Technological Pedagogical Content Knowledge (TPACK) Framework for K-12 Teacher Preparation: Emerging Research and Opportunities

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Foreword

Preface

Acknowledgment

Chapter 1
Teachers’ Knowledge-of-Practice for Integrating Technology: Technological Pedagogical Content Knowledge (TPACK)

Technological Pedagogical Content Knowledge (TPACK) is a dynamic theoretical description of teachers’ knowledge for designing, implementing, and evaluating curriculum and instruction with digital technologies. TPACK portrays a complex interaction among content knowledge, pedagogical knowledge and technological knowledge for guiding teachers in strategic thinking of when, where, and how to direct students’ learning with technologies. Teacher educators’ and educational researchers’ acceptance of the TPACK construct mirrors the acceptance of its parent construct of Pedagogical Content Knowledge (PCK). The importance of teachers’ continued practice in integrating technologies is essential for extending and enhancing their TPACK. Connections with the knowledge-of-practice (Cochran-Smith & Lytle, 1999) construct, suggests rephrasing TPACK as TPACK-of-practice to more accurately describe the process of the knowledge development efforts for guiding teachers in gaining, developing, and transforming their knowledge for teaching as new and more powerful technologies emerge for integration in education.

Chapter 2
Online Learning Trajectory for Knowledge-Building Communities to Reframe Inservice Teachers’ TPACK

Knowledge-building communities facilitate learning through collaborative explorations and investigations using today’s technologies as learning tools. Such communities support teachers in developing their Technological Pedagogical Content Knowledge (or TPACK) so they are able to rearrange educational experiences using a systems pedagogical approach for engaging students in communication, collaboration and inquiry-oriented technologies. A current educational setting for reframing inservice teachers’ knowledge involves online instruction. A researcher conjectured, empirically supported online TPACK learning trajectory provides guidelines for teacher educators as they design new online coursework for guiding teachers in enhancing their TPACK. Using a design-based research methodology, a social metacognitive constructivist instructional lens frames this online learning trajectory for organizing the course content development by interweaving descriptive tasks with specific pedagogical strategies towards reframing inservice teachers’ knowledge through knowledge-building communities. The resulting trajectory describes a dynamic interaction of key tools and instructional processes for scaffolding the content towards an enhanced TPACK understanding.
Chapter 3
Online TPACK Learning Trajectory Tools and Processes

A multiple case, descriptive study provides research insights for illuminating the tools and processes in the online TPACK learning trajectory situated in a social metacognitive constructivist instructional framework for graduate coursework. In this course, inservice K-12 teachers’ relearn, rethink, and redefine teaching and learning for developing a 21st century literacy significantly influenced by the proliferation and societal acceptance of multiple digital technologies. The research examination identifies insights about the incorporation of the key tools (community of learners and reflection) and processes (shared/individual knowledge development and inquiry) in the online learning trajectory for reframing teachers’ Technological Pedagogical Content Knowledge (TPACK). Three themes reveal how the online learning trajectory relies on these tools and processes for enhancing the participants’ learning: the tools and processes are needed for constructing knowledge, for transitioning the participant’s thinking as a student to that of a teacher, and for recognizing the value of pedagogical strategies for teaching and learning with technologies.

Chapter 4
Scaffolding Subject Matter Content with Pedagogy and Technologies in Problem-based Learning with the Online TPACK Learning Trajectory

This research-based application of an online inservice teacher education course highlights how scaffolding subject matter content, pedagogy, and technologies in a problem-based learning approach reframes teachers’ TPACK for integrating digital image and video technologies with 21st century inquiry thinking skills: critical thinking, creative thinking, communicating and collaborating. The course design takes advantage of knowledge-building communities through the application of the online TPACK learning trajectory. The participants’ products, interactions, and reflections demonstrate how the scaffolding engages them in high levels of thinking and learning in mathematics and science with digital image and video technologies. The result is an explanatory framework for how the scaffolding of the subject matter content, pedagogy, and technologies in problem-based learning with the online TPACK learning trajectory guides teachers in rethinking, relearning and reframing their TPACK knowledge for engaging students 21st century inquiry thinking with digital image and video technologies.

Chapter 5
Applying the TPACK Learning Trajectory in Blending Practical Teaching Experiences with Online Community of Learner’s Explorations

Inservice teacher preparation balances theory with practical experiences to support teachers in integrate their theoretical knowledge into their teaching practice. Online instruction holds potential for this education but questions how classroom observations are conducted in the teachers’ classroom practices, particularly where the teachers are geographically dispersed. This multiple case descriptive study examines an online analogue to traditional classroom observations, where the Scoop Notebook (Borko, Stecher, & Kuffner, 2005) reveals inservice teachers’ Technological Pedagogical Content Knowledge (TPACK), more specifically their TPACK-of-practice (Cochran-Smith & Lytle, 1999). The Scoop Electronic Portfolio development process describes teachers’ engagement in classroom practices, transitioning their scholarly theoretical knowledge to practical knowledge through in-depth, rich reflections from classroom actions and artifacts. This course blends the practical experiences of the Scoop process with asynchronous community of learners’ explorations of instructional strategies. The results describe teachers engaged in action research using Scoop artifacts as objects to think with for transforming their TPACK for integrating technologies in teaching their content, ultimately transforming their TPACK-of-practice.
Chapter 6
Looking to the Future in Transforming Inservice Teachers’ TPACK Through Online Continued Learning

The design and empirical support for the online TPACK learning trajectory emerged through a multi-year research process that provided a thorough, in-depth description of how the tools (community of learners and reflection) and processes (shared/individual knowledge development and inquiry) support the scaffolding of TPACK content as an integration of subject matter content, pedagogy, and technologies, thus modeling the knowledge teachers need for teaching with technology. The learning trajectory, framed with a social metacognitive constructivist lens, engaged inservice teachers in knowledge-building communities using inquiry-based, problem-based learning, guiding them in reframing their knowledge for designing student-directed, problem-based learning with the integration of technologies. Limitations and future research extend the understanding of TPACK through online teacher education continued learning in graduate programs and other professional development programs designed to support teachers in rethinking and reframing their knowledge for teaching with technologies. Multiple factors frame the thinking about future designs for these online programs aimed at transforming inservice teachers’ TPACK. Future challenges include whether and how online programs might be designed for developing preservice teachers’ TPACK.

Additional References

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