Constructing Preservice Teachers' Knowledge of Technology Integration

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INTRODUCTION

Citizens today are connecting through social media and consuming more digital content than ever before (Sasseen, et al., 2013). There are nearly 300 new applications being created every day and, according to the Massachusetts Institute of Technology, more than 10 new groundbreaking technologies created every year (2015). These new apps are placed into the app store (Vaala, Ly & Levine, 2015) with little regulation on "educational value" to help educators choose apps that are, in fact, educational as determined by the science of learning (Hirsch-Pasek, et al., 2015).

Though most know our technologically-rich society requires a more technologically-literate educator, teacher preparation has not yet caught up with this reality. There are many reasons for this gap: dwindling higher education budgets that make continually updating technology difficult; preservice students coming into teacher preparation programs with varying competencies and understandings of appropriate technology use (Carroll & Morrell, 2006); and teacher preparation/education faculty members who may have little competence with emerging technologies (Polly et al., 2010).

In order to support preservice teachers (PTs) in developing competency in technology integration we make four suggestions—PTs must:

- Become knowledgeable about what developmentally appropriate practice looks, feels, and sounds like (NAEYC, 2009);
- Explore and develop knowledge about ways experts authentically utilize technologies to consume, create, and connect in their areas of expertise;
- Engage in hands-on experiences with a range of technologies across content areas to build their level of comfort; and,
- Demonstrate their competency in integrating technology with content in developmentally appropriate ways.

This chapter provides a framework for how we construct this foundational understanding with PTs. It shares exemplars-in-practice, and suggests needed changes in order to support this practice across institutions of higher education.

BACKGROUND

We utilize the Technological Pedagogical Content Knowledge (TPACK) framework (Figure 1, Mishra & Koehler, 2006) as a theoretical lens for our argument. TPACK represents one (of many) useful models for thinking about specific knowledge teachers must have to effectively and meaningfully integrate technologies into their

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instruction. Every lens and model has its shortcomings and/or pitfalls (Schmidt, et al., 2009), but we selected TPACK because its compartmentalization and overlapping of three main pieces—Content Knowledge, Technical Knowledge, and Pedagogical Knowledge—are relevant given the ways in which American sets of standards for teacher preparation and student achievement have parsed out content knowledge as a distinct part of teaching and learning and have integrated pedagogy and technology into their standards. The framework holds the most effective way to integrate technology is for teachers to simultaneously draw on their technological, pedagogical, and content knowledge.

The TPACK model has been successfully applied to inservice teacher training (Hutchison & Woodward, 2014; Niess, 2011) and has been used to explore the growth and development of PT's application of technology in P-12 classrooms as well (Koh & Divaharan, 2011; Pamuk, 2011). Studies of TPACK have suggested (1) it is difficult to affect change in PTs' technological content knowledge (Hofer & Grandgenett, 2012); (2) higher TPK scores were apparent in lesson plans associated with models of teaching with which they had the most familiarity as learners themselves (Lee, et al., 2014); and (3) technology-infused approaches to teacher preparation yielded more rapid increases in CK and PK, thus impacting the depth of the PT's understanding of the content as well as the ways in which the methods/pedagogy are effective to support content area learning.

The ways in which the school-aged students will be required to utilize the technology impact the requirements for teacher preparation. In America, the Common Core State Standards (National Governors Association Center & Council of Chief State School Officers, 2010) drive the integration of technology/digital components in reading, writ-

Figure 1. The Technological Pedagogical Content Knowledge (TPACK) framework
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