Researching Technology Infusion in Teacher Preparation

Jon M. Clausen
Ball State University
United States
jmclaus@bsu.edu

David Rutledge
New Mexico State University
United States
rutledge@nmsu.edu

Arlene C. Borthwick
National Louis University
United States
aborthwick@nl.edu

Shannon Driscoll
University of Dayton
United States
sdriskell1@udayton.edu

Yi Jin
Kennesaw State University
United States
yjin8@kennesaw.edu

Debra R. Sprague
George Mason University
United States
dspragu1@gmu.edu

Melissa Warr
New Mexico State University
United States
warr@nmsu.edu

Mia Kim Williams
University of Wyoming
United States
Mia.Williams@uwyo.edu

Abstract

Panelists for this session worked together to refine a research tool to collect teacher candidates' perspectives on their preparation to use and integrate technology in teaching and learning. Development of the tool began through a study proposed at NTLS in 2018 (Clausen et al., 2021) and expanded through alignment of the research tool to the four pillars that support a technology-infused teacher preparation program design: technology integration curriculum, experiences that model innovative uses of technology, practice with reflection, and development of technology self-efficacy for technology integration (Foulger, 2020, Graziano et al., 2023). Panelists will provide an overview of the four pillars, followed by a brief summary of selected instruments used to assess candidate outcomes (Christensen, 2021), intent to use technology in their practice (Foulger et al., 2021), and perspectives on their preparation to integrate technology in teaching and learning (Clausen et al. 2023; Williamson et al., 2023). Panelists will conclude their introductory remarks with an explanation of how working collaboratively, they aligned statements used in a Q sort with the four pillars to obtain a holistic view of technology infusion. Guiding

questions will facilitate discussion by attendees about the use of Q Methodology at their institutions and engagement in further collaborative efforts to investigate and enhance technology infusion in teacher education.

Introduction

The panelists for this session have been working together for over two years, examining the four pillars of technology infusion in teacher preparation programs (Foulger, 2020; Foulger et al., 2023) undergirding the development of Teacher Self-Efficacy in Technology Integration (Williams et al., 2023). As part of a larger team of teacher educators and professional developers, the panelists worked collaboratively to complete a summary of the literature undergirding the four pillars (see Graziano et al., 2023). In 2023, they reviewed prior research related to technology infusion by Clausen et al. (2023) and worked together to align statements for a Q sort with the four pillars identified by Foulger (2020):

- technology integration curriculum that spans certification programs,
- learning experiences that model innovative uses of technology,
- opportunities for practice and reflection, and
- development of self-efficacy and intentionality (Foulger, 2020, pp. 20-22).

The panelists are currently engaging in a multi-institution research study using Q methodology (Stephenson, 1935, 1953; McKeown & Thomas, 2013) and the pillar-aligned Q sort.

During this session, panelists will summarize the four pillars of a technology-infused teacher preparation program and provide a brief review of selected tools for assessing candidate outcomes and the scope of technology infusion in a teacher preparation program. The final portion of the session will include an introduction to Q methodology and describe the design of a pillar-aligned research project that took place in fall 2023. Participants will be invited to share their experiences related to program assessment and candidate preparation to integrate technology in teaching and learning and program assessment as they consider the potential for using Q methodology in future research endeavors. Questions to prompt audience engagement include the following:

- What comments and/or experiences would you like to share related to program design and assessment of candidate preparation to integrate technology in teaching and learning?
- How can we work with methods faculty to inform them about the essential nature of the four pillars? How can we involve them (or ourselves) in the design of technology-infused programs using the four pillars? In assessing candidate perceptions of their preparation?
- How might the four pillar descriptions enable action planning in teacher preparation programs?
- How might you like to be further involved in assessing technology infusion in teacher preparation? Collecting data from various stakeholders?

Abstract of Each Panelists' Perspective

Summary of the Four Pillars of a Technology-Infused Teacher Preparation Program

Yi Jin, Kennesaw State University; Melissa Warr, New Mexico State University; Shannon Driscoll, University of Dayton

In contrast to technology integration which focuses on the use of technology tools for a specific learning experience, technology infusion considers how technology is integrated throughout a teacher preparation program. A group of 19 educational technology experts across the U.S. published a special issue in CITE General in early 2023 to elaborate on the pillars needed for such an approach (Jin, et al., 2023; Sprague, et al., 2023; Warr et al., 2023; Williams, et al., 2023). The four pillars offer practical guidance and recommendations to teacher educators for developing and implementing an infusion approach across a teacher preparation program. These four pillars are: (1) technology-integrated curriculum, (2) modeled experiences, (3) practice with reflection, and (4) technology self-efficacy. In this presentation, the panelists will provide a summary of the four pillars, which provide a conceptual framework for a new study

using Q methodology to examine teacher preparation. Collaborating authors have also undertaken further research related to technology infusion that will be shared during the SITE conference.

Brief Review of Selected Tools for Assessing Candidate Outcomes and Technology Infusion in Teacher Preparation
Debra R. Sprague, George Mason University and Mia Kim Williams, University of Wyoming

Technology infusion in educator preparation programs (EPPs) is essential in cultivating teachers who are adept at navigating the digital landscape of modern classrooms. Measuring candidates' development can support (1) the growth of teacher self-efficacy in technology integration (TSEinTI) and (2) an EPP's curriculum, practicum, and modeling practices. Technology integration frameworks (i.e., TPACK, SAMR, or Triple E) and integration measurement tools (i.e., TPSA C21) enable stakeholders to gauge progress and quantify efforts to promote technology infusion. Additionally, various assessment tools and digital portfolios allow aspiring teachers to demonstrate their competency and readiness in leveraging technology for effective instruction. Presenters will discuss the benefits and constraints of using assessment to foster technology infusion. Participants will be encouraged to share their experiences and ideas about how assessment allows educators to scrutinize, celebrate, and enhance the development of technology integration in our classrooms

Using Q Methodology to Examine the Four Pillars of Technology Infusion
Jon M. Clausen, Ball State University; David Rutledge, New Mexico State University; Arlene C. Borthwick, National Louis University

Q Methodology applied to educational research in teacher preparation can provide insights to teacher candidates' perspectives, experiences and self-efficacy for integrating technology in teaching and learning. The careful preparation of a set of statements, typically 40-60 statements, is a fundamental step in undertaking a Q study. An examination of the literature and consideration of the concourse of possible statements for inclusion can be time consuming. For participants, the process of completing a Q sort requires reviewing each statement in relation to other statements and rank ordering them. This is a different process than completing a survey where each statement is considered independent of the other statements. The panelists will review the scope of competencies, standards, and conditions used in development of statements integral to a Q study on technology infusion in teacher preparation. They will provide an overview of the collaborative research undertaken by the panelists in the Fall of 2023 and invite session attendees to undertake similar or related research.

Outline of How the Panel Will Be Organized

The session will begin with a brief introduction to the topic and organization of the session. The session will be divided into three sections. Each section will be 18 or 19 minutes long, with 8 or 9 minutes for panelists to present their perspective and 10 minutes for audience discussion using the guiding questions provided below. If the session is well-attended, discussion will occur at each table rather than in one large group.

INTRODUCTION *(5 minutes)*

PANEL PRESENTATION: Summary of the Four Pillars of a Technology-Infused Teacher Preparation Program *(8 minutes)*
Yi Jin, Melissa Warr, Shannon Driscoll

AUDIENCE ENGAGEMENT *(10 minutes)*

What comments and/or experiences would you like to share related to program design for candidate preparation to integrate technology in teaching and learning?

How can we work with methods faculty to inform them about the essential nature of the four pillars? How can we involve them (or ourselves) in the design of technology-infused programs using the four pillars?

PANEL PRESENTATION: Brief Review of Selected Tools for Assessing Candidate Outcomes and Technology Infusion in Teacher Preparation (8 minutes)
Debra R. Sprague and Mia Kim Williams

AUDIENCE ENGAGEMENT *(10 minutes)*

What comments and/or experiences would you like to share related to program assessment of candidate preparation to integrate technology in teaching and learning?

How can we involve them (or ourselves) in assessing the four pillars and candidate perceptions of their preparation?

PANEL PRESENTATION: Using Q Methodology to Examine the Four Pillars of Technology Infusion *(9 minutes)*
Jon M. Clausen, David Rutledge, Arlene C. Borthwick

AUDIENCE ENGAGEMENT *(10 minutes)*

How might the four pillar descriptions enable action planning in teacher preparation programs?

How might you like to be further involved in assessing technology infusion in teacher preparation? Collecting data from various stakeholders?

References

Christensen, R. (2021). Validation of a Technology Proficiency Survey for Educators. In E. Langran & L. Archambault (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 782-791). Online, United States: Association for the Advancement of Computing in Education (AACE).\

Clausen, J.M., Rutledge, D. & Borthwick, A. (2023). Candidate perspectives about technology infusion in their teacher education preparation program. In E. Langran, P. Christensen & J. Sanson (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 963-972). New Orleans, LA, United States: Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/primary/p/221953/.

Clausen, J. M., Borthwick, A. C., & Rutledge, D. (2021). Teacher educator perspectives on technology infusion: A closer look using Q methodology. *Journal of Technology and Teacher Education, 29*(1), 5–43. https://www.learntechlib.org/primary/p/218585/

Foulger, T.S. (2020). Design considerations for technology-infused teacher preparation programs. In A. C. Borthwick, T. S. Foulger, & K. J. Graziano (Eds.), *Championing technology infusion in teacher preparation: A framework for supporting future educators* (pp. 3-28). International Society for Technology in Education.

Foulger, T.S., Buss, R.R., & Su, M. (2021). The IT2 Survey: Contextual knowledge (XK) influences on teacher candidates' intention to integrate technology. *Educational Technology Research & Development, 69*, 2729–2760. https://doi.org/10.1007/s11423-021-10033-4.

Foulger, T. S., Graziano, K. J., & Borthwick, A. C (2023) Design implications for technology-infused teacher preparation programs. *Contemporary Issues in Technology and Teacher Education Journal. 23*(1), 260-268. https://citejournal.org/volume-23-issue-1-23/general/editorial-design-implications-for-technology-infused-teacher-preparation-programs/

Graziano, K. J., Foulger, T. S., & Borthwick, A. C. (2023). Editorial: Design pillars for technology-infused teacher preparation programs. *Contemporary Issues in Technology and Teacher Education Journal. 23*(1), 116-123. https://citejournal.org/volume-23/issue-1-23/general/editorial-design-pillars-for-technology-infused-teacher-preparation-programs/

Jin, Y., Clausen, J.M., Elkordy, A., Greene, K. & McVey, M. (2023). Design Principles for Modeled Experiences in Technology-Infused Teacher Preparation Programs. *Contemporary Issues in Technology and Teacher Education, 23*(1), 151-198. Waynesville, NC USA: Society for Information Technology & Teacher Education. https://www.learntechlib.org/primary/p/221541/.

McKeown, B. F., & Thomas, D. B. (2013). Q Methodology (2nd ed.). Sage.

Stephenson, W. (1935). Correlating persons instead of tests. Character and Personality, 4, 17–24.

Stephenson, W. (1953). *The study of behavior: Q-technique methodology.* University of Chicago Press.

Sprague, D.R., Zumpano, N.M., Richardson, J.W., Williamson, J. & Gray, L. (2023). Technology Infusion and the Development of Practice: The Quest to Create Digitally Able Teachers. *Contemporary Issues in Technology and Teacher Education, 23*(1), 199-227. Waynesville, NC USA: Society for Information Technology & Teacher Education. https://www.learntechlib.org/primary/p/221545/.

Warr, M., Driskell, S.O.S., Langran, E., Mouza, C. & Schmidt-Crawford, D. (2023). Curriculum Design for Technology Infusion: A Continuous Collaborative Process. *Contemporary Issues in Technology and Teacher Education, 23*(1), 124-150. Waynesville, NC USA: Society for Information Technology & Teacher Education. https://www.learntechlib.org/primary/p/221547/.

Williams, M.K., Christensen, R., McElroy, D. & Rutledge, D. (2023). Teacher Self-Efficacy in Technology Integration as a Critical Component in Designing Technology-Infused Teacher Preparation Programs. *Contemporary Issues in Technology and Teacher Education, 23*(1), 228-259. Waynesville, NC USA: Society for Information Technology & Teacher Education. https://www.learntechlib.org/primary/p/221546/.

Williamson, J., Sprague, D.R. & Foulger, T.S. (2023). Characteristics and indicators of technology infused programs: Supporting a paradigm shift in teacher preparation. *Journal of Technology and Teacher Education, 31*(2), 203-226. https://www.learntechlib.org/primary/p/222164/