Theory to Practice in TPACK: PD for Educational Technology Integration

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Abstract

Teacher practice is predicated on the epistemic beliefs teachers bring with them to the classroom. This belief system influences all areas of teaching, including use of educational technology. Integrating technology and moving toward a more constructivist approach to teaching and learning will require many teachers to re-evaluate their underlying beliefs in regard to learning theory and the role of teachers, students, and technology in learning. Professional development is critical to help make these changes.
Throughout history new technologies have changed the way information and knowledge is shared. Technological innovations like the Gutenberg Press, developed around 1440, led to a greatly increased distribution of information and knowledge. Inventions like the pencil, which was first mass produced in Nuremberg, Germany in 1662; and the typewriter, first commercially available around 1870, made it possible for a larger number of people to record their ideas and experiences. Before these technological breakthroughs, ideas and information either languished in isolation or were closely controlled by the learned few. These types of inventions started the process of democratization of knowledge.

More recently, innovation in digital technology, including computers and the internet has greatly accelerated the process of democratization. Digital technology is the agent of change that has loomed on the horizon of education since the first computers hit the scene in the early 1950s. Since that time the impact of computers and other digital technologies on the educational landscape has been sporadic at best.

While technology continues to advance, teaching practices have lagged behind. Today, most classrooms in the United States tend to operate in much the same way that classrooms operated in the past. Teachers deliver information. Textbooks are read. Questions are answered. Teachers generally are the experts giving information to students.

Most current educational reform movements, such as those promoted by the Partnership for 21st Century Skills, emphasize creativity, communication, collaboration, problem-solving, and a global perspective (Partnership for 21st Century Skills, 2009). To achieve these goals, the educational environment needs to shift from being teacher focused to being student focused.
Educational technology has become a focus of many reform minded individuals. Unfortunately, this focus has led to a technocentric approach without sufficient emphasis on content and pedagogy (Harris, Mishra & Koehler, 2009). Ongoing educational technology reforms need to avoid this technocentric tendency and focus on learning theory, pedagogy and content.

Teacher Practices

Teachers’ use of educational technology and general teaching practices are directly related to their beliefs about knowledge. Beliefs about knowledge can be placed on a continuum. At one end of the continuum teachers adhere to a belief that knowledge is transferred from an authority (teacher) to a student. At the other end of the continuum is the constructivist belief that students actively create their own knowledge based on personal experience and reason (Buehl & Fives, 2009).

Currently, there is a chasm between educational technology promoters and practicing teachers. Educational technology researchers and promoters tend to focus on “technology uses that support inquiry, collaboration, and reformed practice” (Culp, Honey, & Mandinach, 2003, p. 22) while classroom teachers tend to use technology as a tool for presentations, classroom management, and communications. This decidedly constructivist use of technology envisioned by researchers is not in widespread evidence in classrooms. Essentially, current practice sees educational technology used as an efficiency tool rather than as an agent of change (Culp, Honey & Mandinach, 2003). How to bridge this gap is perhaps the most pressing issue in the field of educational technology.

Much of the blame, or cause, of the above identified gap between potential and performance can be found in a lack of effective technological professional development in pre-
service and in-service teacher training programs. Most pre-service and in-service teachers have never experienced learning their content area in a technology integrated environment (Kajder, 2007). Most teacher development programs address technology as a separate subject and teachers are expected to figure out how to integrate technology into content area teaching (Wallace, 2004).

Research suggests that access to technology does not by itself lead teachers to adopt constructivist practices. Rather, teachers’ integration of technology is guided by their underlying beliefs regarding the role of teachers and students (Windschitl & Sahl, 2002; Palak & Walls, 2009). A teacher firmly rooted in traditional practice is likely to integrate technology only to extend that traditional practice. Teachers who have a predisposed inclination toward constructivism are more likely to use technology to facilitate constructivist activities. However, belief in constructivist methods does not guarantee integration of technology.

It becomes evident that to facilitate meaningful technology integration into classrooms, an emphasis needs to be placed on developing, and in some cases changing, teachers’ beliefs about teaching and learning. Teachers need more than to learn how to use technology. Teachers need to learn how technology, pedagogy and content can be integrated. If technology is to be integrated into classroom learning, pre-service and practicing teacher development needs to focus on the interaction of technology, pedagogy and content.

Research shows that information technology coursework is a component in standards for colleges of education. However, participation in stand-alone technology courses does not translate into the ability to integrate technology in teaching. Further, technology taught as part of curriculum or methods courses has a higher correlation to teachers’ abilities to integrate
technology in their practices (Moursund & Bielefeldt, 1999). This same conclusion was reached by Keeler (2008) in an action research study of a social studies methods class.

Need for Professional Development

Professional development is crucial to ensure teachers gain the knowledge required to effectively integrate technology in the classroom. Three general areas need to be taken into consideration when planning development opportunities for teachers. First, teachers need strong content area knowledge, and professional development should always contain this strand. Teachers also need professional development to understand and develop the pedagogical knowledge needed to create constructivist, student centered, learning environments. Finally, teachers need strong technological knowledge.

Traditional technological professional development focuses on teaching specific software or hardware skills. An assumption is then made that teachers will be able to integrate these skills in meaningful ways into their classes (Misha & Koehler, 2006). This approach to teacher training has proven ineffective in spurring educational technology integration. Broad technological knowledge is not what teachers need. Instead, teachers need knowledge of how specific technologies can be used to teach their content materials (Wallace, 2004).

One new approach to professional development is being promoted by several prominent organizations including the International Society for Technology in Education (ISTE). Technological pedagogical content knowledge (TPACK) is a theoretical framework for understanding the knowledge teachers need to successfully integrate technology into their teaching (Harris, Mishra & Koehler, 2009). The underlying principle behind TPACK is the idea that teachers need differentiated technological, pedagogical, and content area knowledge. Technology integration in a science classroom may look very different from integration in a
language arts class or in an economics class. There is no single technological solution that applies to every teacher, course, or view of teaching (Mishra & Koehler, 2006).

TPACK is an extension of Schulman’s concept of pedagogical content knowledge which changed many teacher preparation and development programs. Schulman and his colleagues proposed that teacher preparation and development programs had focused on developing two knowledge domains in teachers. First, teachers were required to develop content knowledge. Second, teacher preparation focused on developing pedagogical knowledge. Teaching skills were taught as a separate, general knowledge. Schulman proposed an additional knowledge domain which he termed pedagogical content knowledge (PCK). PCK suggests that pedagogy and content cannot be separated. Rather, pedagogy and content interact with and change each other (Schulman, 1986).

TPACK adds technological knowledge to the pedagogical content mix. “In this framework (see Figure 1), there are three interdependent components of teachers’ knowledge—content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK)—all framed within and influenced by contextual knowledge” (Harris, Mishra & Koehler, 2009, p. 396).
Professional development based on the TPACK concept requires collaboration between content area specialists and educational technology specialists. Learning opportunities for teachers are crafted so that teachers will learn technology skills while interacting with their content. A key to teachers gaining technological knowledge is that the technology is infused in the instruction the teachers receive. Using this process teachers gain specific technology skills, experience using those skills in learning situations, and see how the skills relate to pertinent content area materials. In this way teachers gain an understanding of how technology, pedagogy and content interact with each other.

Conclusion

Technology has largely failed to significantly and meaningfully change education. Traditional teaching practices and current professional development efforts are not conducive to meaningful educational technology integration. A realization that technology cannot be approached as a separate skill is necessary for true technology integration in education. The
theoretical framework offered in TPACK provides a guide for creating professional development that combines the use of technology with content learning and pedagogy. Additional work must be done to encourage K-12 professional development leaders to adopt training methods that follow the TPACK framework.
References


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