Chapter 15
Developing TPACK for Elementary Education Teacher Candidates in an Instructional Design and Technology Integration Course

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ABSTRACT
This chapter examines how experiences in a course for elementary education teacher candidates supported their technological pedagogical content knowledge (TPACK). Based on data from teacher candidates and school partners, the author modified course activities and collected data to inform the course. Data analyses indicated that the course refinements positively influenced candidates’ development of aspects of TPACK, specifically TPK, PCK, and TPACK. Candidates reported in both iterations of the study that technology was being used in classrooms in ways that did not match what they were learning in courses. Implications include the need to reconcile the divide between research-based instances of technology integration and the actual use of technology in schools in the context of TPACK.

INTRODUCTION
The current and projected access that teachers and students have to digital devices necessitates attention to the knowledge and skills related to effectively integrating these devices into classrooms (International Society for Technology in Education [ISTE], 2014; New Media Consortium, 2017). Technology access continues to increase in K-12 classrooms, with many teachers in classroom settings in which their students have access to their own devices for periods of the day, if not the entire day. Based on this access to technology, further research is needed to look at ways to develop and deepen the knowledge and skills

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related to technology integration, specifically technological pedagogical content knowledge ([TPACK]; Mishra & Koehler, 2006; Niess, 2005).

Research syntheses and policy reports cite multiple instances of low-level uses of technology where technology use is coupled with low-level thinking and does not greatly enhance teaching and learning (Lawless & Pellegrino, 2007; New Media Consortium, 2017; U.S. Department of Education, 2017; Wenglinsky, 1998). This disconnection between technology use and desired uses can be addressed in educator preparation programs when teacher candidates first earn their teaching credential.

Teacher candidates typically develop TPACK in these ways: a) course work focused on technology integration; b) course work on subject-specific pedagogies that could include examples of how to integrate technology, and; c) clinical experiences in classrooms in which candidates work with teachers who incorporate technology into their teaching (Polly, Mims, Shepherd, & Inan, 2010; Schrum, 1999). Still in these three different ways to develop teacher candidates’ technology integration skills and knowledge, there is varied quality of teacher candidates’ experiences (Polly, Mims, Shepherd, & Inan, 2010; Polly & Binns, in press). This study honed in on the coursework focused on technology integration and examined how the design and modification of course assignments influences elementary education teacher candidates’ TPACK.

BACKGROUND

The seminal writers of technological pedagogical content knowledge ([TPACK]; Mishra & Koehler, 2006; Niess, 2005) conceptualized TPACK as an extension of Schulman’s (1987) pedagogical content knowledge framework with technology as a dimension that can overlap with knowledge related to pedagogy and content. Since the original conception the idea of TPACK-in-action or the application of TPACK-in-practice has developed to provide a more operational and tangible idea of what TPACK looks like in practice (Polly, 2015; Bibi & Khan, 2017).

While TPACK has been studied through the use of surveys, interviews, and other methods that involve participants reporting their knowledge, skills, and perceptions, these views may not entirely capture what TPACK-in-action or enacted TPACK looks like. Therefore, there is a need for current studies to ensure that they are examining data sources related to how TPACK is enacted (Bibi & Khan, 2017). Studies have employed methods such as classroom observations (Polly, 2011a; Polly & Hannafin, 2011), surveys (Schmidt, Baran, Thompson, Mishra, & Koehler, 2009), and interviews (Harris, Grangadent, & Hofer, 2012) to gather data about teachers’ development of TPACK. Other studies have employed document analyses of lesson plans and unit plans (Cox & Graham, 2009; Polly, 2015, 2016; Polly & Rock, 2016) and design tasks (Graham, Borup, & Smith, 2012) to look at the enactment of TPACK.

The idea of TPACK-in-action or enacted TPACK comes from the notion that knowledge and skills must be applied in order to provide evidence that they exist (Bibi & Khan, 2017). Therefore, while interviews and surveys with teachers about their TPACK and related skills are important, the author contends that these measures are only valuable if they are coupled with other documented evidence from teachers applying their knowledge and skills.

In this current study the concept of enacted TPACK is used to examine opportunities for elementary education teacher candidates to deepen their TPACK during a series of course activities related to technology integration. While enacted TPACK and TPACK-in-action often refer to how TPACK is carried out in classrooms, with teacher candidates there is value in examining other outcomes, such as