Technology Infusion in Teacher Preparation

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Technology Integration | TPACK | Faculty Development | Teacher Preparation | Preservice Teachers | Technology Infusion | Preparation Programs | Teacher Candidates | Technology Self-Efficacy | Technological Pedagogical Content Knowledge

A technology-infused preparation program teaches candidates how to use technology as a program-deep and program-wide curricular area. The goal of an infused program is to graduate PK-12 educators who are technology-capable from day one as certified teachers. In contrast to the common practice of addressing technology integration through a single course, technology-infused programs require a continual approach to supporting teacher candidates by addressing their ever-changing, developmental needs. Some PK-12 preparation programs adopt a technology-infused approach because they want to systematically address technology integration in a concerted effort. An infused approach is founded on Technological Pedagogical Content Knowledge (TPACK; Koehler & Mishra, 2009; Mishra & Koehler, 2006). Given that an infused approach represents a system-wide effort, Foulger suggested preparation programs address the pillars in their design. preparation programs can leverage the four pillars when they conceptualize their approach. The four pillars include (a) technology integration curriculum, (b) modeled experiences, (c) practice with reflection, and (d) technology self-efficacy (Foulger, 2020; Borthwick et al., 2020). Scholars recommend preparation programs should strive to recognize the interrelatedness of the pillars (for example, Warr et al., 2023; Jin et al., 2023; Sprague et al., 2023; Williams et al., 2023). As the ultimate measure of success, a program-wide design establishes technology self-efficacy, defined in part by candidates' confidence in their preparedness to teach with technology in future contexts (Buss, 2020).

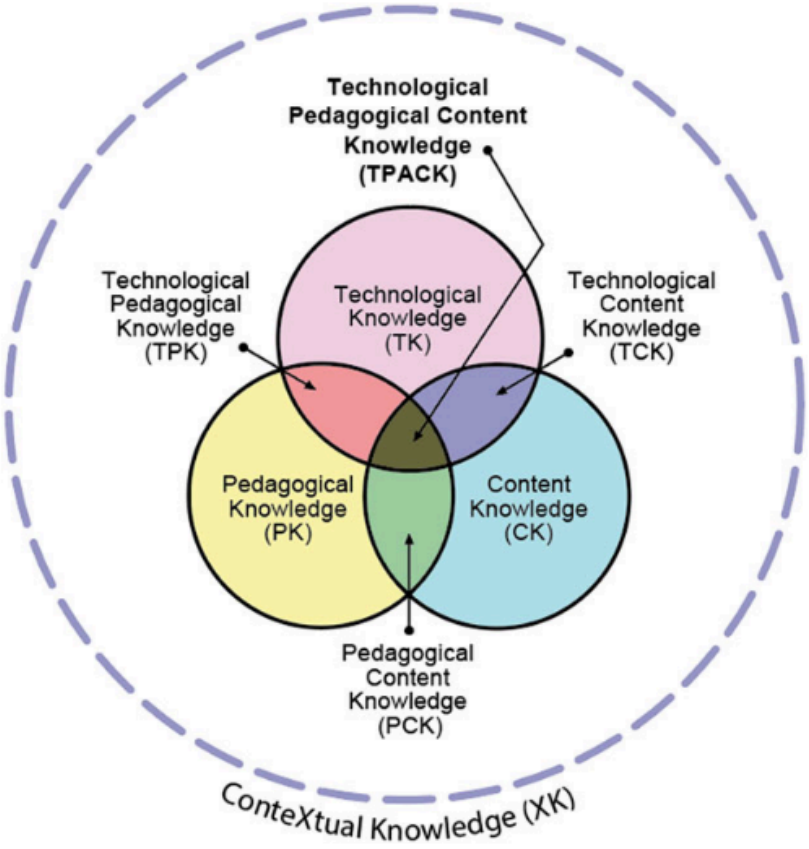
TPACK as a Theoretical Foundation for Technology Infusion

Educators who are proficient in technology have demonstrated TPACK – they understand how to represent their combined knowledge of technology, pedagogy, and content in PK-12 teaching and learning contexts, as illustrated in

Figure 1 (Mishra & Koehler, 2006; Koehler & Mishra, 2009). Notably, a study on technology-infused coursework revealed that the infused approach successfully nurtured teacher candidates' TPACK development, and that infused learning experiences also instilled in candidates a forward-looking perspective and an interest in integrating technology into their future classrooms (Foulger et al., 2021). Preparation programs that adopt an infusion model should recognize that effective implementation of a program-wide effort to address technology content will require teacher education instructors and PK-12 mentor teachers involved have the knowledge and skills (Foulger et al., 2017) to actively contribute to fostering candidates' TPACK and help candidates establish teaching with technology as an ongoing professional growth opportunity.

Figure 1

Technological Pedagogical Content Knowledge



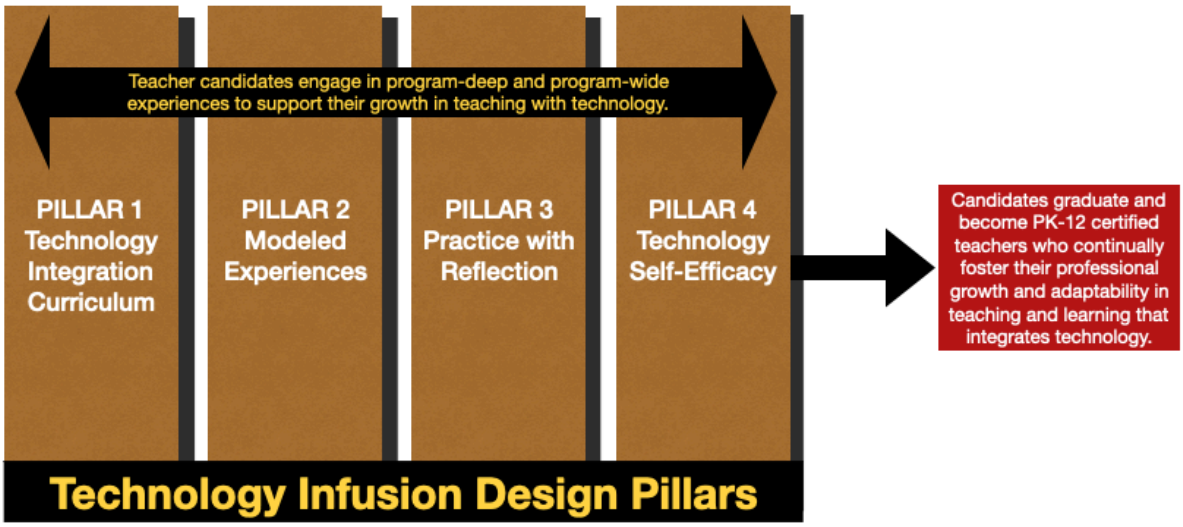
Mishra, P. (2019): Considering contextual knowledge: The TPACK diagram gets an upgrade. Journal of Digital Learning in Teacher Education. https://doi.org/10.1080/21532974.2019.1588611

The Four Pillars of a Technology Infused Design

Preparation programs can anchor their technology-infused models by addressing four design pillars: (a) a technology integration curriculum, (b) modeled experiences, (c) practice with reflection, and (d) technology self-efficacy as posited by Foulger (2020). The four pillars are distinct yet influence each other by forming a cohesive and rich preparation experience for teacher candidates as they learn to integrate technology effectively. See Figure 2.

Figure 2

Technology Infusion Design Pillar



Pillar 1: Technology Integration Curriculum

Pillar 1, the Technology Integration Curriculum, can help programs ensure that the representation of technology becomes more complex as candidates advance. This pillar mandates that preparation programs establish a developmentally appropriate technology integration curriculum that spans all facets of preparation and is seamlessly connected to learning content. The curriculum should be explicit; sequenced to build upon students' prior knowledge and facilitate a logical progression of learning; aligned with national standards, content area guidelines, and expectations set by local PK-12 schools; and written in a way that is measurable as candidates continually evolve. Further, it should consider the local teaching environment of PK-12 contexts such as technology availability and local policy. Ideally, the curriculum should introduce the theoretical foundations of PK-12 technology integration strategies early in preparation experiences, ensuring that candidates' practice is grounded in appropriate research. Assessing candidates' growth in TPACK and self-efficacy at various points, and sharing assessment data with them, could help ensure mastery of the technology integration curriculum. For more information about Pillar 1, see Warr et al. (2023).

Pillar 2: Modeled Experiences

Pillar 2, Modeled Experiences, can help programs provide real-world exposure to teaching. This pillar accentuates the critical role of teacher preparation faculty and mentor teachers who work with teacher candidates in technology infused programs. Teacher candidates who experience modeling can provide teacher candidates with rich opportunities to gain insight into technology's role in different PK-12 settings. Additionally, modeled experiences can positively influence teacher candidates' internal perceptions about the use of technology, including (a) their critical examination of the use of technology, (b) their understanding of how knowledge of technology and pedagogy interrelate with content and work together (i.e., TPACK), and (c) their technology self-efficacy. The most impactful modeling involves teacher candidates as engaged and reflective practitioners teaching PK-12 students in their school environments. Exemplary experiences tie instructional practices to research-based theories, findings from empirical research, and the alignment to technology frameworks for effective technology integration. Modeling experiences are a critical part of an infused approach because they positively impact candidates' motivation to learn about technology and their desire to integrate technology in their future. For more information about Pillar 2, see Jin et al. (2023).

Pillar 3: Practice with Reflection

Pillar 3, Practice with Reflection, can prompt programs to provide candidates with opportunities to put their skills into action. This pillar establishes the essential need for teacher candidates to learn the intricacies of teaching with technology through deliberate practice that leverages real-world PK-12 learning environments and prompts candidates to make theoretical justifications when they design learning experiences. Because practice opportunities occur across the entire preparation program and evolve in complexity, practice experiences align with the candidate's growing

proficiency in technology integration. Iterative practice opportunities can progressively move teacher candidates from being a novice at technology integration to more expert performance, ensuring their increased self-efficacy. Practice opportunities require a shared responsibility between teacher preparation and PK-12 school systems. Candidates benefit the most when they gain confidence enough to be fully responsible for the PK-12 students in their classrooms. For more information about Pillar 3, see Sprague et al. (2023).

Pillar 4: Technology Self-Efficacy

Pillar 4, Technology Self-Efficacy, suggests that preparation programs review their programs for candidates' continual growth. This pillar concentrates on ensuring candidates have confidence in their technology teaching skills and feel that they are pedagogically and technologically capable of facilitating learning experiences that use technology to improve student outcomes. Candidates who are self-efficacious quickly overcome any negative beliefs or attitudes and will take measures to guard their confidence. Preparation programs that infuse technology can influence candidates' self-efficacy in technology by addressing the way activities are designed and how activities are sequenced. To support growth in self-efficacy, the sequence of preparation activities should (a) engage teacher candidates in hands-on, mastery-learning teaching experiences and self-assessment, (b) help candidates take advantage of observational experiences where they can learn vicariously through others, (c) provide opportunities for candidates to set goals for their future use of technology and work with coaches or mentors who provide personalized feedback on their teaching demonstrations, and (d) support candidates to personally review their emotional state as an indication of their changes in beliefs about technology in teaching. For more information about Pillar 4, see Williams et al. (2023).

Conclusion

While the success of technology infusion in teacher preparation programs relies on the interplay of the four pillars (Foulger, 2020), designing and adopting a technology-infused approach should consider some inevitable challenges. For example, preparation programs will need to ensure all candidates have equitable access to appropriate hardware and software that meets minimal standards. As another example, they will need to find ways for their programs to keep pace with the rapid evolution of digital tools, making sure candidates are using new technology effectively and safely when they work with PK-12 students. It will be important that all PK-12 mentor teachers recognize they must support teacher candidates applying principles of ethics when teaching with technology. Finally, leaders of technology infusion must recognize that a paradigm change will be part of the adoption process (Foulger et al., 2019) and that ongoing professional development will be a necessary scaffold for teacher education faculty (Foulger et al., 2017).

Related Terms

Technological pedagogical content knowledge (TPACK)

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