TPACK Newsletter, Issue #30: September 2016

Welcome to the thirtieth(!) edition of the (approximately bimonthly) TPACK Newsletter! TPACK work is continuing worldwide. This document contains recent updates to that work that we hope will be interesting and useful to you, our subscribers.

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

Gratuitous Quote About Research

"Research has been called good business, a necessity, a gamble, a game. It is none of these - it's a state of mind."
- Martin H. Fischer

In This Issue

1. TPACK Newsletter Update

The TPACK Newsletter has been published via the tpack.news email list since January 2009. It has 1163 subscribers currently. Subscription numbers have held steady (+ or – 1% to 3%) since October 2011.

2. Recent TPACK Publications

Below are recent TPACK publications that we know about: 26 articles, 6 chapters, and 12 dissertations that have not appeared in past issues of this newsletter. If you know of others that were published within the past several months, please let us know at: tpacknews.editors@wm.edu.

Articles

Ahuja, A., & Mittal, R. (2016). Integration of technology in mathematics education. *Indian Journal of Research, 5*(7), 195-197. Retrieved from http://worldwidejournals.in/ojs/index.php/pijr/article/download/10804/10904

Abstract: "The present paper focuses on perception of teachers on the use of technology in Mathematics teaching and learning. Mathematics education is one of the domains where one can see prominent and growing effect of technology. It is believed and studied widely that use of technology can have positive effect on Mathematics teaching and learning, yet there seem to be some apprehension on the part of the teachers in the use of technology. This paper has attempted to study perception of teachers in detail on the use of technology in their Mathematics teaching and learning. The perception is studied with respect to the factors - experience of teachers and level of education. The relation between the perception and each factor is studied statistically and inferences are drawn. The sample of given study consisted of the teachers teaching in schools with convenient access to technology."

Aygün, B., Uzun, N., & Atasoy, E. (2016). An examination of teacher candidates level of proficiency in technopedagogical education. *Turkish Journal of Computer and Mathematics Education, 7*(2), 393-416. doi:10.16949/turcomat.37361

Abstract: "The purpose of this study is to investigate preservice elementary mathematics teachers` techno pedagogical knowledge competencies and performance indicators defining these competencies. In this qualitative study, teaching practices which was prepared in learning domain such as numbers and operations, algebra, geometry and measurement, statistics and probability and with different dynamic mathematical software (GeoGebra, Cabri3D and Tinkerplots) by 24 prospective mathematics teachers' candidates were investigated. Data of study was collected through video records and lesson plans filled out by the prospective teachers after their teaching sessions. Data were analyzed within executing the teaching process and problem solving competency fields of technopedagogical education. Findings indicate that technology is used as an explorative tool for the first time in teaching the subject, technology based activities are prepared to prevent misconception; however, they were forced to use technology in assessment evaluation process."

Bauer, W. I., & Dammers, R. J. (2016). Technology in music teacher education: A national survey. *Research Perspectives in Music Education, 18*(1), 2-15. Abstract retrieved from http://www.ingentaconnect.com/contentone/fmea/rpme/2016/00000018/00000001/art00001

Abstract: "The purpose of this study was to examine how collegiate music teacher education programs prepare preservice teachers to utilize digital technology with K-12 music students. Fifty percent of NASM schools with music education programs (*n* = 250) were randomly selected. The head of music education or another music education professor from each

institution was invited to complete an online survey regarding the role, nature, and efficacy of technology instruction in their program. Thirty-six percent (*n* = 89) responded. Of the responding schools, 47% of the programs reported their students participated in a course in music technology designed for all music majors, 33% required a music technology course specifically oriented to music education majors, 13% had students enroll in a technology class for education majors (non-music specific), and 78% integrated information and experiences related to the pedagogical uses of technology into music education classes. Preservice music teacher preparation was also examined within the Technological Pedagogical and Content Knowledge (TPACK) framework. the TPACK domains that included technology were rated as being less developed than the non-technology domains. Respondents reported their preservice teachers were prepared at a proficient level to integrate current and future music technology, but indicated lower levels of readiness to teach music classes that were fully technology-based. Lack of instructional time and/or space in the curriculum, and limited funding and/or access to technology were reported as common obstacles for integrating technology into the music teacher education curriculum."

Chien, C.-W. (2016). Investigating Taiwanese EFL digital natives' TPCK in teaching English to digital immigrants. *International Journal of Technology Enhanced Learning, 8*(2). doi:10.1504/IJTEL.2016.078082

Abstract: "This study investigates 23 Taiwanese EFL digital natives' technological paedagogical content knowledge (TPCK) in teaching English to 23 digital immigrants in a Multimedia in English Instruction class in a language teacher education program in a university in the northwest of Taiwan. The data analysis of interviews, final projects, and videos yielded the following major findings. First, the digital natives' TPCK was developed through collections of multimedia tools, teaching the digital immigrants, and activity designs. Second, these digital natives lacked competence in designing appropriate follow-up activities and tasks for the digital immigrants. Next, they also failed to provide step-by-step modelling and demonstration on using technology and multimedia tools. A framework on developing digital natives' TPCK includes introduction of multimedia tools, provision of step-by-step modelling, recognition of adult learners' needs, and designing interactive follow-up tasks."

Di Blas, N. (2016). Distributed TPACK: What kind of teachers does it work for? *Journal of e-Learning and Knowledge Society, 12*(3), 65-74. Retrieved from http://je-lks.org/ojs/index.php/Je-LKS_EN/article/download/1156/1011

Abstract: "Technology at school can be either integrated as an everyday support to normal, curricular activities or as a trigger for special projects. Drawing on the distributed cognition theory, the distributed TPACK (Technology, Pedagogy and Content Knowledge) model (Di Blas et al., 2014) claims that, at least in the latter case, the knowledge required does not reside in just the teacher's head but is rather distributed within a complex system of resources that includes students, colleagues, relatives, experts, the internet, etc. After introducing the distributed interpretation of the TPACK model, this paper focuses on the profile of the teachers who "enact" it within their classroom, based on data from a large case-study with digital

storytelling at school. Results are quite surprising: most of the teachers are quite aged, with more than 20 years of teaching experience, with a background in humanities rather than science; many admit a poor command of Technology Knowledge. Yet, they succeed: benefits for their students are substantial,over a wide spectrum. What lesson can be drawn? That contrary to what may be expected, PK and not TK is probably the issue when introducing technology at school, at least in the case of special projects."

Efilti, E., & Coklar, A. N. (2016). The analysis of the relationship between epistemological beliefs and TPACK education competence among pre-service teachers. *Journal of Human Sciences, 13*(2), 2960-2971. doi:10.14687/jhs.v13i2.3593

Abstract: "The purpose of the present research is defining TPACK education competence and epistemological beliefs of pre-service teachers, and presenting the relationship between TPACK education competence and epistemological belief. In accordance with this purpose, TPACK education competence scale and Epistemological Beliefs Questionnaire were conducted on 342 (222 female-65%, 120 male-35%) pre-service teachers studying senior year at Necmettin Erbakan University, Faculty of Education in 2012-2013 academic-year. According to the findings obtained from the present designed in quantitative method, pre-service teachers' epistemological belief scores are ranked as learning process-casting doubt on authority/expert knowledge, learning effort, innate/fixed ability, and certainty of knowledge. As for TPACK education competencies, pre-service teachers perceive themselves as advanced level. Another finding is that, gender is not an effective variable in terms of epistemological beliefs and TPACK education competencies among pre-service teachers. For the correlations between TPACK education competencies and epistemological beliefs among pre-service teachers, only learning process and doubt on expert knowledge factors are positively correlated with TPACK competencies at medium level. From this perspective, it can be claimed that TPACK education competencies are higher among pre-service teachers who tend to believe that acquiring knowledge process is important in learning."

Ersoy, M., Yurdakul, I. K., & Ceylan, B. (2016). Investigating preservice teachers' TPACK competencies through the lenses of ICT skills: An experimental study. *Education and Science*. Advance online publication. doi:10.15390/EB.2016.6345

Abstract: "The purpose of this study is to investigate pre-service teachers' TPACK competencies with respect to variables of ICT usage level, ICT usage phase and gender. A pretest-posttest quasi-experimental design with no control group has been implemented. The study has covered 61 pre-service teachers attending education faculty of a state university between 2011-2012 academic year. TPACK-deep Scale, ICT Usage Level and ICT Usage Phase surveys have been employed. TPACK competencies which were in medium level prior to taking TPACK-based activities increased to higher level at the end of the process. Furthermore, certain amount of progress was found in the TPACK-deep subdimensions namely design, exertion, ethics and proficiency. At the end of the intervention, it was also determined that ICT usage phase of pre-service teachers increased. Consequently the rise in ICT usage levels of pre-service teachers correspondingly elevated their TPACK competencies. However no significant difference was

found between TPACK competencies and gender. Most of the correlations between ICT usage phases and TPACK competency subdimensions were at medium-level significance. Some suggestions were provided based on the results."

Gersch, B., Lampner, W., & Turner, D. (2016). Collaborative metaliteracy: Putting the new information literacy framework into (digital) practice. *Journal of Library and Information Services in Distance Learning*. Advance online publication. doi:10.180/1533290X/2016.1206788

Abstract: "This article describes a course-integrated collaborative project between a subject librarian, a communication professor, and an instructional designer that illustrates how the TPACK (Technological Pedagogical Content Knowledge) framework, developed by Mishra and Koehler (Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6),1017–1054.), and the new ACRL Framework for Information Literacy (Framework) converge to support student learning in an online course in public speaking. Aligning TPACK with the Framework hones the behavioral, affective, cognitive, and metacognitive skills in the metaliterate learner. The authors illustrate how TPACK and the Framework can support the subject-specific content areas of public speaking by integrating information literacy learning objects throughout the entire online course."

Green, L. S. (2014). Through the looking glass: Examining technology integration in school librarianship. *Knowledge Quest, 43*(1), 36-43. Retrieved from http://www.lucysantosgreen.com/uploads/6/8/3/3/6833178/through_the_looking_glass.pdf

Abstract: None.

Gregory, P. L., Gregory, K. M. & Eddy, E. R. (2016). Factors contributing to student engagement in an instructional Facebook group for undergraduate mathematics. *Journal of Computers in Mathematics and Science Teaching, 35*(3), 249-268.

Abstract: "This study investigates factors contributing to student engagement in an educational Facebook group. The study is based on survey results of 138 undergraduate mathematics students at a highly diverse urban public university. Survey measures included engagement in the Facebook group, access to Facebook, comfort using technology, and interest in the class. Quantitative analysis found that interest in the class and access to technology both positively correlate to engagement in a Facebook group. The results suggest that integrating a familiar technology in a novel way requires instructor effort, knowledge, and technique. Study findings are discussed in terms of the TPACK framework (technological pedagogical content knowledge), developed by Mishra & Koehler (2006), emphasizing the importance of instructor preparation for effective instructional technology integration."

Jaipal-Jamani, K., Figg, C., Gallagher, T. L., & Ciampa, K. (2015). Collaborative professional development in higher education: Developing knowledge of technology enhanced teaching. *Journal of Effective Teaching, 15*(2), 30-44. Retrieved from http://files.eric.ed.gov/fulltext/EJ1077239.pdf

Abstract: "This paper describes a professional development initiative of teacher educators, called the Digital Pedagogies Collaboration, in which the goal was to build faculty knowledge about technology enhanced teaching (TPACK knowledge), develop a collaborative learning and research community of faculty members around technology enhanced teaching, and provide opportunities for faculty to serve as future workshop facilitators and mentors for other faculty and students. Using a design-based research approach, data sources included workshop evaluation surveys, photographs of workshops in progress, researcher field notes, and narrative case reports constructed by faculty members actively involved in the collaborative re-search. Findings indicated that the Digital Pedagogies Collaboration was effective because it was: 1) based on faculty members' expressed instructional needs, 2) used a TPACK-based professional learning workshop model that translated TPACK principles into practical classroom application, and 3) uniquely included a research collaboration that provided self-study reflection on participants' changing teaching practices."

Karataş, İ., Pişkin-Tunç, M., Demiray, E., Yılmaz, N. (2016). The development of pre-service teachers' technological pedagogical content knowledge in mathematics instruction. *Journal of Abant Izzet Baysal University Faculty of Education, 16*(2), 512-533. Retrieved from http://efdergi.ibu.edu.tr/index.php/efdergi/article/view/1956/2915

Abstract: "The purpose of this study is to investigate the development of pre-service elementary mathematics teachers' technological pedagogical content knowledge (TPACK), TPACK self-confidence and perceptions related to use of technology. Considering this purpose, an education program, which is covered in the course "Computer-assisted Mathematics Teaching" as three hours in a week, was administered to the fourth year students of mathematics education program. Within the scope of the study, Technological Pedagogical Content Knowledge Scale, Technological Pedagogical Content Knowledge Confidence Scale, and Technological Pedagogical Content Knowledge Perception Scale were conducted to 30 pre-service teachers before and after the study. Data gathered from the questionnaires were analyzed qualitatively and quantitatively. Results show that the teaching program resulted with no changes on perceptions of pre-service teachers towards technology use while it affected the technological pedagogical content knowledge and self-confidence of pre-service teachers positively."

Kartal, T., Kartal, B., & Uluay, G. (2016). Technological pedagogical content knowledge self assessment scale (TPACK-SAS) for pre-service teachers: Development, validity, and reliability. *International Journal of Eurasia Social Sciences, 7*(23), 1-36. Retrieved from http://www.academia.edu/26658849/technological_pedagogical_content_knowledge_self_assessment_scale_tpack-_sas_for_pre-service_teachers_development_validity_and_reliability

Abstract: “TPACK has been a new issue of interest for the last decade. Koehler and Mishra (2005) suggested TPACK framework to address the knowledge needed for teachers to integrate technology in their classrooms. Self-reported scales are the most common measurement tools for TPACK. Surveys can inform about participants’ beliefs, views, attitudes, and dispositions that are the most effective on their decisions related to teach with or without technology. Most of the TPACK surveys have lack about reliability and validity. In this study, a valid and reliable survey called TPACK Self Assessment Scale (TPACK-SAS) was developed to identify pre-service teachers’ self-perceptions and self-assessments of their TPACK. The steps (item pool, expert review, item performance analyses, validity, reliability and factor analyses) suggested by DeVellis (2003) were followed in the scale development process. TPACK-SAS was administered to 754 preservice teachers. After the analyses process, it consisted of seven subdomains, similar with the original framework, and 67 items. Pre-service teachers were also asked whether they have their own computers or not, where they access internet, amount of time they spend using computers, proficiency of using computers and their intentions to use computers. The relationships between these variables and TPACK subdomain were investigated.”

Klaytae, V., Philuek, W., Pomsamrit, N., & Panawong, S. (2016). The technological pedagogical content knowledge (TPACK) characteristics of in-service and pre-service teachers in Thailand: Case of Nakhon Sawan Province, Thailand. *Korea Engineering Education, 1*, 97-98. Retrieved from http://www.papersearch.net/view/detail.asp?detail_key=7g701368

Abstract: “The purposes of this study was to identify the existing level of Technological Pedagogical Content Knowledge (TPACK) based on a) the current status on TPACK of inservice and pre-service teachers, and b) the comparison of the current status on TPACK between in-service and pre-service teachers. The research instrument in this study was the TPACK questionnaire. The sample groups were, 1) 90 in-service teachers under the Nakhon Sawan Primary Educational Service Area Office 1 which divided into 8 core contents (Mathematics, Science, Foreign Language (English Language), Thai Language, Arts, Social Studies, Religion and Culture, Health and Physical Education, and Career and Technology, and 2) 249 Pre-service Teachers in the Faculty of Education, Nakhon Sawan Rajabhat University which contained of 8 majors in relation with 8 core contents of in-service teachers areas (Mathematics, Science, Foreign Language (English Language),Thai Language, Arts, Social Studies, Religion and Culture, Health and Physical Education, and Computer Education as Career and Technology). The independent sample t-test was used to compared Mean score of both groups in each elements of TPACK and overall. The result shows that, 1) pre-service teachers in Computer Education major has high level of TPACK)=4 .20, S.D. = 0.71) among the others major and all core contents of in-service teachers, 2) in-service teachers in core content of Career and Technology has high level of TPACK)= 3.97, S.D. = 0.68) among the others core contents, 3) There were not different of overall TPACK between in-service and pre-service teachers (p value >.05), and 4) focused on the comparison of each elements: 4.1) there were different between in-service and pre-service teachers in core content/ major of Science (p value <.05; 0.01), core content/ major of Career and Technology (Computer Education) (p value <.05; 0.00), and core content/ major of Foreign

Language (p value <.05; 0.02) on Technology Knowledge (TK); 4.2) there were not different between in-service and pre-service teachers (p value >.05) on Content Knowledge (CK) and Pedagogy Knowledge (PK); 4.3)) there were different between in-service and pre-service teachers in core content/ major of Science (p value <.05; 0.00) on Pedagogical Content Knowledge (PCK); 4.4)) there were different between in-service and pre-service teachers in core content/ major of Science (p value <.05; 0.04) and core content/ major of Career and Technology (Computer Education) (p value <.05; 0.00) on Technological Content Knowledge (TCK); 4.5) there were different between in-service and pre-service teachers in core content/ major of Science (p value <.05; 0.00), and core content/ major of Career and Technology (Computer Education) (p value <.05; 0.00) on Technological Pedagogical Knowledge (TPK); and 4.6)) there were different between in-service and pre-service teachers in core content/ major of Science (p value <.05; 0.00), core content/ major of Career and Technology (Computer Education) (p value <.05; 0.04), and core content/ major of Foreign Language (p value <.05; 0.03) on Technological Pedagogical Content Knowledge (TPACK). The discussion shows the guideline for training and integrating TPACK into schools for in-service teachers and preservice teachers. "

Koh, J. H. L., & Chai, C. S. (2016). Seven design frames that teachers use when considering technological pedagogical content knowledge (TPACK). *Computers and Education*. Advance online publication. Retrieved from http://www.sciencedirect.com/science/article/pii/S0360131516301580

Abstract: "Technological pedagogical content knowledge (TPACK) encapsulates teachers' pedagogical knowledge for the integration of information and communications technologies (ICT). It is created as teachers engage in collaborative talk during the design of ICT lessons. Design frames characterize teachers' design reasoning and can substantially influence teachers' TPACK considerations. Yet, this aspect of teachers' TPACK is not well understood. This study examined the design talk conducted by 27 Singapore primary teachers as they worked in teams to integrate student-centered ICT lessons into their school curriculum. Through content analysis and chi-square analyses of about 35 h of coded design talk, it was found that teachers used seven design frames and predominantly considered pedagogical content knowledge, TPACK, and design knowledge when they engaged in ICT lesson design. Teachers consideration of pedagogical content knowledge was driven by design frames related to idea development, perception, enactment, institutional considerations, and interpersonal factors. On the other hand, teachers emphasized idea development and enactment when they considered TPACK. Teachers also had to consider the management of design processes during ICT lesson design. The implications for teacher ICT professional development are discussed."

Mutluoglu, A., & Erdogan, A. (2016). Examining primary mathematics teachers' technological pedagogical content knowledge (TPACK) levels according to their preferred teaching styles. *International Journal of Society Researches, 6*(10), 102-126. Retrieved from http://www.opusjournal.net/opusarsiv/2016-1/OPUS20160105.pdf

Abstract: “The purpose of this study is based on the preferences of elementary mathematics teachers' teaching style to examine the level of technological pedagogical content knowledge (TPACK). For this purpose, 178 elementary school mathematics teachers' teaching styles, levels of TPACK and demographic characteristics were determined with the help of relevant scales. While Pearson correlation coefficients are used to measure how strong a relationship is between the TPACK levels and teaching styles of participants, regression analysis is used to determine which teaching styles predict TPACK levels of participants. The significant of data for statistical meaning based on p =.05 and p =.01 levels. According to research findings, the most preferred teaching style group of teachers is facilitator/ personal model / expert, while the least preferred teaching style group is expert/ Formal Authority. While teachers' TPACK levels did not change according to their gender, differentiation at technological knowledge (TK) levels were determined according to their seniority. In addition, differences were determined at technological knowledge (TK), content knowledge (CK) and technological pedagogical knowledge (TPK) levels in favour of the teachers who have computer. At the end of the study, a significant relationship between teaching styles and components of TPACK model has been identified. Furthermore, teaching styles that most predicted TPACK components were emerged as facilitator and formal authority.”

Özdemir, M. (2016). An examination of the techno-pedagogical education competencies (TPACK) of pre-service elementary school and preschool teachers. *Journal of Education and Training Studies, 4*(10), 70-78. doi:10.11114/jets.v4i10.1816

Abstract: “The purpose of this study is to determine the technological pedagogical content knowledge of pre-service elementary school and preschool teachers. The fundamental problem of the study consists of the investigation of teachers' TPACK by their year of study and fields. This is a descriptive study. It was conducted using the survey model because it aimed to determine TPACK of the 995 pre-service elementary school and preschool teachers who participated in the study. They were in the departments of elementary school teaching and preschool teaching at three state universities in the spring term of the 2014-2015 academic year. The study found the means of junior (third year) and senior (fourth year) pre-service teachers in the departments of elementary school teaching and preschool teaching to be high. Their means were also high in the sub-dimensions of TPACK competence. The TPACK means of the pre-service elementary school and preschool teachers were found to be high. The TPACK means of senior pre-service elementary school and preschool teachers were determined to differ from those of junior pre-service preschool teachers. It can be stated that this difference resulted from technology and material development courses taken by the pre-service teachers in different semesters. Their pre-service education had positive effects on their TPACK. Providing pre-service technology education and practice as part of relevant courses will not be adequate. Along with the education, pre-service elementary school and preschool teachers should be provided with opportunities to use technology. These opportunities should go beyond the basis of courses that they take. It should be supplemented with practice in teaching practicum courses and should be included in practice evaluation forms as a criterion. The sub dimensions of TPACK can be examined, and TPACK competency can be assessed in specific teaching programs in further studies.”

Patahuddin, S. M., Lowrie, T., & Dalgarno, B. (2016). Analysing mathematics teachers' TPACK through observation of practice. *Asia-Pacific Education Researcher*. Advance online publication. doi:10.1007/s40299-016-0305-2

Abstract: "Technological pedagogical content knowledge (TPACK) has been well accepted as a framework to understand and describe types of knowledge required by teachers to teach specific content with technology effectively. However, limited studies have used the framework in analysing the complexity of technology integration in mathematics classrooms. This study investigates, through examining critical instructional events, the most influential TPACK constructs in understanding and shaping teachers' pedagogical practices using digital technology. This case study was conducted in an early secondary mathematics classroom in Indonesia that used a web-based resource to support students' understanding of fractions. The finding suggests that the qualitative examination of the four intersected TPACK constructs assists in understanding the challenges and the opportunities to teachers when utilising an exploratory-based technology. It demonstrates that the combination of pedagogical stances and choice of technology significantly influence the visibility of other TPACK constructs. Implications of this study include the need of thoughtful planning prior to using web-based resources and the importance to utilise critical events in developing and assessing teachers' TPACK."

Perkmen, S., Antonenko, P., & Caracuel, A. (2016). Validating a measure of teacher intentions to integrate technology in education in Turkey, Spain, and the USA. *Journal of Technology and Teacher Education, 24*(2), 215-241. Retrieved from https://www.learntechlib.org/noaccess/152244

Abstract: "The main purpose of this study was to examine the validity of the Teacher Intentions to Integrate Technology in Education Scale using pre-service teacher samples from three countries on three continents - Turkey, Spain and the United States. Study participants were 550 pre-service teachers from three universities in Turkey, Spain and the USA (219, 209, and 122 respectively). The majority of the participants were female. All of the participants were junior and senior students enrolled in elementary teacher education programs. Specifically, this study compared pre-service teachers' self-efficacy, outcome expectations, intentions (internal factors) and perceived school climate (external factor) for technology integration in education in these countries. The results of confirmatory factor analysis in this study supported the construct validity of the scale in all three samples. Hierarchical regression analysis was conducted to examine the relative contribution of self-efficacy, outcome expectations and perceived school climate on pre-service teachers' intentions to integrate technology into their future classroom activities. The external factor of school climate predicted pre-service teachers' intention to integrate technology in education in all three samples. However, there were certain differences among the teachers from different countries in our sample in terms of technology integration. Unlike Turkey and the US, self-efficacy predicted technology integration intention to a smaller degree than school climate in the Spanish sample. Interestingly, outcome expectations scores did not make a statistically significant contribution to predicting pre-service

teachers' intention to use technology in the US sample. Given this study's findings, it is important to consider differences in technology integration intentions that exist in different countries, when conducting empirical research on teacher perceptions of using technology for teaching and learning."

Phillips, M. (2016). Processes of practice and identity shaping teachers' TPACK enactment in a community of practice. *Education and Information Technologies*. Advance online publication. doi: 10.1007/s10639-016-9512-y

Abstract: "Technological, pedagogical and content knowledge (TPACK) has been used by hundreds of studies as a theoretical framework to explore teachers' technology use in classroom settings. While these studies have contributed to understandings of the interplay between these different knowledge domains and the differences between pre- and in-service teachers' knowledge, little work has been done to examine the influence of teachers' socially mediated workplace settings on TPACK enactment. This paper examines the impact of situated, social contextual factors on teachers' knowledge development and enactment by reporting findings from an eight month case study involving ten teachers in an Australian secondary school. Results reported in this paper indicate that TPACK enactment is influenced by processes of identity development and practice. These findings challenge the established position of knowledge as an epistemological possession inherent in the TPACK framework rather than also considering knowing as an epistemology of practice. Implications for in-service teachers and school authorities are discussed and three conclusions are presented."

Piotrowski, A., & Witte, S. (2016). Flipped learning and TPACK construction in English education. *International Journal of Technology in Teaching and Learning, 12*(1), 33-46. Retrieved from http://www.sicet.org/images/journals/IJTTL/16-1/3_Amy_Piotrowski.pdf

Abstract: "This study examined how preservice English Language Arts teachers learn to teach and use their knowledge of content, pedagogy, and technology during an English education course focused on technology. Seeking to address a gap in the research, this study utilized a case study methodology to look at preservice teachers' learning about the flipped classroom and designing lessons integrating technology as a way for a teacher education course to facilitate preservice teachers' construction of their Technological Pedagogical Content Knowledge. The participants were preservice English teachers taking an online English education course during Summer 2015. The researcher used a survey to purposefully select nine individuals with a range of self-reported knowledge. Participants were then interviewed twice, had their course assignments collected and analyzed, and submitted three written reflections. The course that the participants took challenged preservice teachers to bring together their content knowledge, pedagogical knowledge, and technological knowledge to create flipped lessons videos and a series of lesson plans. The data showed that there was no pattern or stages of TPACK development. Participants saw potential for flipped learning to be useful in secondary English classes and thought about when and what content they could flip."

Qasem, A. A. A., & Viswanathappa, G. (2016). Blended learning approach to develop the teachers' TPACK. *Contemporary Educational Technology, 7*(3), 264-276. Retrieved from http://www.cedtech.net/articles/73/735.pdf

Abstract: "A theoretical framework has emerged recently to guide research in the teachers' use of ICT and it is the technological pedagogical content knowledge (TPACK). Early research indicates that Blended learning is increasingly being adopted at all levels of educational system. It is considered as a way to foster engaging in interactive learning experiences. The purpose of this article was to determine the levels of ICT knowledge on e-course design through blended learning approach among science teachers of secondary schools in Yemen. The study was conducted on the sample of 60 science teacher trainees in Ibb city. The ICT knowledge scale was used based on TPACK. To analyze the data t-test was used. The findings in this study indicated that TPACK has provided a valuable tool for assessing teacher knowledge in the area of technology integration, the teachers' ICT knowledge was above average in two groups, and there is significant difference between experimental and control groups on ICT knowledge scale. Recommendations are made for future research on online collaboration activities to raise awareness of factors related to online group work and to determine the in-service training needs of teachers on ICT use to follow-up support and to ensure successful utilization of new technologies."

Reese, J. A., Bicheler, R., & Callan, R. (2016). Field experiences using iPads: Impact of experience on preservice teachers' beliefs. *Journal of Music Teacher Education, 26*(1), 96-111. doi:10.1177/1057083715616441

Abstract: "The purpose of this phenomenological case study was to investigate the lived experiences of preservice music teachers using iPads to engage secondary general music students in creating and performing music during field teaching experiences. Two questions guided this research study: (a) What are these preservice teachers' perceptions of their experiences using iPads to create music and to teach? (b) How do these experiences influence their perceptions of the technology's effectiveness as a teaching tool? Data were reflections of nine preservice teachers collected over 5 weeks. The essence of the experience was the preservice teachers' struggle to resolve tensions that emerged while using technology to create and teach music. Tensions caused some to examine cherished beliefs and practices and influenced their development of TPACK (technological pedagogical and content knowledge). Three themes support the essence: (a) tensions, (b) innovation and adaptation, and (c) influence of experiences on perceptions of technology."

Reyes, Jr., V. C., Reading, C., Rizk, N., Gregory, S., & Doyle, H. (2016). An exploratory analysis of TPACK perceptions of pre-service science teachers: A regional Australian perspective. *Information and Communication Technology Education, 12*(4), 1-14. doi:10.4018/IJICTE.2016100101

Abstract: "Four distinct constructs were identified from a survey of a sample of pre-service science teachers at a regional Australian University. The constructs emerged after employing

Exploratory Factor Analysis (EFA) on respondents' perceptions of pedagogical practices incorporating the use of Information Communication and Technology (ICT). The key components of the survey were derived from a Technological Pedagogical and Content Knowledge (TPACK) survey developed for a national project. For future investigations of TPACK application in university contexts, a four-construct configuration of pre-service teacher TPACK perceptions is proposed requiring empirical confirmation. This inquiry depicts a portrait of emerging domains of TPACK. The relevance of the findings and their implications for universities that rely heavily on ICT in the delivery of are discussed, especially in relation to improving teaching practices."

Roberts, K., Shedd, M., & Norman, R. (2012). The common core standards on technology: A shift in focus for states. *NERA Journal, 48*(1), 56-65. Retrieved from https://www.researchgate.net/profile/Rebecca_Norman5/publication/275584285_The_Common_Core_Standards_on_Technology_A_SHIFT_in_Focus_for_States/links/5540272b0cf29680de9dd550.pdf

Abstract: None.

Zhang, T., & Wang, L. (2016). Pre-service mathematics teachers' technology pedagogical content knowledge: An investigation in China. *Journal of Mathematics Education, 9*(1), 126-135. Retrieved from http://educationforatoz.com/images/Tingyan_Zhang_2016.pdf

Abstract: "Teachers' technology pedagogical content knowledge (TPACK) has become a international hot research topic for decades. The framework proposed by Mishra and Koehler (2006) has been widely used to investigate teachers' TPACK. Under the guide of this framework, this paper investigated Chinese pre-service mathematics teachers' TPACK with the employment of questionnaire. 260 pre-service mathematics teachers from three universities in China participated this study. Gender differences and differences among teachers from the three universities were identified. Suggestions were further made for the training of pre-service mathematics teachers' TPACK."

Chapters

Cheng, H.-J. (2016). A TL-TPACK model on CSL pre-service teachers' competencies of online instruction. In C.-H. Lin, D. Zhang, & B. Zheng (Eds.), *Preparing foreign language teachers for next-generation education* (pp. 198- 225). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-0483-2.ch011

Abstract: "This chapter aims to introduce the integration of TPACK into a Chinese pre-service teacher training program and discuss its outcomes and challenges. First, the concept of TPACK was introduced and relevant TPACK research and its constraints in the previous studies were discussed. Through the partnership between a Chinese pre-service teacher training program in Taiwan and a Chinese learning program in the States, the author developed a Teaching and Learning Model, entitled TL-TPACK model, integrating practicum, course design, advisors, peer

cooperation, and reflections—five training strategies to ensure the training and learning outcome. At the end of the chapter, an empirical Chinese pre-service teacher training study applying the TL-TPACK model was conducted to investigate pre- service teachers' seven TPACK competences and Chinese learners' learning performance. Finally, research implications and suggestions for future studies were discussed."

Guo, Y., Li, Y., & Li. M. (2016). A study on teachers' TPACK level in a provincial city in China. In E. L. Brown, A. Krastev, & M. Ranieri (Eds.), *E-Learning and social media: Education and citizenship for the digital 21st century* (pp. 65-92). Charlotte, NC: Information Age Publishing.

Abstract: "Over the last few decades, the incorporation of information and communication technologies (ICTs) into daily pedagogical practices has been viewed as a viable solution for the innovation of educational systems. Teachers have been seen as crucial actors in this process, and therefore much emphasis has been put on the necessity to provide them with adequate technological and pedagogical competences through training and lifelong learning. However, while a greater knowledge of teachers' level of skills in technology-enhanced learning would be extremely helpful to deliver effective training courses, up to now, empirical studies on teachers' digital and pedagogical skills have been poor and fragmented, especially in developing and populous countries such as China. The current study attempted to explore this issue in a provincial…"

McVey, M. K., Poyo, S., & Smith, M. L. (2017). Optimizing K-12 education through effective educator preparation: Lessons learned from a synchronous online pilot study. In N. Ostashewski, J. Howell & M. Cleveland-Innes (Eds.), *Optimizing K-12 education through online and blended learning* (pp. 23-44). Hershey, PA: IGI Global. doi: 10.4018/978-1-5225-0507-5

Abstract: "Teacher interaction, presence, and participation in online and blended courses are key to facilitating student learning and student satisfaction. Those being prepared to teach in online K-12 environments must learn the knowledge, content, skills, and dispositions relevant to the online learner of the digital age, and particularly to incorporate into online courses the appropriate methods, including Technological Pedagogical Content Knowledge (TPACK). It is imperative that educator preparation programs provide its candidates with authentic field experiences in K-12 digital environments. This chapter includes findings of a pilot study that examined challenges faced by teacher candidates placed in an online student teaching environment and provides recommendations for course design, faculty support, infrastructure, and future research direction."

Ntuli, E., & Nyarambi, A. (2016). Learner-centered pedagogy in technology integrated classrooms: An agenda for teacher preparation and professional development. In J. Keengwe, & G. Onchwari (Eds.), *Handbook of research on learner-centered pedagogy in teacher education and professional development* (pp. 291-308). Hershey, PA: IGI Global. doi: 10.4018/978-1-5225-0892-2.ch016

Abstract: "Research evidence exists to support the implementation of learner-centered approaches in technological usage and in teaching methodologies. This chapter uses qualitative observation data on implementation of learner-centered approaches in technology integrated classrooms collected by two participant observers. Findings indicate that the problems that some instructional technology researchers in the past decade have found still persist despite the extensive technology professional development designed to enhance the use of technology in a learner-centered approach. The TPACK framework which is used as a guide to effective technology integration has not been fully utilized by many who offer professional development or those who design technology courses at teacher preparation programs. Two major problems noted in observation notes are: 1) those who provide professional development do not begin with the background of the TPACK framework; 2) the TPACK framework is usually discussed in isolation of other frameworks such as the UDL framework."

Sun, Z., You, J., Song, W., Qu, Z., & Luo L. (2016). Identifying the contributors to improve mobile-based TPACK competency of elementary school teaches in China. In C.-H. Lin, D. Zhang, & B. Zheng (Eds.), *Preparing foreign language teachers for next-generation education* (pp. 74-91). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-0483-2.ch005

Abstract: "Self-Efficacy (SE) and technology acceptance are two contributors related to Technological Pedagogical and Content Knowledge (TPACK). Many studies have indicated that TPACK is correlated with SE and the level of technology acceptance in both traditional and online learning environments. Studies using mobile learning devices in the classroom, however, are yet to be established. The authors conducted an empirical study by investigating mobile-based TPACK, SE, and technology acceptance of more than 500 English teachers from about 220 elementary schools in China, who used Android system-based pad in classrooms for one year. As a result, SE and technology acceptance had indirect positive effects on mobile-based TPACK, while no significant difference was observed in gender for TPACK. However, younger teachers and teachers with higher levels of education showed superior TPACK levels than other participants in the study. Finally, several implications for teacher professional development, limitations, and future research plans are presented."

Wang, W., & Feng, L. (2016). *Technology standards for Chinese language teacher education*. In C.-H. Lin, D. Zhang, & B. Zheng (Eds.), *Preparing foreign language teaches for next-generation education* (pp. 38-54). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-0483-2.ch003

Abstract: "Guided by the TPACK theory (Mishra & Koehler, 2006), this chapter reviews and compares the technology standards related to and designed for teachers of Chinese as a Foreign Language (CFL) from the entry level to the accomplished level in the United States and China. It has found that the technology standards are often included in the comprehensive standards for teachers and parallel the standards about other aspects of teaching. The technology standards related to CFL in the two countries share some similarities but also differ in important ways. Several important and critical understandings are identified, including the needs for CFL technology standards, the theoretical foundations for CFL technology standards,

and a more solid and comprehensive infrastructure for CFL education. Recommendations are made to address the needs, and research is called for to study the development and implementation of CFL technology standards."

3. Recent TPACK-Related Dissertations

Bixler, S. G. (2016). *One-to-one iPad technology in the middle school mathematics and science classrooms* (Doctoral dissertation, University of Kentucky). Retrieved from http://uknowledge.uky.edu/edsc_etds/14/

Abstract: "Science, technology, engineering, and mathematics (STEM) education has become an emphasized component of PreK-12 education in the United States. The US is struggling to produce enough science, mathematics, and technology experts to meet its national and global needs, and the mean scores of science and mathematics students are not meeting the expected levels desired by our leaders (Hossain & Robinson, 2011). In an effort to improve achievement scores in mathematics and science, school districts must consider many components that can contribute to the development of a classroom where students are engaged and growing academically. Computer technology (CT) for student use is a popular avenue for school districts to pursue in their goal to attain higher achievement.

The purpose of this study is to examine the use of iPads in a one-to-one setting, where every student has his own device 24/7, to determine the effects, if any, on academic achievement in the areas of mathematics and science. This comparison study used hierarchical linear modeling (HLM) to examine three middle schools in a private school district. Two of the schools have implemented a one-to-one iPad program with their sixth through eighth grades and the third school uses computers on limited occasions in the classroom and in a computer lab setting. The questions addressed were what effect, if any, do the implementation of a one-to-one iPad program and a teacher's perception of his use of constructivist teaching strategies have on student academic achievement in the mathematics and science middle school classrooms. The research showed that although the program helped promote the use of constructivist activities through the use of technology, the one-to-one iPad initiative had no effect on academic achievement in the middle school mathematics and science classrooms."

Carlson, S. M. (2016). *An examination of teacher understandings of technology integration at the classroom level* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10124342)

Abstract: "The purpose of this dissertation is to describe and understand how teachers describe the changes in their practices as a result of ten years [of] participation in a one-to-one environment. This research study focuses on one successful middle school's adoption of laptops to support teaching and learning. A qualitative study using interviews of key participants was undertaken with teachers and administrators. The Technological, Pedagogical and Content Knowledge (TPACK) framework was used in conjunction with Rogers' Diffusion of Innovation framework to understand from the participants' perspective changes to their practice. The

results indicate teachers underwent changes in their use of technology to support teaching and learning, showing increasing overlap between the domains of technological and pedagogical knowledge. The changes resulted in an increase in the transparency of the teaching and learning process for other teachers, students, administrators, and parent. These changes were supported by four school-wide factors; the adoption of a common software suite, robust social networks, modeling by leadership and the professional development model used. The findings were discussed in relation to participants' position on the adoption spectrum of Rogers' Diffusion of Innovation theory."

Gomez, M. (2016). *TPACK in practice: A qualitative study of middle school Social Studies teachers in a 1:1 laptop environment* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10123672)

Abstract: "The purpose of this qualitative study was to examine what effective teaching with technology looked like in practice within middle grade Social Studies' classrooms. An additional purpose was to understand how teachers' combine content knowledge, pedagogical knowledge, and technological knowledge when making decisions about their curriculum. Guiding this study was a conceptual framework that suggests effective teaching with technology comes from technological pedagogical content knowledge (TPACK), a knowledge that is created by combining content knowledge, pedagogical knowledge, and technological knowledge (Mishra & Koehler, 2006). Lakeside Middle School was selected for this study due to both its commitment to technology integration and its implementation of a school wide 1:1 laptop initiative. Three middle grade Social Studies' teachers at Lakeside were selected, one each from 6th, 7th, and 8th grade classrooms. A multiple case study methodology was used in this study. An observation protocol, designed specifically to capture TPACK moments during observations, was developed. Multiple data sources (interviews, observations, focus group, and artifacts) were collected and analyzed for emerging themes about the TPACK practices of each teacher. Using the data collected, a descriptive case study was written for each teacher. These descriptive case studies identified examples, grouped thematically, of TPACK in practice. These descriptive case studies also recorded each teacher's beliefs about teaching, technology in education, and their own placement within the TPACK framework. Data analysis suggested that that TPACK is developed uniquely in each teacher, shaped by their beliefs and strengths in teaching. Analysis of the data also suggested that the TPACK framework may need to be rethought, in order to fully capture TPACK in practice. Included in this are discussions about how the TPACK framework model fails to account for any of the three teachers' TPACK practices, discussions about the model's failure to differentiate between depth and breadth of TPACK knowledge, and discussions about other factors that influence TPACK in practice, including students and teaching environment. The study findings have implications for teacher educators, teachers, and policy makers. Specifically, teacher education courses need to be developed to address the lack of TPACK knowledge that preservice teachers have. Additionally, new professional development sessions are needed for practicing teachers that focus on developing both the depth and breadth of their TPACK practices."

Kaaki, W. (2016). *The relationship between part-time online faculty's technological, pedagogical, and content knowledge and student grades* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10129025)

Abstract: "Current research from 2010–2016 indicates online learner grades have dropped at for- profit virtual institutions. During this same period, part-time online faculty made up for 80–90% of online faculty at for-profit virtual institutions. There is evidence of low online learner grades in an era of increased use of part-time online faculty. The purpose of this quantitative non-experimental study was to examine the relationship between seven self-reported predictor variables of part-time online faculty working at a private for-profit virtual institution and the criterion variable, online learners' grades. A total of 81 out of 148 faculty members participated in the TPACK Survey. Multiple linear regressions and a Pearson r correlation coefficient were used to analyze data. Results of the analyses indicated the seven self-reported predictor variables of technological, pedagogical, and content knowledge of part-time online instructors did not predict online learners' grades. Study findings imply that the domains of technological, pedagogical, and content knowledge of part-time online instructors do not account for low online learners' grades. Close analysis of other predictor variables that may account for low online learner grades is recommended."

Keegan, J. (2016). *Teacher preferences on technology use using the iTEaCH implementation model: A case study in a Tanzanian private school* (Doctoral dissertation, University of New England). Retrieved from http://dune.une.edu/cgi/viewcontent.cgi?article=1074&context=theses

Abstract: "To advance both transformative school leadership skills and the use of ICT integration in this school, while aiming to enhance positive school change, this study used the iTEaCH (ICTTechnogogy-and-Collegiality) Implementation Model proposed by Choy (2013) to investigate, quantitatively, teacher perceptions of ICT use in a case study school in Tanzania. The iTEaCH Implementation Model provides focus on teachers' choice of technology use, desire for technology use, pedagogy perceptions, and collegiality to identify gaps that might be used to inform teachers and school leaders of technology provision, professional development, and collegial support needs in the school. Using a slightly modified version of the Choy and Ng (2015) data gathering tool (Appendix A) data were collected to investigate the teachers' use of technology across three dimensions, namely; types of technology available in the school, teachers' pedagogical preferences, and the level of teacher support or collegiality experienced by teachers in the school.

Specifically, the study intended to investigate the research questions:
1. How do teachers respond to the iTEaCH technology implementation model survey?
2. How can the teachers' attitudes about a change in practice be used by school leadership to design a working model for ICT integration in the school?

The results showed that teacher use of technology in the classroom was positively correlated with three research variables namely; with a teacher's desire to use technology; teachers

feeling that they have the pedagogic skills to use technology in the classroom, and teachers having colleague/school support to use technology in the classroom. Also, teacher use of technology in the classroom was significantly different between types of interactive learning. The results from the the iTEaCH Implementation Model survey provided data that could be used to assist the school leadership plan budgets for technology provision and for the concomitant professional development of staff. Additionally, the selective focus of this model allowed for the empowerment of both teacher and school leadership to focus on and possibly identify technological, pedagogical and collegial interventions that are needed in the school better meet the need of 21st -century teaching and learning."

Ocak, C. (2016). *Observable indicators of technological pedagogical content knowledge (TPACK) in science classrooms through video research* (Master's thesis, Middle East Technical University). Retrieved from http://etd.lib.metu.edu.tr/upload/12620160/index.pdf

Abstract: "The purpose of the study was to examine the observable indicators of science teachers' technological pedagogical content knowledge (TPACK) through a multiple case study with video research. The study was carried out in a private campus school offering primary and secondary education level of education. Following multiple case study methodology, design and implementation of process of technology enhanced science instruction among in-service science teachers were investigated in depth in order to explore observable indicators of science teachers' TPACK. [Four] inservice science teachers, teaching at the private campus school in 2015-2016 spring semester, were the participants of the study. Data sources were semi-structured pre video interviews, video recordings of classroom teaching and semi-structured post video interviews. Multiple case study methodology in support of video research was conducted in the lessons of four in-service science teachers, embracing an organized and systematic attitude towards the analysis of teaching performance. The results of the study provided rich contextual information of the cases, observable TPACK indicators emerged in the design and implementation processes of technology enhanced science instruction as well as teachers' motives towards technology integration."

Petersen, A. R. (2016). *Developing TPACK: A study of new interactive whiteboard implementers* (Master's thesis, Hamline University). Abstract retrieved from http://digitalcommons.hamline.edu/hse_all/4172/

Abstract: "Typical professional development for teachers implementing new technologies has been limited to technology knowledge, largely excluding pedagogical and content knowledge. This capstone investigates the process of developing Technological Pedagogical Content Knowledge (TPACK) for new interactive whiteboard implementers. An initial survey was conducted exploring the professional development needs of the participants in the study. Professional learning group sessions were then conducted with the participants, and discourse analysis was used to analyze the transcripts of the sessions. The study found that the participants developed TPACK through participation in the professional learning group sessions. Application of the professional learning group initiative to other technology implementations is also discussed."

Poyo, S. R. (2016). *Transforming traditional practices of teacher preparation to meet changing needs of digital learners: A first step intervention by assessing and addressing needs of pre-service teachers in a dual learning environment* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10109526)

Abstract: "Changes in the field of education require teachers' acquisition of specific knowledge of technology and the skills of its effective use in the classroom. With the expansion of the traditional classroom to include virtual learning environments, concern still exists regarding characteristics necessary for quality teaching and learning.

This research is an examination of pre-service teachers' needs relevant to integrating technology in an online learning environment. It is a first step toward acknowledging the responsibility teacher preparation programs have in the formation of educators equipped to instruct in dual learning environments, thus providing pre-service teachers with opportunities and experiences to become fluent in the technological pedagogical content knowledge (TPACK) required for online learning environments as well as the traditional face-to-face instruction.

The purpose of this study was to determine if active engagement with content of an online instruction module would affect the attitudes, knowledge and skills, and instructional centeredness of pre-service teachers' towards technology integration in an online learning environment. A mixed-methods concurrent triangulation design procedure was utilized to measure characteristics of pre-service teachers in a teacher preparation program. A two-way within-subjects analysis of variance was conducted to evaluate the effect of engagement with the content of the online instruction module for all three domains. Participants began the intervention with limited knowledge and skills of technology integration and online learning environments; however, they made statistically significant gains upon completion of the intervention. The implementation of an intervention such as this online instruction module may support other teacher preparation programs in identifying strengths and weaknesses of their pre-service teachers and provide valuable information necessary to guide program goals."

Sickel, J. L. (2016). *TPACK development in science teacher preparation: A case study in Queensland, Australia* (Doctoral dissertation, Ohio University). Abstract retrieved from http://rave.ohiolink.edu/etdc/view?acc_num=ohiou1457379586

Editors' note: Full text release has been delayed at the author's request until May 01, 2017.

Abstract: "This study sought to identify key experiences that impact the development of technological pedagogical content knowledge (TPACK) of preservice secondary sciences teachers at a medium-sized university in Queensland, Australia. TPACK is a conceptual framework of a body of knowledge that teachers draw upon to influence practice; it is a dynamic and emergent form of knowledge that informs the employment of technology for teaching specific subject matter.

This study employed an embedded case study approach, including delivery of a TPACK survey instrument and analysis of participant interviews, to identify the context-specific experiences that promote the development of TPACK among twelve preservice secondary science teachers. The research addresses a specific need cited in the literature, identifying TPACK impact factors, and provides a novel way to visualize TPACK development through contextual experiences.

A novel approach to visually representing context-specific experiences and their influence on teacher knowledge, self-efficacy, values and beliefs was employed. Three major findings are presented below: 1) the majority of preservice secondary science teachers were unable to define the constructs of learning and science; 2) a focus on motivation and interest paired with a disconnect between expressed and enacted pedagogical orientation lead to teacher-centered instruction augmented with superficial tactics aimed at generating interest; and 3) difficulty in integrating knowledge bases yielded lower TPACK self-efficacy, which has detrimental impacts on the instruction planned by pre-service teachers for their students. Findings are directly aligned with participants' prior experience, compared to the relevant literature, and utilized to identify implications for teacher preparation as well as recommendations for future research."

Vandykgibson, J. L. (2016). *K-12 educational technology implementations: A Delphi study* (Doctoral dissertation, Walden University). Retrieved from http://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=3802&context=dissertations

Abstract: "The use of educational technologies is a key component of education reform. In its current national technology plan, Future Ready Learning: Reimagining the Role of Technology in Education, the U.S. Department of Education asserts that educational technologies can transform student learning. Successful integration of educational technology could increase student achievement and transform the setting to bring about positive social change. The purpose of this study was to provide a group of expert panelists an opportunity to identify strategies and guidelines to create an effective educational technology plan. Data were gathered using a modified Delphi technique from 7 teachers, 8 administrators, and 7 policymakers. All had expertise in educational technologies and experience with past state technology implementations, and all used a Delphi instrument to rate statements from current research. Their recommendations confirmed the importance of each stage of Rogers' 5 stages of the innovation-decision process; the panelists also reached consensus about the role of the state and its responsibility to provide support and guidance to districts and schools when implementing educational technology plans. The results showed that an individualized approach to implementation of an educational technology innovation, rather than an organizational approach, may improve the rate of diffusion and adoption of educational technology innovations in this state's K-12 public schools. This shift in how implementations are managed could produce a more efficient and effective way to integrate educational technology innovations in U.S. K-12 schools."

Varela, K. D. (2016). Museum resources and mobile technology in the classroom curriculum (Master's thesis, University of Texas at Austin). Retrieved from

https://repositories.lib.utexas.edu/bitstream/handle/2152/39437/VARELA-THESIS-2016.pdf?sequence=1

Abstract: "In the United States, both Common Core standards and 21st century learning skills are dictating educational policy, while teachers are expected to teach to standardized tests while also providing students authentic learning experiences. Creating these authentic learning experiences involves not only ensuring learning will occur, but also connecting the lesson to real world examples. These connections are increasingly made possible in classrooms through the use of mobile technology. Art museums are also taking advantage of digital tools to develop mobile applications that extend interactions with artworks beyond the museum's walls. It is at this intersection of classrooms, mobile technology, and art museums that this study originated. The study focuses on how two elementary educators integrated online art museum resources into their curriculum using mobile technology, and what pertinent implications arise from these experiences that can be applied to developing substantive art museum resources. I prepared myself for the study by reviewing literature concerning constructivism (Hein, 1990), andragogy (Knowles, 1990), mobile technology, technology integration into classrooms, and art museum resources. Working alongside one art specialist and one vii math teacher, I sought to understand each teacher's experience with bringing art museum mobile applications and iPads into their curriculum. It was important to include in the study my voice as a researcher, as well as the voices of the teachers. I, therefore, adopted a narrative approach to reporting the data that enabled our three stories to intersect. The trio of narratives reflect our experiences as I interacted with the teachers as they designed and conducted lessons that utilized museum developed mobile applications of their choice and hosted on iPads. I used the Technological, Pedagogical, and Content Knowledge (TPACK) framework (Koehler, Mishra, & Cain, 2013) to identify how each teacher's technological, pedagogical, and content knowledge areas interacted during their teaching. Both educators' familiarity with, and evolution of, their technological pedagogical knowledge correlated with their perceived success of the lesson. From the teachers' experiences, I was better able to identify and understand the importance of collaborating with teachers in research, the unique opportunities for increasing interaction with art museum objects by embracing mobile technology, and the potential for collaborating between universities and art museums in digital projects."

Yang, S.-H. (2016). *Exploring special education teachers' perceptions of technology and internet for teaching* (Master's thesis, National Taiwan University of Science and Technology). Retrieved from http://pc01.lib.ntust.edu.tw/ETD-db/ETD-search/view_etd?URN=etd-0719116-095642

Abstract: "This study was aimed to explore the special education teachers' perceptions of technology and Internet for teaching. The interview data were analyzed by using phenomenographic method, and seven categories of special education teachers' perceptions for technology and Internet of teaching were found: Tool, Toy, Telecommunication, Treasure of information, Territory, Tour and Trend. The specific 'Tree of special education teachers' perceptions of technology for teaching' and 'Tree of special education teachers' perceptions of Internet for teaching' were proposed to represent special education teachers' multiple

perceptions. This study also found that special education teachers with more agreements for the perceptions of 'Toy' and 'Trend' in technology tended to display higher technological pedagogical content knowledge (TPCK), and with more agreements for the perceptions of 'Tour' in Internet tended to display higher Web-based Pedagogical Content Knowledge (WPCK)."

4. Recent TPACK Presentations

Alqurashi, E., & Samarin, S. (2015, October). *In-service English language teachers' knowledge of technology integration into the classroom.* Paper presented at the 2015 International Business and Education Conference, Las Vegas, NV.

Abstract: "The purpose of this study was to investigate the perceived TPACK (technological pedagogical content knowledge) level of in-service English language teachers, to examine the correlation among the TPACK components, and to explore the extent in which TPACK components correlate with demographic characteristics (age, years of experience, level of education). Findings revealed that teachers' knowledge in technology was not as strong as their knowledge in pedagogy and content. Correlations between the subscale variables in the TPACK were significant except for the relationship between content and technology. A significant and positive correlation found between Teachers' age and pedagogy, content, and pedagogical content knowledge, between experience and pedagogy and pedagogical content knowledge, and between education level and pedagogy, pedagogical content knowledge and technological content knowledge."

Cheung, G., Chan, K., Brown, I., & Wan, K. (2016, June). *Teachers' knowledge and technology acceptance: A study on the adoption of clickers*. Paper presented at the 11th International Conference on e-Learning, Kuala Lumpur, Malaysia.

Abstract: "Teacher acceptance is the key for the successful implementation of a new technology in education settings. While the Unified Theory of Acceptance and Use of Technology (UTAUT) offers a well-validated solution in explaining the behavioral intention of adopting an emerging technology, there are research gaps in understanding the determinants of the components in the model. Extending the previous model and applying it in the context of adoption of student response system (a.k.a. clickers), the current study explored the underlying factors that influence the core components of UTAUT— effort expectancy, performance expectancy, social influence, and facilitating conditions. In particular, the study examined the impact of teachers' knowledge on the evaluation of those components. Incorporating the concepts of Technological Pedagogical Content Knowledge (TPACK), the study attempted to investigate the association of teachers' knowledge and the major components in UTAUT. Fifty-two teachers from 7 faculties at the Hong Kong Polytechnic University participated in our teacher survey between May and July 2015. Pearson's correlation analysis reveals that technological knowledge was positively correlated with effort expectancy ($p<.01$), and behavioral intention ($p>.01$). Further, there were positive associations between TPACK and performance expectancy ($p>.01$), as well as behavioral intention ($p>.01$). Findings supported the

hypothesis that teachers' knowledge is relevant to the perception on performance expectancy, effort expectancy, and facilitating conditions. In terms of theoretical implication, the current study extends the UTAUT by integrating the key concepts of TPACK in explaining the adoption of an emerging technology. As for practical implication, the study sheds light on strategies for successful implementation of clickers in university settings."

Hartikainen-Ahia, A., Kukkonen, J., Kärkkäinen, S., & Valtonen, T. (2012, September). *Developing teacher students' TPACK-in-action: Google Maps as a thinking tool in geography instruction.* Paper presented at the European Conference on Educational Research 2012, Cadiz, Spain.

Abstract: "The aim of this study is to develop ways to support teacher students´ skills and knowledge for the use of information and communication technology (ICT) in the teaching of geography. Nowadays, teachers need diverse knowledge and skills for teaching with ICT and these have been described by Koehler and Mishra (2005) in the TPACK model. According to Koehler and Mishra (2005, 2009) the main components in the TPACK model are content knowledge (CK), pedagogical knowledge (PK) and technological knowledge (TK). TPACK can be seen as a mixture of these components, offering the knowledge needed for supporting students' learning of specific content and using ICT in a pedagogically meaningful way (Koehler & Mishra 2005). It is also important to notice that the teachers´ TPACK is influenced by contextual factors, such culture, socioeconomic status and the school organization. (Harris, Mishra, & Koehler, 2009). "

Liang, X. and Luo, J. (2015). Micro-lesson design: A typical learning activity to develop pre-service mathematics teachers' TPACK framework. In H. H. Yang, et al. (Eds.), *Proceedings of EITT 2015: The Fourth International Conference of Educational Innovation Through Technology* (pp. 259 - 263). Los Alamitos, CA: The Institute of Electrical and Electronics Engineers Computer Society. doi:10.1109/EITT.2015.61

Abstract: "This study is designed to determine whether micro-lesson design can become a typical learning activity of learning technology by design. In this study, the professional development course Educational Technology Application took by 80 pre-service mathematics teachers was studied, a systematic design of 12-week micro-lesson learning activity was made, Likert scale was developed to measure their views on the matching of micro-lesson design and TPACK, as well as their intention of improving the ability of integrating technology in instruction through micro-lesson design and their behavior. The results indicate that the majority of pre-service mathematics teachers believe that micro-lesson design incorporates technological knowledge, pedagogical knowledge and subject content knowledge, they have positive intention to develop the ability of integrating technology in instruction through micro-lesson design, and are making efforts to achieve the goal."

Phillips, J., & Toth-Cohen, S. (2016, June). *A multi-dimensional framework for exploring effective technology integration into the learning environment.* Paper presented at

Thomas Jefferson University Faculty Days, Philadelphia, PA. Retrieved from http://jdc.jefferson.edu/tjufacultydays/42

Abstract: "Instructors at all levels indicate a growing awareness of educational technology and an intention to use technology for teaching. However, a divide exists between adoption and effective integration. The presentation outlines the difference between adopting a technology and integrating a technology. The Concerns Based Adoption Model (CBAM) offers a framework that describes the stages of integration. However, CBAM fails to address the pedagogy plays in integration of technology.

The TPACK (Technology, Pedagagy, and Content Knowledge) framework addresses the important overlap between pedagogy, teaching and subject matter expertise in integration. TPACK; however, does not address the stages of implementation or suggest the key environment conditions that support adoption. The presentation provides an alternative model that draws upon CBAM and TPACK to describe an adoption timeline and key characteristics of integration. The presentation will address factors influencing successful integration at the individual and institutional levels."

Wang, A. Y. (2016, June). *TPACK assessment in English language arts for teacher of English as a foreign language.* Paper presented at EdMedia: World Conference of Educational Media and Technology 2016, Vancouver, BC. Retrieved from https://www.learntechlib.org/p/173081

Abstract: "The importance of technological pedagogical and content knowledge (TPACK) in preparing effective teachers in this technological age has been recognized. Many quantitative TPACK assessments have been developed, but they did not seem to be able to help teachers of English as a Foreign Language (EFL) to diagnose the needs for professional development. Therefore, the purpose of this paper is to present the development of a TPACK assessment in English language arts that better address the needs of EFL teachers in developing their TPACK. In total, 180 teachers participated in the study. Data collected included results of a TPACK survey, interview notes, and observation notes. In this study, the analytical frameworks include the TPACK framework and the Revised Bloom's Taxonomy. A preliminary TPACK assessment in English language arts was suggested for the EFL teachers to self-evaluate their TPACK needs. The paper concludes with suggestion for future research and practices."

Wiziack, J. C., & dos Santos, V. D. (2016, June). *Incorporating technology into education processes: Proposal for an extension of the technology, pedagogy, and content knowledge framework by applying integrated cognitive competencies.* Paper presented at the 11th Iberian Conference on Information Systems and Technologies (CISTI), Canary Islands, Spain. doi:10.1109/CISTI.2016.7521433

Abstract: "The ongoing communicational transformation brought on by digital technology and the increasing imbrication of reticular ecosystems amplify their effects and changes in social life, defining new relationship configurations. The practices and trends of incorporating

Information and Communication Technology (ICT) into education, published in the past five years, points to a trend of simply transposing everyday ICT into school processes, without taking into account the necessary pedagogical, technical and conceptual adjustments, nor other factors of the educational complexity. This paper presents an alternative application of an extension to TPACK (technology, pedagogy, and content knowledge) framework model with CCI (integrated cognitive skills) application for incorporation of technology in the educational process as a way of overcoming these difficulties. The combined application of technological and pedagogical skills in this hybridized model allows the enhancement of learning processes by thinking of education and technology as integrated tools, becoming absolutely vital for better understanding, rethinking and reformulating syllabi, educational policies and practices so as to improve teaching processes."

Yasar, O., Veronesi, P., Maliekal, J., Little, L. J., Vattana, S. E., & Yeter, I. H. (2016, June). *Computational pedagogy: Fostering a new method of teaching.* Paper presented at the 2016 ASEE Annual Conference & Exposition, New Orleans, LA. Retrieved from https://peer.asee.org/computational-pedagogy-fostering-a-new-method-of-teaching

Abstract: "Teaching with technology still remains as a challenge. Making judicious choices of when, what and how specific tools and pedagogies to use in the teaching of a topic can be improved with the help of curriculum inventories, training, and practices but as new and more capable technologies arrive, such resources and experience do not often transfer to new circumstances. This article presents a case study in which computational modeling and simulation technology (CMST) is used to improve technological pedagogical content knowledge (TPACK) of teachers. We report findings of a summer training program for both pre-service and in-service teachers in the Northeastern United States. CMST has shown to be effective on both teaching and learning. Results show that it helps teachers to integrate technology into their teaching in a more permanent, constructive, and tool-independent way. It has also shown to improve student learning in a constructive fashion by first enabling deductive introduction of a topic from a general simplistic framework and then guiding the learner to inductively discover underlying STEM principles through experimentation."

Zaritsky, M., Doryoseph, L., & Goodman, A. (2016, June). *Bringing technology into the classroom: One iteration at a time*. Paper presented at EdMedia: World Conference on Educational Media and Technology 2016, Vancouver, BC. Retrieved from https://www.academicexperts.org/conf/edmedia/2016/papers/49354/

Abstract: "This design-based research explores professional growth of in-service English teachers in Israel. Participating teachers took part in one of two iterations of a professional development course focusing on the integration of technology in English teaching. Both iterations were designed based on a cognitive apprenticeship approach and the use of the model of Technological, Pedagogical and Content Knowledge (TPACK) as a lens for teachers to implement and evaluate the integration of technology in their own classrooms. The mediating process of reflection has been added to the second iteration in the form of reflective writing. Quantitative analysis of pre-post TPACK questionnaires shows significant improvement of

teachers' perceptions in the first iteration. Results of the second iteration confirm and extend the findings of the first one. The course is a promising model for supporting teachers in developing the capacity for integrating technology into their everyday teaching."

5. Call for TPACK Manuscripts

2017 SPECIAL ISSUE of the Australasian Journal of Educational Technology (AJET):
Future Directions in TPCK/TPACK Research and Development

Guest Editors

- Judith B. Harris, College of William & Mary
- Michael Phillips, Monash University
- Matthew J. Koehler, Michigan State University
- Joshua M. Rosenberg, Michigan State University

Focus of the Special Issue

Building upon Shulman's (1986; 1987) influential notions of *pedagogical content knowledge*, or the knowledge needed to teach effectively (and differently) within different curriculum areas, educational technology researchers have embraced *technological* pedagogical content knowledge, or TPCK/TPACK (Angeli & Valanides, 2005; Mishra & Koehler, 2006; Niess, 2005). TPACK scholarship examines how to develop, apply, and assess this knowledge in diverse education settings and content areas. During the last decade, multiple ways to understand and support its development have emerged, generating approximately 1,000 publications that utilize the construct, impacting the practice of postsecondary faculty, administrators, and others invested in meaningful educational uses of technology.

Perhaps inevitably, TPACK's enthusiastic reception and rapid dissemination have generated multiple points of divergence which need further study, such as:

- The *specific* nature of the knowledge that TPACK describes;
- How to understand and describe *contextual influences* upon instructors' TPACK;
- How to *measure* this knowledge appropriately;
- How to *structure TPACK development* in accordance with different adult learners' needs.

Given the widespread diffusion of TPACK, research focusing upon these and related issues will help to determine the direction of future postsecondary learning and teaching with technologies. Therefore, this special issue of *AJET* will address **future directions in TPCK/TPACK research and development**. Please note that since *AJET*'s focus and scope address post-secondary education, submitted manuscripts should speak to TPCK/TPACK in higher education, professional learning/development for teachers and university faculty, and/or educators' workplace learning.

Manuscript Submission Instructions

Manuscripts addressing the special issue's focus should be submitted through the *AJET* online manuscript submission system. Please review the Author Guidelines and Submission

Preparation Checklist **carefully**, and prepare your manuscript accordingly. Information about the peer review process and criteria is also available for your perusal.
NOTE: When submitting your manuscript, please include a note in the field called 'Comments for the Editor' indicating that you wish it to be considered for the "TPACK Future" special issue. Please direct questions about manuscript submissions to Judi Harris at: judi.harris@wm.edu.

Timeline
Manuscript **submission deadline** (firm): 12 December 2016
Decisions and feedback on manuscripts: 1 March 2017
Revised manuscripts due: 1 April 2017
Expected Publication: May 2017

6. 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., & Rodriguez, K. (Eds.). (2016, September 20). TPACK newsletter issue #30: September 2016 [Electronic mailing list message]. Retrieved from http://bit.ly/TPACKNewslettersArchive

7. 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.news.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 & Kim

…for the SITE TPACK SIG leadership:

Josh Rosenberg,	Co-Chair, Michigan State University
Mamta Shah,	Co-Chair, Drexel 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, Michigan State University