TPACK Newsletter, Issue #21: September 2014

Welcome to the twenty-first 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 Technology

"The one exclusive sign of thorough knowledge is the power of teaching."
-Aristotle

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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 1235 subscribers currently. Subscription numbers have held steady (+ or – 1% to 3%) since October 2011.

2. Recent TPACK Publications

Below are recent TPACK publications that we know about: 26 articles, 14 doctoral dissertations, and 3 master's theses that have not appeared in past issues of this newsletter. (These are the largest number of dissertations and theses that we have reported in one issue of this newsletter to date!) If you know of others that were published within the past several months, please let us know at: tpacknews.editors@wm.edu.

Articles

Bachy, S. (2014). TPDK, a new definition of the TPACK model for a university setting. *European Journal of Open, Distance and E-Learning, 17*(2), 15-39. Retrieved from http://www.eurodl.org/materials/contrib/2014/Bachy.pdf

Abstract:
"In this paper we propose a new Technopedagogical Disciplinary Knowledge model. This model integrates four separate dimensions, which we use to measure a teacher's effectiveness. These are the individual teacher's discipline (D), personal epistemology (E), pedagogical knowledge (P), and knowledge of technology (T). We also acknowledge the existence of relationships between these components. These can be more or less correlated depending on the teacher's individual profile. They are always present, but they do not necessarily have the same weighting. In order to test the potential differences between teachers' profiles, we designed a questionnaire, which tested our model's components, and the relationships between them. This questionnaire was initially submitted to a group of teachers with whom we were familiar, to ensure the questions were understandable and that, based on what we already knew of the teachers' characteristics, the profiles that emerged were reliable. A second test was then carried out, which we used to compare the answers of university and non-university level teachers, based in the two institutions in which we work. This second questionnaire was used to test the consistency of responses, and the correlations between the model's different dimensions. Having analysed the outcome of these questionnaires, it appears that "pedagogical knowledge" is significantly correlated with the other three dimensions. This consolidated framework has helped us to build a system of education development coaching for teaching practices that use technology widely."

Cengiz, C. (2014). The development of TPACK, technology integrated self-efficacy and instructional technology outcome expectations of preservice physical education teachers. *Asia-Pacific Journal of Teacher Education*. Advance online publication. doi:10.1080/1359866X.2014.932332

Abstract:
"The purpose of this intervention has been to improve preservice physical education teachers' Technological Pedagogical Content Knowledge (TPCK or TPACK), Technology Integrated Self-Efficacy (TISE), and Instructional Technology Outcome Expectations (ITOE). A pre-/post-test design without a control group was used in the study. Participants were third-year students (n = 42) who have completed the Turkish version of TPACK, TISE, and ITOE before and after this 12-week intervention. The data were primarily analysed through descriptive and paired-sample t-test statistics (p < .05). Descriptive analyses showed an increase in all subscales of TPACK, TISE, and ITOE scores. The paired-sample t-tests revealed a significant difference in scores for content knowledge, pedagogical knowledge, technological pedagogical knowledge, overall TPACK and ITOE. However, no significant difference in technological knowledge, TPACK, and TISE scores was observed. In

conclusion, the intervention was effective for determining and developing TPACK variables and ITOE in preservice physical education teachers."

Chang, Y., Jang, S. J., & Chen, Y. H. (2014). Assessing university students' perceptions of their physics instructors' TPACK development in two contexts. *British Journal of Educational Technology*. Advance online publication. doi: 10.1111/bjet.12192

Abstract:
"Technological Pedagogical and Content Knowledge (TPACK) has been gaining traction among educational researchers; however, studies documenting university students' perceptions of their teachers' TPACK remain limited. This study intends to investigate the professional development of two physics instructors through the lens of the TPACK framework. Moreover, this study spans an 18-week semester within both the contexts of Taiwan and China. Multiple data were collected and analyzed, including the pretest and posttest TPACK surveys, instructor interviews, in-class observations and students' feedback and opinions. The results revealed that John's instructional representations and strategies and technology integration and application scores increased significantly, as well as Mike's knowledge of students' understanding score showing a significant increase from the middle to the end of semester. John (Taiwan) emphasized life examples and the use of multimedia while Mike (China) chose to emphasize students' knowledge and evaluation. Such results showed different teaching characteristics in the two contexts. Implications and suggestions are put forward based on the results of this study."

Chang, Y., Tsai, M. F., & Jang, S. J. (2014). Exploring ICT use and TPACK of secondary science teachers in two contexts. *US-China Education Review, 4*(5), 298-311. Retrieved from http://davidpublishing.org/show.html?16439

Abstract:
"The aims of the study were to census and compare the technological pedagogical and content knowledge (TPACK) of secondary science teachers and their most used information and communication technology (ICT) in two contexts, Taiwan and Shaanxi Province in China. A questionnaire was employed to examine secondary school science teachers' most used ICT and their TPACK in science teaching. Eight hundred and six secondary science teachers from Taiwan and 164 teachers from Shaanxi participated in the study. The analytical results showed that multimedia was the most used ICT in Taiwan, followed by PowerPoint (PPT), Internet platforms, and interactive whiteboards (IWBs). In Shaanxi, PPT was the most used ICT reported by science teachers, followed by multimedia, IWBs, and Internet platforms. The findings indicated that in Taiwan, science teachers' TPACK was statistically significant in relation to different types of ICT, whereas in Shaanxi, science teachers' TPACK did not demonstrate significant difference. In Taiwan, science teachers who reported their most used ICT to be multimedia were found to show significant differences in TPACK according to gender and teaching experience. In Shaanxi, science teachers who reported their most used ICT to be PPT did not show any significant difference on TPACK by gender; however, they showed significant differences on TPACK in regard to teaching experience. The research implications of this study are provided below along with suggestions for future research. "

Chea, P. & Vibulphol, J. (2014). Proposed guidelines for developing primary English teacher training programs for provincial teacher training colleges, Kingdom of Cambodia. *Online Journal of Education, 9*(1), 487-491. Retrieved from http://www.edu.chula.ac.th/ojed/doc/V91/v91d0037.pdf

Abstract:
"The purpose of this research was to propose guidelines for developing primary English teacher training programs in Cambodia. Specifically, the objective was to ascertain the aims, key competencies, and content domains for developing primary English teacher training programs for Provincial Teacher Training Colleges (PTTCs) in the Kingdom of Cambodia. The study employed three rounds of an online Delphi survey. The three rounds were used to identify, prioritize, and classify the aims with key competencies and content domains. The survey lasted for 14 weeks. A panel of English curriculum designers and English teacher trainers from the Cambodian Ministry of Education, Youth and Sports were invited to participate as the experts. The questionnaire was generated from documentary research of primary English teacher education programs in several ASEAN countries based on the TPACK framework. The data were analyzed quantitatively and qualitatively according to the responses received. Percentages and content analysis were employed in the data analysis.

The findings of the Delphi survey were used to propose the guidelines for developing primary English teacher training programs at PTTCs in Cambodia. The guidelines consist of 5 aims, 14 key competencies, and 15 content domains."

Engida, T. (2014). Chemistry teacher professional development using the technological pedagogical content knowledge (TPACK) framework. *African Journal of Chemical Education, 4*(3), 2-21. Retrieved from http://www.ajol.info/index.php/ajce/article/view/104084

Abstract:
"The knowledge base for teaching was considered to be the pedagogical content knowledge (PCK) conceptualized in the mid-1980s. But with the advent of modern technologies, information and communication technologies (ICTs) are becoming part of the day-to-day life of teachers and students. It was thus argued in the mid-2000s that the knowledge base for teaching in the 21st century is the technological pedagogical content knowledge (TPCK/TPACK). As such TPACK is not a professional development model; rather it is a framework for teacher knowledge. We have thus developed and validated an ICT-enhanced teacher development (ICTeTD) model and the corresponding standards and teacher training modules based on the TPACK framework. This paper demonstrates this innovative model with examples from Chemistry."

Garcia, D., Dominguez, A., Stipcich, S. (2014). The TPACK model as a framework to teach electrostatic simulations. *Latin American Journal of Physics Education, 8*(1). 81-90. Retrieved from http://www.lajpe.org/march14/10_LAJPE_879_Daiana_Gracia.pdf

Abstract:

"This paper is part of a broader research work which aims to contribute to the analysis and reflection of the teaching and learning of science when these technologies are incorporated. New technologies among which include educational software is a valuable tool, if accompanied by a specially designed teaching proposal. A review article presents research that addresses the teaching and learning of electrostatics."

Herring, M., Thomas, T., & Redmond, P. (2014). Special editorial: Technology leadership for preparing tomorrow's teachers to use technology. *Journal of Digital Learning in Teacher Education, 30*(3), 76-80. doi: 10.1080/21532974.2014.891875

Abstract:
"Teacher education leaders must attend to leadership practices that set direction, develop people, and redesign their programs of teacher education to develop technology, pedagogy, and content knowledge (TPACK) and skills in preservice teachers. This special editorial shares the results of a leadership-strand discussion at the past two National Technology Leadership Summits (NTLS) focused on good teaching and organizational change that incorporates TPACK-based practices. It highlights focus-group results from College of Education deans, the American Association of Colleges for Teacher Education (AACTE) Innovation & Technology Committee, and other leaders attending NTLS regarding context-specific products and processes needed to create change in teacher education at the local level."

Hong, J. E., & Stonier, F. (2014). GIS in-service teacher training based on TPACK. *Journal of Geography*. Advance online publication. doi:10.1080/00221341.2014.947381

Abstract:
"This article introduces the geographic information systems (GIS) in-service teacher training, focusing on the intersection of technological, pedagogical, and content knowledge (TPACK) for successful implementation of GIS in the classroom. Eleven social studies teachers in Georgia learned GIS technologies, inquiry-based learning, and social studies so that they could create technology-enhanced and inquiry-based lessons using GIS technologies. This article reports participating teachers' opinions and attitudes of the TPACK-based GIS training. It also reports useful pedagogical methods of introducing GIS technologies to students and additional support for teachers to help them use GIS in their classrooms more often."

Kharade, K., & Peese, H. (2014). Problem-based learning: A promising pathway for empowering preservice teachers for ICT-mediated language teaching. *Policy Futures in Education, 12*(2), 262-272. doi: 10.2304/pfie.2014.12.2.262

Abstract:
"Information and communication technology (ICT) has become a prominent part of education and offers numerous means of improving teaching and learning in the classroom. However, the tendency to take the teacher education curriculum for granted and the assumption that it adequately prepares teachers for the integration of ICT into their teaching practice need to be questioned. Recent studies on technology have shifted from

the emphasis on technology skills alone to integrating pedagogy and content with technology, which is termed technological pedagogical content knowledge (TPACK). Deeper understanding of how TPACK can be cultivated is needed. This design-based research explored how a problem-based learning approach can help preservice language teachers to develop TPACK and impact their teaching practices. Data was collected via self-progress surveys, ICT-mediated language lesson plans, reflections by the preservice teachers, student-produced artefacts, records of instructional design and log entries by the facilitators. Based on the survey data, the preservice teachers believed that they had developed TPACK. By comparing the qualitative data, it was discovered that the preservice teachers became better positioned to use ICT in their teaching practices. The shift from teacher-centeredness to student-centeredness was also observed in their instructional planning. The problem-based learning approach created critical but safe opportunities for preservice teachers to better understand that while using technology, teachers may have to re-evaluate their teaching practices and to rethink the nature and scope of the subject for which it will be used."

Koh, J. H. L., Chai, C. S., & Tay, L. Y. (2014). TPACK-in-action: Unpacking the contextual influences of teachers' construction of technological pedagogical content knowledge (TPACK). *Computers & Education, 78,* 20-29. doi:10.1016/j.compedu.2014.04.022

Abstract:
"In school-based environments, teachers need to consider contextual factors such as the availability of technology and school policies as they apply TPACK to address instructional problems. However, qualitative TPACK studies tend to exemplify the seven TPACK constructs whereas its contextual influences have not been articulated in detail. This study describes TPACK-in-Action, a framework that can be used to visualize the interplay between TPACK and four contextual factors (Physical/Technological, Cultural/Institutional, Interpersonal, and Intrapersonal) that influence teachers' design of ICT lessons. This was used to analyze the lesson design discussions of 24 school teachers from a Singapore primary school who were teaching the levels of Primary 1, 4, and 5. Content analysis of the transcribed audio-recordings of teachers' discussions and chi-square analysis of coding frequencies found that when the logistics of lesson implementation as per the Cultural/Institutional category dominated group discussions, it curtailed the emergence of TPACK. When Intrapersonal factors such as beliefs of teaching and students were articulated and its pedagogical implications considered, it facilitated TPACK. Furthermore, the team facilitated by an experienced educational technologist also demonstrated higher occurrences of TPACK. These results suggest that for ICT innovation to be effective, the composition of design teams need to be carefully considered. Teachers also need to develop competencies to facilitate and discourse about design such that contextual concerns can be turned into opportunities to support pedagogical improvement."

Koh, J. H. L., Chai, C. S., Hong, H.-Y., & Tsai, C.-C. (2014). A survey to examine teachers' perceptions of design dispositions, lesson design practices, and their relationships with technological pedagogical content knowledge (TPACK). *Asia-Pacific Journal of Teacher Education*. Advance online publication. doi:10.1080/1359866X.2014.941280

Abstract:

"This study investigates 201 Singaporean teachers' perceptions of their technological pedagogical content knowledge (TPACK), lesson design practices, and design dispositions through a survey instrument. Investigation of these constructs reveal important variables influencing teachers' perceptions of TPACK which have not yet been explored. The confirmatory factor analysis and reliability analysis confirm the validity and reliability of the instrument. The structural equation model shows that the teachers' perceptions of design dispositions (orientations towards design) and lesson design practices (approaches used for lesson design) have direct relationships with the teachers' perceptions of TPACK. The results of this study show that to enhance teachers' TPACK perceptions, teacher educators need to help teachers develop lesson design practices that support ideation and iteration. They also need to develop teachers' design dispositions that are amenable to exploring and resolving conflicting lesson design ideas. Going beyond TPACK, understandings of teachers' lesson design practices and design dispositions are important for teacher educators to better design professional development for integration of information and communications technology."

Koh, J. H. L., Chai, C. S., & Tsai, C. (2014). Demographic factors, TPACK constructs, and teachers' perceptions of constructivist-oriented TPACK. *Journal of Educational Technology & Society, 17*(1), 185-196. Retrieved from http://www.ifets.info/journals/17_1/16.pdf

Abstract:

"Teachers' knowledge for implementing constructivist instruction with technology is termed as their constructivist-oriented technological pedagogical content knowledge. There are currently no available surveys for understanding teachers' perceptions in this aspect. Therefore, teachers' perceived knowledge gaps in terms of constructivist-oriented technology integration are not well understood. Using the Technological Pedagogical Content Knowledge for Meaningful Learning Survey, this study examines the constructivist-oriented technological pedagogical content knowledge perceptions of 354 practicing teachers. The survey was first validated through exploratory and confirmatory factor analyses. Regression analysis found that teachers' perceptions of technological pedagogical knowledge, technological content knowledge, and technological knowledge had the largest positive relationships with their constructivist-oriented technological pedagogical content knowledge. It was not related to teachers' age and gender but primary school teachers and those with more teaching experience tend to be less confident of their constructivist-oriented technological pedagogical content knowledge. These results show that when teachers develop intermediate forms of technological pedagogical content knowledge, it contributes to their confidence for constructivist-oriented technology integration. The specific challenges faced by experienced teachers and primary school teachers need to be better understood and considered when designing teacher technology professional development."

Kopcha, T., Ottenbreit-Leftwich, A., Jung, J., & Baser, D. (2014). Examining the TPACK framework through the convergent and discriminant validity of two measures. *Computers & Education, 78*, 87-96. doi: 10.1016/j.compedu.2014.05.003

Abstract:
"The purpose of this multiple case study was to critically evaluate the Technological Pedagogical Content Knowledge (TPACK) framework by examining the convergent and discriminant validity associated with two popular TPACK measures. Twenty-seven preservice teachers completed the Schmidt et al. (2009) survey and their planning documents were analyzed using the Harris et al. (2010) rubric. A Spearman rank order correlation on the two measures revealed low levels of convergence within similar constructs and a lack of discrimination between dissimilar constructs. Holistic narrative analysis of end-of-course portfolios supported the rubric scores overall. Recommendations for re-examining the measures and the TPACK framework itself are discussed."

Lee, C. J., & Kim, C. (2014). An implementation study of a TPACK-based instructional design model in a technology integration course. *Educational Technology Research and Development, 62*(4), 437-460. doi: 10.1007/s11423-014-9335-8

Abstract: "The purpose of this study was (a) to develop an instructional design model for preservice teachers' learning of technological pedagogical content knowledge (TPACK) in multidisciplinary technology integration courses and (b) to apply the model to investigate its effects when used in a preservice teacher education setting. The model was applied in a technology integration course with fifteen participants from diverse majors. Data included individual participants' written materials and TPACK survey responses, group lesson plans, and the researchers' field notes. The data analysis results revealed that: (1) the participants had difficulties understanding pedagogical knowledge (PK), which hindered their learning of integrated knowledge of TPACK and (2) their learning of TPACK was the combination rather than the integration of PK, technological knowledge, and content knowledge. Suggestions and implications for refining the model and future research possibilities are discussed."

Loong, E. Y. K. (2014). Using the Internet in high school mathematics. *Journal on Mathematics in Education*, *5*(2), 108-126. Retrieved from http://ejournal.unsri.ac.id/index.php/jme/article/download/1496/543

Abstract:
"Whilst the technological, pedagogical and content knowledge (TPACK) model has been increasingly adopted for understanding teachers' use of technology, there have been many calls for greater discussion about the constituent constructs, their relationship with one another and the central TPACK. This paper analyses qualitatively the TPACK demonstrated by the teacher of a Year 11 class who used web-based simulated contexts and interactive web objects in a Mathematics Studies course. The findings indicate aspects of TPK relating to academic learning time and the transformational mode of the technology were not fully realised in this case study. The implications these has for teacher professional development are discussed."

Magen-Nagar, N., & Ungar, O. A. (2014). The effect of PICTK and TPACK knowledge on ICT instructors' sense of empowerment. *International Journal of Learning, Teaching and*

Educational Research, 5(1), 48-62. Retrieved from
http://www.ijlter.org/index.php/ijlter/article/view/60/pdf

Abstract:
"The implementation of technology in the national Information and Communication Technology (ICT) program is supported by instructors who act according to the program's outputs. The current research has two goals: to examine the predictive variables of ICT instructors who instruct at the district level (henceforth: "district ICT instructors") compared to ICT instructors who instruct at both the district and the school level (henceforth: "district-school ICT instructors") and to examine Program Information Communication Technology Knowledge (PICTK) and Technology Pedagogy and Content Knowledge (TPACK) potency on the ICT instructors' sense of empowerment for facilitating the implementation of ICT in the schools. One hundred and twenty one ICT instructors participated in the research: 77 "district ICT instructors" (64%) and 44 (36%) "district-school ICT instructors". The research tool consisted of four self-report questionnaires. Path analysis was performed using structural equation analysis. The main results show that PICTK knowledge has a significant positive effect on TPACK knowledge among the "district ICT instructors", whereas there was no change among the "district-school ICT instructors". The results indicate that PICTK and TPACK knowledge does not necessarily promote the pedagogical-ICT knowledge of the ICT instructor, but is critical for his or her sense of empowerment. It is therefore recommended to continue the support for all ICT instructors, and to expand their personal knowledge about the evolving ICT program."

Messina, L., & Tabone, S. (2014). Technology in university teaching: An exploratory
research into TPACK, proficiency, and beliefs of education faculty. *CADMO, 22*(1). 89-110. doi: 10.3280/CAD2014-001009

Abstract:
"Research into technology integration in teaching has for a long time studied
school instructional practices and teacher professional development (e.g., Lawless & Pellegrino, 2007) or preservice teacher training (Kay, 2006; Tondeur, van Braak, Sang, Voogt, Fisser, & Ottenbreit-Leftwich, 2011), and, more recently, technology integration in higher education and faculty professional development (Mishra, Koehler, & Zhao, 2007; Surry, Stefurak, & Gray, 2011)."

Moroney, M., & Haigh, M. (2011). A lens on educational technology professional
development opportunities: development of a general purpose technological, pedagogical and content knowledge questionnaire. *Journal of Applied Research in Education, 15*(1), 1-16.

Abstract:
"The purpose of this study is to develop a questionnaire that may be used to measure teacher perceptions of their technological, pedagogical and content knowledge (TPACK). It is evident that for teachers to use digital technologies effectively in classrooms they benefit from not simply knowing about digital technology, pedagogy, and content, but also the interplay between these three knowledge domains. Given that it may be impractical to

develop separate TPACK instruments for every educational setting researchers in this study explored the feasibility of developing a general questionnaire that may be administered to teachers in primary or secondary schools. This paper describes the resultant TPACK questionnaire development and testing processes. Results of testing indicate the questionnaire is reliable as indicated by satisfactory subscale and overall Cronbach's alpha scores. The coefficient of stability (r=0.94), calculated using a test-retest procedure, was also satisfactory. Correlation coefficients between subscales were mostly significant at the 0.05 level (2-tail), calling into question the distinctiveness of the 7 domains measured. This study represents a preliminary approach to measuring teacher perceptions of their own TPACK. This is especially important at this time as it necessary to find ways to accurately target audiences with continuing professional development that meets teacher requirements. Suggestions for further research are discussed."

Pico, S. (2013). ICT teacher training to ensure successful integration of technology. *Revista de Filologia*, *4*, 65-80. doi:10.14198/ITACA2013.4.03

Abstract:
"This article defines some keys that make integrating technology into the curriculum a clear and simple process, underlining the strengths that teacher training should reflect on, both initial and lifelong learning. Taking into account methodological training, we try to find the balance where TPACK methodology (Technological Pedagogical Content Knowledge) may be the answer to ICT teachers training. We need to go a step further in this matter, expanding our horizons to a training characterized by a self-initiative, based on our personal learning environment - PLE. Finally, it is defined a set of optimal qualities that every teacher should have aimed at integrating ICT to improve student learning."

Rahmany, R., Sadeghi, B., & Chegini, A. S. (2014). Normalization of CALL and TPACK: Discovering teachers' opportunities and challenges. *Journal of Language Teaching and Research, 5*(4), 891-900. Retrieved from http://ojs.academypublisher.com/index.php/jltr/article/viewFile/jltr0504891900/9603

Abstract:
"The present study aims at investigating the effect of technology integration in general and normalization of CALL in particular on Iranian teachers' technological, pedagogical, and content knowledge (TPACK). It also examines teachers' main opportunities and challenges with normalization of CALL. In this regard, 16 teachers taught a course with the goal to integrate computer technology fully. The researchers implemented a TPACK questionnaire before and after the course and a semi-structured interview after the course. Observations also helped the researchers to gain a complementary understanding of the process of CALL normalization and how teachers deal with their new roles. The results revealed that technology-related knowledge domains developed significantly. The results also showed that Iranian educational society is highly sensitive to instructional technology and its use in education."

Sancar Tokmak, H. (2014). Preservice teachers' perceptions on TPACK development after designing educational games. *Asia-Pacific Journal of Teacher Education*. Advance online publication. doi:10.1080/1359866X.2014.939611

Abstract:
"This qualitative case study aimed to investigate Early Childhood Education (ECE) preservice teachers' perception of development in their technological, pedagogical, content knowledge (TPACK) after designing educational computer games for young children. Participants included 21 ECE preservice teachers enrolled in the course Instructional Technology and Material Design. The data were collected through focus group interviews, observations, and journals. The results indicated a perceived improvement in TPACK. Moreover, participants described initial difficulty designing educational computer games since they had limited technological knowledge (TK), design knowledge (DK), or experience designing educational computer games (TPACK). However, during the game design, specific TPACK was disseminated, and participants reported increased abilities in using technology and designing computer games for educational purposes."

Staus, N., Gillow-Wiles, H., & Niess, M. (2014). TPACK development in a three-year online master's program: How do teacher perceptions align with classroom practice? *Journal of Technology and Teacher Education, 22*(3), 333-360.

Abstract:
"A new primarily distance education Master's degree program was focused on the development of technological pedagogical content knowledge (TPACK) for integrating appropriate digital technologies in mathematics and science classes. In this mixed-method multiple case study, we documented in-service K-8 teachers' perceptions of their TPACK development through surveys and interviews. In addition, we conducted classroom observations to assess the degree of alignment between these perceptions and actual practice. The results indicated that teachers' perceptions of their TPACK development were generally positive, but were not always supported by evidence from classroom observations. This research indicates the importance of using multiple lines of evidence when investigating complex constructs such as TPACK and discusses possible reasons for lack of alignment between perception and practice."

Tseng, J. J. (2014). Developing an instrument for assessing technological pedagogical content knowledge as perceived by EFL students. *Computer Assisted Language Learning*. Advance online publication. doi:10.1080/09588221.2014.941369

Abstract:
"Researchers have been keen to develop instruments for the assessment of teachers' self-perceived technological pedagogical content knowledge (TPACK); however, few studies have been conducted to validate such assessment tools through students' perspectives in the context of English as a foreign language (EFL). The purpose of this study was thus to develop a TPACK instrument that can be utilized to investigate EFL students' perceptions of their teachers' TPACK. Thirty-five survey questions were initially created through a literature review and then reviewed by experts, teachers, and students. Exploratory factor

analysis was undertaken to ensure the validity of this scale and Cronbach's alpha was adopted to evaluate the internal consistency of the survey. The results revealed that the TPACK instrument was a valid and reliable tool for measuring EFL students' perceptions of their teachers' TPACK. Finally, suggestions are offered for future studies regarding the use of the TPACK instrument in the assessment of teachers' TPACK."

Wetzel, K., Buss, R., Foulger, T. S., & Lindsey, L. (2014). Infusing educational technology in teaching methods courses: Successes and dilemmas. *Journal of Digital Learning in Teacher Education, 30*(3), 89-103. doi: 10.1080/21532974.2014.891877

Abstract:
"In this action research study, we describe the implementation of a program to infuse technology in general methods courses as a requirement of a teacher preparation program. Results from teacher candidate focus groups revealed successes and dilemmas of infusing technology into the courses. Candidates ably described prospective use of elements of the Technological Pedagogical Content Knowledge (TPACK) model (Mishra & Koehler, 2006), but were less confident of their ability to develop and implement content-based lessons in which P–12 students employed technology to meet content and technology standards. Recommendations include continuing to fine-tune the new courses, providing more resources for professional development (PD), and encouraging instructors to participate in more PD leading to greater modeling of hands-on learning with a focus on content and pedagogical uses of technology."

Xiang, K., & Ning, L. (2014). Evaluating Chinese preservice mathematics teachers' knowledge of integrating technology in teaching. *Journal of Mathematics Education, 7*(1), 48-58. Retrieved from http://educationforatoz.com/images/2014-Article_4-_Kun_Xiang_Lianhua_Ning.pdf

Abstract:
"This study investigates the profile of Chinese preservice mathematics teachers' Technological Pedagogical Content Knowledge (TPACK) through a sample of 106 people. An adapted scale was developed and validated in the survey. From the data collected from the scale, the findings reveal that Chinese preservice mathematics teachers rated themselves as most competent in the factor of Content Knowledge (CK) and least competent in the term of TPACK. The survey also suggests that the scores of tech-related factors are generally lower than non-tech-related factors, which indicate that Chinese preservice mathematics teachers are more familiar with traditional ways of thinking and teaching mathematics. In addition, implications of the current survey in terms of Chinese mathematics preservice teachers' professional development are discussed."

3. Recent TPACK-Related Dissertations and Theses

Alzahrani, A. A. (2014). *The effects of instructors' technological, pedagogical, and content knowledge (TPACK) on online courses* (Doctoral dissertation, Texas Tech University). Retrieved from http://hdl.handle.net/2346/58720

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. Examining the relationship between instructors' TPACK and students' TPACK perceptions is important for getting a clear view of both of these important aspects of the educational process. The participants of this study were 46 online instructors and 618 students at King Abdulaziz University. This research is quantitative and an online survey was used to collect the data. 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. No significant correlations were found between the seven components of instructors' TPACK and students' TPACK perceptions and their attitudes. The results of this study reported several implications that might improve the online learning at King Abdulaziz University, such as professional development for online instructors and administrators. Moreover, understanding the role of technology and how to integrate the technology was a necessity for online instructors. Evaluation of the online learning policy was also recommended to help the Deanship of E-learning and Distance Learning to better implement the online courses."

Blackburn, H. A. (2014). *A mixed methods study: Assessing and understanding technology pedagogy and content knowledge among college level teaching faculty* (Doctoral dissertation, Drexel University). Retrieved from https://idea.library.drexel.edu/islandora/object/idea%3A4531/datastream/OBJ/view

Abstract:

"Online higher education has grown rapidly over the last decade. While online higher education has improved access for many students, it suffers from the problem of higher learner attrition. Student persistence engagement in online learning may be enhanced through improvements in instructor technology and pedagogy knowledge. This mixed-methods study on online learning is an exploration into the online instructional faculty's knowledge of integrated Technological, Pedagogical, and Content Knowledge (TPACK). TPACK has been used to assess teaching in the K-12 classroom setting and is currently being utilized as an assessment in the U.S. Department of Education's Race to the Top grant selection process. This study applied the TPACK framework to college level teaching faculty to assess their technology and pedagogy knowledge, their TPK, and TPACK. The primary research questions of this study were, "What is the level of TPACK among college level teaching faculty within a diverse college at a large, private four year university?", "What processes do online higher education instructors use in developing their technological pedagogical knowledge of new technologies?" and "What techniques do instructors with high TPACK utilize to engage online students?" The study began as a quantitative study and measured the level of TPACK among college level teaching faculty. A qualitative method

followed with one-on-one interviews of nine selected instructors demonstrating high TPACK components. Quantitative findings of the study indicate that there is high technology, content, pedagogy, and technological pedagogical knowledge amongst the college level teaching faculty within the xi college studied. The level of full, integrated TPACK amongst the faculty has not fully been explored due to limited data on content knowledge. Qualitative findings of the study indicate that the college level teaching faculty instructors are engaged in high impact practices with their online students that demonstrate their TPACK skills and that the college level teaching faculty use their TPK to assess inclusion of new technologies tools in the online classroom."

Burfield, C. (2013). *Determining the effects of situated instructional design utilizing the technological pedagogical content knowledge (TPACK) professional development framework* (Doctoral dissertation, Nova Southeastern University). Retrieved from http://flippedfaculty.com/Dissertation.pdf

Abstract:
"This applied dissertation was designed to address a gap in the research regarding teachers' technological pedagogical content knowledge (TPACK). This is important because the new Common Core State Standards (CCSS) in English language arts and literacy implemented beginning with the 2011–2012 school year reflect an integrated approach to teaching and learning with emphasis on 21st-century skills. The CCSS encompass reading, writing, speaking, listening, and language, with the processes of communication closely connected. Research and media skills are woven throughout the CCSS. The CCSS are to be infused into the content areas of science and social studies. The type of pedagogy implied in the CCSS reflects the abundance of research on 21stcentury teaching and learning. The CCSS emphasize a learner-centered pedagogy that focuses on real-life skills, such as communication, collaboration, higher order thinking, problem solving, creative thinking, and decision making, which can be facilitated through effective technology integration. Such integration of technology requires a learner-centered design and pedagogical approaches that recognize the importance of links among technology, pedagogy, and content. The TPACK professional development framework was used to design and evaluate a CCSS-based unit of instruction."

Fanni, F. (2014). *Confidence in technology use:* the development and validation of a technological, pedagogical, and content self-efficacy scale for teachers*. (Doctoral dissertation, Università della Svizzera italiana). Retrieved from http://doc.rero.ch/record/210297

Abstract:
"This thesis is positioned at the intersection of education, technology, and motivation research fields, specifically in the context of K-12 teaching. The purpose of this study is to investigate the relationship between teachers' self- efficacy and their technology use, and design and validate a self-efficacy measure to assess teachers' beliefs about technology use in their profession. This measure is based on the Technological, Pedagogical and Content knowledge (TPACK) framework (Mishra & Koehler, 2006) and on the standards put forth

by the International Society for Technology in Education (ISTE) and by the Partnership for 21st Century Skills (P21). In today's so-called "Information Society," technology is pervading every aspect of our life, and the education sector is no exception. On the one hand, the increased presence of technology demands teachers to be proficient in its use. On the other, a high level of technological knowledge and skills does not necessarily mean that a teacher is effective at implementing those skills in his or her classroom (or life). As Pajares pointed out, "what we know, the skills we possess, or what we have previously accomplished are not always good predictors of subsequent attainments because the beliefs we hold about our capabilities powerfully influence the ways we behave" (Madewell & Shaughnessy, 2003, p. 381). Consequently, behavior can be often better predicted by the beliefs people have about their capabilities to accomplish a particular task than by their actual capabilities (Bandura, 1977). This thesis contributes to the literature on teacher development and motivation in using technology. Firstly, it presents a psychometrically sound instrument to assess teachers' efficacy perceptions about working with and using technology in their profession. The scale, named Self-efficacy for TPACK scale, is composed of 20 items, organized in three subscales: Technological Pedagogical Self-Efficacy (11 items), Technological Content Self-Efficacy (6 items), and Technological Pedagogical Content Self-Efficacy (3 items). Secondly, this study illuminates the role played by years of teaching experience, professional development with technology, age, gender, ethnicity, and school level in the development of teacher self-efficacy for TPACK. On one hand, experienced teachers reported to have less confidence in technology use. On the other hand, teachers who received extensive/moderate professional development with technology reported higher levels of self-efficacy for TPACK. The role of teacher training in technology use emerged to be essential in increasing their self-efficacy for TPACK. No significant differences were detected in self-efficacy for TPACK as function of gender, ethnicity, and school level. Finally, this research confirms the role of self-efficacy in predicting teachers' use of technology. Results indicate that self- efficacy for TPACK positively predicts teachers' technology use. These findings shed more light on the role played by teachers' self-efficacy in the technology integration process, as one of the significant indicators of teachers' technology use."

Friedrich, L. A. (2014). *New literacies integration by student teacher/cooperating teacher dyads in elementary schools: A collective case study* (Doctoral dissertation, University of Nebraska). Retrieved from http://digitalcommons.unl.edu/cehsdiss/214/

Abstract:
"Situated in Technological Pedagogical Content Knowledge (TPACK) and collaborative inquiry, this collective case study examines new literacies integration by student teacher/cooperating teacher (ST/CT) dyads supported by a coach in elementary schools. The study took place at a large Midwestern public school district where many STs from a large Midwestern public university complete their student teaching experience. Through detailed vignettes of five ST/CT dyads, this study provides an explicit view of varieties of dyad collaboration when a new literacies emphasis is included in the student teaching semester. Research questions prompt the examination of dyad new literacies integration through (a) enacting professional development in the classroom, (b) planning lessons to involve children with new literacies and (c) impacting dyad collaboration. ST and CT

detailed descriptions provide a valuable insight into processes and effects of this integration focus. Lessons learned include collaborative approaches to integration that work, teacher growth comes with empowerment, and dyad partners become learners together when adding a new literacies focus. An innovative student teaching design arises to prepare teachers for 21st century classrooms."

Gehrett, M. (2014). *Investigating the use of mobile technology for classroom instruction: A case study of two K-12 Christian schools* (Doctoral dissertation, George Fox University). Retrieved from http://digitalcommons.georgefox.edu/edd/30/

Abstract:
"How useful is the Technological Pedagogical Content Knowledge (TPACK) model in analyzing and explaining teacher effectiveness in the use of technological tools for teaching and learning? One way a researcher can answer this question is to apply the TPACK model to specific cases such as the Christian school environment. As a result, the purpose of this case study was to explore the connections between the use of mobile computing technology, system wide factors that promote successful implementation, and a teacher's technological pedagogical content knowledge (TPACK) on classroom instruction in two K-12 Christian schools in the Central Valley of California. Specifically, profiles of each school were developed utilizing online surveys, classroom observations, review of technology planning documents, personal interviews with the administration, and focus groups of the school staff. Using the data derived from these various sources; a greater understanding was developed regarding the use of mobile computing technology for classroom instruction, system wide factors that promote successful implementation, and changes in the teaching practice of teachers. Implications and ideas for future research were shared regarding the use of mobile technology for K-12 classroom instruction."

Gravel, R. J. (2014). *The effects of pre-kindergarten through twelfth grade in-service teachers' participation in a professional development course aligned with the TPACK framework* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3624794)

Abstract:

"This mixed-methods data collection study explored the effects of a professional development course aligned with the TPACK framework on pre-kindergarten through twelfth grade in-service faculty members. In an effort to provide an authentic professional development learning experience, faculty members enrolled in a graduate-level technology integration course that was hosted within a school district facility and facilitated by the district's instructional technology director.

This study utilized a pre/post survey administration to measure the growth of faculty members' technology integration knowledge, supported by feedback from the faculty members collected in during a focus group reflection meeting. Units of study were defined within the course's syllabus, and were supplemented as necessary to support the needs of the faculty members.

The findings indicated that there was a significant difference between the mean pretest and posttest scores for the TK, CK, TCK, TPK, and TPACK areas, identifying that the faculty member's technology integration knowledge increased as a result of their participation in the course. The evidence also indicated that the structure of the course, development of a professional learning community, and development of a deep understanding of technology tools led to the growth of students."

Holland, D. D. (2014). *Technological, pedagogical, and content knowledge (TPACK) competencies of preservice teachers at a small rural university* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3615136)

Abstract:
"Some members of the millennial generation entered postsecondary education at the end of the first decade of the 21st century. From 1980–2009, the importance of technology training for preservice teachers was increasingly recognized. During this same time period, administrators and educators of teacher education programs were urged to prepare preservice educators to implement successfully 21st century skills into their teaching. Preservice education researchers who have developed Technological, Pedagogical, and Content Knowledge (TPACK) models have not integrated the motivation construct. For understanding human behavior generally and learning behavior specifically, motivation has been identified as a key construct. Researchers developed a motivation model that combined Ajzen's theory of planned behavior with Ryan and Deci's self-determination theory. However, they did not integrate a valid measure of a learning behavior construct into their model. Consequently, an opportunity exists to begin synthesizing the TPACK model and motivation model. The purpose of this quantitative study was to examine the relationship between TPACK competencies and motivation of millennial preservice teachers at a small rural university in Montana in order to improve learning behaviors. The 85 participants were millennial preservice teachers from one small rural university in Montana. For the 21 correlational relationship hypotheses, seven null hypotheses were rejected. For the seven predictive relationship hypotheses, none of the null hypotheses were rejected, indicating that there were no predictive relationships between all three independent variables and the dependent variable. Consequently, to answer the seven research questions, there was only a limited relationship between the three motivation variables and the seven TPACK competencies variables, among a sample of millennial preservice teachers at a small rural university in Montana. For practitioners, the researcher recommended that instructors of preservice teachers and preservice teachers should begin to consider the role that motivation plays in learning and how motivation affects specifically technology domains, pedagogical domains, and content domains. Learners in these knowledge domains may be motivated contingently such that either intrinsic motivation or extrinsic motivation works better sometimes, but not all the time for a specific knowledge domain."

Kaalberg, K. F. (2014). *Enhancing teaching and learning through iPad integration in a clinic-based literacy course* (Doctoral dissertation, University of Nevada, Las Vegas). Retrieved from http://digitalscholarship.unlv.edu/thesesdissertations/2101/

Abstract:

"A re-conceptualized clinic-based literacy methods course offered the opportunity to engage participants with digital media, i.e., iPads, as a part of reading and writing instruction. This multiple case study highlights the experiences of those involved with the course: two instructors, 18 teacher candidates, and the 18 elementary tutees who received literacy tutoring. Framed through a new literacies perspective and TPACK framework, the study focused on teacher candidates' use of iPads with their literacy instruction of elementary tutees, tutees' learning experiences, and the ways in which course instructors' TPACK was influenced.

Data collection involved multiple case study methodology (Merriam, 1998; Yin, 2003, 2009) and consisted of interviews, collaborative discussions, observation and field notes, artifacts, and surveys. Data analysis involved open coding and axial coding, utilizing additional analytic tools, and drawing from a TPACK content analysis. Categories were constructed and grouped together to form constructs.

Four themes formed; honoring course instructors and teacher candidates as learners, tutee motivation and engagement, challenges with using technology creates tension, and broadening literacy perspectives. The findings indicate course instructors and teacher candidates integrating technological, pedagogical, and content knowledge as they learned about and with iPads in a supportive environment that encouraged their learning. Teacher candidates utilized digital media with their literacy instruction as they provided tutees opportunities to engage with a variety of literacies. A key implication for this study involves issues of domestication, where technology is placed into existing structures rather than being recognized for the new possibilities it creates."

Lu, L. (2014). *Learning by design: Technology preparation for "digital native" preservice teachers* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3620477)

Abstract:

"Effective technology integration in teaching requires teachers to construct technological pedagogical content knowledge (TPACK). To help teachers develop TPACK, the learning environment must address the situated nature and complex interplay of technology, pedagogy and content. Learning By design (LBD) has been proposed as one promising instructional model to create such a learning environment. To explore effective and theory-grounded technology instruction for digital native preservice teachers, an LBD environment was designed, developed and implemented in a technology integration course for preservice teachers. Using design-based research methodologies, this dissertation research study is intended to explore whether LBD is effective in helping digital native preservice teachers develop TPACK, how LBD takes effects, and what improvement can be made to the learning environment.

This dissertation is in multi-paper format and consists of four individual papers. Each paper focuses on one aspect of the research study. In paper #1 (Chapter 1),Learning by

Design: Technology Preparation for Digital Native Preservice Teachers, the researcher describes the research purposes, the theoretical framework and instructional design model behind the courses, and the application of LBD in a technology integration course for preservice teachers. In addition, as the first paper in this multi-paper dissertation, the researcher also introduces the research design and methods of the study.

In paper #2 (Chapter 2), Learning By Design for Preservice Teacher Technology Preparation: How Effective Is It and in What Ways, the researcher examined whether an LBD environment is effective in helping preservice teachers develop TPACK, and described how the participants perceived the effectiveness of LBD. The results indicated that LBD can be an effective instructional theory in designing learning environments to facilitate preservice teachers' TPACK development. The participants generally agreed that LBD was helpful for them to learn about teaching with technology. They felt more comfortable with and confident in using technology in their teaching. Recommendations are made for future research and practices.

In paper #3 (Chapter 3), Using Live Dual Modeling to Help Preservice Teachers Develop TPACK, the researcher investigated whether a Live Dual Modeling strategy in the LBD environment was effective in helping preservice teachers develop TPACK and what conditions influenced the use of this strategy. The findings showed that preservice teachers demonstrated the initial ability to transfer what they learned in the modeling to real-world classroom teaching. When Live Dual Modeling is used, attention should be paid to the conditions that influence the effectiveness of the strategy due to preservice teachers' limitations in their overall knowledge base, practical experience, and ability to transfer learning to other contexts.

Paper #4 (Chapter 4), Cultivating Reflective Practitioners in Technology Preparation: Constructing TPACK through Reflection, investigated the participants' TPACK development as manifested in their reflection journals and how reflection helped preservice teachers construct TPACK. Through content analysis of the participants' reflection journals, the researcher found that the preservice teachers constructed their initial TPACK awareness. However, their TPACK development was incomplete and superficial. Interviews with the participants showed that reflection helped them describe and elaborate on their technology integration experience, be more confident in their ability to use technology for teaching, and be more reflective and open-minded about using technology in classrooms. Finally, the researcher discussed this study's implications for teacher educators and researchers."

Matas, J. (2014). *The impact of digital education on learning and teaching* (Doctoral dissertation, Northeastern University). Retrieved from http://iris.lib.neu.edu/education_theses/190/

Abstract:
"The purpose of this study was to identify how teachers can transform teaching and learning by integrating 21st century digital technology. In this paper, teacher action

research was used to investigate the impact of digital education on teaching and learning. The main research question was 'How can teachers integrate digital technology into their teaching practice in order to transform teaching and learning?' The study was conducted in a suburban Jewish day school in the Northeast, in the teacher-researcher's seventh and eighth grade social science classes. In an iterative cycle of research, reflection and revision, the teacher-researcher integrated technology interventions into his teaching while also collecting data. Two surveys and one interview were conducted to triangulate the data collected from examining student work and the teacher's reflexive journal. The findings from the study suggest: (a) student motivation can lead to deeper student engagement; (b) digital projects can represent a 'high water mark' of student learning; (c) the teacher's technological-pedagogical content knowledge (TPACK) is vitally important and (d) technology has tremendous potential to contribute to constructivist learning environment. Teacher choices determine whether student enthusiasm translates into deeper engagement with course content. Digital assignments that encourage deeper student learning were identified as representing a 'high water mark' of student learning, where the finished project captures the depth of the students' conceptual understanding. This did not always occur and was dependent on alignment between the assignment goals, students and technology. The implications for this research are that teachers must learn to apply their emerging TPACK in order to effectively integrate technology into their teaching. Even when teaching with technology, teaching and teacher still matter."

Owusu, K. A. (2014). *Assessing New Zealand high school science teachers' technological pedagogical content knowledge* (Doctoral dissertation, University of Canterbury). Retrieved from http://hdl.handle.net/10092/9254

Abstract:
"Technological pedagogical content knowledge (TPACK) is the knowledge required for effective technology integration in teaching. In this study, New Zealand high school science teachers' TPACK was assessed through an online survey. The data and its analysis revealed that New Zealand's high school science teachers in general had a high perception of their understanding of TPACK and its related constructs. Science teachers had high mean scores on all the constructs on a five- point Likert scale except technological knowledge. There is thus an indication that science teachers in New Zealand perceived themselves as being able to teach with technology effectively. Correlation analysis revealed that all six constructs correlated significantly with TPACK (also referred to as TPCK). Multiple and stepwise regression analyses revealed that Technological Pedagogical Knowledge (TPK) and Technological Content Knowledge (TCK) made statistically significant unique contributions to Technological Pedagogical Content Knowledge (TPCK). Pre-registered teachers indicated that their levels of TCK and Pedagogical Content Knowledge (PCK) were lower than more experienced teachers. This implied that recently graduated teachers found it difficult to appropriate the affordances of technology to affect the content they taught. Also, these recently graduated teachers lacked the experience to represent content in a format that made it comprehensible to their learners. The contextual factors that influenced teachers' use of technology as well as teachers' TPACK levels were investigated through multiple embedded case studies of six teachers who were regular users of technology in their teaching. The case studies revealed that science teachers used technology to support

inquiry learning in a wide range of ways in lower levels of high school but mostly to clarify concepts and theories when it came to the senior level of high school. Teachers demonstrated different levels of expertise and engagement in the use of technology for transferring different types of knowledge from one teaching and learning context to another and for addressing differences amongst learners. This signalled that science teachers' TPACK apparent developmental levels shifted depending on the context of the assessment requirements of the students. This is a major finding in this study because although previous researchers have assumed that context influences teachers' TPACK characteristics and development, this study provides evidence of how specific aspects of context influences teachers' TPACK. This evidence shows examples of how the development of an individual's TPACK can be considered as dynamic where the interacting constructs and characteristics shift and change based on the context. The recommendations from this study propose that teacher education programmes should ensure that there is a focus on teaching preservice teachers how to appropriate the affordances of technology to teach specific content instead of teaching one technology skills based course. The evidence from this study indicates that teachers in New Zealand schools use collegial approaches in the use of technology. Therefore professional learning programmes should target groups of teachers in the same school or cluster of schools rather than targeting individual teachers. This will enable teachers to share ideas and provide leadership for their colleagues in terms of how to use technology. Again, technology related professional development programmes should move away from enriching teachers' technological skills to emphasising how teachers can appropriate the affordances of technology in their classroom practices to meet their instructional goals as well as students' learning outcomes. There is a consequent obligation for teacher educators, educationists and stakeholders to enable teachers to understand how best to harness the increased knowledge retrieval capacity that Information and Communication Technology affords, its information sharing abilities as well as the capacity to engage young people to act as experimenters, designers and creators of knowledge."

Qi, Y. (2014). *Action research on TPACK enhance students' teaching competency-based media applications* (Master's thesis, Central China Normal University). Retrieved from http://cdmd.cnki.com.cn/Article/CDMD-10511-1014236673.htm

Abstract (Chinese to English translation using Google):
"In the education information comprehensively promote the background, building more and more attention of highly qualified teachers, and instructional media application capability is an information age, teachers must have the ability, and accordingly attention in it also rising. Normal students as prospective teachers in the information age, not only to master the disciplines solid professional knowledge, but also to have the capability of teaching media applications. In order to improve the normal students of instructional media application capabilities, our school opened a modern educational technology experimental class, which offers a variety of instructional media practice opportunities for students to operate as a clue, so that normal students in the operating practice gradually acquired the ability to apply the teaching of media form the instructional media effectively applied awareness teaching. In recent years, the interactive whiteboard is widely used in primary and secondary schools, our school based on this situation, the addition of the

"interactive whiteboard" pilot project in modern educational technology experiment lesson, however, the effect of the experimental project of teaching is unsatisfactory The reason is mainly the following problems: classroom time is short, learning task; weak students existing knowledge base; students to explore their own too, ignoring leading role of teachers; lack of teaching resources in the application of resources. Proposed after the teacher TPACK knowledge framework is defective in reflection WebQuest and TELS integration of these two phases is about technology integration in the teaching process in order to promote deep thinking student learning, trying to correct only the first two phases emphasis on technology or student application technology while ignoring the role of teachers in the teaching process to guide the trend, emphasizing the search for solutions to the problem from a technical teaching, teaching, teaching content in three cross. This study will TPACK framework introduced to "interactive whiteboard" experimental project, teaching from teaching resources, teaching strategies, technical support and other aspects of the design of pilot projects and to carry out action research-based, continue to find the problem and improve the experimental project instructional design, trying to solve the existing problems in teaching, thus achieving the goal of enhancing the ability Students' Teaching media applications, and finally summarizes some of the principles used in modern educational technology TPACK framework experimental course according to research practices. This paper is divided into five chapters, the main content of each chapter is as follows: The first chapter in the description of the background papers, analysis, based on current research, explained the significance of this research, research methods and research programs designed . The second chapter provides an overview of the theoretical basis of this study, including the TPACK framework, learning community theory, situated cognition theory, analysis, and discusses the essence of these theories and guiding significance for the study. The third chapter details how, under the guidance TPACK framework, drawing on learning community theory, the essence of situational cognitive theory to design interactive whiteboard teaching experimental projects. Instructional design of pilot projects in the analysis learner characteristics, on the basis of learning needs to clarify learning goals, and then from teaching resources, teaching strategies, technical support three aspects of the detailed design of the teaching process, and briefly describes the teaching evaluation method, the final A sound instructional design experiments TPACK interactive whiteboard Chapter IV action research project on teaching design applications based pilot project was introduced. Feedback This study conducted two rounds of action research, using questionnaires, interviews, and writing assessment scale study to reflect a combination of learning-related data collection and learning, and then analyze TPACK framework for learner instructional media applications Capacity. Chapter V of the entire research process to be concluded during the study to reflect the lack of follow-up research work and prospects."

Tai, S. (2013). *From TPACK-in-action workshops to English classrooms: CALL competencies developed and adopted into classroom teaching* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3597398)

Abstract:
"As researchers in the CALL teacher education field noted, teachers play the pivotal role in the language learning classrooms because they are the gate keepers who decide whether

technology or CALL has a place in their teaching, and they select technology to support their teaching, which determines what CALL activities language learners are exposed to and how learners use them (Hubbard 2008). While a considerable amount of research related to CALL teacher education has focused on teachers' attitudes, beliefs, and confidence regarding CALL (e.g., Kamhi-Stein, 2000; Kassen & Higgins, 1997; Lam, 2000; Peters, 2006; van Olphen, 2007), there are very few studies that have investigated the impact of CALL teacher education programs (Desjardins & Peters, 2007; Hegelheimer, 2006; Kessler, 2007; Kilickaya, 2009). These studies reported that teachers confirmed their learning and adoption of CALL into their classroom teaching; however, the findings are based on self-report data, which are insufficient for capturing actual classrooms CALL integration. Citation reproduced with permission of ProQuest LLC. Abridged abstract reproduced with the permission of ProQuest LLC. Full text available at URL below."

Wehrle, T. (2014). *Teaching digital natives: Preservice teacher preparedness to use technology in the classroom* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3623577)

Abstract:
"The goal of this study was to determine the perceptions of preservice teacher technology preparedness from the classroom perspective of the cooperating teacher. Educators must be able to teach digital natives, provide digital literacy to communicate, and be technologically capable. Teachers need to be able to create and disseminate information in ways that students can best make use of the information. Learning technology skills alone is not sufficient; learning to integrate is equally important (Mishra, Koehler & Kereluik, 2009). This study was conducted to determine the extent to which preservice teachers are prepared to infuse technology into their lessons. The significance of the study related to the need for preservice teachers to possess the Technological Pedagogical Content Knowledge (TPACK) (Mishra & Koehler, 2006) capabilities, which will enable them to enhance learning and teaching by having the necessary technological, pedagogical, and content knowledge skills, from the perspective of cooperating teachers. The findings will provide the basis for informing the design of teacher education programs concerning implementing pedagogical, content, and technological knowledge to implement effective lessons."

Yushan, L. (2014). *TPACK junior high school teachers serving in different parts of the status quo investigation and comparative study* (Master's thesis, Central China Normal University). Retrieved from http://cdmd.cnki.com.cn/Article/CDMD-10511-1014234340.htm

Abstract (Chinese to English translation using Google):
"In today's information age, with the rapid development of wide application of network technology, the popularity of the campus network and multimedia technology, education, management and learning mode revolutionary change has occurred. In today's era of information technology on campus, information technology education teachers are required to become a new teacher has information capabilities. TPACK is the information age, teacher professional knowledge base. American Koehler and Mishra in 2006 to Shulman's PCK is based on the technical elements (T) integration in the formation of a new

framework for teacher knowledge --TPACK. A total of seven TPACK knowledge dimensions: three core elements (subject content knowledge (C), pedagogical knowledge (P) and technical knowledge (T)) and four composite elements (there are these three core elements intersect to form). This study attempts to sort out the system TPACK knowledge framework, measurement and training methods of knowledge. The objective of this study is the formation of a reliable and effective in-service teachers in junior high school level TPACK questionnaire to understand the characteristics and level of TPACK Xiaogan City and Binzhou City junior high school teachers were compared to identify differences between the two cities TPACK middle school teachers, so as to put forward constructive suggestions junior high school teacher TPACK development. This study shows that: a good job status quo of middle school teachers TPACK questionnaire scales designed to accurately reflect the current situation serving TPACK junior teachers. 2. comparative analysis from seven dimensions TPACK knowledge: in-service middle school teachers are in their own cities TPACK knowledge of technical knowledge (T) as well as the level of the composite element containing T elements are relative to other elements to be lower for , and subject knowledge and academic knowledge relative to other elements of pedagogy higher; TPACK knowledge in each dimension, the Xiaogan City and Binzhou City junior high school teacher comparison: For general pedagogical knowledge level, the difference between the two cities the level of middle school teachers small, almost equal; Binzhou City teachers in the subject content knowledge and pedagogical knowledge levels above disciplines Xiaogan middle school teachers; other four dimensions, the Xiaogan City junior high school teachers in junior high school teachers in levels above Binzhou City. 3 cities of the middle school teachers are equipped with the basic knowledge of TPACK, but need to be further improved."

Zaiyun, Z. (2014). *Based on "modern educational technology" experiment teaching TPACK design and implementation* (Master's thesis, Central China Normal University). Retrieved from http://cdmd.cnki.com.cn/Article/CDMD-10511-1014236584.htm

Abstract (Chinese to English translation):
"Long-term Education Reform and Development Plan (2010-2020)" put forward: the application of information technology to improve the level of teachers, updating teaching concepts, improve teaching methods to improve teaching effectiveness. For Teachers Colleges, how effective the concept of modern education Teacher training technical students to improve teaching ability of information technology is an urgent need to explore and resolve the problem. "Modern Educational Technology" course teaching is the main way to cultivate the ability of educational technology. As a major part of the experimental course "Modern Educational Technology", its normal students to exercise skills, teaching theory and practice to improve the practical application ability plays an important role. However, there exist many problems in experimental teaching, especially in the theory and practice of touch, technique and teaching separation phenomenon is very common. With further promote education reform, how to effectively improve teachers' teaching ability of information already widely discussed in academia, research in this area to integrate technical knowledge and pedagogical content knowledge in foreign countries particularly attention. TPACK represents the ideas of this theory is the direction of development, which emphasizes integration with the dynamic development of technical knowledge, subject

matter knowledge and teaching knowledge. If you can use TPACK theoretical guidance teacher education training philosophy and curriculum development, research information teaching normal students will cultivate the ability to provide good new ideas. TPACK integration technology provides a guideline from the perspective of "Modern Educational Technology" experimental teaching reform. In this paper, "Modern Educational Technology" experimental course TPACK Horizon conducted detailed interpretation, the introduction of "technology mapping" and the TPACK design is based on experimental teaching depth study carried out by empirical research carried out detailed analysis and argumentation, Finally a practical teaching strategies, provide reference for experimental teaching reform. Based on the above ideas, this paper studies conducted by the following six chapters: Chapter 1: Introduction. Clarify the research background, research status, significance and research ideas and methods of the present paper. Chapter 2: The theoretical basis. TPACK framework for ICT-TPACK model and theoretical explanations, and under TPACK Horizon "Modern Educational Technology" Location and nature of the experimental curriculum interpretation, finally proposed instructional design model based on technology mapping ideas. Chapter III: study design and implementation. On experiments undertaken in this study provides an overview, and then elaborated study guide book and questionnaire design ideas, and finally illustrate the implementation process of experimental research. Chapter 4: Research results and analysis. Attitude from the normal students, experimental task completion, TPACK levels of these three aspects of the implementation of teaching effectiveness is analyzed and discussed the findings and deficiencies. Chapter 5: experimental teaching strategies. From the perspective of macro and micro teaching strategies were analyzed, which describes the microscopic aspects of experimental teaching environment, experimental teaching content, teaching methods experiment three aspects. Chapter VI: Conclusion. This paper summarizes the research results and innovations, as well as inspiration and outlook."

4. Recent TPACK Presentations
Asterisk denotes abstract was retrieved from "TPACK" keyword search at www.isteconference.org/2014/program/search_all.php

Baran, E., Uygun, E., Altan, T., Bahcekapili, T., & Cilsalar, H. (2014). Investigating technological pedagogical content knowledge (TPACK) in action: Workshop design cases. In J. Herrington, J. Viteli, & M. Leikomaa (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2014* (pp. 1536-1541). Chesapeake, VA: AACE. Abstract retrieved from http://www.editlib.org/p/147683/

Abstract:
"Recent research on technological pedagogical content knowledge (TPACK) calls for the investigation of TPACK in action. This study examined how TPACK is put into action in workshops conducted as part of a graduate course that was designed with the TPACK framework. Case study used in this research helped to capture detailed information about the TPACK applications within the workshops. This paper described two cases from the list of workshops delivered by the students: 1) Integrating Technology into Educational Sciences Courses, and 2) Integrating Technology into Computer Education."

Campbell, C., & Dobozy, E. (2013, October). *What is the relationship between learning design and TPACK?* Paper presented at the 63rd Institute of Electrical and Electronic Engineers (IEEE) Annual Conference, Las Vegas, NV. Abstract retrieved from http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=6820149&url=http%3A%2F%2Fieeexplore.ieee.org%2Fxpls%2Fabs_all.jsp%3Farnumber%3D6820149

Abstract:
"There is a great deal of literature currently available on eLearning and there are numerous available models on integrating technology into teaching practices, in the areas of mobile learning and blended learning. This paper will investigate two areas that are emerging as leaders in the field; namely Learning Design and Technological, Pedagogical and Content Knowledge, which is also referred to as TPACK. By exploring these two areas it is possible to interpret where the two areas intersect and to move the literature forward on both areas. Learning Design is a sub-field of eLearning, while TPACK has gained a great deal of currency after being developed by Mishra and Koehler (2006) earlier this century. This paper demonstrates that by using these two frameworks together it allows for a stronger epistemological foundation and better design for teaching."

Chang, Y. F., Wen, B. S., Lin, F. J., & Hsu, C. Y. (2014, October). *Examining secondary student teachers' perceptions of technological pedagogical content knowledge in Taiwan.* Paper presented at the International Academic Conference on Social Sciences (IACSS), Osaka, Japan. Abstract retrieved from http://www.academicinst.com/admin/editor/uploads/files/IACSS%202014%20PROCEEDINGS%20-%20New.pdf#page=187

Abstract:
"This paper examined the profile of Taiwanese secondary student teachers in terms of their technological pedagogical content knowledge (TPACK). A TPACK survey on a 7-point Likert scale was employed for this study. The survey had a total of 38 items consisting of seven constructs: technological knowledge (TK), content knowledge (CK), pedagogical knowledge (PK), pedagogical content knowledge (PCK), technological content knowledge (TCK), technological pedagogical knowledge (TPK), and technological pedagogical content knowledge (TPACK). A total of 586 responses were collected from 25 randomly selected teacher preparation programs in Taiwan during the beginning of 2012 fall semester. The results indicated that the respondents had moderately high perception for each construct, with CK being rated the highest and TK the lowest. In addition, their TPACK perceptions differed significantly due to their gender and hours of technology integration experience. Implications for development of preservice teachers' technological pedagogical content knowledge were then discussed."

Christie, A. (2014, July). *Developing Web-based, TPACK-based lessons for digital age learners.* Presented at the 2014 International Society for Technology in Education (ISTE) Conference, Atlanta, GA.

Abstract*:

"Teachers will see numerous examples of Web-based, TPACK-based lessons/units that combine digital data from numerous online sources in one central location. These lessons/units (coined GoogleTreks™ by the presenter) use digital maps with clickable pushpins indicating locations where students can find photos, text-based information, videos, audio clips, charts, graphs, podcasts, historical or scientific data, or other user-created data.

The goal of educators creating Web-based, TPACK-based lessons/units (GoogleTReks™) for digital-age learners is to effectively integrate technology around specific subject matter that requires understanding the unique and dynamic, transactional relationship between content knowledge, pedagogical knowledge, and technological knowledge. Educators create GoogleTreks™ to individualize and differentiate instruction as no single combination of content, technology, and pedagogy will apply for every teacher, every course, or every pedagogical approach.

After digital-age learners become familiar with the GoogleTreks™ format and use a variety of Web 2.0 tools, they can create GoogleTreks™ that incorporate their research, photos, podcasts, or other digital data that they wish to share with others around the world. Creating GoogleTreks™ that incorporate authentic data, digital photography, voice notes, and location-based research, which learners gather and compile, is an effective way for learners to engage in problem solving, critical thinking, visual literacy, contexts for spatial and cultural differences, and communication skills."

Chui, H. L., Au-Yeung, H. K. C., & Cheng, G. (2014, July). *Reflective practice with digital portfolio for teacher readiness and maturation of prospective teachers within the TPACK framework.* Paper presented at the Inaugural International Conference on Technology in Education (IICTE), Hong Kong, China. Abstract retrieved from http://repository.ied.edu.hk/dspace/handle/2260.2/15022

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."

Foulger, T., Buss, R., Wetzel, K., & Lindsey, L. (2014, June). *Tech-infused methods courses: Instructors' professional development in TPACK.* Paper presented at the 2014 International Society for Technology in Education (ISTE) Conference, Atlanta, GA. Retrieved from https://www.isteconference.org/uploads/ISTE2014/HANDOUTS/KEY_87812838/ISTE2014_FoulgerBussWetzelLindsey_RP.pdf

Abstract:
"As educational technology faculty members, we have long professed the integration of technology with content such as social studies or science as a goal. Because of this perspective, when the TPACK model was developed, we wholeheartedly subscribed to it. Yet we were troubled with the fact that we were teaching a stand-alone technology integration course to teacher candidates, void of such context. We found ourselves contriving ways to embed technology tools and pedagogical solutions into content, but we realized this was not an authentic solution and we were not making the most of our efforts. Simultaneously, the iTEACH program was initiated. One component of the program was to free up space in the program for more content-related courses and longer student teaching. The curriculum from the long-standing educational technology course and the assessment course would be integrated into content courses. Educational Technology faculty members supported the idea; thus, the change provided them with the opportunity to work with content area instructors to infuse the curriculum from the stand-alone educational technology course into methods courses. This manuscript documents a portion of the journey toward solving this problem, the stories of our instructors who were content experts, asked to infuse technology into their courses."

Iryanti, E., Hindersah, H., & Priyana, Y. (2013, November). *Design and implementation of interactive video content using TPACK framework: (Case study: Exhibition system of primordial man's weapon in geological museum).* Paper presented at the International Studies Association (ISA) Joint International Conference, Budapest, Hungary. Abstract retrieved from http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=6741516&url=http%3A%2F%2Fieeexplore.ieee.org%2Fxpls%2Fabs_all.jsp%3Farnumber%3D6741516

Abstract:
"Museum is one of places for recreation and education that can be visited by all ages, from children to adults. Elements of pedagogy in the museum cannot be abandoned, and the current geological museum has begun to implement some of the technology, so users can capture the contents of the knowledge contained in it with easy and interesting. The study was conducted to determine the incorporation of elements of pedagogy, content and technology framework that incorporates such elements called TPACK framework which is then represented in a visual interactive video technology that also uses the concept of digital story telling. For the implementation, interactive video about the weapons used by early humans is composed of three elements, namely technology, pedagogy and content. The technology used is a visual technology in the broadcast can use a standard monitor or projector, while the interaction with the user and the system is done using a light sensor technology. Second element is a content technology, knowledge and the payload contains

three stories that describe the tool / weapon used by early humans to hunt and survive. And for elements of pedagogy, at the end of each story there is one question that comes to feedback answers and there is a value there of the interaction system, which is to cultivate the attitude of helping each other in need and alert to the problems. Testing and evaluation of interactive video products on the weapons used by early humans based on the development of this era was done by reviewing the three main elements of the TPACK framework and the evaluation using field study approach. The evaluation shows that the evaluators liked the interactive gesture video implementation, evaluation of several criteria, the minimum percentage is 61% and maximum 97%. Visual representation of a user can be understood more video than just using text / image which reached 97%, while for the improvement is needed to be done on the use of technology integratio- (61%) and delivery of the message sent in the video (69%).”

Jones, E., & Krause, J. (2014, June). *TPACK in PE [physical education] teacher education.* Presented at the 2014 International Society for Technology in Education (ISTE) Conference, Atlanta, GA.

Abstract*:
“This presentation will focus on the state of TPACK education in Physical Education Teacher Education through the discussion of ISTE and NASPE Standards, current beliefs of teacher candidates, and perceptions of vital technologies of PETE programs. Each of these areas will be highlighted on the poster and on handouts. A list of vital PE technologies and their applications will be included in the handout as well as demonstrations of these technologies via video on the screen that can be useful for physical education teachers, classroom teachers who teach physical education, administrators, and instructional technology specialists looking for ways to assist physical education teachers in meeting local or ISTE standards.”

Juniu, S. (2014). Innovative pedagogy: Integration of technology in a physical education context using the TPACK framework. In J. Herrington, J. Viteli, & M. Leikomaa (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2014* (pp. 1585-1591). Chesapeake, VA: AACE. Abstract retrieved from http://www.editlib.org/p/147692/

Abstract:
“This presentation examines the TPACK framework as a way to prepare physical educators to integrate technology in the teaching and learning process and to understand how to represent subject matters with technology in pedagogically ways. The TPACK approach is to reflect on the pedagogical actions and on the subject matter when designing successful, technology integrated projects in physical education. In order to teach in a given discipline, the teacher must have the knowledge on the subject, the understanding of the teaching strategies to represent this content, and the knowledge of the learners’ characteristics and of the educational context (i.e. gymnasium).”

Kopcha, T. J., & Leftwich, A. (2014, July). *Improving preservice TPACK through case-based learning.* Presented at the 2014 International Society for Technology in Education (ISTE) Conference, Atlanta, GA.

Abstract*:
"The purpose of this study was to examine the TPACK knowledge and performance of 27 early childhood and elementary education preservice teachers after engaging in a semester-long course on technology integration. TPACK knowledge and performance was measured as their performance on situation-specific lesson plans. The course was unique in that a key instructional strategy was to make use of case-based learning to engage preservice teachers in decision-making about technology integration under classroom-specific considerations and constraints. Examining preservice teachers' TPACK under case-based learning can inform the manner in which technology integration courses are developed and preservice teachers learn to integrate technology into their lessons."

McCann, K. (2014). Using technological-pedagogical-and-content knowledge (TPACK) to support universal design for learning: A case study. In H. Caltenco, P.- O. Hedvall, A. Larsson, K. Rassmus-Gröhn, & B. Rydeman (Eds.), *Assistive Technology Research Series: Vol. 35. Universal Design 2014: Three Days of Creativity and Diversity* (pp. 376 – 383). Amsterdam: IOS Press. doi: 10.3233/978-1-61499-403-9-376

Abstract:
"This paper represents a partial report on the design and implementation of a case study based upon a series of observations interviews, and the analyses of materials that were utilized to discover how a Hawaii Department of Education (HDOE) teacher utilized TPACK to support UDL in an inclusive instructional environment. A constant comparative methodological and content analyses of data, paired with peer and expert review, and member checking were also utilized to ensure inter-rater reliability and rigor within this research study. Findings suggest that UDL-based instruction requires a combination of time, digital and physical resources, and effort; and, delivering such instruction may be supported by a TPACK that incorporates a range of strategies and materials. Recommendations include the ongoing integration of 21st century standards, technologies, and related professional development for educators. Additionally there is also a call for innovations within administrative policies and visions to provide opportunities that further the ongoing development of TPACK, for practitioners in the field, as well as broadening opportunities for research that advance the connections between TPACK and UDL."

McCann, K. (2014). Using technological-pedagogical-and-content knowledge (TPACK) to support universal design for learning (UDL): A case study. In J. Herrington, J. Viteli, & M. Leikomaa (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2014* (pp. 2253-2258). Chesapeake, VA: AACE. Abstract retrieved from http://www.editlib.org/p/147789/

Abstract:
"This poster session is a report on the design and implementation of a case study based upon series of observations, interviews, and the analyses of materials were utilized to

discover how a Hawaii Department of Education (HDOE) teacher utilizes TPACK to support UDL in an inclusive instructional environment. An ethnographic analysis of data, paired with peer review, expert review, and member checking were also utilized to ensure validity and minimize researcher bias. Findings reveal that both TPACK and UDL play a complex and series of interconnected roles in supporting inclusion for practitioners in the field and for policymakers who define professional guidelines and supports."

Meletiou-Mavrotheris, M., Kleanthous, I., & Paparistodemou, E. (2014, July). *Developing preservice teachers' technological pedagogical content knowledge (TPACK) of sampling.* Paper presented at the 9th International Conference on Teaching Statistics (ICOTS), Flagstaff, AZ. Retrieved from http://icots.info/9/proceedings/pdfs/ICOTS9_3A1_MELETIOUMAVROTHERIS.pdf

Abstract:
"This research sought to explore and improve preservice primary school teachers' statistical knowledge for teaching informal ideas related to samples and sampling through the conduct of a two-phase exploratory study. In Phase I, a randomly selected sample of n=42 teacher candidates completed an open-ended questionnaire designed to assess their reasoning about sampling concepts and their understanding of student thinking in this area. Insights gained informed the design and implementation of a teaching experiment within an undergraduate mathematics methods course, which aimed at enhancing the participating primary school teachers' (n=8) technological pedagogical content knowledge (TPACK) of sampling. Findings from Phase II indicate a positive impact on participants' TPACK of sampling and other key ideas related to informal inferential statistics."

Phillips, M. (2014, September). *TPACK as workplace learning.* Paper presented at the Australian Computers in Education (ACE) Conference, Adelaide, Australia. Retrieved from http://newmediaresearch.educ.monash.edu.au/lnmrg/sites/default/files/TPACK%20and%20workplace%20learning.pdf

Abstract:
"Technological, pedagogical and content knowledge (TPACK) has been used as a theoretical lens which identifies the nature of knowledge required by teachers for technology integration in their teaching. While there have been hundreds of studies that have used TPACK to examine what teachers need to know about technology as part of their classroom practice, there has been little research specifically investigating how in-service teachers acquire this knowledge. This paper builds on earlier reviews of workplace learning literature and suggests that Communities of Practice (CoP), in particular notions of a socially formed identity, may provide an alternate lens through which teachers' TPACK development can be understood."

Phillips, M., Lancaster, G., & Cooper, B. (2014, September). *Team teaching with technology: Upsetting the TPACK applecart.* Paper presented at the Australian Computers in Education (ACE) Conference, Adelaide, Australia. Retrieved from http://newmediaresearch.educ.monash.edu.au/lnmrg/sites/default/files/Team%2

Abstract:

"In contrast to the pedagogical solitude experienced by some teachers working with their students behind closed doors, teams of teachers collaboratively teaching larger groups of students is a practice becoming more frequently employed with junior and middle years classes. The research literature examining team teaching reports a number of benefits that lend support to the decision of schools who have adopted a team teaching approach; however, studies also report a number of challenges that have also been commonly identified with this practice. In particular, research indicates difficulties associated with the formation of effective teaching teams due to the differences in teachers' professional knowledge and skills. These differences can manifest themselves in a number of key areas including pedagogical approaches and content knowledge. The efficacy of teaching teams is further complicated by the increased availability of digital technologies and the tensions created by the different skill levels and pedagogical choices made by teachers in the same team. In this paper we consider the ways in which TPACK is challenged by the complex nature of team teaching and propose the notion of developing a communal TPACK for improved team effectiveness."

Pirttimaa, M., Rönkkö, M. L., Grönman, S., & Aerila, J. A. (2014). Educational blogging as a tool supporting the teachers' TPACK competencies in crafts. In J. Herrington, J. Viteli, & M. Leikomaa (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2014* (pp. 1655-1663). Chesapeake, VA: AACE. Abstract retrieved from http://www.editlib.org/p/147698/

Abstract:

"This study presents a case study about using a blog as a tool supporting and reflecting teachers practice concerning the development of technological, pedagogical, and content knowledge (TPACK) of teacher in-service course participants. The participating teachers were studying the contents of Finnish crafts for one and a half years between the August 2012 and December 2013. The challenge related to the in-service education is the paucity and shortness of intensity days during the educational periods. The personal blogs served a media for the course participants to support, reflect, and share their work and learning. According to the study, using educational blogging becomes more meaningful and more target-orientated during habituation of using the blog. Blogging proved to be a useful method for describing craft processes, monitoring the processes of others, and generating ideas for craft products."

Ponnudurai, P. & Jacob, T. (2014, March). *Facebook: A shift from social to academia.* Paper presented at Taylor's 6th Teaching and Learning Conference, Selangor Daruh Ehsan, Malaysia. Abstract retrieved from http://www.sciencedirect.com/science/article/pii/S1877042814014438

Abstract:

"Technology has engulfed all aspects of our lives, with no exception in academia. The latest branch of e-learning is the incorporation of social networks into the classroom domain. With its recent passing of 1 billion users, Facebook is no doubt a force to be reckoned within the classroom too. A large majority of its users tend to be adolescences who are dependent on it for varying reasons. Past research has clearly indicated the importance of language particularly writing skills is undoubtedly the most daunting skill for students at university level. Therefore, the main objective of this study is to determine if this mode of online writing affects students writing anxiety and to access overall students' attitudes towards the use of Facebook in the academic domain. A longitude quantitative study comprising 96 students from a variety of disciples partook in this study. Based on Vygotsky's (1978) constructivist leaning theory and The Technological Pedagogical Content Knowledge (TPACK) model, the data was analyzed using SPSS, the findings indicated that there was a positive correlation between writing online via Facebook and reduced anxiety levels, whilst resulting in an overall positive attitude towards the use of Facebook in the course. Therefore, with the prominence given to e-learning today, educators should embrace the use of social networks in classroom practices and be ever willing to adapt these new technological trends into classroom practices."

Price, G. (2014, June). *Learning activities with Lego robotics: A TPACK approach.* Paper presented at the 2014 International Society for Technology in Education (ISTE) Conference, Atlanta, GA. Abstract retrieved from http://geoffprice.weebly.com/learning-activities-with-lego-robotics-a-tpack-approach-iste-2014.html

Abstract:
"LEGO Robots and their user-friendly graphical-based programming software have emerged as a leading digital tool for implementing and facilitating a STEM education. In his Getting Started with LEGO Robotics book published by ISTE, Mark Gura (2011) touts the ability of this unique technology to "enable and facilitate progressive approaches to instruction, such as problem-based learning, hands-on learning, collaborative learning, authentic learning and assessment, and constructivist learning" (p.12). As the popularity of this tool has risen, schools have created Robotics clubs that participate in regional and national competitions. In addition to the traditional arts or athletics, many schools now offer an elective course featuring robotics and the LEGO Mindstorms technology. During ISTE's annual exposition, LEGO representatives disseminate information regarding the purchase of LEGO products and curriculum for after-school programs and technology-focused courses. However, few resources exist for teachers interested in integrating the same technology with the research-supported pedagogies they use in their instructional and assessment activities.

In this presentation targeted towards K-12 teachers in the traditional content area (English/Language Arts, Math, Science, Social Studies), participants will receive lesson ideas for teaching simple concepts with LEGO Robotics. Presenters will share what the robots (technology) can do and how these capabilities align with what (content) teachers teach and how (pedagogy) they teach that content. The presentation will feature

instructional activities for teaching concepts such as probability, geography, story plots, world explorers, and independent and dependent variables that also engage students in higher-order, critical thinking. Each activity incorporates one or more of Hofer and Harris' (2011) Learning Activity Types. For example, one lesson activity explains how a student can program robotics to move to different ordered pairs on Cartesian coordinate plan displayed on a classroom floor. Through this activity, students learn about ordered pairs and the quadrants of the coordinate plan. In addition, teachers can use the robots to begin teaching about concepts such as reflection, translation, and rotation. The presentation will also offer participants the opportunity to ask questions about other ways robotic technology can be utilized to create instructional activities and authentic assessments."

Ramatlapana, K. (2014). Developing rubrics for TPACK tasks for prospective mathematics teachers: A methodological approach. In M. Lebitso & A. Mclean (Eds.), *Proceedings of the 20th Annual National Congress of the Association for Mathematics Education of South Africa (AMESA): Vol. 1* (pp. 198-210). Johannesburg, South Africa: AMESA. Retrieved from http://www.amesa.org.za/AMESA2014/Proceedings/papers/Long%20Papers/16.%20KIM%20RAMATLAPANA%20-DEVELOPING%20RUBRICS%20FOR%20TPACK%20TASKS.pdf

Abstract:
"This paper will focus its discussion on the tasks utilized in a study that seeks to understand the characteristics of prospective teachers' technological pedagogical content knowledge constructed in a GeoGebra-based environment. I will discuss a methodological approach that was adopted during the design of rubrics to code the data that will emerge from the study. Using Task 1 as an example to support the description, I will first deconstruct the task by providing a description that will elaborate the critical components and expectations of the task in constructing mathematics PTs' TPACK and then provide a description of the methodology. A
detailed description of the design of the rubrics Task 1 will be discussed."

5. Recent TPACK-related Blog Entries

Hos-McGrame, M. (2014, June 30). SAMR and TPACK: Using technology with a focus on learning [Web log post]. Retrieved from http://www.maggiehosmcgrane.com/2014/06/samr-and-tpack-using-technology-with.html

Excerpt:
"Yesterday I attended Dr. Ruben Puentedura's ISTE presentation about how to bring SAMR together with TPACK. I've used the SAMR model for many years (in fact my posts about using the SAMR model are the most popular ones on this blog), and more recently have considered the different types of knowledge contained in PTACK. It was really great to see how these two models come together to support technology integration that can transform student learning. I was really interested to hear that Dr. Puentedura stated that PCK

(pedagogical content knowledge) is the most crucial of all the TPACK knowledge for any process that involves change/transformation of teaching practice."

Mishra, P. (2014, August 7). Having fun with TPACK (songs, skits & more…) [Web log post]. Retrieved from http://punya.educ.msu.edu/2014/08/07/some-tpack-fun/

Excerpt:
"A search on YouTube reveals a wide range of videos related to TPACK. Most of them are serious descriptions of the framework (heck, I have created a few of those myself). But there is a smaller genre of TPACK videos that don't necessarily seek to explain the construct. They are just good fun. There are songs and skits and things in between. Here are a few that I managed to find. Most of these were created by students in the Master of Arts in Educational Technology (MAET) program."

6. TPACK Newsletter Suggested Citation

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

Harris, J., & Rodriguez, K. (Eds.). (2014, September 22). TPACK newsletter issue #21: September 2014 [Electronic mailing list message]. Retrieved from http://www.tpack.org/

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.wmwikis.net/
- Access three tested TPACK assessment instruments at: http://activitytypes.wmwikis.net/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, with the following text in the subject line: subscribe tpack.news FirstName LastName (of course, substituting their own first and last names for 'FirstName' and 'LastName' — unless their name happens to be FirstName LastName, in which case they can just leave it as is).

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

Standard End-Matter

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

- Judi & Kim

...for the SITE TPACK SIG leadership:

Petra Fisser,	Co-Chair, SLO Expertise Center, National Curriculum Development
Josh Rosenberg,	Co-Chair, Michigan State University
Candace Figg,	Rocking Chair, Brock University
Mark Hofer,	Sedan Chair, College of William & Mary
Judi Harris,	Wing Chair, College of William & Mary
Mario Kelly,	Futon, City University of New York
Matt Koehler,	Chaise Lounge, Michigan State University
Punya Mishra,	Recliner, Michigan State University