Editorial:
What We Learned about Technology and Teacher Education in 2019

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We include two main editorials each year in the Journal of Technology and Teacher Education (JTATE). In the second issue of the year, we report quantitative and qualitative results of the review process of all manuscripts submitted the prior year (see Ferdig & Baumgartner, 2019). In the fourth issue (this one), we look back at what we learned from articles published in the current year (2019). The recap is not meant to replace reading through each article; we always encourage JTATE subscribers to read and reflect on all the articles. Instead, it is meant to give readers a meta-summary of the types of articles published and the major things we learned from reading those articles. We continue to publish both editorials in order to increase communication between the editors, editorial review board members, international advisory board members, and current and future JTATE authors.

Twenty-one peer-reviewed articles were published in four issues of the 28th volume of JTATE (2019). The volume includes a special issue in the fourth issue that explores teacher candidate’s integration of technology. Papers across the entire volume can broadly categorized into four main topics or categories:

1. Mathematics and Computational Thinking
2. Professional Development
3. Teacher modeling, coaching, and confidence 
4. Teacher Educator Technology Competency (special issue)

Topics are presented below with a summary of the key findings.

**Topic 1: Mathematics and Computational Thinking (CT)**

- *Decorative images on Pinterest are correlated with lower cognitive load mathematics activities* (Sawyer, Dick, Shapiro, & Wismer, 2019). Sawyer and authors (2019) reviewed the top 500 mathematics activities on Pinterest, since many elementary teachers utilize Pinterest for their classrooms. Their goal was to determine what kind of mathematics materials and topics are available and what their cognitive demands are. They found that there are less than 2% of high-cognitive demand math activities, with suggestions for teacher educators to help prepare teachers on how to decide which materials they should be looking for to increase the cognitive demand of their students.

- *Interactive simulations provide varying opportunities for student engagement and teacher integration* (Findley, Whitacre, Schellinger, & Hensberry, 2019). Findley and colleagues (2019) investigated PhET interactive simulations with middle school mathematics teachers to see how the teachers integrated them and their beliefs of the affordances of them. They found that different teachers assumed different roles in implementing simulations and noted all the teachers utilized the sims in varying ways. They also found that teachers’ beliefs are tied to their preferred role in the classroom, but teachers need to adapt for the sims to be effective.

- *Teachers can draw upon their previous experiences to make connections between CT and classroom practices* (Rich, Yadav, & Schwarz, 2019). Elementary school teachers were interviewed regarding their understanding of CT. The authors note the importance of teachers understanding how CT connects to their classroom practices. They also introduced a foundation for a workshop introducing CT to teachers. In addition, they discuss the importance of teachers having experiences that increase their knowledge and understanding of CT and how professional development opportunities can be beneficial.
Teacher preconceptions of CT affect how they define CT, how they integrate it, and how they teach and learn. (Cabrera, 2019). Cabrera (2019) reviewed 24 articles identifying the preconceptions teachers have regarding CT. He found there are preconceptions around defining and identifying CT and around teaching and learning CT. He notes that some of these preconceptions can affect teachers integrating CT into their classrooms. He encourages teacher educators to address these at the beginning by building on previous knowledge and understanding the definition of CT. He also found that CT is hard to integrate in K-12 education.

**Topic 2: Professional Development**

- The Technology Integration Enhancing Success (TIES) program can increase skills of various technologies for teachers, but does not change attitudes towards technology (Li, Murnen, Zhou, Wu, & Xiong, 2019). Teachers from various countries in English as a Foreign Language (EFL) programs participated in a technology professional development workshop with the goal of presenting effective technology integration. They found the program was beneficial in introducing teachers to new technologies and gave them opportunities to practice hands-on. They found that the technology skills of the teachers were significantly improved.

- Massively Open Online Courses for Educators (MOOC-Ed) can lead to increased retention, engagement, and connectedness (Akoglu, Lee, & Kellogg, 2019). A study was conducted to examine MOOCs for online professional development. The authors also examined professional learning teams (PLTs) within MOOCs to gain perspective on a blended professional development experience where participants were both in a large course and a smaller team. The participants who were in the PLTs within the MOOCs were more active, engaged and completed more of the course. They encourage more professional development online activities to adopt a similar model of having PLTs within courses.

- Pre-Service teachers’ prior experience and views of technology affect their technology use in the classroom (Akapame, Burroughs, & Arnold, 2019). Pre-service mathematics teachers were given a methods-modeling practicum to address the components of Technological Pedagogical Content Knowledge (TPACK). This multiple case study
specifically looks at three students who were enrolled in three courses during the semester. They compared self-reported and enacted TPACK skills and found that there can be a vast difference between the two. The authors also note that understanding TPACK development in pre-service teachers is complex and found that their three-course collaboration is not enough to develop TPACK alone.

- *The Concerns-Based Adoption Model (CABM) can lead to successful adoption of technology-enhanced embodied learning* (Georgiou & Ioannou, 2019). Georgiou and Ioannou (2019) investigated a professional development program in which in-service teachers (n=31) engaged in a program with the goal of adopting technology-enhanced embodied learning. They found teachers had positive thoughts about technology-enhanced embodied learning, but they also found that there are technological constraints and classroom orchestration limitations. By the end of the program, the concerns of teachers were mostly mitigated, except for high-level concerns.

- *Having individual needs met encourages progress towards learning goals* (Hall et al., 2019). In-Service teachers (n=344) participated in a personalized professional learning experience to promote ICT integration in preK-12 classrooms. Teachers were given the opportunity to select their own courses that best met their needs. Participants were given pre- and post-tests and five were interviewed regarding self-efficacy and experience towards technology. They found that the participants’ perceptions of their self-efficacy towards technology was significantly improved after the training.

**Topic 3: Teacher modeling, coaching, and confidence**

- *The Teacher Preparation Technology Inventory can measure how often teacher candidates model and apply the 2017 ISTE Standards for Educators* (Riegel, 2019). Teacher preparation programs are required to ensure candidates can apply technology standards successfully (CAEP, 2013). A Likert-scale model instrument was developed to measure how often teacher candidates were engaged in behaviors from the ISTE Standards over three rounds of the Delphi technique. After analyzing the instrument items, the final draft consists of 81 items that all had acceptable correlations. The instrument can be utilized by higher education institutions to ensure candidates are prepared to utilize technology.
• *Teachers have increased confidence in technologies utilizing a creatively focused technology fluent (CFTF) mindset.* (Henriksen, Mehta, & Rosenberg, 2019). Education Master’s students (n=74) participated in hybrid courses with activities focusing on the CFTF mindset. They engaged in micro-design activities, macro-design projects and STEAMlabs to collaboratively and individually generate creative thinking and technology fluency outcomes. Students were surveyed pre- and post- and the authors found there was increased technology confidence. Implications suggest putting teachers in a position to create can assist confidence in utilizing technology tools.

• *Teachers can focus on students ideas by analyzing their thinking through video* (Bopardikar et al., 2019). Elementary science teachers (n=13) participated in a professional learning program in which they were paired with a coach to analyze their students’ science thinking in order to create effective instruction. The authors found teachers were able to attend to their student’s thinking, reasoning, and ideas for future instruction based upon the analysis of their videos with a coach. They encourage professional learning programs to incorporate teachers’ own video and interaction with a coach.

**Topic 4: Teacher Educator Technology Competency**

Our guest editors and authors of the TETCs provided an extended editorial for this special issue. In order to not duplicate efforts of their editorial, we will simply summarize the main finding of each article.

• There are unique differences of PD between higher education and K-12 education (Parrish & Sadera, 2019).
• A survey was developed to measure TETCs consisting of 12 Likert-type items and is recommended for use in future studies (Knezek et al., 2019).
• Teachers can collaborate to integrate the TETCs into their own classrooms (Thomas et al., 2019).
• Coaching, situated learning, and technology integration professional development is responsible for successful learning (Dillon et al., 2019).
• The technology teachers use should be integrated in a responsible manner (Krutka et al., 2019).
2019 themes and 2020 needs

The articles published in the 27th volume of JTATE could be broadly categorized under four main topics. However, there are themes that emerged throughout the articles. For instance, professional development with in-service teachers was a highly researched topic this volume. Additionally, there was innovative research published on how opinions of technology affect teacher’s use in the classroom, with both preservice and in-service teachers. Finally, JTATE authors were willing to explore new instruments to further research agendas.

Looking forward to 2020, we encourage authors to investigate cutting-edge technologies and innovative topics that are emerging in our field. Such topics may include (but are not limited to) robotics, VR/AR, 360-degree video, artificial intelligence, the Internet of Things (IoT), and accessibility. Many topics have already appeared in teacher education classrooms or professional development settings and deserve further research exploration.

We conclude by thanking our international advisory board and our editorial review board. The IAB provides direction and support for our journal and the ERB provides excellent reviews and advice for authors. We thank our current authors and future authors for submitting their work to JTATE.

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