



## TPACK Newsletter, Issue #23: May 2015

Welcome to the twenty-third 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 Knowledge

“Knowledge has to be improved, challenged, and increased constantly, or it vanishes.”

- Peter Drucker

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### 1. TPACK Newsletter Update

The TPACK Newsletter has been published via the tpack.news email list since January 2009. It has 1206 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: 42 [articles](#), 4 [chapters](#), and 6 [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](mailto:tpacknews.editors@wm.edu).

## Articles

Akman, O., & Guven, C. (2015). Analysis of TPACK self-efficacy perception levels of social studies teachers and pre-service teachers. *International Journal of Contemporary Educational Research*, 2(1), 1-12.

Abstract: "The purpose of this research is to examine the self-efficacy technological pedagogical and content knowledge (TPACK) of the social studies teachers and pre-service teachers. TPACK scale which is developed by the researcher in this respect is applied to 113 social studies teachers and 919 social studies pre-service teachers. The method of the research has been patterned by the monitoring method. In accordance with the obtained data, the consistency index values are found by calculation of structural equity path coefficients (path analysis). The data has been classified with SPSS program and has been analysed with AMOS (Analyses of Moment Structures) program. In the study, while the relation level between other components and the technological knowledge teachers and pre-service teachers are seen in low and middle level, the relation level between the content knowledge and pedagogical knowledge has been found in higher level. Consequently, the necessity has occurred for the integration of the technological pedagogical and content knowledge of the social studies teachers and pre-service teachers with each other."

Avidov-Ungar, O. & Nagar, N. M. (2015). ICT instructors' sense of empowerment and viewpoint on the implementation of a national ICT program. *Journal of Computers in Education*. Advance online publication. doi:10.1007/s40692-015-0030-5

Abstract: "Within implementation of the National Information and Communication Technology (ICT) Program, ICT instructors facilitate schools with integrating ICT in teaching. Two types of ICT instructors take part in the implementation process: External district ICT instructors and internal school ICT instructors. This research has two goals: to examine how the ICT instructors perceive the encouraging and inhibiting factors of the change implementation, and to examine the factors predicting external district ICT instructors' sense of empowerment in comparison with internal school ICT instructors, thus examining the knowledge power PICTK (Program Information Communication Technology Knowledge) and TPACK knowledge (Technological Pedagogy and Content Knowledge) on the sense of empowerment within them. The methodology combines quantitative and qualitative research tools in a self-report questionnaire. The research findings clarify that the ICT instructors' sense of empowerment improves by enhancing their PICTK knowledge and TPACK knowledge. This sense of empowerment helps the instructor in creating viewpoints on the implementation process and the National Program's outcome. The research shows that the ICT instructors' viewpoints have unique significance to understanding the change elements that the National ICT Program creates in the schools. It is therefore recommended to continue with encouraging ICT instructors to expand their personal knowledge on the developing ICT program."

Ay, Y., Karadağ, E., & Acat, M. B. (2014). The technological pedagogical content knowledge-practical (TPACK-practical) model: Examination of its validity in the Turkish culture via

structural equation modelling. *Computers and Education*, 88, 97-108. doi: 10.1016/j.compedu.2015.04.017

Abstract: “The purpose of this study was to examine the construct of the Technological Pedagogical Content Knowledge [TPACK] Practical Model in the Turkish culture using structural equation modelling. The research was conducted on 296 teachers working in 13 different schools. To test the validity and reliability of the 22-item TPACK-Practical scale, item-total and item-rest (sometimes referred to as remainder) correlations, item discrimination, confirmatory factor analysis and Cronbach’s alpha reliability analyses were performed. The item-total and item-rest correlation coefficients were high, and all values were significant. The powers of all of the items to differentiate between the top 27% and the subgroup averages were significant ( $p < .01$ ). The original construct was validated according the confirmatory factor analysis that was performed to determine the construct validity. Additionally, Cronbach’s alpha reliability coefficient of the scale was determined to be 0.89.”

Bauer, W. I. (2015). Music learning and technology. *New Directions in Music Education*, 1. Retrieved from <http://nd.music.msu.edu/music-learning-technology-william-bauer>

Abstract: “This article discusses conceptualizing and actualizing technology for music learning. While approaches to using technology in education have often been technocentric, music teachers must not only consider technology itself, but also curricular outcomes, pedagogy, and the teaching/learning context when designing learning experiences for students. The extent to which technology may be utilized can vary on a continuum from slight enhancement to complete transformation of the learning experience. Three recent and potentially transforming approaches to music learning that are made possible through technology are described. It is important for music educators to consider the ramifications of new and developing technologies on creating, performing, listening to, and learning about music. Through current and emerging technologies, people of all ages and from all walks of life may be able to engage in meaningful musical experiences throughout their lives.”

Blonder, R., & Rap, S. (2015). I like Facebook: Exploring Israeli high school chemistry teachers’ TPACK and self-efficacy beliefs. *Education and Information Technologies*. Advance online publication. doi:10.1007/s10639-015-9384-6

Abstract: “The goal of this research was to examine how Israeli chemistry teachers at high school level use Facebook groups to facilitate learning. Two perspectives were used: Teachers’ TPACK (Technological Pedagogical Content Knowledge) and the self-efficacy beliefs of chemistry teachers for using CLFG (chemistry learning Facebook groups). Three different case studies were chosen and qualitative and quantitative research tools were used to learn about the teachers’ self-efficacy beliefs and knowledge. More specifically, a validated questionnaire for measuring teachers’ self-efficacy beliefs for using Facebook and for integrating Facebook into teaching was developed. We show that the initial beliefs (not based on a real acquaintance of Facebook) were replaced by more realistic efficacy-beliefs after the teachers started to work with the CLFG and that the technological support provided to each teacher, together with their

mastery experience, supported the development of strong self-efficacy beliefs regarding the use of CLFG. Teachers' TPACK was investigated by analyzing their interviews and the interactions in their CLFG. We found that the notion regarding what constitutes learning in the CLFG had not changed during the experiment but rather, the teachers knew better how they can facilitate this leaning. In addition they better integrated links to videos and visualizations that supported understanding abstract chemistry concepts. Interestingly, the intervention that was conducted did not influence teachers' perceptions of learning; however, it was found to serve as an additional tool for supporting their self-efficacy beliefs by providing vicarious experience for the teachers. We therefore recommend performing a longer intervention in the future."

Bozkurt, E. (2014). TPACK levels of physics and science teacher candidates: Problems and possible solutions. *Asia-Pacific Forum on Science Learning and Teaching*, 15(2), 1-21. Retrieved from [https://www.ied.edu.hk/apfslt/download/v15\\_issue2\\_files/bozkurt.pdf](https://www.ied.edu.hk/apfslt/download/v15_issue2_files/bozkurt.pdf)

Abstract: "This research examined whether the technological pedagogical content knowledge (TPACK) of physics and science teachers is at a sufficient level and whether the TPACK level affected the academic achievements of the students. In the research, a mixed method was used quantitatively and qualitatively. In the quantitative part of the research, Provus' assessment model was exploited in order to determine whether the TPACK levels of the teacher candidates were sufficient. On the other hand, in the qualitative dimensions of the research, we tried to determine whether there was a significant relationship between the academic achievements and TPACK levels of physics and science teacher candidates, and whether it predicted academic achievement in a significant manner. As a result of the data analyses, significant results were found in favour of physics teacher candidates in terms of their academic achievement and TPACK attitudes. Furthermore, it was also found that TPACK scores predicted the academic achievement scores of the teacher candidates positively. However, the TPACK levels of the teacher candidates in both departments were found to be insufficient, according to Provus' assessment model. In the qualitative dimension of the research, an in-depth interview method was utilized in order to determine to what extent the TPACK levels of the teacher candidates were affected, where the differences between the two departments originated, and from what the insufficiencies in the TPACK levels resulted. In-depth interviews were conducted with a total of 10 teacher candidates from both departments. The data which was obtained from the interviews cast substantial light on the findings of the research."

Chen, Y., & Jang, S. (2014). Interrelationship between stages of concern and technological, pedagogical, and content knowledge: A study on Taiwanese senior high school in-service teachers. *Computers in Human Behavior*, 32, 79-91. doi:10.1016/j.chb.2013.11.011

Abstract: "Whereas teachers' Stages of Concern (SoC) and their Technological, Pedagogical, and Content Knowledge (TPACK) appear to be related constructs, studies are scant regarding the connection between these two research areas. This study intensively examined the association between Taiwanese senior high school teachers' SoC and TPACK through a national survey (N = 605) and canonical correlational analysis. To ensure rigor of study, we revised a

TPACK instrument for Taiwanese senior high school teachers, statistically tested SoC's developmental phases, and reworked the Stages of Concern Questionnaire. Three canonical correlations became evident, portraying a significant connection between SoC and TPACK and further supporting our hypothesis that a higher level of technology integration would correlate higher with more synthesized types of teacher knowledge. Recommendations were put forward regarding support strategies of change facilitators, as well as directions for future research *Interrelationship between Stages of Concern and Technological, Pedagogical, and Content Knowledge: A study on Taiwanese senior high school in-service teachers.*"

Chua, J. H., & Jamil, H. (2014). The effect of field specialization variation on technological pedagogical content knowledge (TPACK) among Malaysian TVET instructors. *Malaysian Online Journal of Educational Technology*, 2(1), 36-44. Retrieved from <http://www.mojet.net/articles/pdf/v02i01/v02-i01-05.pdf>

Abstract: "Technological Knowledge is directly related to productivity, enhanced performance and service quality. Technology integration in the Technical and Vocational Education and Training (TVET) curriculum is expected due to high application of technical knowledge and technology applications. TPACK is a professional knowledge framework that gives flexibility and provides dynamic strategies to TVET instructors to enhance and therefore improve the teaching and learning process. This study analyzed the impact of Field Specialization variation on the level of knowledge gained. It is found that regardless of the large variation and multiple perspectives of specialization existing among TVET instructors, specialization is not a factor that influenced the level of knowledge gained. Therefore, this study contributes to the understanding that there are other factors that may influence the knowledge gained among Malaysian TVET instructors."

Chuang, H., Weng, C., & Huang, F. (2015). A structure equation model among factors of teachers' technology integration practice and their TPCK. *Computers & Education*, 86, 182-191. doi:10.1016/j.compedu.2015.03.016

Abstract: "This study used a structural equation model to investigate the latent structure of teachers' technology integration practice and its relation to their technological pedagogical content knowledge (TPCK). We developed a validated survey comprised of 10 items for the TPCK construct informed by competences as proposed by Angeli and Valanides, 2009 and Angeli and Valanides, 2013, 6 items for the construct of technology integration with ICT tools (TI-ICT tools), 4 items for that of technology integration with social media (TI-Social media) and another 4 items for technology integration with graphic and dynamic visualizations (TI-Graphic and dynamic visualizations), respectively. The survey was then administered using stratified random sampling in a metropolitan area of southern Taiwan, and a total of 320 valid respondents were collected from elementary and secondary school teachers in January 2014. Further analysis based on structural equation modeling showed that teachers' technology integration practice with ICT tools (TI-ICT tools) maintained not only a direct link to TPCK scores but also an indirect association mediated by that with graphic and dynamic illustrations (TI-Graphic and dynamic visualizations). In addition, the association between TI-Social media and

self-assessed TPCK turned out to be spurious after the level of TI-ICT tools was accounted for. Discussion of the results is also provided.”

Dong, Y., Chai, C. S., Sang, G.-Y., Koh, J. H. L., & Tsai, C.-C. (2015). Exploring the profiles and interplays of pre-service and inservice teachers’ technological pedagogical content knowledge (TPACK) in China. *Educational Technology & Society*, 18(1), 158–169. Retrieved from [http://ifets.info/journals/18\\_1/14.pdf](http://ifets.info/journals/18_1/14.pdf)

Abstract: “This research surveyed three hundred and ninety pre-service and three hundred and ninety four in-service teachers with regards to the seven factors of technological pedagogical content knowledge, their beliefs about constructivist oriented teaching (CB) and design disposition (DD). Both exploratory and confirmatory factor analyses showed that the survey based on the nine-factor model had high reliability and validity. Significant differences between pre-service and in-service teachers in the TPACK factors and CB and DD were found and the differences reveal that the pre-service teachers are less knowledgeable and confident with regards to all the factors. In order to identify predictors of TPACK, the research further explores the relationships among TPACK factors, CB and DD through structural equation models. The findings reveal that DD consistently predict both pre-service and in-service teachers’ TPACK and this provide support about the importance of design disposition for TPACK advancement. However, CB does not predict the pre-service teachers’ TPACK. In addition, CB is a significantly negative predictor for the in-service teachers’ TPACK. The findings may imply that while the inservice teachers believe strongly in constructivist oriented teaching, they need further professional development in designing instruction to actualize their desired form of education.”

Elmendorf, D. C., & Song, L. (2015). Developing indicators for a classroom observation tool on pedagogy and technology integration: A Delphi study. *Computers in the Schools*, 32(1), 1-19. doi: 10.1080/07380569.2014.967620

Abstract: “Rapid advances in technology and increased access to technology tools have created new instructional demands and expectations on teachers. Due to the ubiquitous presence of technology in K-12 schools, teachers are being observed on both their pedagogical and technology integration practices. Applying the technological pedagogical and content knowledge (TPCK) framework, the purpose of this study was to determine, through the Delphi research method, a consensus among experts of what should be contained in a classroom observation tool that simultaneously facilitates evaluating pedagogy and technology integration. The study resulted in a list of 30 indicators.”

Evans, M., Nino, M., Deater-Deckard, K., & Chang, M. (2015). School-wide adoption of a mathematics learning game in a middle school setting: Using the TPACK framework to analyze effects on practice. *The Asia-Pacific Education Researcher*. Advance online publication. doi:10.1007/s40299-014-0225-y

Abstract: “This case study uses the Technological Pedagogical Content Knowledge (TPACK) framework to describe how teachers from two contiguous school districts in southwest Virginia implemented *The Candy Factory*, an iPad-specific learning game that focuses on pre-algebraic concepts, particularly fraction knowledge. As a result of this implementation, significant changes in practice and instruction took place for these teachers and their students. The goal of this paper is to exemplify the most salient changes that took place, using the TPACK framework and seven knowledge areas. Through a series of focus group interviews with nine teachers and an interview with a program administrator from three middle schools in two districts, findings of this study illustrate how the main and interconnected types of knowledge of the TPACK framework could be used to evaluate the affordances and constraints of a learning game implementation and how it affected the content and pedagogical styles of teachers in the classroom. Using an interpretative research methodology, complemented by quantitative pre-/post-assessments of fraction achievement, data from these interviews were collected and analyzed, using a coding system to identify patterns and themes regarding best practices for instructional alignment as well as shifts in instruction, assessment, and pedagogical styles. As part of the special issue, the case study includes a series of recommendations and implications that could be relevant to similar school districts, including those in the Asia Pacific region, that are considering the adoption of game-based learning and implementing these types of mathematical learning games in classrooms to enhance engagement and performance.”

Gur, H., & Karamete, A. (2015). A short review of TPACK for teacher education. *Educational Research and Reviews*, 10(7), 777-789. doi: 10.5897/ERR2014.1982.

Abstract: “The aim of this descriptive study is to examine the ICT and TPACK literature for teacher education. First, the general characteristics of the ICT and TPACK have been examined. In [this] study, the researchers answer the questions, "How [were] the TPACK articles [distributed] for the year?", "How [were] the ICT and TPACK articles [distributed], "What is the distribution of ICT and TPACK [by] year?" and "How can we integrate TPACK [in]to our teacher training program?" One hundred and sixteen articles were analysed. [The study focuses] on ICT and TPACK through findings and discussions. The study presents some recommendations to teacher education [programs]. “

Harr, N., Eichler, A., & Renkl, A. (2014). Integrating pedagogical content knowledge and pedagogical/psychological knowledge in mathematics. *Frontiers in Psychology*, 5, 924. Retrieved from <http://journal.frontiersin.org/article/10.3389/fpsyg.2014.00924/full>

Abstract: “In teacher education at universities, general pedagogical and psychological principles are often treated separately from subject matter knowledge and therefore run the risk of not being applied in the teaching subject. In an experimental study (N = 60 mathematics student teachers) we investigated the effects of providing aspects of general pedagogical/psychological knowledge (PPK) and pedagogical content knowledge (PCK) in an integrated or separated way. In both conditions ("integrated" vs. "separated"), participants individually worked on computer-based learning environments addressing the same topic: use and handling of multiple external representations, a central issue in mathematics. We

experimentally varied whether PPK aspects and PCK aspects were treated integrated or apart from one another. As expected, the integrated condition led to greater application of pedagogical/psychological aspects and an increase in applying both knowledge types simultaneously compared to the separated condition. Overall, our findings indicate beneficial effects of an integrated design in teacher education.”

Holland, D. D., & Piper, R. T. (2014). A technology integration education (TIE) model: Millennial preservice teachers' motivations about technological, pedagogical, and content knowledge (TPACK) competencies. *Journal of Educational Computing Research, 51*(3), 257-294. doi:10.2190/EC.51.3.a

Abstract: “Nobel laureates Schultz (1971) and Becker (1964, 1993) reinvigorated the analysis of education investments. Human capital investments that improve cognitive skills for elementary and secondary students have important economic implications. An interdisciplinary, 12-construct technology integration education (TIE) model was developed. The sample consisted of 33 elementary education majors and 23 secondary education majors. Limited correlational and predictive relationships between the motivation variables and TPACK variables were found. However, the empirical evidence revealed new insights about self-determination motivation theory. Intrinsic motivation had a higher, significant positive correlation than extrinsic motivation with three dependent variables, while extrinsic motivation had a higher, significant positive correlation than intrinsic motivation with two dependent variables. These limited findings suggest that complex, contingent relationships exist between motivation variables and TPACK variables. The TIE model advances a robust research agenda for the interdisciplinary field of microhuman capital investments, which includes the education of Millennial preservice teachers.”

Kennedy, J. (2015). Using TPCK as a scaffold to self-assess the novice online teaching experience. *Distance Education, 36*(1), 148-154. doi: 10.1080/01587919.2015.1019964

Abstract: “How does one evaluate one’s own online teaching? Do novice online instructors depend on end-of-semester course evaluations or a Quality Matters rubric? Perhaps their professional development is driven by a personal belief that seeking multiple perspectives from different lenses is core to reflective practice. This work explores one way to interrogate one’s own online teaching practices through a systematic reflection on technological pedagogical content knowledge (TPCK). It involved identifying and reflecting upon instances in which TPCK was evident in the design and facilitation of the online learning environment in an undergraduate online course. Ways to improve online teaching based on increased meta-cognitive awareness of TPCK are considered. Implications of this self-study for distance learning professional development are discussed.”

Kimmons, R. (2015). Examining TPACK’s theoretical future. *Journal of Technology and Teacher Education, 23*(1), 53-77.



Abstract: “TPACK (Technological Pedagogical and Content Knowledge) has quickly become popular amongst researchers and practitioners as a framework for understanding necessary teacher knowledge for supporting effective technology integration. Utilization of TPACK, however, has generally been approached in a manner that is non-critical and that does not inform on-going development of the framework. This theoretical paper utilizes five characteristics of “good” scientific theory (accuracy, consistency, scope, simplicity, and fruitfulness) taken from the work of Thomas Kuhn as points of departure for exploring affordances and limitations of TPACK for researchers and teachers. Based upon this examination, four suggestions are provided to support future research into technology integration that seek to help address limitations in the TPACK framework and to inform its appropriate and thoughtful use in research and practice.”

Koh, J. H. L., Chai, C. S., Wong, B., & Hong, H.-Y. (2015). Technological pedagogical content knowledge (TPACK) and design thinking: A framework to support ICT lesson design for 21st century learning. *The Asia-Pacific Education Researcher*. Advance online publication. doi:10.1007/s40299-015-0237-2

Abstract: “This conceptual paper argues that to develop students’ twenty first century competencies, teachers need to consider how technological pedagogical content knowledge (TPACK) can be applied through design thinking processes. It proposes a conceptual framework articulating various TPACK considerations and how these various forms of TPACK can be used as epistemic resources to support design thinking for developing ICT-integrated lessons targeted at twenty first century learning. This framework provides an initial vocabulary for describing how teachers create TPACK through design, which is a critical gap in extant TPACK research. Implications for teachers’ design of ICT-integrated lessons as well as future directions of research are discussed.”

Krauskopf, K., Zahn, C., Hesse, F. W., & Pea, R. D. (2014). Understanding video tools for teaching: Mental models of technology affordances as inhibitors and facilitators of lesson planning in history and language arts. *Studies in Educational Evaluation*, 43, 230-243. doi:10.1016/j.stueduc.2014.05.002

Abstract: “The aim of this study was to investigate how pre-service teachers' mental models of the functions of a newly encountered video-technology (WebDIVERTM) influence their lesson planning employing this technology. Participants designed a lesson plan and evaluated a practice-proven lesson plan for a sample topic. Results revealed that few participants cognitively represented specific functions of the tool. However, in their designed lesson plans, specific tool functions were only scarcely reflected and participants relied upon tool-unspecific uses. Of greater interest, representing cognitive or socio-cognitive functions of a technology differentially predicted the evaluation and design of lesson plans. We conclude that it is insufficient to provide pre-service teachers with separate technological and pedagogical knowledge to develop TPACK to leverage the potential of video-tools.”

Liu, Q., Zhang, S., & Wang, Q. (2015). Surveying Chinese in-service K12 teachers' technology, pedagogy, and content knowledge. *Journal of Educational Computing Research*. Advance online publication. doi: 10.1177/0735633115585929

Abstract: "Technology, pedagogy, and content knowledge (TPACK) has been considered as a promising theoretical framework to guide teacher educators in designing and developing in-service K12 teacher education programs. However, it seems unclear whether in-service teachers have different TPACK perceptions when entering the education programs. This study surveyed the TPACK perceptions of 2,728 Chinese in-service K12 teachers. A questionnaire adapted from Koh, Chai, and Tsai's survey was validated by reliability and validity tests. Exploratory factor analysis revealed that Chinese in-service K12 teacher's TPACK perceptions could be grouped into five scales. Analyses of means and standard deviation of all the variables of the TPACK construct to examine Chinese in-service K12 teachers' TPACK perceptions showed that teachers had rated themselves as slightly above five points for all the variables. Independent sample t tests to examine the relationships between in-service K12 teachers' gender and the TPACK variables indicated that male teachers rated themselves higher than female teachers for the variable content knowledge (CK) and lower for the variable pedagogical content knowledge. F tests to examine the relationships between in-service K12 teachers' years of service and the TPACK variables revealed that young in-service K12 teachers tended to perceive better in the capacities of applying technology and worse in the capacities of teaching method and subject matter. Hierarchical regression analysis to explore which variables (technological knowledge, pedagogical knowledge, CK, pedagogical content knowledge, technological content knowledge, and technological pedagogical knowledge) could predict the variable of TPACK showed that in-service K12 teachers' perceptions of pedagogical knowledge, technological knowledge, and CK had the largest positive effect on the TPACK variable."

Machado, C. & Laverick, D. (2015). Technology integration in K-12 classrooms: The impact of graduate coursework on teachers' knowledge and practice. *Journal of Technology and Teacher Education*, 23(1), 79-106.

Abstract: "The cohort approach, which has gained popularity with graduate level programs in the United States, presented the researchers with the unique opportunity to use a year-long Scholarship of Teaching and Learning (SoTL) approach to study a cohort of 19 in-service teachers and their own perception of their technology integration knowledge, skills, and emerging technology, pedagogy and content knowledge (TPACK), along with the factors that impede effective technology integration. Quantitative and qualitative data were generated through multiple sources during the first phase and through focus groups during the second phase of data collection, six months later. Comparison of pretest and posttest results and typological analysis of qualitative data generated before, during, and after engaging in technology-rich instruction, during the first phase of the study, confirm that coursework that provides direct instruction and hands-on experience with contextual TPACK-focused instruction enhanced K-12 teachers' perceived ability to integrate technology into their teaching practice. It also helped to identify challenges faced by teachers in their own classrooms."

Manfra, M.M., & Spires, H.A. (2013). Creative synthesis and TPACK: Supporting teachers through a technology and inquiry-rich graduate degree program. *Contemporary Issues in Technology and Teacher Education*, 13(4), 386-418. Retrieved from <http://www.citejournal.org/vol13/iss4/general/article1.cfm>

Abstract: "This study offers a new way to assess TPACK within the context of a graduate program revitalized to focus on new literacies. Whereas previous studies have focused on teacher lesson planning or modeling best practices, our research examines TPACK by exploring the Creative Synthesis Projects of graduates from our program. These projects reveal the manner in which the teachers synthesized personal and professional insights gained over the course of graduate study. Portraits of four teachers provide a holistic understanding of the evolving nature of teacher professional knowledge, especially within the context of prolonged, authentic inquiry and reflection."

Martin, B. (2015). Successful implementation of TPACK in teacher preparation programs. *International Journal on Integrating Technology in Education*, 4(1), 17-26. Retrieved from <http://airccse.org/journal/ijite/papers/4115ijite02.pdf>

Abstract: "Today's teacher education programs should be providing pre-service teachers with ample preparation in shifting instructional approaches enriched with innovative educational technologies. In fact as Lambert & Gong (2010) stated "We have entered a crucial time when the technological preparation of teachers has become an urgent problem we can no longer afford to marginalize" (p. 55). This review of literature examines recent publications on the topic of technology in teacher preparation through theoretical lens of Technology, Pedagogy and Content Knowledge (TPACK) which has shown potential to emphasize a teacher's understanding of how technologies can be used effectively as a pedagogical tool."

Ndongfack, M. N. (2015). Teacher profession development on technology integration using the mastery of active and shared learning for techno-pedagogy (MASLEPT) model. *Creative Education*, 6(3), 295-308. doi: 10.4236/ce.2015.63028

Abstract: "As various learning technologies increasingly become available in schools, teachers are not using them for instructional purposes. Many studies have indicated that one of the reasons for which teachers do not use the tools is because they have not been effectively trained. The purpose of this study was to experiment the use of the MASLEPT school-based professional development model in updating primary school teachers' knowledge of technology, pedagogy and content (TPACK). The study employed a single group pre-training and post-training quasi-experimental design methodology in the collection of quantitative data from 52 teacher-participants from four separate schools located in the same campus. The data were meant to evaluate their TPACK after 10 weeks of professional development programme. The results indicated teacher-participants who took part in the experiment demonstrate a significant improvement in their TPACK. To test whether improvement had any statistical significant difference, the mean of the pre-training and posttraining results were compared

using the t-test. The findings indicated that  $p = 0.005 < 0.05$ . It was therefore concluded that there was a statistically significant difference between the scores.

Therefore teacher-participants' TPACK improved as a result of their participation in the professional development programme. This finding was further triangulated by comparing the scores of the lesson notes produced by the teacher-participants with the post-training scores. It was found that the scores of each construct of the lesson notes were better than the post-training scores. This led to the recommendation that the MASLEPT school-based model be adopted for teacher professional development on technology integration in instructional processes."

Niess, M. & Gillow-Wiles, H. (2014). Transforming teachers' knowledge focused on student thinking with technologies using a learning trajectory instructional approach. *Journal of Technology and Teacher Education*, 22(4), 497-520.

Abstract: "This study examined the influence of a researcher-conjectured learning trajectory instructional approach toward the enhancement of teachers' technological pedagogical content knowledge (TPACK). The study provides a rich description of how a learning trajectory, situated within a social metacognitive - constructivist instructional framework, influenced 19 K-12 teacher participants' thinking about their own thinking with the technology in learning mathematics/science and their thinking about their students' thinking and understanding when learning with the technology. Three themes emerged: The learning trajectory as an ordered network of experiences is multi-faceted; the tools are used for sharing knowledge as well as constructing knowledge; and the tasks sequence the participant in the role of a 'teacher as a student' transitioning to the role of 'teacher as a teacher'. The empirically supported learning trajectory instructional approach describes the scaffolding in an explanatory framework that interweaves descriptive tasks with specific pedagogical strategies toward influencing the transformation of teachers' knowledge for teaching their content with technology – their TPACK."

Nyikahadzoyi, M. R. (2015). Teachers' knowledge of the concept of a function: A theoretical framework. *International Journal of Science and Mathematics Education*, 13(2), 261-283. doi: 10.1007/s10763-013-9486-9

Abstract: "In order to teach mathematics effectively, mathematics teachers need to have a sound mathematical knowledge, but what constitutes sound mathematical knowledge for teaching is subject to debate. This paper is an attempt to unpack what constitutes teacher knowledge of the concept of a function which is a unifying idea in the mathematics curriculum. The central components of the framework, which will be elaborated on in this paper, are: teachers' subject matter knowledge, teachers' pedagogical content knowledge, teachers' technological pedagogical knowledge, technological content knowledge, and technological pedagogical content knowledge in relation to the concept of a function. The framework is informed by Shulman's (Educational Researcher 15:4–14, 1986) Types of Teachers Knowledge Framework, Ball, Bass & Hill 29:14–17, 20–22, 43–46 (2005) Mathematical Knowledge for

Teaching Framework, and Mishra & Koehler's (Teachers College Record 108:1017–1054, 2006) Technological Pedagogical Content Knowledge (TPACK) framework.”

Öz, H. (2015). Assessing pre-service English as a foreign language teachers' technological pedagogical content knowledge. *International Education Studies*, 8(5), 119-130. doi:10.5539/ies.v8n5p119

**Abstract:** “The present research aimed to assess pre-service English as a foreign language teachers' technological pedagogical content knowledge. A total of 76 undergraduate students enrolled in an English language teaching (ELT) program at a major state university in Turkey were recruited in the study and were asked to anonymously complete the Technological Pedagogical Content Knowledge Scale and answered some open-ended questions. The findings revealed a highly developed knowledge of TPACK (Mean > 3.5; 81%). Gender differences were found to be significant with respect to Technological Knowledge (TK) and Pedagogical Knowledge (PK) dimensions with females proportionally having higher TPACK development. The findings of qualitative data analysis also revealed that compared with cooperating teachers, faculty members in the department used more TPACK in a classroom lesson. Thus, these findings contribute to understanding the nature and development of TPACK based instruction among pre-service English teachers, suggesting that the integration of content, pedagogy and technological knowledge into the existing teacher education paradigm and fostering technologically-rich environment for language learners will contribute to quality learning and teaching.”

Pamuk, S., Ergun, M., Cakir, R., Yilmaz, H. B., & Aya, C. (2015). Exploring relationships among TPACK components and development of the TPACK instrument. *Education and Information Technologies*, 20(2), 241-263. doi: 10.1007/s10639-013-9278-4

**Abstract:** “Educators' interest in technological pedagogical content knowledge (TPACK) has been increasing. In parallel with implementations of TPACK-based activities taking place in different settings, efforts for assessing effectiveness of those activities and understanding the overall TPACK framework have also been under investigation. In this study, the main purpose has been placed on understanding the TPACK framework and its dynamics that contribute to effective TPACK development. More specifically, through preservice teachers' experiences we have explored the nature of relationships among the TPACK components. To do this, a TPACK instrument was developed and the data were analyzed by using multi-stage approaches. Results briefly indicated that all correlations among the components were significant. In the structural equation modeling analyses, TPK and TCK's impact were statistically powerful contributors to explaining TPACK variance. In addition, and most important, our results suggest that second-level knowledge basis (TPK, TCK, PCK) had a stronger impact than core knowledge basis on predicting TPACK development. TCK in the structural model stands out as the mediator knowledge base. Finally, indirect relationships among some of the TPACK components were found to be of considerable importance.”

Parker, C. E., Stylinski, C. D., Bonney, C. R., Schillaci, R., & McAuliffe, C. (2015). Examining the quality of technology implementation in STEM classrooms: Demonstration of an evaluative framework. *Journal of Research on Technology in Education*, 47(2), 105-121. doi: 10.1080/15391523.2015.999640

Abstract: “Technology applications aligned with science, technology, engineering, and math (STEM) workplace practices can engage students in real-world pursuits but also present dramatic challenges for classroom implementation. We examined the impact of teacher professional development focused on incorporating these workplace technologies in the classroom. Because existing measures primarily use only presence or type of technology as proxies for implementation quality, we developed an expanded framework that incorporated (a) the type of technology used; (b) the degree of alignment to STEM practices; (c) the use of student-centered pedagogical practices; and (d) the degree of relevance to real-world contexts. While our framework successfully described the variation in technology implementation in our study group, we found no statistically significant difference between teachers with and without extensive training on STEM workplace technologies. Our results provide evidence that the framework captures quality of technology use and point to the need for additional research on effective teacher education around technology applications.”

Pringle, R., Dawson, K., & Ritzhaupt, A. (2015). Integrating science and technology: Using technological pedagogical content knowledge as a framework to study the practices of science teachers. *Journal of Science Education and Technology*. Advance online publication. doi:10.1007/s10956-015-9553-9

Abstract: “In this study, we examined how teachers involved in a yearlong technology integration initiative planned to enact technological, pedagogical, and content practices in science lessons. These science teachers, engaged in an initiative to integrate educational technology in inquiry-based science lessons, provided a total of 525 lesson plans for this study. While our findings indicated an increase in technology-related practices, including the use of sophisticated hardware, very little improvements occurred with fostering inquiry-based science and effective science-specific pedagogy. In addition, our conceptual framework, technological pedagogical content knowledge, as a lens to examine teachers’ intentions as documented in their lesson plans, provided an additional platform from which to investigate technology integration practices within the ambit of reform science teaching practices. This study, therefore, contributes knowledge about the structure and agenda of professional development initiatives that involve educational technology and integration into content knowledge disciplines such as science.”

Saab, N., & Stengs, S. (2015). Teachers who use flipping the classroom: Professional development, feelings of autonomy and TPACK. *International Journal of Social Media and Interactive Learning Environments*, 2(4), 341-360. doi: 10.1504/IJSMILE.2014.067639

Abstract: “This paper reports on a study that investigates whether teachers who use the flipping the classroom approach carry out different professional learning activities, feel more autonomous and have more knowledge about the integration of pedagogy, technology and content than teachers who do not do so. The study was conducted through two questionnaires completed by 71 and 41 secondary education teachers respectively. The results indicate that teachers who apply the flipping the classroom approach stated that they performed more individually oriented professional learning activities and were more developed in TPACK compared with teachers who do not use flipping the classroom. Keeping up to date by reading and through work-related training, trying out new methods by experimenting, and evaluating newly applied methods by reflecting were the activities they used to develop themselves the most. No differences were found for feelings of autonomy between the groups of teachers”

Şad, S.N., Açıkgül, K., & Delican, K. (2015). Senior preservice teachers’ senses of self-efficacy on their technological pedagogical content knowledge (TPACK). *Journal of Theoretical Educational Science*, 8(2), 204-235. doi: 10.5578/keg.9480

Abstract: “This research investigates the preservice teachers’ senses of efficacy about their technological pedagogical content knowledge (TPACK) in terms of some variables, and the association between their perceived efficacy and frequency of computer use. It was designed based on a baseline descriptive survey method, followed by associational models of casual-comparison and correlation. The research group comprised 365 senior preservice teachers. The data were collected using TPACK survey developed by Şahin (2011). Results suggested that participants had favorable perceptions of efficacy in terms of TPACK and its domains. While no statistical differences were observed for gender, significant differences were established with regard to department and computer possession variables. Low-to-medium level of positive significant correlations were found between preservice teachers’ frequency of computer use and perceived efficacy of TPACK. Finally, Pedagogical Content Knowledge, Technological Pedagogical Knowledge, Technological Content Knowledge, and Pedagogical knowledge were found to be the significant predictors of TPACK.”

Scharber, C., Henrickson, J., Koseoglu, S., Lanegran, D., & Doering, A. (2014). Technology integration in K-12 geography education using TPACK as a conceptual model. *Journal of Geography*, 113(6), 223-237. doi: 10.1080/00221341.2014.896393

Abstract: “There is a need for quality professional development programs and instructional models addressing the needs and challenges of K–12 technology integration in the geography classroom. This study used a mixed-methods design employing surveys and observations to evaluate teacher experiences within a professional development program focused on developing in-service geography teachers’ technological, pedagogical, and content knowledge (TPACK) through content-specific learning tools and resources. Results indicate that instructional scaffolding plays an important role in improving teachers’ ability to integrate technology in pedagogically meaningful ways geared toward enhancing students’ geographic inquiry skills.”

Shinas, V. H., Karchmer-Klein, R., Mouza, C., Yilmaz-Ozden, S., & Glutting, J. J. (2015). Analyzing preservice teachers' technological pedagogical content knowledge development in the context of a multidimensional teacher preparation program. *Journal of Digital Learning in Teacher Education*, 31(2). doi:10.1080/21532974.2015.1011291

Abstract: “In this quantitative study, correlational and multiple regression analyses were conducted to examine the technological pedagogical content knowledge (TPACK) development of 299 preservice teachers in response to the technology preparation they received during their initial teacher licensure program. Survey data were analyzed to determine the extents to which preservice teachers' knowledge increased in response to technology preparation and to determine the contribution of individual knowledge components, including technological knowledge, pedagogical knowledge, and technological pedagogical knowledge, to the development of TPACK. Findings revealed that individual knowledge components made statistically significant and unique contributions to preservice teachers' TPACK. Findings from this work help explicate the significant contributions of individual knowledge components to TPACK development and have implications for teacher preparation programs on the use of technology.”

Steckel, B., Shinas, V. H., & Vaerenewyck, L. V. (2015). Artistic technology integration: Stories from primary and elementary classrooms. *The Reading Teacher*. Advance online publication. doi:10.1002/trtr.1356

Abstract: “The purpose of this article is to inform teachers about the ways technology can be integrated to add value to literacy instruction. Artistic technology-integrated literacy and disciplinary instruction in pre-K through grade 4 classrooms is described through the stories of five teachers who were identified as both strong teachers of literacy and strong technology integrators. Artistic integrators select digital tools based upon their instructional purpose and leverage the capabilities of the tools to support and extend the literacy development of students. They use technology to provide opportunities for students to write for authentic purposes and audiences, and to create communities of learners both within and beyond the classroom walls. The authors forward a theoretical framework for thinking about the characteristics of pedagogically sound, technology integration, which they have named TPACK+ and provide guiding principles for classroom practice.”

Stoilescu, D. (2015). A critical examination of the technological pedagogical content knowledge framework: Secondary school mathematics teachers integrating technology. *Journal of Educational Computing Research*. Advance online publication. doi:10.1177/0735633115572285

Abstract: “This study explores the Technological Pedagogical Content Knowledge (TPACK) for three experienced mathematics secondary teachers from a Toronto public school. By using a multiple case study, teachers' attitudes, skills, and approaches toward the use of Information and Communications Technology (ICT) in classrooms are described. By being aware of the three main facets of TPACK (technological, pedagogical, and mathematical aspects), the relative



importance of each component and their intersections were scrutinized. Although from the same school, the teachers had very different conducts of showing their integration of ICT in mathematical pedagogy and therefore, their TPACK was different. Teachers demonstrated various strategies and different paces of adopting ICT: One teacher was a later adapter of ICT with strong emphasis in pedagogy, a second teacher was an early adapter of ICT with focus on finding an adequate technical support for mathematical content, and the third teacher was a very early adopter of ICT with extraordinary capabilities to reflect on the mathematics curriculum and continually adapt to his classrooms' needs. It was noticed that the teachers integrated technology to (a) help them describe the concepts to students; (b) motivate students to learn mathematics; (c) give students opportunities to experiment with mathematical concepts and skills; (d) assess, evaluate, and provide feedback to student's work, and (e) help them communicate mathematical solutions. Overall, the framework shows consistency in tracing their assorted routines of integrating technology in various classroom contexts. In the end, some considerations and insights on the potential of the TPACK framework are provided.”

Tai, H., Pan, M., & Lee, B. (2015). Applying technological pedagogical and content knowledge (TPACK) model to develop an online English writing course for nursing students. *Nurse Education Today*, 35(6), 782-788. doi:10.1016/j.nedt.2015.02.016

Abstract: “Learning English as foreign language and computer technology are two crucial skills for nursing students not only for the use in the medical institutions but also for the communication needs following the trend of globalization. Among language skills, writing has long been ignored in the curriculums although it is a core element of language learning. To apply the TPACK (Technological Pedagogical and Content Knowledge) model to design an online English writing course for nursing students, and to explore the effects of the course to the students' learning progress as well as their satisfactions and perceptions. A single-group experimental study, utilizing the CEEC (College Entrance Examination Center) writing grading criteria and a self-designed course satisfaction questionnaire, is used. Fifty one nursing students who were in their first/four semesters of the two year vocational pre-registration nursing course in a Taiwan university were selected using convenience sampling. Quantitative data were analyzed using descriptive statistics and repeated measure MANOVA. Qualitative data were analyzed by content analysis. Students' writing competence had been improved significantly in every dimension after the instruction. Only half of the learners preferred online writing compared to the traditional way of writing by hand. Additionally, participants reported that they would prefer to receive feedback from the teacher than peers, yet they did not like the indirect feedback. The teacher perceived the course as meaningful but demanding for both learning and teaching sides. To implement the peer review activities and give feedback on time were two major challenges during the cycles. The TPACK model suggests a comprehensive and effective teaching approach that can help enhance nursing students' English writing performance. Teachers are advised to consider its implementation when designing their syllabus.”

Tai, S.-J. D. (2015). From TPACK-in-action workshops to classrooms: CALL competency developed and integrated. *Language Learning and Technology*, 19(1), 139-164. Retrieved from <http://llt.msu.edu/issues/february2015/v19n1.pdf#page=144>

Abstract: "This study investigated the impact of a CALL teacher education workshop guided by the TPACK-in-Action model (Tai, 2013). This model is framed within Technological Pedagogical Content Knowledge (TPACK, Mishra & Koehler, 2006) and advocates a learning-by-doing approach (Chapelle & Hegelheimer, 2004) to understand how English teachers develop CALL competency and adopt the competency in their teaching. Participants were 24 elementary English teachers in Taiwan. The study used a mixed methods design (Creswell & Plano Clark, 2007), collecting and analyzing qualitative and quantitative data concurrently but separately before they were triangulated. Findings show that the TPACK-in-Action workshops had a positive impact on the 24 teachers. In addition to the development of CALL competency, it was also observed that participants demonstrated CALL competency in their teaching, such as selecting online materials and appropriate technology for content teaching, using cloud computing for student interaction, and matching the affordances of technology to meet their instructional goals and pedagogy. In sum, the study provides empirical evidence and a new perspective in the investigation of CALL teacher education. Theoretical and pedagogical implications for CALL teacher education research and practice are discussed."

Tømte, C., Enochsson, A.-B., Buskqvist, U., & Kårstein, A. (2015). Educating online student teachers to master professional digital competence: The TPACK-framework goes online. *Computers and Education*, 84, 26-35. Advance online publication. doi 10.1016/j.compedu.2015.01.005

Abstract: "In this article we study how online teacher education programmes may enhance innovative ways of teaching and learning with Information and Communication Technology (ICT). We explore how online teachers are practising professional digital competence, in general and within subject areas, and to what extent they encourage student teachers to develop their own professional digital competence. Based on online teacher education programmes at two distinct higher education institutions (HEIs), we applied mixed method design including quantitative and qualitative approaches to illuminate the aims and the scope. Our study revealed that even if online teacher education programmes represent good avenues for stimulating teachers and student teachers to develop digital competence for pedagogical purposes, this aspect is poorly integrated within the actual programmes, although some interesting examples were demonstrated. By looking at the origins of the discourses on online education and on digital competence, we found that they derive from different stakeholders: while the discourse on online education originated from the management side at both HEIs, the discourse on digital competence derived from certain teaching staff at the two HEIs. Our study indicated that there is still some way to go to innovative solutions and to develop the potential of professional digital competence in online teacher education programmes."

Tournaki, N., & Lyublinskaya, I. (2014). Preparing special education teachers for teaching mathematics and science with technology by integrating TPACK framework into the

curriculum: A study of teachers' perceptions. *Journal of Technology and Teacher Education*, 22(2), 243-259.

Abstract: "Previous studies have suggested that understanding the relationships and developmental paths among TPACK constructs plays a crucial role in teachers' TPACK development process. Researchers (Chai et al., *Edu Technol Soc* 13(4):63–73, 2010) have found that technological knowledge, pedagogical knowledge, and content knowledge are all significant predictors of pre-service teachers' TPACK. Thus, one of the major concerns that educators may have is, which type of knowledge should come first in an educational technology course in order to enhance the participants' TPACK. This study was conducted to examine the effects of the technology- and pedagogy-oriented course design on improving in-service preschool teachers' technological pedagogical content knowledge-Games (TPACK-G) as well as their acceptance of digital game-based learning. The participants were 49 in-service preschool teachers. They were assigned into a technology- and a pedagogy-oriented group. The results show that when integrating the TPACK-G framework into the preschool context, teachers who were taught with game knowledge first tended to have higher competencies in game knowledge and game pedagogical content knowledge than those who were first instructed with game pedagogical knowledge."

Wong, L., Chai, C. S., Zhang, X., & King, R. B. (2015). Employing the TPACK framework for researcher-teacher co-design of a mobile-assisted seamless language learning environment. *IEEE Transactions on Learning Technologies*, 8(1), 31-42.  
doi:10.1109/TLT.2014.2354038

Abstract: "Integrating technologies into teaching and learning poses a significant challenge for many teachers who lack socio-techno-pedagogical know-how and time to design interventions. A possible solution is to design sound technology-enhanced learning (TEL) environments with relevant content and pedagogical tools to reduce teachers' design efforts. Technological pedagogical content knowledge (TPACK) is a promising framework for understanding how teachers could integrate technologies into classrooms. Scholars have highlighted the "repurposing" of the framework to inform the design of TEL environments. This study employed the TPACK framework to design the learning environment called 'MyCLOUD'. MyCLOUD advances the integration of mobile and cloud technologies for self-directed, collaborative and seamless Chinese Language learning among primary students. In this paper, we unpack how the distributed TPACK resources among the teachers and the researchers have contributed to the design of the learning environment. The analysis is accomplished through researchers' coding and consolidation of 42 meeting minutes throughout the developmental period, thereby outlining the trajectory of the researcher-teacher co-design of the learning environment as a manifestation of newly created TPACK. This is followed by a study of students' perceived usability of the platform, with all three subscales of the user acceptance survey scoring above the mid-point of 3 in their respective mean values. This research contributes to current development of TEL by using the TPACK framework to widen the design considerations that go beyond what is technologically possible to include what is pedagogically desirable for a specific content learning."

Ying, L. W. (2015). The efficacy of Nonaka's knowledge creation spiral in advancing teachers' TPACK. *Advances in the Scholarship of Teaching and Learning*, 2(1). Advance online publication. Retrieved from [http://tlc.unisim.edu.sg/research/AdvSoTL-2/pdf/Lim\\_Wei\\_Ying.pdf](http://tlc.unisim.edu.sg/research/AdvSoTL-2/pdf/Lim_Wei_Ying.pdf)

Abstract: "This paper reports the use of Nonaka's knowledge creation spiral as a design strategy for developing teacher TPACK. While it is evident in the literature the importance of TPACK for technology integration, it is less obvious how to develop TPACK in teachers. Designed using the case study approach, a total of 28 teachers participated in our professional development programme that required them develop shared knowledgeable objects as a knowledge creating community. Preliminary findings indicated a growth of TPACK evidenced by (1) a deep understanding of student learning difficulty, (2) a tight technology and pedagogy coupling in the lesson design, and (3) appropriate design of TPACK scaffolds. We discuss our early assertions of Nonaka's knowledge creation spiral as conclusion of this paper."

### **Chapters**

Chui, H., Au-Yeung, H., & Cheng, G. (2015). Reflective practice with digital portfolio for teacher readiness and maturation of prospective teachers within the TPACK framework. In K. Li, T.-L. Wong, S. S. Cheung, J. Lam, & K. Ng (Eds.), *Technology in education: Transforming educational practices with technology* (pp. 156–162). Berlin: Springer.

Abstract: "This study explores the influence of digital portfolio on reflective practice of prospective teachers (PTs) with the Technological Pedagogical Content Knowledge framework (TPACK). A total of 36 PTs studying in a teacher education course (one-year full-time) at a tertiary education institute in Hong Kong took part in the study. Blended learning approach was adopted to facilitate the completion of digital portfolio with various applications of Web services as a pedagogical tool. At the end of the course, the PTs completed the same questionnaire again as a post-test. Results showed that engaging PTs in digital portfolio integrated with different levels of Web services can increase their degree of readiness and maturation in different dimensions under the TPACK framework. The findings shed light on the development of teacher readiness for their entering of teaching profession in terms of technical, pedagogical and content knowledge individually and holistically, and further cultivated a higher degree of sustainability in reflective practice for the prospective teachers."

Koh, J., & Chai, C. (2015). Towards a Web 2.0 TPACK lesson design framework: Applications of a Web 2.0 TPACK survey of Singapore preservice teachers. In T.-B. Lin, V. Chen, & C. S. Chai (Eds.), *New media and learning in the 21<sup>st</sup> century* (pp. 161–180). Singapore: Springer.

Abstract: "The ability to use Web 2.0 technologies is an essential form of media literacy for twenty-first-century learners. Colleges of education need to train preservice teachers to use Web 2.0 technologies in pedagogically sound ways. This kind of teacher knowledge can be understood as a form technological pedagogical content knowledge (TPACK) or knowledge to integrate technological, pedagogical, and content knowledge to design ICT-integrated lessons.

This paper analyzes Singapore preservice teachers' perceived competencies for the integration of Web 2.0 technologies. A Web 2.0 TPACK survey was administered on 270 graduating preservice teachers, and subsequent factor analysis revealed teachers perceiving five types of TPACK that are needed to support Web 2.0 integration: Web 2.0 Efficacy, Social Networking Efficacy, Efficacy for Teaching without Web 2.0, Efficacy for Teaching with Web 2.0, and Cyberwellness Efficacy. Regression analysis found that all factors except Social Networking Efficacy had positive impact on preservice teachers' Efficacy for Teaching with Web 2.0. The implications of these results for enhancing preservice teachers' Web 2.0 TPACK are discussed with respect to a Web 2.0 TPACK Lesson Design Framework developed to scaffold preservice teachers in their consideration of TPACK elements during lesson design."

Reed, K. (2015). The impact of ICT on pedagogical practices in an interdisciplinary approach. In W. W. K. Ma, A. H. K. Yuen, J. Park, W. W. F. Lau, & L. Deng (Eds.), *New media, knowledge practices and multiliteracies* (pp. 217–224). Singapore: Springer.

Abstract: "Technological, pedagogical and content knowledge (TPACK) is a growing area of research that describes the knowledge base required by teachers to proficiently use educational technologies. However, few studies have focused on TPACK in an interdisciplinary approach. This paper reviews the literature related to interdisciplinary approaches in school contexts and outlines the differing views of TPACK. A conceptual framework using ICT-PCK based on Angeli and Valanides (2009) conceptualisation of ICT-TPCK as a distinct body of knowledge is proposed. "

Sundberg, M. (2015). A study of mathematics teachers' conceptions of their own knowledge of technological pedagogical content knowledge (TPACK). In C. Bernack-Schüler, R. Erens, T. Leuders, & A. Eichler (Eds.), *Views and beliefs in mathematics education* (pp. 159–169). Wiesbaden, Germany: Springer.

Abstract: "In this study, a sample of mathematics teachers at upper secondary level rated their knowledge with respect to the key domains described by the Technological Pedagogical Content Knowledge (TPACK) framework. The results indicated that teachers expressed that they had a high level of knowledge in terms of pedagogy and content and the combination of these, but the knowledge level was lower in terms of technology such as software installation or troubleshooting of computers. The results also indicated that there were small differences in the expressed level of knowledge between sexes and years of teaching experience. The study indicated that effective integration of digital tools should include training both in the educational use and the actual operation of the tools."

### **3. Recent TPACK-Related Dissertations and Theses**

Bavonese, J. L. (2014). *Determining the impact of a multiliteracies workshop on TPACK knowledge of elementary preservice teachers* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI No. 3683632)

Abstract: “This study applied the researcher-created Multiliteracies Workshop Model (MWM) to a literacy block methods experience and measured the changes in elementary/early childhood and elementary/collaborative preservice teachers' technological pedagogical content knowledge (TPACK) learning. The study gathered information on the experiences of two comparison groups: Group A that attended methods courses and practicum and Group B that attended methods courses and practicum along with the Multiliteracies Workshop (MW). The study collected data on the kinds of experiences in teaching and technology in methods courses, practicum, and for Group B, the MW. The preservice teachers' experiences in the study shed light on preservice teachers' understanding of the relationships between traditional literacy, pedagogy, content knowledge, technology, and multiliteracies. Results from the preservice teachers' self-reporting on TPACK knowledge indicated that some changes occurred in both groups in their depth of understanding of these concepts, but Group B outpaced Group A as evidenced by empirical and experiential data.

The MWM was designed using four types of multiliteracies pedagogy: Situated practice, over instruction, critical framing, and transformed practice. Group B participants were engaged in a participatory culture through three research-based approaches designed to yield TPACK learning: Learning activity types, deep-play, and learning by design. Teacher educators can use the MWM to provide nested experiences with teaching and technology during methods courses and practicum in preservice teacher education. Future research should apply the Multiliteracies Workshop Model to longitudinal studies.”

Ervin, L. (2014). *Assessing student learning with technology: A descriptive study of technology-using teacher practice and technological pedagogical content knowledge (TPACK)* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI No. 3682899)

Abstract: “In 2013, a majority of states in the US had adopted Common Core State Standards under the Race to the Top initiative. With this adoption came the opportunity to utilize computer-delivered and computer-adaptive testing. Although the computer-based assessments were intended to assist teachers in designing classroom assessments and using student data to inform instructional practice, teacher-reported data indicated that the areas in which teachers are most unprepared, lack confidence, or are in need of development were assessment (DeLuca, 2012; Wayman et al., 2007) and technology (Brush & Saye, 2009; Kramarski & Michalsky, 2010). The TAPS study was developed based on research in assessment literacy and in the technological pedagogical content knowledge framework. The purpose for developing this mixed-method study was the need to understand better how technology-using teachers assess student learning with technology. Two primary research questions facilitated a description of the assessment literacy and use of technology by 84 technology-using teachers. Participants in the study represented a diverse population of self-identified technology-using teachers. Quantitative and qualitative data were analyzed to provide insight into how technology-using teachers use technology to assess student learning. These data were analyzed for fitness with the TPACK theoretical model of teacher knowledge in order to fill an identified gap in the TPACK research (Cox & Graham, 2010). The TAPS study shows that technology-using

teachers who belong to professional education organizations have higher levels of confidence in both assessment and technology. Quantitative and qualitative data collected in the study also provides insight into the ways in which technology-using teachers think about, design, implement, and use the results of assessments in the classroom. Technology-using teachers exemplify TPACK, including attention to context at the macro, meso, and micro levels (Abbitt, 2011; Doering et al., 2009; Koehler & Mishra, 2009; Mishra & Koehler, 2005, 2006; Porras-Hernandez & Salinas-Amescua, 2013; Voogt et al., 2012). Future qualitative and quantitative research is needed into how preservice and inservice teachers use technology to assess student learning. Stakeholders in national, state, and local educational institutions need to consider how they are supporting the successful use of technology to assess student learning.”

Hall, A. N. (2015). *Technological, pedagogical and content knowledge (TPACK) for web 2.0 tools* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI No. 3701013)

Abstract: “The purpose of this study was to measure middle school teacher use of Web 2.0 tools. Factors (both positive and negative) affecting the use of Web 2.0 tools were examined. This study explored the use of Web 2.0 tools by middle school classroom teachers through the lens of Technological, Pedagogical and Content Knowledge (TPACK) Framework. An investigation into the influences that contribute to and restrict the use of Web 2.0 tools for use by middle school was conducted with mixed methods.

An online survey was made available to educators and analyzed using an exploratory factor analysis. Factors that emerged were identified as: Low TPACK for Web 2.0 Tools, High TPACK for Web 2.0 Tools, and Factors Preventing Web 2.0 Implementation.

The lowest rated Web 2.0 tools for TPACK included: social news networks, events, blogs and wikis. Additionally, other Web 2.0 tools were ranked low for Technological, Pedagogical, and/or Content area use. The highest rated Web 2.0 tools for TPACK included only pictures. Other Web 2.0 tools were ranked high for Technological, Pedagogical, and/or Content area use. Two factors preventing Web 2.0 implementation emerged. Professional development and training, professional development for Web 2.0 tools, and personal interest were the highest ranked factors affecting classroom implementation. Implications with regard to qualitative responses, TPACK, 21st century skills, and Universal Design for Learning are discussed.”

Larsen, N. A. (2015). *Examining the differences in technological pedagogical content knowledge (TPACK) self-assessment scores of foreign language instructors and first-line supervisors in six institutes of higher education (IHE) in California* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI No. 3700296)

Abstract: “The purpose of this two-group, quasi-experimental quantitative study was to examine whether differences exist in Technological Pedagogical Content Knowledge (TPACK) self-assessment scores between foreign language (L2) instructors and first-line supervisors (FLSs) in higher education. The key objective of the study was to shift the focus from the

importance of intensive educational technology (ET) implementation to the need for TPACK assessment of foreign language (L2) instructors and first-line supervisors (FLSs), and to raise awareness about TPACK in foreign language education (FLED). The research design involved testing Technology Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological and Content Knowledge (TCK), Pedagogical and Content Knowledge (PCK), Pedagogical and Technological Knowledge (PTK) and Technological Pedagogical Content Knowledge (TPACK) of these two groups of foreign language educators. The study population is faculty at two different levels within foreign language institutes of higher education. The population sample was obtained from six institutes of higher education (IHE) in California: three community colleges and three state universities with one or more departments of foreign language teaching/world languages and/or English as a Second Language (ESL). These IHEs are: Monterey Peninsula College (MPC), San Jose State University (SJSU), California State University, Sacramento (CSUS), Cal State University, East Bay (CSU East Bay), Allan Hancock Community College (Santa Maria, CA), and Glendale Community College (Glendale, CA). This study sample included 57 L2 instructors and 9 FLSs. The data was analyzed quantitatively using the two-sample t test and corresponding Mann-Whitney U test. This study used a Likert-scale 2012 TPACK survey (Da Silva, 2012) modified and validated from a 2009 TPACK survey (Schmidt et al., 2009-10) to address FLED. The data revealed that FLS evaluated themselves significantly higher in TPACK domains related to technology: TCK, TPK and TPACK. L2 instructors evaluated themselves significantly higher in PCK. The study provides recommendations for IHE with L2 departments about utilizing the results of this study in their institutions to raise TPACK awareness in FLED through TPACK faculty assessment and design of TPACK-enhanced professional development trainings, improving the effectiveness of technology integration into the content areas, and thus, advancing students' second language competence (Van Olphen, 2008a)."

Lu, Y. (2014). *Towards technological pedagogical content knowledge via cross socio-linguistic interaction: A case study of beginning teacher-researchers' decision-making in school-engaged teacher-researcher* (Doctoral dissertation, University of Western Sydney). Retrieved from <http://researchdirect.uws.edu.au/islandora/object/uws:22679>

Abstract: "Much of the current research demonstrates that teachers' knowledge is a powerful force in students' learning and teachers' instruction, and it is also persuasive, individualistic, and modifiable (Sotelo, & Stigler, 2010). It is further argued that to achieve to pedagogical knowing conceptually as well as substantively, requires attending to teachers. It is in teaching that knowing resides, and is revealed. This study first aims to explore the 'knowledge base' that beginning teacher-researchers have used, changed and developed through a research-oriented school-engaged teacher education (ROSETE) Partnership in Western Sydney (Australia). To do so, it explores the influence of the ROSETE Partnership on developing beginning teachers into teacher-researchers. Case study methodology was selected in order to provide a detailed examination of what teachers do in the classroom, in addition to how and why they draw on particular types of knowledge to facilitate student learning. Volunteer Teacher Researchers (VTRs) from the ROSETE Partnership were chosen as the main participants for this study. The data were collected from VTRs' theses, face-to-face interviews and lesson plans. These data



were analysed to investigate the different categories of knowledge that VTRs have developed in order to support their teaching in Western Sydney schools. It reveals that the VTRs' beliefs about the subject and educational purposes influence their decisions on what Chinese should be taught to Australian students. It also shows that knowledge of context, curriculum, content (Mandarin), pedagogy and learners are the main categories that contribute to effective teaching and learning. In addition, knowledge of self and knowledge of English are two new categories of knowledge that proved indispensable elements for effective teaching and learning, especially in the English-speaking context of this study. However, the VTRs' were concerned about the way they can organise these types of knowledge to make Chinese learnable for English-speaking learners. Another main participant of this case study is the researcher herself. The data were from my self-reflection diary, accompanied by mentor's lesson feedback, as well as interviews with teachers and the questionnaires with students. The first 18 months of face-to-face classroom teaching aimed to investigate ways to make Chinese learnable for Australian students. Shulman's (1976, 1987) concept of pedagogical content knowledge (PCK) and Ringbom's (2007) concept of cross-linguistic similarities were used as theoretical tools to analyse the evidence for the possibility of making Chinese learnable. The analysis of evidence suggests that by making connections between Chinese and English with which the Second Language (L2) learners are familiar presents possibilities for making Chinese more learnable for them. However, Ringbom's (2007) concept was contested because comparisons between Chinese and English can be from linguistic perspective, and perhaps more importantly from social and cultural perspectives. Therefore, a new concept of 'cross socio-linguistic interaction' (CSLI) is proposed. The close relationship between PCK and CSLI provides a novel theoretic-pedagogical framework to inform the debates about making Chinese learnable. This study also investigated the concept of technological pedagogical content knowledge (TPACK) through a 'Connected Classroom' Chinese course. The analysis of evidence reveals that relying on video-conferencing facilities provides a potential teaching and learning medium to engage students' Chinese language learning, and to offer Chinese language courses for schools in distant areas. However, there exist numerous challenges, problems and issues in the 'Connected Classroom' context. These require teachers to master a range of technological knowledge such as video-conferencing equipment, Bridgit and Smartboard. Such challenges also demand teachers to adapt pedagogical strategies to make Chinese learnable through 'Connected Classroom'. This analysis helps to provide a better understanding of TPACK and its related knowledge sources in Chinese language education."

Phung, T.-T. L. (2013). *Learning with, from, and through technology: TPACK9 for dummies*. (Master's thesis, University of Sydney). Retrieved from [https://www.researchgate.net/profile/Tieu-tieu-Le-phung/publication/259975900\\_Learning\\_With\\_From\\_Through\\_Technology\\_TPACK9\\_for\\_Dummies/links/02e7e52eda6d5e1215000000.pdf](https://www.researchgate.net/profile/Tieu-tieu-Le-phung/publication/259975900_Learning_With_From_Through_Technology_TPACK9_for_Dummies/links/02e7e52eda6d5e1215000000.pdf)

Abstract: "By incorporating the three functions of computers [tools, media, and social actors] from Fogg's (Fogg, Cuellar, & Danielson, 2002; Fogg, 1998) triadic taxonomy, TPACK [Technology, Pedagogy, and Content Knowledge, also formerly TPCK] (Harris, Mishra, & Koehler, 2009; Koehler & Mishra, 2009; Mishra & Koehler, 2006) can be extended to more

comprehensive formulations of technological integration in education. Moreover by compounding these three technological roles with Chi's (2009) three types of learning activities [active, constructive, and interactive], 9 possible combinations of TPK can be derived, hence TPACK9.

The criteria of TPACK versus TPACK9 comparison do not measure whether interventions such as teachers' PD designs are viable, legitimate and efficient (Nieveen, Akker, et al, 2006). Instead at this preliminary stage of design-based research [DBR], namely the pre-experimental/ intervention/ treatment phase (McKenney & Reeves, 2013), the first criterion of comparison between TPACK and TPACK9 is the conceptual distinction in the learning process of technological functions. Theoretical implications of Fogg's (1998; Fogg et al., 2002, p. 200) triadic functions are also explored on the basis of their educational design purposes. In short, as a validation study of possible conceptual frameworks for supporting teachers' PD, this design paper *redesigns* the prevailing TPACK (Harris et al., 2009; Koehler & Mishra, 2009; Mishra & Koehler, 2006) and provides a theoretical exploration of TPACK9 as alternative model."

Note: For an elaboration of TPACK9, please refer to non-dummies' version, "Learning With, From, & Through Technology: Redesigning TPACK as TPACK 9" (Le Phung, 2013). Available from: [http://www.researchgate.net/publication/259942338\\_Learning\\_With\\_From\\_Through\\_Technology\\_Re-Designing\\_TPACK\\_as\\_TPACK9](http://www.researchgate.net/publication/259942338_Learning_With_From_Through_Technology_Re-Designing_TPACK_as_TPACK9).

#### 4. Recent TPACK Presentations

Abio, G. (2015, May). *Use of web 2.0 authoring tools as facilitator of technological pedagogical content knowledge of pre-service Spanish language teachers*. Paper presented at the Sixth National EDaPECI Seminar, Maceió, Brazil.

Abstract: "The adoption and integration of ICT in educational practices are not direct or easy processes, despite the efforts that are carried out through the various training activities with teachers. In this paper, based on the TAM and TPACK models, we report an experience of presentation and use of Quizlet and Bab.la, two web 2.0 authoring tools, by pre-service teachers of Spanish language. We consider that these two authoring tools are easy to use and with great potential utility. According with the opinions of participants obtained by mean of a questionnaire and activities prepared by them, we found that there were no difficulties in working with both tools and that the two were perceived as important or useful for the study of languages, but showed a slightly more preference of Bab.la, because it appears in the user's language while Quizlet appears only in English."

Bariş, M. F. (2014, October). *Exploring European Union teachers' technological pedagogical content knowledge (TPCK) and educational use of web technologies*. Paper presented at the Ninth International Conference on Virtual Learning, Bucharest, Romania.

Abstract: "Several studies have been carried out on technological pedagogical content knowledge and web-based education. In this study, Technological Pedagogical Content

Knowledge and Educational Use of Web Technologies (TPCK-W) self-efficacy and attitudes of 33 teachers from 8 different branches carrying on their duties in 19 countries of European Union (EU) were analyzed.

In the research, the Technological Pedagogical Content Knowledge-Web (TPCK-W) Survey developed by Lee, Tsai, and Chang (2008) was used. The data obtained in the research were analyzed using SPSS for Windows 17.0 program. As result of the analysis, it was revealed that TPCK-W self-efficacy level of teachers carrying on their duties in EU countries was high; and age, experience, and gender did not affect their TPCK-W self-efficacy levels.”

Baya'a, N., & Daher, W. (2015, June). *The development of college instructors' technological pedagogical and content knowledge*. Paper presented at the International Conference on New Horizons in Education, Paris, France.

Abstract: “The ministry of education is launching an overall project to implement the use of ICT in the Israeli higher education institutes, as well as in the elementary through high schools. In the 2011-2012 academic year. Al-Qasemi Academic College of Education was chosen to receive support from the ministry of education to participate in this project. The project goals are to facilitate the ICT integration into teaching on all its aspects; i.e. facilities and instructors. The goal of the research was to accompany the implementation of the college plan and intervention, especially the steps which the college carried out regarding the instructors’ preparation and support, with a research that primarily examines the development of the instructors’ TPACK (technological, pedagogical, and content knowledge) and its various components, in addition to the instructors’ attitudes toward computers and instructors’ ICT proficiency. For this purpose we translated to Arabic and modified existing questionnaires developed by the MOFET institute and by previous researches.

The findings of the research indicate that instructors and pedagogical supervisors in Al-Qasemi Academic College of Education had relatively high positive attitudes toward computers before the college intervention. These attitudes did not change significantly after the intervention. The instructors’ ICT proficiency improved significantly after the college intervention especially as a result of three components of this intervention: ICT center support, participation in workshop and availability of assistants. The TPACK level of the instructors and the pedagogical supervisors, improved after the college intervention. Another major change occurred in the number of pedagogical initiatives that involve special use of ICT in teaching proposed by the pedagogical supervisors, going up from only one before the college plan to at least six initiatives this year. Moreover, the number of WBLE (web based learning environments) constructed by the pedagogical supervisors and presenting ICT based learning units that they developed by themselves or with their students in the practical training increased from only two at the beginning of the college intervention to over thirty toward the end.”

Samarji, A. (2015, May). *Technological, pedagogical and content knowledge (TPACK): Unpacking the TPACK features*. Paper presented at the Conference on Education, Partners in Excellence, Doha, Qatar.

Abstract: “The Technological, Pedagogical and Content Knowledge (TPACK) model is an emerging one which adds technology as a lens and context to the Pedagogical and Content Knowledge (PCK) model. Technology is no longer an ad hoc visitor, where teachers are at liberty of inviting or excluding. Hence, the TPACK model has emerged in response to the fact that teaching and learning should be viewed, conceptualised, and re-contextualised from a “21st century digital lens”. This presentation showcases a mathematics education “TPACKed course” which was delivered to education students at Victoria University, Melbourne. The course embedded ICT enriched and carefully planned activities, exemplars, and e-practices. Towards the end of the course, the students were surveyed about their TPACK experiences. The presentation will share the promising and encouraging results associated with students’ attitude towards the implemented TPACK approach. Reported concerns and challenges will also be shared. This presentation will argue that whilst the integration of technology across teaching and learning is essential, technology itself should neither become the focus of education nor a superficial mean to merely promote the “know how” capabilities. Technology should be a strategic and tactical investment into education to actively engage students, promote students’ understanding, connect to students’ experiences, and promote their “know why” conceptual understanding.”

**Society for Information Technology in Teacher Education (SITE) 2015 TPACK Presentations**  
(Editors’ Note: Although more SITE 2015 presentations than those listed below referenced TPACK, the following presentations focused intensively upon use and/or study of the construct. Given the considerable length of this newsletter (55 pages), we thought it best to focus upon the presentations that make significant use of TPACK in this section. –Judi & Kim)

Adams, S., Bernal, E., Cole-Jackson, M., & Martin-Hansen, L. (2015, March). *Training teachers to use educational technologies in STEM using field experience at a community based organization*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44545/>

Abstract: “This presentation highlights the evaluation of a model for training credentialed teachers to use educational technologies in science, technology, engineering, and mathematics (STEM). The model includes a 3-unit summer university course with a field experience project at a community-based organization. Teachers worked in teams of four to plan a set of four 2-hour workshops for youth in the organization. Data sources included questionnaires at the beginning and end of the course that included a TPACK survey plus an end-of-course interview. A total of 17 teachers participated in the course and 12 agreed to participate in the study. There were statistically significant increases in the mean scores related to Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK), and Technological Pedagogical and Content Knowledge (TPACK), as well as in individual items of other categories. We will report on analyses of complementary interview data.”

Akçay, A.O., Mancilla, R., & Polat, N. (2015, March). *An examination of EFL teachers’ technological pedagogical content knowledge (TPACK)*. Paper presented at the 26th

annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44780/>

Abstract: “Computer tools are increasingly integrated in English as Foreign (EFL) curricula. Integrating technology in English language curriculum is necessary for preparing 21st century learners. Teachers’ Technological Pedagogical Content Knowledge (TPACK) is a comprehensive framework for assessing teachers’ own perceptions of their preparedness to use technology in their classrooms according to their assigned content area and specific grade level. The purpose of this pilot study was to investigate EFL teachers’ perceptions of their Technological Pedagogical Content Knowledge (TPACK). The data was collected from 54 EFL pre-service or/and in-service teachers using a TPACK survey to identify if and how teachers interact with technology in their classrooms. The preliminary results revealed no statistically significant differences between those who were active EFL in-service teachers and those who continued in pre-service education programs regarding the seven technology acceptance measures.”

Akman, O., Guven, C., Kiray, S.A., & Celik, I. (2015, March). *Views of social science teachers and preservice teachers on their TPACK perceptions*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44590/>

Abstract: “The purpose of this study is to analyze the perceptions of the social science teachers and teacher candidates related to technological, pedagogical and content knowledge. In accordance with this purpose, semi-structured interviews were executed with six social sciences teachers and six social sciences teacher candidates. A qualitative research design was used in the study. The data were analyzed in the study. Following the interviews, it was found that the perceptions of the social science teacher candidates related to content knowledge were lower while those of the teachers were higher. The teacher candidates had higher perceptions related to using technology in education while the teachers had lower perceptions levels. Some suggestions were given in order to provide complete integration of technological pedagogical and content knowledge (TPACK) to the teachers and teacher candidates.”

Alzahrani, A., & Cheon, J. (2015, March). *The effects of instructors’ technological pedagogical and content knowledge (TPACK) on online courses*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/45573/>

Abstract: “This study examined the current status of instructors’ technological, pedagogical, and content knowledge (TPACK) in online courses at King Abdulaziz University in order to provide practical suggestions to improve the quality of online education in Saudi Arabia. The results of this study revealed that there was a significant negative correlation between the seven components of the instructors’ TPACK and their ages in TPK and TPACK. Additionally, it

was also found that there was no significant correlation between the seven components of the instructors' TPACK and their online teaching experience, nor any significant differences between the seven components of the instructors' TPACK and their colleges. It was also seen from the results that PCK was the only significant contributor to the instructors' TPACK. "

Bohach, B.M. (2015, March). *"Padding" literacy pedagogy: Pre-service teachers prepare for teaching in 1:1 iPad environments*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44887/>

Abstract: "As more and more schools move to a 1:1 computing environment, how are pre-service teachers learning to work as teachers within this environment? With the recent use of tablets in elementary classrooms, pre-service teachers need to understand how one's personal technical knowledge, pedagogical knowledge, and content knowledge (TPCK) work together to create effective [literacy] instruction (Mishra & Koehler, 2006). Using this TPCK framework with a 1:1 iPad environment in a language arts methods course, pre-service teachers developed lessons using tablets in collaboration with a fifth graders in a 1:1 tablet environment. This session shares their TPCK (TPACK) experiences. "

Debbagh, M., & Jones, W.M. (2015, March). *Using the TPACK framework to examine technology integration in English language teaching*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44539/>

Abstract: "A wealth of research involving technology use in World Language Teacher Education (WLTE) has mainly focused on how to enhance the teachers' practices. The study of knowledge systems of teachers of English to speakers of other languages as they relate to technology integration to support language teaching has received little attention. The purpose of this paper is to fill the gap in the current literature by presenting a theoretical framework that explains technology integration in English language skills teaching and teachers' cognition. Using Technological Pedagogical Content Knowledge (TPACK) as a conceptual framework, we will describe the knowledge base teachers of English to speakers of other languages need to effectively teach with technology. To this end, we will a) explain the TPACK framework, b) outline what constitutes the knowledge base in English language teaching within the TPACK framework and c) examine the implications of applying the TPACK framework."

DeVoogd, G., Kunnath, J., Rocha, R., & Jackson, A. (2015, March). *Teacher development in the English classroom: Exploring the affordances of Twitter to address the action element of critical literacy*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44897/>

Abstract: “New developments in the areas of communications and technology in our society over the last ten years have increased the range and volume of information young people have to manage every day. Faced with this problem, this action research study followed a teacher as he sought to use Twitter to guide 32 eleventh grade AP English students in the application of critical literacy. The TPACK framework was used to guide the process of merging teaching with the use of social media. Utilizing a qualitative approach, researchers gathered and analyzed four sources of data to ensure triangulation. Results showed three significant emergent themes from the study: learning time, student voices, and limited action. Conclusions include the success of Twitter as a tool to teach the English curriculum and apply critical literacy, however Twitter was not shown to be successful as a tool to guide students in taking action steps.”

Digiovanni, L. (2015, March). *Rethinking instructional technology in a graduate early childhood education class: Moving Away From TPACK*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44771/>

Abstract: “Digital literacy is an important aspect to consider within teacher education as a way to address 21st century learner needs. An analysis of an online graduate level technology course for early childhood educators revealed a quickly out of date framework had been utilized, and a course redesign to focus on pedagogical possibilities for digital literacy occurred. The original framework intended for the course redesign was the TPACK framework, but analysis of the course by K-12 instructional technology experts yielded a shift from TPACK to frameworks more in line with conversations happening on K-12 level.”

Elwood, K., & Savenye, W. (2015, March). *Current tensions: A review of technology integration models utilized by pre-service teacher educator programs*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/45577/>

Abstract: “First-year teachers often feel under-prepared to handle technology integration in the classroom; yet, the diversity of integration approaches continues to grow, making it increasingly difficult for teacher educator programs (TEPs) to design quality instruction. This review of the literature describes the tensions among three models of technology integration in pre-service preparation programs: the methods/content infusion model, the field based experience model, and the stand alone course model. While each model has demonstrated certain advantages, the equally compelling disadvantages of each has led researchers to conclude that a combination of strategies may be necessary to provide teachers enough experience for truly effective real world application. In exploring how appropriate strategies might be implemented, we consider the growing use of the TPACK framework as a measurement scale to determine pre-service teachers’ level of technology integration skill.”

Figg, C., & Jaipal-Jamani, K. (2015, March). *Investigating the development of TPACK knowledge through gamification*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44738/>

Abstract: “The application of game elements in nongaming situations, such as teacher education courses, is a recent phenomenon. The purpose of this study was to explore the effects of gamification on preservice teachers’ understanding of how to teach with technology (TPACK knowledge). Participants were 133 preservice teachers and qualitative data sources included interviews with instructors teaching the gamified technology methods course, researcher fieldnotes, student reflections, student artifacts, and student surveys. Findings indicated that participation in the gamified course promoted the development of TPACK knowledge. Preservice teachers demonstrated their understanding of how content, pedagogy, and technology interact to promote learning of content through created artifacts, survey responses, and reflections. Findings suggest that gamification may be an effective instructional strategy to motivate higher education students to engage with routine course materials.”

Fisser, P., Rosenberg, J., Teske, J., Koehler, M., Mishra, P., Voogt, J., Tondeur, J., van Braak, J., Harris, J., Angeli, C., Valanides, N., Christodoulou, A., Forssell, K., Archambault, L., Smart, V., Finger, G., Schmidt-Crawford, D., Tai, S.J.D., Wang, W., & Herring, M. (2015, March). *Technological pedagogical content knowledge (TPACK): Revision and rethinking*. Symposium conducted at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/45606/>

Abstract: “The Handbook of Technological Pedagogical Content Knowledge (TPCK) for Educators was critical to the development of the field of educational technology research and practice, but much has changed since its publication. The Handbook of Technological Pedagogical Content Knowledge (TPCK) for Educators was critical to the development of the field of educational technology research and practice, but much has changed since its publication. Each paper/presentation will be allocated 15 minutes. The first four papers will be presented during the first hour, and the final three papers during the second hour. The final 15 minutes of the second hour will be allocated to a summary and an interactive question-and-answer period led by the discussants.”

Foulger, T.S. (2015, March). *Graphic assessment of TPACK instrument (GATI) as a professional development tool*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44805/>

Abstract: “The popularity of TPACK is evident by the surge of literature surrounding the framework. But there is much debate about the foundation of the framework and the wickedness produced by the “fuzzy boundaries” of the overlapping circles. Some wonder about the framework’s viability and have called for researchers to participate in continual elaboration



of the framework. The Graphic Assessment of TPACK Instrument (GATI) was created to help teachers assess their own TPACK. The GATI helps teachers self-identify their TPACK with circles representing relative size comparisons, then demonstrate the interrelatedness of their knowledge bases by creating their unique VENN diagram. This study involves a group of high school teachers and their professional developer who use the GATI further their TPACK. This study extends the TPACK literature by exploring ways learning organizations can customize professional development through use of the GATI.”

Hameister, T. (2015, March). *Online learning that supports critical conversation in teacher education programs*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44878/>

Abstract: “Fully online teacher education programs are presented with challenges to engage pre-service teachers in work that demands dialogue, clear direction and practice of field experience tasks that mirror teacher daily work. This session will provide best practices for online learning options that help in the engagement of critical discourse around not only procedurally focused teacher directed work such as contextual planning, instruction and assessment of students in real classrooms but also reflective conversation on key elements of the teaching experience that are essential to quality teacher practice. The unique platforms of online learning have pushed our understandings of effective pedagogy used to engage students in high impact conversation. Both synchronous and asynchronous options exist to interact peer to peer and peer to instructor. Videoconferencing, communal learning through social networking, and unique use of discussion forums will be explored through the lens of TPACK.”

Hoffmann, M. (2015, March). *Mentoring with teachers and teacher educators on TPACK integration*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44164/>

Abstract: “Often technology is taught as a standalone course in K-12 and teacher training. This session will cover the ways a university formed teacher mentorships with teacher educators, key technology educators, content knowledge educators to integrate TPACK strategies into everyday instruction supporting a better model of instruction for future teachers.”

Hoffmann, M. (2015, March). *Mobile device: Undergraduate student and faculty uses for academics in and out of class*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44139/>

Abstract: “As mobile devices become more and more ubiquitous amongst teens, they are fighting their way into the educational landscape. With the rapid changes in technology and the focus on education to integrate it, this study is timely. Educators find it difficult to capture the attention of their students and motivate them to stay engaged in formal class. Historically,

education has been device centric, focusing on the tool rather than the ways in which that tool can be used. Using TPACK, or technological, pedagogical, content knowledge pulls the attention from the specific devices and focuses on how those devices can be used. This study will look at how undergraduate students and higher education faculties use mobile devices in and out of the class for academic purposes. It will suggest TPACK as an educational framework for educators to integrate these devices into their instruction. Key words: mobile devices, TPACK, formal learning, informal learning.”

Itow, R., & Hickey, D. (2015, March). *Using participatory professional development to impact TPACK*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/45571/>

Abstract: “With the growing ubiquity of online education and the push to foster connected learning and 21st century skills, new pedagogical practices are needed. Teachers must have access to professional development that helps them gain insight into the relationships between their technological, pedagogical, and content knowledge so that they can integrate new practices into their teaching. This paper introduces participatory professional development (PPD), a new professional development model that engages teachers in a participatory learning environment focused on understanding how digital technologies afford and constrain learning in online courses, and what pedagogical practices can be used to maximize their potential.”

Jaipal-Jamani, K., Figg, C., Collier, D., Gallagher, T., Winters, K.L., & Ciampa, K. (2015, March). *Transitioning into the role of technology leaders: Building faculty capacity for technology-enhanced teaching*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44744/>

Abstract: “This paper reports on an ongoing professional development initiative for developing faculty capacity about technology-enhanced teaching. The purpose of this study was to explore how participation in the Phase 2 prepared faculty to take on the role of technology leaders. Qualitative data from four education faculty members were interviews, videotaped workshop presentations, workshop artifacts, and observations. Findings indicated that: 1) the TPACK-based Professional Learning Design Model supported preparation and implementation of workshops, 2) the opportunity to take on leadership roles as a technology workshop facilitator deepened their understanding of how to use tools more effectively in instruction, 3) the pedagogical dialog of the TPLDM workshop model was critical for effective technology professional development, and 4) taking on technology leadership roles as workshop facilitators was perceived as important for promoting faculty capacity for technology-enhanced instruction.”

Jin, Y., Jenner, A., Karakaya, O., Kramer, E., & Schmidt-Crawford, D. (2015, March). *Designed for success: Exploring pre-service teachers’ growth in TPACK after taking a redesigned blended technology integration course*. Paper presented at the 26th annual conference

of the Society for Information Technology and Teacher Education, Las Vegas, NV.  
Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44822/>

Abstract: “The purpose of this study is to investigate pre-service teachers’ growth in TPACK after taking a redesigned blended technology integration course. The participants of the research are around 180 pre-service teachers enrolled in a technology integration course. The researchers of this study will collect and analyze data from a TPACK survey and one major course assignment, final course reflection paper to measure pre-service teachers’ self-reported growth in technology integration under the TPACK framework. We propose that the results from the study help the researchers not only map students’ growth in TPACK but also evaluate the effectiveness of the course redesign. Moreover, the findings will help the researchers further develop and improve the course design, as well as guiding instructors of other content area method courses better preparing pre-service teachers to integrate technology in their future classrooms using the TPACK framework.”

Jones, D., Heffernan, A., & Albion, P. (2015, March). *TPACK as shared practice: Toward a research agenda*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44601/>

Abstract: “The task of using Information and Communication Technologies (ICT) to effectively teach hundreds of pre-service educators, many of whom never attend campus, is a significant challenge, which is amplified by the need to do so in ways that model how they might use ICT in their own classrooms once they graduate. This paper analyses a collection of posts written across a teaching year on a group blog by three teacher educators as they explored their practice and attempted to learn how to meet this challenge. The analysis uses a distributed view of knowledge and learning to identify the barriers and enablers encountered, and how the teacher educators developed their distributed TPACK throughout the year. The paper argues that a distributed view of TPACK offers some interesting insights that can inform practitioners, researchers and policy makers as they explore practice and learn how to meet the technology integration challenge.”

Jordan, J., & Jordan, W. (2015, March). *Librarians meeting the common core literacy challenge through technology, pedagogy and content knowledge (TPACK)*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44846/>

Abstract: “In this discussion, participants will have the opportunity to discuss the potential impact of the school librarian on the Common Core Standards. There has been a significant shift in the education of school librarians in the state of Pennsylvania. The need for librarians to place teaching at the forefront of their libraries has become the norm. In this discussion, the presenters will share methods/ skills that school librarians must possess in order to utilize

technology in conjunction with pedagogy and content knowledge to implement Common Core Standards.”

Journell, W., Beeson, M., & Ayers, C. (2015, March). *Exploring TPCK in one-to-one high school civics classrooms*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/45493/>

Abstract: “In this multiple case study, we compare the instruction of two high school civics teachers during the 2012 Presidential Election. Both were highly-qualified practitioners who worked in schools with one-to-one laptop initiatives, creating an environment in which access to digital technology ceased to be an issue. Although both teachers regularly used technology in their classrooms, we describe stark differences in the complexity and authenticity of their instruction, which we attribute to the teachers’ technological pedagogical content knowledge (TPCK). We conclude by discussing implications for better understanding TPCK within civics instruction, specifically in terms of teachers’ pedagogical vision and preparing teachers for one-to-one laptop environments.”

Kaplon-Schilis, A., & Lyublinskaya, I. (2015, March). *Exploring changes in technological knowledge (TK), pedagogical knowledge (PK), content knowledge (CK) and TPACK of pre-service, special education teachers taking technology-based pedagogical course*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44525/>

Abstract: “This paper presents the preliminary findings of a study conducted with pre-service special education elementary teachers taking the graduate level course Integrating Technology in Mathematics and Science Instruction in Special Education and Inclusive Classrooms in a New York City public college. The purpose of this exploratory study was to analyze a) whether the TPACK-based course affects basic domains of pre-service special education elementary teachers' knowledge: TK - technological knowledge, PK - pedagogical knowledge, and CK - content knowledge in Math and Science, and b) how does the course affect teachers' TPACK. A single group pre- post-test design was used to answer the research questions. The paired sample t-test indicated preliminary findings show significant gain in teachers' TPACK, however, there were no significant changes in PK, TK, and CK. These results suggest that the basic domains of the TPACK framework are independent of TPACK domains.”

Lee, K.S., Hao, Y., & Smith, S. (2015, March). *TPACK growth at a distance*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/45453/>

Abstract: “As part of a larger mixed methods study, this paper is reporting on the TPACK development of twelve graduate students enrolled in a teaching methods distance learning

course at a large southwestern university in Texas. The TPACK survey was administered at the beginning of the course as a pre-test and at the end of the course as a post-test to measure self-reported beliefs regarding development of teacher knowledge as defined by the TPACK construct. Statistical analysis using Wilcoxon rank test in SPSS showed statistically significant gains in individual survey items related to PK, TCK, TPK, and TPCK. Implications related to the measurable development of TPACK within a 15-week distance learning methods course are discussed.”

Lee, T., Forasiepi, C., & Graziano, K. (2015, March). *Dialogic and reflective learning in online teacher education programs: Constructivist and critical approaches*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44120/>

Abstract: “As teacher education colleges increasingly venture into online education, the need for faculty training and innovations to support dialogic and reflective learning becomes more pressing. This interactive roundtable session seeks to evoke dialogue about the necessary faculty competencies and specific instructional strategies and tools that can be used to support the dialogic and reflective learning processes of preservice and inservice teachers in online teacher education programs. The authors outline how they have integrated technology in their content areas using the constructivist and critical approaches that are integral to their discipline. Roundtable participants will take the initial steps towards using the Technology, Pedagogy and Content Knowledge (TPACK) framework to create a working action plan to effectively integrate technology in their educational settings to support knowledge building and critical reflection.”

Leshem, B., Avidov Ungar, O., Margaliot, A., & Grobgeld, E. (2015, March). *Faculty usage of the active leaning classroom: Teacher perceptions, teaching patterns, barriers and facilitators*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/45477/>

Abstract: “The study examines teachers' perceptions towards new pedagogy among 22 college professors, after one year experience in a new Active Learning Classroom (ALC) designed for teacher training. Data was collected via structured personal interviews. Mixed qualitative and quantitative analysis was used in order to recognized and classify teaching patterns, usage of pedagogical and technological innovations and barriers/facilitators to teacher ALC usage. The relationships between teaching patterns, demographic factors and professional factors were examined using TPACK framework as an underlining model. Initial analysis identified four teaching patterns related to TPACK sub-forms and recognized a correlation between ALC usage frequency and teacher choices of pedagogical and technological traits in the classroom.”

Lokey-Vega, A. (2015, March). *Expert as the TPACK misfit: A cognitive task analysis to map expert-teacher cognitive processes of technology-rich lesson planning*. Paper presented

at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44272/>

Abstract: “This applied cognitive task analysis of five expert teachers employed qualitative methods to understand and represent their cognitive processes of planning a technology-rich lesson. The expert sample was purposely-selected from a population convenience, a metropolitan school district in the southeast USA. A twelve step CTA protocol of interviews, data analysis, and knowledge representation resulted in a common expert cognitive map with nine ordered key-steps. Furthermore, this study showed that expert-teachers use a holistic collection of supportive knowledge in planning each of these nine key-steps. Novice data was collected for purposes of triangulation and showed gaps between the cognitive planning process of novices and all experts. The study concludes with plausible applications of the expert cognitive map for pre-service teacher preparation and discussion of expert cognitive processes that fail to align with a popular technology framework, Technological Pedagogical Content Knowledge.”

Lyublinskaya, I., & Tournaki, N. (2015, March). *Examining the relationship between self and external assessment of TPACK of pre-service special education teachers*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44357/>

Abstract: “This study examined the relationship between TPACK scores of lesson plans (external scores) developed by 150 pre-service special education teachers and TPACK scores of self-reflections (self-scores) about teaching these lessons. The TPACK Levels Rubric (Lyublinskaya & Tournaki, 2012) was used to assess both types of TPACK. Results indicated that a) both, self and external TPACK scores significantly improved, and b) there was no significant difference between external and self TPACK scores for each lesson plan. In order to examine relationships between self and external scores, the participants were divided into three groups: close-estimators (self and external scores are within one standard deviation), over- and under-estimators (self scores are respectively higher or lower than external by more than a standard deviation) Correlational analysis conducted on self and external scores of TPACK revealed significant moderate to strong positive correlation between self and external scores.”

Marcovitz, D., & Janiszewski, N. (2015, March). *Technology, models, and 21st-century learning: How models, standards, and theories make learning powerful*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44614/>

Abstract: “This paper describes the variety of educational technology models, how they all fall short in some ways, and how they can be used together to form a powerful integrative model that can be used to evaluate technology applications in the classroom. The integrative model is

a tool to help teachers think about and improve their use of technology. It combines the best of various models, including SAMR, TPACK, Technology Integration Matrix, and more.”

Minsheu, L., & Anderson, J. (2015, March). *Teacher efficacy in 1:1 tablet integration: Year 2*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44396/>

Abstract: “This poster provides an update on the ongoing research in a one-to-one table initiative at an urban middle school in the southeastern United States. Expanding upon the work presented at SITE 2014, this poster presents findings from two additional iterative cycles and the resultant lessons created by teachers after content-specific professional development designed to help teachers consider TPACK. Observational data and teachers’ lesson designs will be shared to illustrate that although issues of teachers’ efficacy with technology and TPACK integration still exist, slight changes in teachers’ practice are evident. Researchers hope to generate conversations around facilitating changes in teachers’ efficacy and classroom practices in regard to one-to-one initiatives.”

Paolini, P., DI Blas, N., & Torrebruno, A. (2015, March). *MOOCs, communities and distributed TPACK*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44490/>

Abstract: “This paper is about TPACK as a model for explaining the dynamics and informing the design of innovative, ICT-based, educational experiences. The main thesis is that the TPACK model, in its more advanced versions, provides the necessary concepts to explain the complex relationships among the various participants in their roles. The most important consequence is that TPACK can be used to drive the design of complex experiences, and especially of Massive Online Open Courses and their communities. Thesis is supported through concrete case-studies.”

Peled, Y., & Oster, A. (2015, March). *The impact of modeling and mentoring on pre-service teachers to use technological pedagogical content knowledge*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/43897/>

Abstract: “The present study examines the ability of pre-service teachers from a large college located in the center of Israel and a small college in the northern part of Israel to integrate technological knowledge and pedagogical content knowledge (TPACK) into their teaching and compares the colleges. Significant differences were found between the two colleges concerning TPACK knowledge. The influence of lecturer and mentor teacher modeling on ICT integration is discussed, as well as the level of training components for technology integrated teaching and the pre-service teachers' attitudes towards ICT and TPACK.”

Piotrowski, A., & Witte, S. (2015, March). *Flipped learning and preservice ELA teachers: Results from a pilot study*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44185/>

Abstract: “This qualitative case study focused on two preservice English Language Arts teachers who learned about the flipped classroom in an English Education course that focused on technology. The study found that participants built their Technological Pedagogical Content Knowledge through hands-on experience using technology tools to create lessons. Participants also showed a desire to get students using technology in the classroom, although they viewed flipped lessons mostly as a means of content delivery.”

Pugh, J. (2015, March). *Social media and education: A position on web 2.0 and networking sites in the classroom*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44079/>

Abstract: “The position demonstrates the value of incorporating social media tools into pedagogical methods to increase content understanding. Social media and Web 2.0 tools have been an emerging technology in the past decade, as students are already familiar with the components of social networking sites and see educational value in operating these sites. Maintaining safety within the school environment and increasing awareness of cyber-bullying and cyber-ethics enhance students’ confidence levels in sharing perceptions with the assistance of these sites. A major concern is teachers’ comfort levels in operating social media sites, which could cause a greater problem for establishing credibility and affinity. The literature supports creating more professional development opportunities and time for practice, so that teachers can familiarize themselves with these technological tools. Finally, curricula and lesson designs should include social media integration to associate directly with the Technological Pedagogical and Content Knowledge (TPACK) model. Two issues are addressed with enhancing curriculum design: lack of teacher support and lack of administrative support. It is proposed that district and state leaders should consider providing the development necessary for teachers and allowing more access to social media sites and Web 2.0 technology in schools, so that teachers can have the availability and autonomy to enhance their pedagogical methods and further engage student learning.”

Redmond, P., & Peled, Y. (2015, March). *An international investigation of TPACK*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44200/>

Abstract: “Effective technology integration requires knowledge and skills of three key interdependent knowledge areas: pedagogical content knowledge, technology content knowledge and technological pedagogical knowledge. At the intersection of all these knowledge areas is Technological Pedagogical and Content Knowledge or TPACK. From the



analysis of the data from an online survey completed by pre-service teachers in Australia and Israel, the authors will share similarities and differences of TPACK across two international universities.

The aim of this research was to identify if there are any contextual differences between the levels of TPACK in pre-service teachers from the two different countries. This paper presents implications for teacher education programs that may be relevant in multiple contexts. The following are outcomes of the research. First, pre-service teachers are provided with a wealth of experiences using technology in their learning and in designing learning experiences in their course work. Second, pre-service teachers need to have opportunities to apply theory of TPACK in the design of their lessons and learning tasks in their professional experience. Third, pre-service teachers have low confidence in TK and TPK. Finally, there is limited difference in the experience and confidence of pre-service teachers in TPACK irrespective of location.”

Rosenberg, J., Greenhalgh, S., & Koehler, M. (2015, March). *A performance assessment of teachers' TPACK using artifacts from digital portfolios*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44906/>

Abstract: “Researchers have employed many different methods of measuring teachers’ Technological Pedagogical Content Knowledge (TPACK). Existing measures of TPACK have typically focused on teachers’ self-report of their understanding, and relatively few approaches directly measure teacher performances. Moreover, to date, no performance assessments of teachers’ TPACK have used teachers’ digital portfolios or the work samples (or artifacts) included in teachers’ portfolios. In this paper, we build on our initial attempt (Koehler, Rosenberg, Greenhalgh, Zellner, & Mishra, 2014) to test the validity and reliability of a performance assessment of the TPACK present in teachers’ portfolio artifacts by focusing on two specific types of artifacts: Dream IT (a type of grant proposal) and a sustainable technology initiative. We report the reliability of our attempts to code levels of TPACK evident in these artifacts and discuss the development of more robust performance measures of teachers’ TPACK.”

Slough, S., Connell, M., & Chamblee, G. (2015, March). *Looking for learners: The legacy of technological content knowledge (TCK)*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44867/>

Abstract: “Technological Pedagogical Content Knowledge (TPACK) is a theoretical framework that has enjoyed widespread applications as it applies to the integration of technology in the teaching and learning process. This paper reviews the background for TPACK, discusses some of its limitations, and reviews an alternative theoretical framework, Technological Content Knowledge (TCK), to clarify the discourse surrounding teaching and learning with technology.”

Slykhuis, D., Hofer, M., Lee, J., & Ptaszynski, J. (2015, March). *Using the TPACK framework to increase technology use in higher education around the world*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44870/>

Abstract: "Higher education faculty are experts in their fields, but often are not practiced in the fine art of teaching. Teaching practice in higher education is dominated by stand and deliver pedagogies that limit students' opportunities to engage in the process of meaning making and knowledge construction. Technology can change how faculty and their students interact with content and with each other. The TPACK framework offers a mechanism to shift higher education faculty teaching practices. In this paper, we consider how TPACK can be used as lever to help faculty expand and extend their pedagogies toward more student interaction and a more thoughtful utilization of instructional technologies. With regard to innovation in teaching, some faculty can be recalcitrant when it comes to shifting their practice. This paper examines a process for shifting practice, focusing on design and program activities that have shown promise in shifting faculty teaching practices."

Spaulding, M. (2015, March). *Using a technology integration course to move from student to teacher centered technology integrated approach*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44107/>

Abstract: "With the implementation of the new Common Core standards, there is a wide range of uncertainty on exactly how to teach the standards to students and how to determine that they have mastered them. Technology has repeatedly been looked to as a vehicle to help improve test scores. The Technological Pedagogical Content Knowledge (TPACK) framework has helped define how technology meets content knowledge and pedagogy. Research has shown that by integrating technology effectively in the classroom and adapting a more learner or student-centered approach, the learners are more motivated which in turn could lead to learning at a higher, more cognitive level (Draude, & Brace, 1999). This study utilized a technology course to determine if students move from a more teacher centered approach to a student centered approach after completion of the course. Results of the study found that they do indeed become more student centered following completion of the course."

Stefanick, P., & VanOverbeke, D. (2015, March). *Preservice teachers + Pinterest = TPACK in action*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/45407/>

Abstract: "This survey research study investigated the development of Pinterest boards by preservice teachers for use in math and reading methods courses and accompanying field experiences. After completing the Pinterest activities, 39 (34 females, 5 males) math methods

and 32 (29 females, 3 males) reading methods preservice teachers in early childhood and elementary education completed surveys at the end of fall 2013 and spring 2014 semesters. Responses indicated preservice teachers enjoyed the use of Pinterest in their course work and found it provided easy access to engaging and useful hands-on activities. The teacher educators noted preservice teachers were able to self-navigate Pinterest without formal instruction. Results also showed the majority of preservice teachers did not know how to determine the research backing of Pinterest strategies. Therefore, a need exists in teacher education courses for instruction in identifying research-based strategies. “

Tai, S. J. D., & Dzekoe, R. (2015, March). *An English teacher's journey of technology integration: A case study*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44890/>

Abstract: “The study investigates what and how Shannon, an English teacher, adopted what she learned in the technology for literacy course into her classrooms. Starting from being handed an iPad and told to use it to taking a course guided by the TPACK framework (Mishra & Koehler, 2006) and TPACK-in-Action model (Tai, 2013), Shannon went through an adventurous journey. Guided by a case study approach, data were collected from multiple data sources, including course projects, observations, and interviews. It showed that Shannon not only adopted what she learned in the course but also transformed it into actions. Shannon also demonstrated a number of TPACK competencies, indicating that she was able to see beyond technology in isolation but rather the interplay among technology, pedagogy, and content. In all, the findings indicate that helping teachers understand TPACK and employing TPACK-in-Action model might play an important part in preparing teachers to integrate technology.”

Tai, S. J. D., & Schmidt-Crawford, D. (2015, March). *The impact of field experience in technology-integrated classrooms on preservice teachers' development of TPACK*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44849/>

Abstract: “The purpose of the study is to investigate the impact field experiences, that are specifically targeted on using technology in PreK-12 educational contexts, have on preservice teachers in relation to their development of TPACK and as a result how prepared they are to integrate technology into their future classrooms. Participants are 9 preservice teachers enrolled in a 1-credit class offered for a Learning Technologies Minor at a large Midwestern university. Participants are required to complete a minimum of 24 hours in classrooms or educational contexts to observe how PreK-12 educators interact with and teach using technology. Data are collected from surveys completed before and after the field experiences, participants' documentation of two observations framed in TPACK, their written reflections after each visit, and a focus group interview that is conducted at the end of the semester. Participants' survey responses showed that they perceived themselves with higher TPACK after completion.”

Tournaki, N., & Lyublinskaya, I. (2015, March). *TPACK for teaching mathematics and science and differentiation of instruction: Case Study with pre-service special educators*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44319/>

Abstract: "In this paper, we argue that the TPACK framework (TPACK, Mishra & Koehler, 2006) can be used to develop excellence in teaching in a variety of classrooms, which includes differentiation of instruction. In order to examine how the quality of differentiation changes as TPACK improves, 150 lesson plans of pre-service special educators were assessed using TPACK Levels Rubric (Lyublinskaya & Tournaki, 2012). Two lesson plans were randomly selected at each level of TPACK (with total of eight) and examined for evidence of differentiation of instruction. The study describes how strategies used for differentiation parallel the levels of TPACK that were achieved by each participant."

van der Stap, N., & Edwards, S. (2015, March). *Implementing blended learning programmes requires teachers developing blended learning courses to be trained*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44172/>

Abstract: "This paper discusses how Blended Learning can be implemented at the teacher trainer college of the University of Applied Sciences, Utrecht, Netherlands. To ensure quality blended learning programmes, it is essential that teachers developing blended learning courses are trained, particularly in relation to applied methodology. To understand how best to implement blended learning at the teacher trainer college extensive research was carried out, the findings of which were made available to the University's teachers in the form of a content-based, yet hands-on blended training programme with TPACK as its exit point. The student results showed a marked improvement when following a blended learning course developed by teachers who were trained in the programme as compared to blended learning courses developed by non-trained teachers. In addition, the results of the blended courses (which were developed by trained teachers) showed a vast improvement of the non-blended courses, its so called 'regular variant.'"

Wang, Z., & Lohnes Watulak, S. (2015, March). *Using TPACK as a lens to examine the literature on mobile assisted language learning (MALL)*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44477/>

Abstract: "Traditional L2 learning has been critiqued for its prescribed classroom instruction with tedious repetition, dreary memorization, and decontextualized assessment. The demand for more effective language learning experience has driven language instructors to seek tools that increase student learning time and provide immediate feedback both in and outside of

class. Mobile technologies enable language instructors to resolve many issues identified in traditional L2 learning, and elevate student learning of languages in intriguing and invigorating ways. The integration of MALL in language curriculum, however, still remains marginal and problematic. In this paper, we use TPACK as a lens to examine current MALL literature, aiming to identify gaps in both research and implementation of MALL that may provide language teachers, researchers and administrators with new perspectives on narrowing such gaps.”

Willermark, S., & Pareto, L. (2015, March). *Progression in practice: Development of TPACK in didactical designs*. Paper presented at the 26th annual conference of the Society for Information Technology and Teacher Education, Las Vegas, NV. Abstract retrieved from <https://academicexperts.org/conf/site/2015/papers/44609/>

Abstract: “We report results from a three-year School Development Project in which digital technology supports cross-border collaboration and innovative models for teaching in virtual classrooms are designed. The study involved 22 teachers and 600 students in elementary school. The development and implementation of didactical designs were examined by using the TPACK model as an analytic lens. An in-depth analysis of 14 didactical designs, i.e., pre-planned sequences of lessons with specified learning objectives, in mathematics were conducted. We show how the TPACK model can be used to identify progression in practice, when didactical designs are studied in detail. We have been able to track progression in the didactical designs, where the TPACK components are becoming more integrated and balanced over time. We have seen examples of organizational development, in which teacher teams together with researchers built a productive community of practice around developing TPACK-based competence.”

### **AERA 2015 TPACK Presentations**

Angeli, C. M., & Ioannou, I. (2015, April). *Examining the effects of an instructional intervention on destabilizing learners’ misconceptions about the central processing unit: A technological pedagogical content knowledge perspective*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

Abstract: “The authors herein discuss the design and implementation of e-TPCK, an adaptive e-learning environment that targets the development of teachers’ Technological Pedagogical Content Knowledge (TPCK). The system deploys a technological solution that promotes teachers’ ongoing TPCK development by engaging them in the design of learner-centered ICT-infused scenarios fostering a self-paced and personalized learning experience, while taking, at the same time, into account teachers’ diverse needs, information processing constraints, and preferences. The design of the system followed a design-based research methodology and was informed by different theoretical and methodological frameworks. The authors conclude with recommendations about how to improve the design of e-TPCK by incorporating built-in features to support adaptive scaffolding and self-regulatory processes in order to provide a complete personalized learning experience for the teacher.”

Baram, E., Bilici, S. C., & Uygun, E. (2015, April). *Investigating the impact of a technological pedagogical content knowledge (TPACK) – based professional development program on science teachers’ TPACK*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

**Abstract:** “In-service teacher training programs need planned, continuous and usable professional development (PD) and support opportunities going beyond techno-centric approaches that are disconnected from teacher practice. This research aimed to investigate the impact of a TPACK-based PD program on science teachers’ TPACK. The program included modules designed to develop science teachers’ domain specific TPACK with a variety of teacher learning methods. Data sources included the Know-Want-Learn (KWL) charts and PD evaluation forms that 24 elementary science teachers completed. The results revealed that science teachers’ self-assessment of their TPACK increased and sustained over a period of one year. Recommendations for designing and implementing future TPACK-based PD programs in science teacher education are presented.”

Chai, C. S., Koh, J. H. L., Tan, L., & Tsai, C.-C. (2015, April). *Contextualizing technological pedagogical content knowledge (TPACK) for school learners’ instructional leadership for a new culture of learning*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

**Abstract:** “Effective school leadership today is defined beyond the principal’s competence in administrative and operational duties. Increasingly, the involvement of principals in aspects of teaching and learning has been given greater emphasis. It has also created an important agenda for research and educational reforms related to effective technology implementation in schools. Within educational research, studies focusing on building teachers’ competency for technology integration abound. A notable area is the use of the Technological Pedagogical Content Knowledge (TPACK) framework for characterizing teachers’ competency for technology integration. It is widely acknowledged that many TPACK studies centre on preservice and inservice teachers (such as Angeli & Valanides, 2013; Kramarski & Michalsky, 2010; Chai, Koh, Ho & Tsai, 2012). In this paper, we put forward our argument on the need to develop TPACK for principals with the goal of developing them as instructional leaders.

While principals cannot ignore their administrative and operational duties, their role as an instructional leader is paramount in rethinking learning in the digital age. New media has shaped the learning environments of our learners and led to an emergent culture of learning whereby the ethos of learning are notably different from the dominant culture of learning observed in many school practices. The emergent culture of learning necessitates a new TPACK for principals who play a significant role in designing schools fit for the 21st century. TPACK is a form of situated knowledge creation grounded in context (Porrás-Hernández & Salinas-Amescua, 2013). In this paper, we present our working framework for TPACK for principals as instructional leaders in the fluid context of the emergent culture of learning. Our suggested

TPACK framework draws on Bronfenbrenner's (2005) five levels of ecological context on the ground that TPACK is better understood as a multilevel construct. Unlike many TPACK studies, we focus on principals as instructional leaders and our framework is posited beyond the micro level, which is associated with the classroom in many TPACK studies on teachers. Using a case study of planning and implementing a TPACK course for principals, we explain our notion of collaborative TPACK as an interlocking multi-level construct. It is our intent to further dialogues on how TPACK may be instrumental in empowering school leaders who are keen on appropriating the emergent culture of learning for formal learning as they gear their schools into the 21st century learning."

Choi, B., Slota, S., Lai, B., & Young, M. F. (2015, April). *CARD-tamen TPACK-L: Assessing teacher competency with technology integration*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

Abstract: "Simply knowing about technology and having the pedagogical skills to apply it has historically proved insufficient for contending with the dynamics of curriculum modification, student input, and other emergent challenges associated with classroom instruction. As a result, the authors have revised Mishra and Koehler's (2006) TPACK framework to include Learning Theory (TPACK-L), a way to smooth and sustain the wise integration of technology into teaching. This has led to the development and implementation of a novel assessment tool built through the adaptation of a commercially available card game, CARD-tamen™. Preliminary analysis of player audio data suggests that gameplay may serve as a reliable means of pre- and in-service educator evaluation and a measure of TPACK-L competency as a whole."

Gillow-Wiles, H., & Niess, M. L. (2015, April). *Characterizing engagement with technology as a pedagogical tool in developing teachers' technological pedagogical content knowledge (TPACK)*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

Abstract: "The growing importance of technology in education presents challenges for the current conceptualization of student engagement. This descriptive case study presents an extended characterization of student engagement to better address the concept of engagement with technology designed to support teaching and learning with technology. This emerging model of engagement with technology was used as a framework to develop and facilitate courses in an online continuing education MS program with an integrated science, mathematics, and technology curriculum. The study revealed the influence of using this new model of engagement with technology in program design on teachers' technological pedagogical content knowledge (TPACK)."

Harris, J. B. (2015, April). *A [construct] by any other name: School districts' contextually shaped conceptions and implementations of technological pedagogical content knowledge (TPACK)*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

**Abstract:** “Teachers’ contextual knowledge encompasses the many characteristics of their current and past experiences, beliefs and learning, both in school and outside of it. This understanding mediates instructional knowledge and practice, including TPACK and curriculum-based technology integration (Harris & Hofer, 2014). As Cox (2008) reminded us in her critical examination of the construct’s many interpretations, “TPACK is unique, temporary, situated, idiosyncratic, adaptive, and specific, and will be different for each teacher in each situation.” (p. 47).

Porrás-Hernández and Salinas-Amescua’s (2013) recent re-examination and redefinition of contexts within the TPACK construct argue that social, political, economic and technological conditions and objects shape teachers’ knowledge at macro (national/global), meso (local/institutional), and micro (classroom) levels of scope. Both student and teacher actors, all with “unique internal and external contexts” are complex and important “objects of knowledge” to be considered (p. 231). The specific nature of TPACK is therefore largely dependent upon these contextual characteristics, as Porrás-Hernández & Salinas-Amescua illustrate with examples from their research with rural teachers.

What are the conceptions and functions of TPACK within differing North American school district contexts in which the construct has been appropriated as part of professional learning and/or collaboration? How do varying interpretations and implementations of the construct reflect school districts’ contextual similarities and differences vis-à-vis the development of teachers’ professional knowledge? This study expanded upon the results of previous inquiry (Harris & Hofer, 2014), examining (at the meso level) the similarities and differences among twelve school districts’ (from ten U.S. states and Canadian provinces) use of TPACK to frame aspects of teachers’ professional learning. Phenomenological analysis of interviews, district documents, and participant-created video presentations that describe the districts’ understandings and uses of TPACK is still in progress, but some preliminary findings have emerged.

Similar to the results of the previous study (Harris & Hofer, 2014), the importance of context and professional culture in planning and implementing educational technology-related professional development is emphasized in the current inquiry. Study participants have appropriated TPACK in ways that reflect their school districts’ unique cultures, initiatives, histories, and values. In addition, the ways in which TPACK was introduced and built upon reflected the usual decision-making and implementation processes applied to professional learning in each district. While the reasons for these patterns of introduction and diffusion of TPACK-based professional development are highly contextualized between different districts, they are easily explained by the study’s participants within each by noting specific and multiple contextual influences at meso and macro levels.

These preliminary results may suggest a potential and perhaps necessary evolution of our understanding of a highly contextually-sensitive theoretical construct. The nature of the TPACK that is being built in different schools and districts may vary principally according to contextual



characteristics. If that is so, then our understanding and use of TPACK in both research and professional development must shift to reflect this contextually determined reality.”

Lee, K., & Brett, C. M. (2015, April). *Improving online in-service teacher discussion for technological pedagogical content knowledge learning: An approach based on Bakhtin’s dialogism*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

Abstract: “Teachers are expected to adapt to new educational environments through the effective implementation of ICTs in their classrooms. However, this pedagogical change involves a complex technological pedagogical content knowledge (TPCK) learning process that leads to perspective transformation. The authors in this paper have designed and taught a discussion based online course for inservice teacher TPCK learning. Taking Bakhtin’s Dialogism as an analytic lens, the authors carefully investigated teachers’ discussions and perspective transformations in the online learning environment. The results of this qualitative case study demonstrate a close relationship between teachers’ authentic dialogue and their perspective transformation. This paper suggests the effectiveness of Bakhtin’s dialogism for teacher educators to deepen their perspectives on teacher discussion and improve their educational practices.”

Lin, C.-Y., & Kuo, Y.-C. (2015, April). *Preservice teachers’ perceptions and beliefs of technological pedagogical content knowledge (TPACK) in algebra*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

Abstract: “The purpose of this study was to investigate elementary pre-service teachers’ content knowledge in algebra (Linear Equation, Quadratic Equation, Functions, System Equations and Polynomials) as well as their technological pedagogical content knowledge (TPACK) in teaching algebra. Participants were 79 undergraduate pre-service teachers enrolled into the university core program and the teacher education program. Quantitative analysis was utilized to analyze the collect data. Results indicated that there were significant differences in content knowledge for System Equations between the pre-service teachers from two programs. The five sub-scales of the algebra content were significantly correlated with each other. Content knowledge and pedagogical knowledge significantly predicted TPACK. Technology skills had a significant impact on pre-service teachers’ TK, PK, TCK, PCK, and TPACK.”

Mouza, C., Nandakumar, R., Ozden, S. Y., & Karchmer-Klein, R. A. (2015, April). *A longitudinal investigation of preservice teachers’ technological pedagogical content knowledge (TPACK) development in the context of a teacher preparation program*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

Abstract: “This study uses longitudinal data collected from freshman to senior year, to investigate the development of pre-service teachers’ technological pedagogical content knowledge (TPACK) throughout their initial teacher preparation program. Findings indicated that educational technology coursework, content, methods courses, and field experience

collectively provided pre-service teachers' with opportunities to develop their knowledge of teaching with technology. Findings, however, indicated that opportunities to develop TPACK are limited in the absence of intentional coursework. Further, findings indicated that intentional coursework in technology might be more effective when spaced throughout teacher education programs to ensure that knowledge gains are retained over time."

Porras-Hernandez, L. H., & Salinas-Amescua, B. (2015, April). *The transformative power of context for teachers' knowledge and practice*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

Abstract: "In order to successfully integrate information and communications technologies (ICT) to their practice, teachers need different types of knowledge, which in turn allow them making appropriate design decisions that benefit students' learning. Several voices have pointed out the limitations of teacher education programs that emphasize the development of technological skill and knowledge only, and alternative views have been suggested. Among these alternative approaches Mishra and Koehler's Technological, Pedagogical, Content Knowledge (TPACK) Framework (2006, 2008) outstands as a reference for these purposes, since it provides a comprehensive and dynamic framework of teacher knowledge. By developing Shulman's (1986) Pedagogical Content Knowledge (PCK) propositions further, they highlight the interactions among these types of knowledge, as well as the context in which teaching is to take place.

In a previous publication we pointed out the need to further investigate and develop conceptually the Context element present in the TPACK framework (Porras-Hernández & Salinas-Amescua, 2013). Based on emerging results from rural teachers' narratives, we proposed to strengthen the TPACK framework by incorporating context in terms of two dimensions: scope and actors. Scope depicted three levels of contextual variables: micro, meso and macro; while actors were represented by teacher and students, both bringing part of their own contexts to the multiple interactions that the framework suggests (Íbid.)

The purpose of this presentation is to highlight that context is not only a set of physical, social or emotional conditions that facilitate or hinder ICT integration to which teachers have to adapt their practice, but also object of knowledge and influence for teacher change. Context-relevant designs require teachers to know the contextual factors at different levels that come into play when introducing ICT to their practice and how these factors interact, in this interaction teachers themselves change. Therefore, we propose that this understanding be accompanied by the constructions of situated knowledge, recontextualization processes, and changes in teachers' standpoints.

Using a phenomenological approach in which data of eight Mexican rural teachers' narratives are used, in this presentation we exemplify how these teachers identify contextual factors and preview their interactions to make decisions concerning how ICT should be integrated and for

what purposes.

Results indicate that rural teachers are constantly taking into consideration multiple variables in their decisions, and that the same teacher comes to different solutions of ICT integration according to variations in each situation. Such results are consistent with literature reporting approaches in general teacher education programs that emphasize the need of pre-service teachers to develop contextual knowledge, particularly in culturally diverse settings (Gomez & Rodriguez, 2011; Bennet & Lancaster, 2012; Henderson, Bellis, Cerovac & Lancaster, 2013).

Conclusions of this presentation are significant for further conceptual constructions of the 'context' element in the TPACK framework and for practical considerations in teacher education programs and in context-sensitive designs for ICT integration to teaching practice."

Rosenberg, J. M., & Koehler, M. J. (2015, April). *Context and technological pedagogical content knowledge: A content analysis*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

**Abstract:** "The objective of this study is to better understand the extent to which researchers included context in analyses of TPACK, and what researchers meant by context when it is addressed. Context has been described as central to the Technological Pedagogical Content Knowledge (TPACK) framework, which is described by its developers (Koehler & Mishra, 2008; Koehler, Mishra, Kereluik, Shin, & Graham, 2014; Mishra & Koehler, 2006) and others (Angeli & Valanides, 2009; Harris & Hofer, 2014; Kelly, 2007; 2008a; 2008b; 2010; Porras-Hernández & Salinas-Amescua, 2013; Koh, Chai, & Tsai, 2014) as the knowledge needed to teach with technology effectively. However, research that uses the TPACK framework—which has become prominent in recent scholarship about the roles of technology in teacher education and professional development (Chai, Koh, & Tsai, 2012; Voogt, Fisser, Roblin, Tondeur, & van Braak, 2012)—has displayed comparative inattention to context. Despite the stated importance of context in understanding TPACK, mention of contextual information is often missing when researchers address or describe TPACK in their work (Kelly, 2010). Moreover, when TPACK researchers have included context, its meaning has varied widely, from teachers' epistemological beliefs to classroom and institutional resources (Porras-Hernández and Salinas-Amescua, 2013), and more.

We conducted a mixed methods content analysis of peer-reviewed journal articles that incorporated the TPACK construct in substantive ways. The data in the sample for this study are research publications located by searching the Education Resources Information Center (ERIC) and PsychINFO databases with the keywords 'Technological Pedagogical Content Knowledge,' 'TPACK,' and 'TPCK.' We also searched the TPACK group on the citation reference software and website Mendeley, as well as the TPACK newsletters published on <http://tpack.org> between January 2009 and December 2013. In order to be included in this study, publications had to

meet six inclusion criteria. They had to be: 1) published in a peer-reviewed journal, 2) published between 2005 and 2013, 3) about TPACK, 4) empirical in nature, and 5) published in the English language. 192 publications met these criteria.

We found that context was included in 37% of the 192 articles, and that when researchers addressed context, what they meant differed according to the five categories of the coding frame for context developed by Porras-Hernández & Salinas-Amescua (2013). Micro, or classroom factors were included in 84% of the publications examined; meso, or school factors, in 61%; macro, or societal factors, in 14%; teacher factors in 57%; and student factors, in 44%. Results of this study provide strong empirical support for the notion that context is important but largely missing from research about TPACK, and that the meaning of context has differed widely among TPACK researchers, even though the number of peer-reviewed journal articles about TPACK that mention context is comparatively large. We use these identified patterns to make recommendations about future incorporation of context and contextual factors into analyses of educators' TPACK and educational technology use."

Swallow, M., & Olofson, M. W. (2015, April). *Contextual understandings in the technological pedagogical content knowledge framework*. Paper presented at the 2015 American Educational Research Association Annual Meeting, Chicago, IL.

Abstract: "The technological, pedagogical, and content knowledge (TPACK) framework is used in numerous research and practitioner settings, but the interaction with context continues to be an ambiguous area. The purpose of this multiple-case study was to investigate the development and enactment of teachers' TPACK during a program of technology adoption and teacher professional development. A small body of research pointed to building or student-level contextual influences, but our primary results suggested more teacher-centered contextual factors; background, educational training, conceptualization of twenty-first century education, teaching philosophy, and content area. As teaching and learning in multiple contexts continues to evolve, a growing understanding of the role of context helps researchers gain a more nuanced vision of teachers' TPACK and application in their classrooms."

## 5. Selected TPACK-related Blog Entries

Hollis, K. (2014, October 24). Features and qualities important to pedagogical models [Web log post]. Retrieved from <https://kristinahollis.wordpress.com/tag/tpack>

Excerpt: "I have long had an interest in pedagogical and instructional design models and the elements of them I have looked for, as evidence of their quality, has been guided by these questions:

- Does the model provide adequate scaffolding for a learning experience?
- What is considered most important, content or pedagogy?
- Are students' getting the opportunity to demonstrate higher-order thinking skills?

- Is ICT considered as a supporting tool in the process and experience of teaching and learning?
- Is there room for flexibility, adaptability and differentiation?
- Is there room for student self-regulation to be facilitated and encouraged?"

Itow, R. (2015, March 7). Impacting teacher learning with PPD and TPCK [Web log post]. Retrieved from <http://rebeccaitow.com/2015/impacting-teacher-learning-with-ppd-and-tpck/>

Excerpt: "On Friday, I gave a talk on this paper at the SITE conference in Las Vegas on the relationship between Participatory Professional Development and Technological Pedagogical Content Knowledge (TPCK). Generally, I asserted that all of these innovations in technology are changing the ways learners interact with information, learning environments, their teachers, and each other. They are more connected – to everything – which means that we need to re- envision our understandings of what learning environments look like, how to design for them, and what counts as "engagement" and "learning" within them. However, this also means that we need to re- envision what professional development looks like and the ways in which it presents new information to teachers so that they can learn how to design for and teach in these new environments."

Jones, D. (2015, January 6) TPACK as shared practice: Toward a research agenda. [Web log post]. Retrieved from <https://davidtjones.wordpress.com/2015/01/06/tpack-as-shared-practice-toward-a-research-agenda>

Excerpt: "The task of using Information and Communication Technologies (ICT) to effectively teach hundreds of pre-service educators, many of whom never attend campus, is a significant challenge, which is amplified by the need to do so in ways that model how they might use ICT in their own classrooms once they graduate. This paper analyses a collection of posts written across a teaching year on a group blog by three teacher educators as they explored their practice and attempted to learn how to meet this challenge. The analysis uses a distributed view of knowledge and learning to identify the barriers and enablers encountered, and how the teacher educators developed their distributed TPACK throughout the year. The paper argues that a distributed view of TPACK offers some interesting insights that can inform practitioners, researchers and policy makers as they explore practice and learn how to meet the technology integration challenge."

## 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 (6<sup>th</sup> edition) of the *Publication Manual of the American Psychological Association* suggests that the citation should look like this:

Harris, J., & Rodriguez, K. (Eds.). (2015, May 30). TPACK newsletter issue #23: May 2015 [Electronic mailing list message]. Retrieved from <http://www.matt-koehler.com/tpack/tpack-newsletters/>

## 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.htm>
- Subscribe to the tpack.research, tpack.teaching, tpack.grants and/or tpack.future discussion lists at: <http://site.aace.org/sigs/tpack-sig.htm>
- Access the TPACK Learning Activity Types taxonomies at: <http://activitytypes.wm.edu/>
- Access three tested TPACK assessment instruments at <http://activitytypes.wm.edu/Assessments>

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](mailto:sympa@lists.wm.edu), with the following text in the subject line: subscribe tpack.newsFirstNameLastName (of course, substituting their own first and last names for 'FirstName' and 'LastName' — unless their name happens to be FirstNameLastName, 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](mailto: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](mailto: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](mailto:sympa@lists.wm.edu), with the following text in the subject line: unsubscribe tpack.news

- Judi & Kim

...for the SITE TPACK SIG leadership:

<a href="#">Petra Fisser</a> ,	Chair, SLO Expertise Center, National Curriculum Development
<a href="#">Josh Rosenberg</a> ,	Associate Chair, Michigan State University
<a href="#">Candace Figg</a> ,	Rocking Chair, Brock University
<a href="#">Mark Hofer</a> ,	Sedan Chair, College of William & Mary
<a href="#">Judi Harris</a> ,	Wing Chair, College of William & Mary
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