



TPACK Newsletter, Issue #40: March 2019

Special Spring 2019 Conference Issue

Below please find a list of TPACK-related papers/sessions that will be presented at the SITE conference in March in Las Vegas; at the AERA annual meeting in April in Toronto; and at the ISTE conference in June in Philadelphia. (That's 35 TPACK-focused conference sessions in just 3 months!)

Please note that we have included only those presentations that use TPCK/TPACK *extensively* as either a theoretical framework and/or a focus for investigation throughout the cited conference papers/presentations. The construct is used so often in educational technology research and professional learning that including all presentations that mention TPCK/TPACK, but do not focus upon it – even at just these three national/international conferences – would make this special issue of the newsletter inconveniently long for you, our readers.

If you are not sure what TPACK is, please surf over to <http://www.tpack.org/> to find out more.

Gratuitous Quote About Conferences

"I feed on conferences."

- Marilyn Ferguson

In This Issue

- 1. [Gratuitous Quote About Conferences](#)
- 0. In This Issue **(You are here.)**
- 1. [SITE 2019 TPACK-Focused Presentations](#)
- 2. [AERA 2019 TPACK-Focused Presentations](#)
- 3. [ISTE 2019 TPACK-Focused Presentations](#)
- 4. [TPACK Newsletter Suggested Citation](#)
- 5. [Learning and Doing More with TPACK](#)
- . [Un-numbered miscellaneous stuff at the end](#)

1. SITE 2019 TP(A)CK-Focused Presentations

Beri, N., Sharma, L., & Kumar, A. (2019, March). *A study on technological pedagogical and content knowledge among teacher-educators in Punjab region*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/53775/>

Abstract: “In modern years, investigators revealed that efficient ICT assimilation necessitates educators to have competencies about content matter, usage of technology and how to deliver content matter by using technology along with connection of these three parts content, technology and pedagogy referred as TPACK (Archambault, L. & Crippen, 2009 ; Mishra, P. & Koehler, M. J, 2006).TPACK competencies are very fruitful in making teaching learning process an ecstatic experience as it would make notable changes in the interaction pattern of educators. The prime intent of this research was to appraise the know-how of technological pedagogical and content knowledge commonly referred as (TPACK) competencies among teacher-educators in the state of Punjab, (India). A five-point Likert scale was applied in the present study. Instrumental survey method was practiced as a tool for the present research. A random sampling method was applied in the drafting of sample of as many as 200 teacher-educators. The collected data was analyzed by using SPSS 22.0 software. The outcomes of the study show that the know-how of technological pedagogical and content knowledge commonly known as (TPACK) competencies have found high in the teacher-educators of Punjab region. The results of the research also reveal that there are statistically variances in the (TPACK) competencies of teacher-educators with respect to gender, locality of college, stream and type of colleges.”

Date/Time: Thursday, March 21 3:00-3:30 PM, Sunset 1

Bruewer, A., & Brown, T. (2019, March). *Podcast as authentic meaningful learning in the educational technology classroom: Reconceptualizing the course literature review for student TPACK development*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54226/>

Abstract: “This paper will present the results of a study situated within a reconceptualized educational technology course at a small, rural Midwestern university. In the process of shifting from a tool focused to philosophical learning first focus, course assignments were augmented and transformed as needed, including the midterm literature review. Students were instead tasked to participate in research and interviews for the creation of a Podcast, transforming the traditional literature review. The focus was on providing an authentic task for teachers to learn about new technology in their content areas and grade bands while creating an educational product for a wider audience that brought together course content, pedagogical considerations and emergent digital technology. TPCK was used as a framework to reconsider the closure and assignment, and to interview the development of technology integration by the teacher

candidates. Results of students dispositional and attitudes about technology integration are forthcoming.”

Date/Time: Thursday, March 21 4:35-4:55 PM, Sunset 1

Cheah, Y. H., Chai, C. S., & Toh, Y. (2019, March). *Teachers’ TPACK evolvement in a technology-mediated elementary science innovation: A translation perspective*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54529/>

Abstract: “While TPACK framework has been widely adopted to address teacher professional development needs, teacher TPACK growth from the innovation translation perspective is apparently underexplored. Adopting a case study approach, our paper uses cultural historical activity theory to explore teacher TPACK evolvement when they re-contextualized a joint-school inquiry science curriculum. Firstly, we present two cases revealing that teachers’ different TPACK orientations were influenced by the interplay between personal and contextual factors. Then we highlight how teachers’ teaching beliefs and their interpretation of the environment could affect their responses toward the contextual barriers encountered. By unpacking the reciprocal relationship between the person-environment interaction across multilevel context (classroom, within-school and between-school), our study could contribute to ensure the fidelity of educational technology innovation while addressing the localized needs.”

Date/Time: Friday, March 19 3:45-4:00 PM, Sunset 5 & 6

Enderson, M. C., & Watson, G. C. (2019, March). *A case study of a STEM teacher’s development of TPACK in a teacher preparation program*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54650/>

Abstract: “This case study involved researching pre-service secondary STEM teachers’ development of TPACK by use of modeling & simulation applications. The main research question focused on how do self-reported TPACK measures align with demonstrated TPACK knowledge and skills. The study design was qualitative and included five secondary STEM pre-service teachers who were completing their program of study and teaching lessons in the field with secondary students. This particular brief paper reports on one of the pre-service STEM teachers in this study. Coding and analysis were carried out to search for characteristics of tasks that support development of TPACK in future teachers. Findings from this one case identified somewhat high marks on the TPACK self-scores but weaker identification of features of modeling and simulation (M&S) applications integrated into instructional use. The challenge for teacher education programs is to search for ways to better measure and support TPACK development in future teachers.”

Date/Time: Wednesday, March 20, 3:00-3:20 PM, Sunset 2

Ervin-Kassab, L. (2019, March). *TPEs, TPAs, TPACK, and TETCs: Working together to integrate technology into a methods course*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54210/>

Abstract: “This brief paper presents the ongoing work and professional growth of three professors collaborating to integrate technology into an elementary mathematics methods course. This integration occurred in response to changes in accreditation standards and a high-stakes teaching performance assessment. In spite of the externally-motivated nature of the instigation of the work, the professors decided to leverage the opportunity to learn with and from one another. They utilized the Teacher Educator Technology Competencies (Foulger, et al., 2017) to reflect on their learning and the TPACK framework for course modifications. Using a collaborative inquiry structure and co-teaching strategies, they re-imagined not only the assignments but the roles colleagues play in sharing expertise. Experiences, materials, lessons learned and implications for policy and practice will be presented.”

Date/Time: Wednesday, March 20 3:40-4:00 PM, Sunset 2

Jin, Y. (2019, March). *The nature of TPACK: Is TPACK distinctive, integrative or transformative?* Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/53924/>

Abstract: “The technological pedagogical content knowledge (TPACK) framework has been used widely in the field of education to conceptualize what are the knowledge domains teachers need when they integrate technology into their classroom. An ongoing discussion exists in the literature that explores the nature of TPACK. Three stances are influential in this discussion: the distinctive view, the integrative view, and the transformative view. It is critical to further this dialogue since the nature of TPACK has direct impacts on research and practice. Moreover, it is essential to conduct more research that could provide empirical evidence to the discourse. Therefore, the purpose of this paper is to explore whether TPACK is a distinctive, integrative or transformative construct using data collected from an empirical study. From the results, TPACK seems to be a transformative knowledge. Suggestions for practice are provided.”

Date/Time: Thursday, March 21 1:45-2:05 PM, Sunset 2

Jin, Y., Baran, E., Schmidt-Crawford, D., Donner, J., Foulger, T., Niess, M., & Tondeur, J. (2019, March). *Multiple perspectives on applying the TPACK framework in teacher education*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/53951/>

Abstract: “The purpose of this panel discussion is to facilitate conversations among scholars in the field who are applying the TPACK framework in teacher education as a component of innovative approaches. TPACK SIG members from a variety of universities will serve as panelists in the session and will share their university's' approaches as well as participate in the dialog

about how research and findings from these areas might support innovation in other colleges of education. The overall goal of the session is to initiate collaborative relations among TPACK SIG members, including panelists and attendees, and to establish connections among those with common interests.”

Date/Time: Thursday, March 21 3:00-4:00 PM, Celebrity Ballroom 1 & 2

Kessler, A., & Phillips, M. (2019, March). *What do published abstracts reveal about the TPACK research community?* Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54454/>

Abstract: “A singularly significant contribution to the TPACK community of researchers has been the curation of publication details of TPACK related research since 2009 in the TPACK newsletter published online at <http://tpack.org>. This research explored abstracts from books, book chapters, journal articles and dissertations from newsletters published between December 2016 and October 2017 (n=180) using an emergent and thematic synthesis review process. Results indicate that the content of abstracts are highly variable and large percentages fail to include information about number of participants, content level, or type of analysis used. We discuss potential implications of these findings for the research community.”

Date/Time: Tuesday, March 19 3:15-3:30 PM, Sunset 5 & 6

Khirwadkar, A., & Figg, C. (2019, March). *Makerspaces for developing TPACK: A self-directed creative exploration for learning mathematics.* Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54647/>

Abstract: “Preparation for teaching in digital classrooms and designing learning environments for students immersed in a digital society has become increasingly important in teacher education programs. Makerspaces are emerging as promising experiential learning environments supporting the development of future ready skills. This poster presentation shares the findings from an exploratory pre-pilot study as to what connections participants could make between the teaching of mathematics and makerspace experiences. Preliminary findings suggest that participants enhanced their TPACK and: 1) were able to make connections between their makerspace activities and how grade 1-5 students would learn various concepts in mathematics; 2) were able to describe how makerspace activities could be used to connect multiple strands in mathematics together to learn the concept holistically; 3) found that working in groups facilitated the discussion of ideas for making mathematics connections; and 4) identified the issue of time as a constraint on their learning.”

Date/Time: Wednesday, March 20 5:45-7:00 PM, Mezzanine

King, C., & MacKinnon, G. (2019, March). *Multimedia case-based learning sports injury assessment educational tool: Using TPACK principles to enhance athletic therapy*

education. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/53591/>

Abstract: “Multimedia scenarios can be used as effective constructivist instructional tools that create contextually authentic injury experiences, while also scaffolding instruction to help students move beyond their current skill/knowledge base. In the current study, a multimedia educational tool and accompanying pedagogical model were designed using TPACK theory to engage athletic therapy students in learning about comprehensive orthopedic injury assessments. The purpose of this research was to explore the impact of this multimedia tool on the nature of teaching and learning in an athletic therapy specific context. Multimedia technologies were embedded throughout the educational tool to enhance instruction and create contextually authentic scenarios. The research described herein describes the findings from this study which have direct implications for any educator who wishes to capitalize on the benefits of using pedagogically sound technology-enhanced scenarios.”

Date/Time: Wednesday, March 20 5:45-7:00 PM, Mezzanine

Liu, H., & Boltz, E. (2019, March). *The impact of MOOC learning experience on foreign language teachers’ technological knowledge, epistemology and pedagogical beliefs*. Roundtable presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54671/>

Abstract: “Earlier studies indicated that teachers’ epistemology, pedagogical beliefs and technological knowledge are essential for their effective technology use (Deng et al., 2014; Ertmer et al., 2012; Teo & Koh, 2010; Mishra & Koehler, 2006), yet few studies have explored how teachers’ MOOC learning experience would lead to changes in teachers’ beliefs and knowledge. This multiple case-study research was designed to answer the question, “what influences do teachers MOOC learning experience have on their epistemology, pedagogical beliefs and technological knowledge?” Ten college-level foreign language teachers were purposefully selected for an interview to examine teachers’ change in three aspects: epistemology, pedagogical beliefs and technological knowledge. All participants have never had online learning experience before they took MOOC classes. Results suggested that teachers’ MOOC learning experience has influences on almost all of the participants' epistemology, which shows a change toward a constructivist/relativist epistemological stance. MOOC learning experience also had impact on most teachers’ pedagogical beliefs and led to a change toward a more student-centered one. Additionally, some teachers also reported improvement in their technological knowledge. This study has implications for teacher trainers/educators when designing courses and/or workshop aiming for teachers’ technology integration.”

Date/Time: Tuesday, March 19 10:15-11:15 AM, Melrose 3

Mourlam, D. (2019, March). *Understanding teacher candidate TPACK while participating in a STEM professional development school partnership program*. Paper presented at the

Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54048/>

Abstract: “Preparing teacher candidates to teach with technology is an enduring issue within teacher education. As programs throughout the United States have revised curriculum to prepare candidates to combine their knowledge of content, pedagogy, and technologies, multiple approaches to teacher candidate TPACK development have emerged. One approach concurrently enrolls teacher candidates in educational technology, methods, and field experience courses. Building upon these efforts, the purpose of this study was to investigate teacher candidate TPACK development while enrolled in an educational technology course taught as part of a STEM professional development school partnership program. A self-report TPACK survey instrument was used to collect pre-post data from two cohorts of teacher candidates enrolled in the program. Data was analyzed using descriptive and inferential statistics. Findings indicated a statistically significant increase on most composite TPACK domains with medium and large effect sizes.”

Date/Time: Friday, March 22 11:30 AM-12:00 PM, Sunset 2

Nelson, R. (2019, March). *Tracking T-dimensional TPACK in elementary preservice and clinical teachers*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54676/>

Abstract: “This survey acted as a needs assessment and examined the development of confidence in the T-dimensions of TPACK in undergraduate preservice teachers. It compared the T-dimensional confidence of two elementary preservice teacher groups (preservice and clinical teachers) using the technology sections of the Survey of Preservice Teachers’ Knowledge of Teaching and Technology (Schmidt et al., 2009). The results showed a statistically significant difference between the TK and TCK confidence, with clinical teachers having higher confidence in both. There was no statistical difference between the TPK and TPACK of the two groups, with the means of both groups closely aligned. The findings demonstrate the variability in TPACK development between preservice and clinical teachers.”

Date/Time: Thursday, March 21 4:45-5:15 PM, Melrose 2

Parra, J. (2019, March). *Using TPACK to teach #FutureTeachers in an undergraduate integrating technology with teaching course*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/53859/>

Abstract: “A learning technologies course, Integrating Technology with Teaching (ITT) is being redesigned to address the needs of 1) an educator preparation program, and 2) the needs of students preparing to be future teachers. TPACK is used for both course design and course content. For this session, the course design for both the face-to-face (F2F) and online versions will be shared along with the results of a case study on the F2F version and learning highlights

from students in the online version. Key course concepts include LMS and learning plan design, digital citizenship, personal learning networks, TPACK with focus on Pedagogy of Love/Care and Constructivism, social justice, games in education, STEM and Makerspaces, and Free/OER technology.”

Date/Time: Wednesday, March 20 5:45-7:00 PM, Mezzanine

Saubern, R., Urbach, D., Koehler, M., & Phillips, M. (2019, March). *A construct map for TPACK: Developing an empirically derived description of increasing TPACK proficiency*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/53893/>

Abstract: “Over the last ten years, the TPACK model has had a major influence on research into technology integration in education and been adopted for research across a wide variety of contexts. While this research has provided a valuable contribution to our understanding of professional knowledge of teachers, the TPACK construct, like the PCK construct on which it is based, remains in flux. Researchers continue to explore key questions about the definition of TPACK and its components, boundaries between the TPACK components, the transformative or integrative nature of TPACK components, and the validity of TPACK measurement. This paper uses a measurement lens to focus on the description of the TPACK construct. It demonstrates how a ‘construct map’ for TPACK, which describes increasing proficiency in TPACK, can be developed using empirical data gathered from a TPACK survey tool.”

Date/Time: Thursday, March 21 4:14-4:45 PM, Melrose 4

Schropshire, N. (2019, March). *Introducing SW-TPACK*. Virtual paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54497/>

Abstract: “This work-in-progress presentation addresses a research gap of the pedagogical knowledge required of social work faculty to competently prepare to teach with technology in distance education programs. Situated in Mishra and Koehler’s (2006) Technological Pedagogical Content Knowledge (TPACK) framework, this session introduces program administrators and educators to a discipline-specific, proposed conceptual model designed for effective teaching with technology in social work education, the Social Work - Technological Pedagogical and Content Knowledge (SW-TPACK) model. This session is the first discipline-specific presentation of TPACK applied to the social work content area.”

Singer, J., & Teclehaimanot, B. (2019, March). *A Rasch analysis of a TPACK assessment instrument and online K-12 teachers in the United States*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54282/>

Abstract: “TPACK, an extension of Pedagogical Content Knowledge, has the potential to provide a theoretical lens through which researchers can focus on the skills teachers need to meaningfully incorporate technology into instruction. To date, however, TPACK has been a challenge to measure because of imprecise definitions and confounded dimensions. This study utilized Rasch modeling to assess an existing TPACK instrument, perceived TPACK knowledge of online teachers, and the TPACK theoretical framework itself. An analysis from a nationwide sample of 165 online teachers indicated that the instrument is producing valid and reliable measures. Participants rated their own knowledge highest in areas related to Content and Pedagogy, and lowest in the area of Technology. Significant differences were found across genders, ages, and years of service. Data analysis also revealed that several of the component areas of TPACK were conflated by participants. Ultimately, this study could not validate the seven-component theoretical structure of TPACK, and offers an alternate framework based on the Rasch analysis.”

Date/Time: Friday, March 22 10:45-11:15 AM, Melrose 1

Su, M., & Foulger, T. (2019, March). *We aren't there yet: A progression of literature on TPACK measures to assess technology integration*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54443/>

Abstract: “Technological, Pedagogical, and Content Knowledge (TPACK) is a widely-accepted framework for defining, conceptually, the interrelated skills required of teachers who effectively integrate technology. Research using the TPACK framework has proliferated in the literature over the past decade, including processes and instruments to assess this concept. Some of the researchers involved with the development of TPACK published an extensive report of how empirical studies up to 2010 addressed validity and reliability. Since then, researchers have more precisely defined TPACK and have developed additional ways to assess teachers' knowledge of TPACK including self-report measures, open-ended questionnaires, performance assessments, interviews, and observations. The purpose of this manuscript is to provide a selective review of the progression of TPACK measurement instruments since 2009. This paper ends with a call for researchers to continue efforts to develop effective measures of technology integration, to address limitations of current measures, and to more thoroughly identify and assess teachers' trajectories in learning to teach with technology.”

Date/Time: Friday, March 22 10:15-10:45 AM, Sunset 5 & 6

Warr, M., Mishra, P., & Scragg, B. (2019, March). *Beyond TPACK: Expanding technology and teacher education to systems and culture*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54663/>

Abstract: “Despite copious amounts of research on technology in education, many teachers still struggle to use technology effectively. Much research on technology integration focuses on

teacher education and design. For example, the TPACK framework describes the type of knowledge teachers need to design effective uses of technologies in their classrooms. However, despite its prevalence, TPACK has not led to wide-spread change in educational technology use. We argue this is because we have not paid enough attention to how educational technology works at a systems and culture level. In this article, we present a new framework, the Five Discourses of Design, that can help us consider how educational technology impacts and is impacted by systems and culture. We provide examples of how the framework applies to teacher education.”

Date/Time: Friday, March 22 10:45-11:15 AM, Sunset 5 & 6

Zhu, Y., Shawon, F., Dousay, T. A., & Weible, J. L. (2019, March). *Analyzing a biology lesson plan for TPACK alignment*. Paper presented at the Society for Information Technology and Teacher Education 30th International Conference, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2019/papers/54160/>

Abstract: “Following the design and implementation of a lesson plan for 4th grade biology using a variety of technologies to stimulate creativity and interest in content, the lesson plan was analyzed for alignment with TPACK to assist researchers with revising the lesson plan and teachers with evaluating the lesson plan for future implementation. Technologies integrated into the lesson include curated digital media presented via Padlet and student use of the 3Doodler pens. From an evaluative standpoint, this biology lesson aligns with TCK, PCK, TPK, and TPACK intersections, demonstrating effective technology integration and sound instructional design. This poster presentation presents components of the lesson plan itself with findings of the content analysis for discussion. The poster will be presented as a 4’x6’ printed poster with highlighted details and supplemented with a mobile device displaying supporting online media and the 3Doodler pens for demonstration.”

Date/Time: Wednesday, March 20 5:45-7:00 PM, Mezzanine

2. AERA 2019 TP(A)CK-Focused Presentations

Christensen, R. R., & Knezek, G. A. (2019, April). *Technology proficiencies among teachers: Impact of teaching level, classroom access, use, and support for learning*. Paper presented at the annual meeting of the American Educational Research Association, Toronto, ON.

Abstract: “The Technology Proficiency Self Assessment (TPSA) has been used since 1997 in its original form with only a few minor modifications (changing Alta Vista as a search engine example to Google). The survey instrument has retained its reliability even in the evolving arena of educational technology. The survey has been translated to multiple languages including Turkish and Spanish. In this study, the research team focused on similarities and differences among elementary, middle school, high school and university teachers in a native Spanish language environment, regarding technology integration self-efficacy in four areas: Email, World Wide Web, Integrated Applications and Teaching with Technology.”

Date/Time: Fri, April 5, 12:00 to 2:00 PM, Metro Toronto Convention Centre, 200 Level, Room 202B

Dasgupta, C., & Magana, A. J. (2019, April). *Scaffolding productive teacher practice in a CAD-enabled engineering design learning environment*. Paper presented at the annual meeting of the American Educational Research Association, Toronto, ON.

Abstract: “This study investigated one way of supporting middle school teachers in implementing a project-based unit using a Computer Aided Design (CAD) tool, Energy3D (Xie et al., 2014), designed to engage students in the engineering design process with an emphasis on the uncertainty that is inherent in engineering problems. Prior research suggests that there may be two types of uncertainty in engineering problem scenarios – (a) content uncertainty i.e. uncertainty caused by inadequate understanding or incomplete information related to the content and concepts relevant to the problem being solved and (b) relational uncertainty i.e. uncertainty caused by interaction with teachers and peers in the context of solving the engineering problem (Metz, 2004; Jordan and McDaniel, 2014). Both these uncertainties can lead to dissonance in the classroom that is ultimately part of the authentic experience of solving an engineering problem. However, teachers are not prepared to foster dissonance in the classroom and help students manage uncertainty (Frykholm, 2004).

In this design-based research study, we adopted the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra and Koehler, 2006) to create a teacher-researcher co-design process for iteratively developing and refining the pedagogical scaffolds and professional support needed by the teachers in our context. This study was part of a larger design-based research study that was conducted in a middle school in the Midwest US. While the larger study spanned three grades – sixth (102 students), seventh (124 students), and eighth grade (92 students) – and their respective science and technology teachers; for the illustrative case study we will focus on Grade 6 that was taught by Ms. Pai. The entire study was conducted in all the grades simultaneously and spanned one week with 45 minute lessons every day. The data set for this paper comprises of classroom observation notes, videos of student-teacher interaction

in the classroom, student-work from Grade 6, and teacher-work completed during the teacher workshop. Ms. Pai participated in an immersive teacher workshop that was part of the larger study and designed the lesson plan for her classroom using a TPACK-based lesson plan redesign template provided to her during the workshop. She focused on three key factors influencing the design of an energy efficient house- effective use of solar radiation by solar panels, relationship between insulation and heat transfer, and seasonal variation in the direct and indirect solar radiation and its effect on energy consumption. Students' engagement with these topics and final design challenge were facilitated by the Energy3D CAD software. For designing the lesson plan, Ms. Pai decided to narrow down the focus to these few topics based on her experience with the software from the previous year and her emphasis on providing mini-challenges that lead to the final challenge.

Authentic engineering problems and their solutions frequently require engineers and designers to grapple with uncertainty and manage that during the solution process. This work provides one way of fostering such an experience in the classroom and proposes teacher resources that may help them prepare for playing a productive role in such classrooms."

Date/Time: Tue, April 9, 12:20 to 1:50 PM, Metro Toronto Convention Centre, 800 Level, Hall G

Harris, J. B., & Hofer, M. J. (2019, April). *Emphasis and sequence in technological pedagogical and content knowledge – based instructional planning: Teachers' pedagogical reasoning with educational technologies*. Paper presented at the annual meeting of the American Educational Research Association, Toronto, ON.

Abstract: "What is the nature of experienced K-12 teachers' pedagogical reasoning when planning instruction that incorporates students' use of educational technologies? Eight volunteer classroom teachers with expertise in a broad variety of curricula and instructional levels participated in a university-sponsored professional learning program that helped them to explore multiple ways to plan curriculum standards-specific lessons, units, and projects incorporating educational technologies. Data from individual think-alouds and group reflections, plus follow-up interviews after the planned units were taught, were generated and analyzed. Overall, teachers' TPACK-based pedagogical reasoning first emphasized curriculum content, then knowledge of students and/or learning activities. Contextual information was referenced minimally. Technological considerations were voiced far less than those regarding content, students, and learning activities. Many individual differences were noted."

Date/Time: Fri, April 5, 12:00 to 2:00 PM, Metro Toronto Convention Centre, 200 Level, Room 202B

Ikpeze, C. H. (2019, April). *E-books, disciplinary literacy, and technological pedagogical and content knowledge: Finding the nexus*. Paper presented at the annual meeting of the American Educational Research Association, Toronto, ON.

Abstract: "Situated within the social constructivism and the sociocultural frameworks, this study examined the role of EBooks in facilitating disciplinary literacy (DL) and TPACK. The participants were 16 graduate teacher candidates enrolled in a content area literacy methods course for elementary schools. Data sources included surveys, eBooks, eBook commentaries

and focus group interviews. Data were analyzed using descriptive statistics and content analysis. Results indicated that designing eBooks served as a catalyst for DL. The teacher candidates used the process of making eBooks to learn how to engage their own students in disciplinary literacy. In addition, they developed a robust TPACK. The study suggests that teacher educators should engage their candidates with eBook designing to facilitate both DL and TPACK.”

Date/Time: Fri, April 5, 4:20 to 5:50 PM, Metro Toronto Convention Centre, 700 Level, Room 710

Kaplon-Schilis, A., & Lyublinskaya, I. (2019, April). *Development and transfer of technological pedagogical content knowledge for a special education elementary school teacher: Case study*. Paper presented at the annual meeting of the American Educational Research Association, Toronto, ON.

Abstract: “This case study analyzed the TPACK development and transfer of a special education elementary school teacher. The study was guided by the following research questions: 1) What instructional strategies and experiences in the graduate pedagogy course supported teacher’s TPACK development? 2) What are the internal and external factors affecting teacher’s TPACK transfer? The study showed that TPACK level of the participant increased to the Exploring level during the graduate course but regressed to the Adapting level during first year of teaching showing partial transfer of TPACK. The study described course experiences and instructional strategies that supported preservice teacher’s TPACK development and identified some external and internal factors that could have affected the TPACK transfer from college classroom to teaching.”

Date/Time: Fri, April 5, 12:00 to 2:00 PM, Metro Toronto Convention Centre, 200 Level, Room 202B

Ko, Y., & Hughes, J. E. (2019, April). *Teachers’ online information-seeking for technology integration guidance: A technological pedagogical content knowledge (TPACK) analysis*. Paper presented at the annual meeting of the American Educational Research Association, Toronto, ON.

Abstract: “More teachers are engaged in professional learning opportunities through a form of self-seeking technology-based information to meet their curricular, teaching, and learning needs. The goal of this study aimed to understand teacher information-seeking behaviors for technology-infused teaching and learning with technological pedagogical content knowledge (TPACK) as its conceptual framework. Using a mixed method case analysis approach, both quantitative and qualitative data were collected from teachers in the two technology-intensive school districts. The findings showed that teachers sought TCK information most frequently, followed by TK. District A teachers were found to search information online less than District B teachers in all TK, TCK, and TPK areas, which can be explained by various supports and professional learning opportunities available in District A.”

Date/Time: Fri, April 5, 12:00 to 2:00 PM, Metro Toronto Convention Centre, 200 Level, Room 202B

Macrides, E., & Angeli, C. M. (2019, April). *Technological pedagogical content knowledge and the inclusion of affect in the design of technology-enhanced music lessons*. Paper presented at the annual meeting of the American Educational Research Association, Toronto, ON.

Abstract: “In this study, the authors propose a set of design principles based on the framework of Technological Pedagogical Content Knowledge (TPCK or TPACK) through the subject matter of music focusing on the affective domain, and identify interrelations among musical content, emotions, and technology. The design guidelines were tested in an empirical investigation and the results showed statistically significant differences between the control and the experimental groups in favor of the experimental group. The study extends the theoretical framework of TPCK to a design framework and proposes instructional design guidelines that address both the cognitive and the affective domains of learning, a focus that is currently missing from the existing TPCK or TPACK literature.”

Date/Time: Fri, April 5, 12:00 to 2:00 PM, Metro Toronto Convention Centre, 200 Level, Room 202B

Nelson, M. J., Voithofer, R. J., & Cheng, S–J. (2019, April). *Mediating factors that influence the technology-integration practices of teacher education*. Paper presented at the annual meeting of the American Educational Research Association, Toronto, ON.

Abstract: “In light of a recent push from the main US accreditation organization for teacher education to embed technology across the curriculum, this study explores the technology integration behaviors and competencies of teacher educators. Based on a sample of 806 teacher educators, structural equation modeling is used to identify the mediating factors that influence TPACK and the implementation of the ISTE standards across numerous subject-area contexts. The findings reveal that both TPACK and ISTE standard alignment differ across subject areas, and that experience slightly influences the adoption of the ISTE standards. Additionally, TPACK is a strong predictor of ISTE standard alignment and both technology knowledge and institutional support serve important roles as mediators, with both predicting TPACK and ISTE standard alignment.”

Date/Time: Mon, April 8, 12:20 to 1:50 PM, Metro Toronto Convention Centre, 800 Level, Room 802A

Wang, A., Yu, S., Wang, M., & Chen, L. (2019, April). *Effects of a visualization-based peer-feedback report on teachers’ technological, pedagogical, and content knowledge development in lesson study*. Paper presented at the annual meeting of the American Educational Research Association, Toronto, ON.

Abstract: “Lesson study provides the opportunity for teachers to explore conflicting ideas and practice self-reflection. Peer feedback is an important method to facilitate the effect of lesson study. However, teachers do not have enough time to review feedback and most of teachers are inexperienced in dealing with statistical analysis, so that they could not get effective

suggestions from their peers. Therefore, in this study, a visualization-based peer feedback report has been developed in order to improve the development of teachers' knowledge. An 8-week quasi-experiment was conducted to verify the performances of the visualization-based report. The results reveal that the visualization-based report could promote the development of sub domains of TPACK, including PCK, TPK and TPACK."

Date/Time: Fri, April 5, 12:00 to 1:30 PM, Metro Toronto Convention Centre, 800 Level, Hall G

Wen, H., & Shinas, V. H. (2019, April). *Assessing technological pedagogical and content knowledge (TPACK): Using teacher candidate reflections to examine TPACK development*. Paper presented at the annual meeting of the American Educational Research Association, Toronto, ON.

Abstract: "Grounded in the Technological Pedagogical and Content Knowledge conceptual framework (TPACK; Mishra & Koehler, 2006), this study aimed to examine pre-service teachers' TPACK development using a mixed method design. 26 teacher candidates enrolled in a graduate-level education technological course in literacy were sampled in the Spring of 2017 and 2018. All participants were given a pre- and post-course TPACK survey and asked to write an end-of-course reflection. The quantitative analysis of TPACK survey showed statistically significant growth in nearly all domains of TPACK. Qualitative data analysis extended the quantitative findings with three emerging themes relating to participants' growth in self-efficacy for teaching with technology, a more in-depth understanding of digital literacy, multimodality and the need for teaching digital citizenship."

Date/Time: Sat, April 6, 2:15 to 3:45 PM, Metro Toronto Convention Centre, 800 Level, Hall G

3. ISTE 2019 TP(A)CK-Focused Presentations

Anderson, S., & Putnam, R. (2019, June). *Decisions, decisions: Planning and implementing technology-integrated lessons in special education classrooms*. Poster presented at the International Society for Technology in Education 2019 Conference, Philadelphia, PA.

Abstract retrieved from

https://conference.iste.org/2019/program/search/detail_session.php?id=112094746

Abstract: “Results of this qualitative study illustrate special education teachers' decision-making process while planning and implementing technology-based instruction. The findings contribute to a developing strand of research that focuses on how special education teachers exhibit TPACK in their reasoning and practice and provide a basis for professional development efforts.”

Focus: Digital Age Teaching & Learning

Date/Time: Sunday, June 23, 11:30 AM–1:30 PM

Bruch, J., Lare, D., & Post, K. (2019, June). *The use of learning analytics to support pre-service teacher digital pedagogy*. Paper presented at the International Society for Technology in Education 2019 Conference, Philadelphia, PA. Abstract retrieved from

https://conference.iste.org/2019/program/search/detail_session.php?id=112129052

Abstract: “This research is in how learning analytics can be used to develop pre-service teachers' digital pedagogy (TPACK) and data literacy in order to improve instructional planning and design for blended and 1:1 technology-enabled environments.”

Focus: Digital Age Teaching & Learning

Date/Time: Tuesday, June 25, 4:15-5:15 PM

Karr, K. (2019, June). *A phenomenological study of first-career millennial novice teachers' use of technology*. Paper presented at the International Society for Technology in Education 2019 Conference, Philadelphia, PA. Abstract retrieved from

https://conference.iste.org/2019/program/search/detail_session.php?id=112190345

Abstract: “Learn about how millennial first-career novice teachers describe their lived experience, attitudes and understandings toward transformational technology integration in the elementary classroom as it relates to the Technological, Pedagogical and Content Knowledge framework (TPACK).”

Focus: Professional learning

Date/Time: Monday, June 24, 8:30-9:30 AM

Kruger-Ross, M., & Schmidt, P. (2019, June). *Podcasting thru pedagogy: Reflections on preparing future secondary English teachers*. Interactive lecture presented at the International Society for Technology in Education 2019 Conference, Philadelphia, PA.

Abstract retrieved from

https://conference.iste.org/2019/program/search/detail_session.php?id=112121535

Abstract: “In this session, we (two teacher educators that co-teach a required course for future secondary (grades 6 to 12) English educators focusing on integrating emerging educational technologies) will describe how a simple book study course assignment has transformed into a podcast that chronicles our pedagogical collaboration for students.”

Focus: Digital Age Teaching & Learning

Audience: Beginning

Date/Time: Sunday, June 23, 3:00-4:00 PM

Platt, S., & Whitworth, B. (2019, June). *Examining preservice teachers’ interest, attitudes, and technology integration with makerspaces*. Paper presented at the International Society for Technology in Education 2019 Conference, Philadelphia, PA. Abstract retrieved from https://conference.iste.org/2019/program/search/detail_session.php?id=112199350

Abstract: “This session examines the use of makerspaces with preservice special education majors and education minors. This session includes attitudes and interest about Makerspaces by undergraduate students as well as an evaluation of lesson plans using Makerspaces and UDL and TPACK frameworks”

Focus: Professional learning

Date/Time: Wednesday, June 26, 8:00-10:00 AM

4. TPACK Newsletter Suggested Citation

Our thanks to [Lisa Winebrenner](#), who wrote to suggest that we suggest a citation format for you ‘academic types’ who might want to cite something that appears in this humble virtual publication. Our reading of the most recent (6th edition) of the *Publication Manual of the American Psychological Association* suggests that the citation should look like this:

Harris, J., & Wildman, A. (Eds.). (2019, March 17). *TPACK newsletter issue #40: Special spring 2019 conference issue* [Electronic mailing list message]. Retrieved from <http://bit.ly/TPACKNewslettersArchive>

5. Learning and Doing More with TPACK

Interested in learning more about TPACK or getting more involved in the TPACK community? Here are a few ideas:

- Visit the TPACK wiki at: <http://tpack.org/>
- Join the TPACK SIG at: <http://site.aace.org/sigs/tpack-sig/>
- Read past issues of the newsletter at: <http://bit.ly/TPACKNewslettersArchive>
- Subscribe to the tpack.research, tpack.teaching, tpack.grants and/or tpack.future discussion lists at: <http://site.aace.org/sigs/tpack-sig/>

- Access the TPACK Learning Activity Types taxonomies at: <http://activitytypes.wm.edu/>
- Access three tested TPACK assessment instruments at: <http://activitytypes.wm.edu/Assessments>
- Access and/or adapt TPACK online short courses at: <http://activitytypes.wm.edu/shortcourse/>

Please feel free to forward this newsletter to anyone who might be interested in its contents. Even better, have them subscribe to the TPACK newsletter by sending a blank email to sympa@lists.wm.edu, with the following text in the subject line: subscribe tpack.news FirstName LastName (of course, substituting their own first and last names for 'FirstName' and 'LastName' — unless their name happens to be FirstName LastName, in which case they can just leave it as is).

If you have a news item that you would like to contribute to the newsletter, send it along to: tpack.newsletter.editors@wm.edu.

Standard End-Matter

If you have questions, suggestions, or comments about the newsletter, please send those to tpack.news.editors@wm.edu. If you are subscribed to the tpack.news email list, and — even after reviewing this impressive publication — you prefer not to continue to receive the fruits of our labors, please send a blank email message to sympa@lists.wm.edu, with the following text in the subject line: unsubscribe tpack.news

- Judi & Amelia

...for the SITE TPACK SIG leadership:

Teresa Foulger ,	Co-Chair, Arizona State University
Yi Jin ,	Co-Chair, Sonoma State University
Mamta Shah ,	Plantation Chair, Drexel University
Josh Rosenberg ,	Camping Chair, Michigan State University
Petra Fisser ,	Red-Blue Chair , SLO Expertise Center, National Curriculum Development
Candace Figg ,	Rocking Chair, Brock University
Mark Hofer ,	Sedan Chair, College of William & Mary
Judi Harris ,	Wing Chair, College of William & Mary
Mario Kelly ,	Futon, City University of New York
Matt Koehler ,	Chaise Lounge, Michigan State University
Punya Mishra ,	Recliner, Arizona State University