Age Work and Learning*: Teachers use their knowledge of current technology and emergent technology to communicate and collaborate with peers, parents, and others. In addition, they are able to use digital tools to identify and evaluate resources with potential to support students' learning.
- *Promote and Model Digital Citizenship and Responsibility*: Teachers use and teach students how to use technology in responsible ways, address the needs of a diverse