TPACK Newsletter, Issue #19: March 2014

Welcome to the nineteenth 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

"We've got 21st-century technology and speed colliding head-on with 20th- and 19th-century institutions, rules and cultures."
— Amory Lovins

In This Issue

1. TPACK Newsletter Update

Happy Anniversary to the TPACK Newsletter, which has now been distributed for more than five years! It has 1227 subscribers currently. Our subscription numbers have held steady (+ or – approximately 3%) since October 2011. The newsletter has been published since January 2009.

2. Recent TPACK Publications

Below are recent TPACK publications that we know about: 27 articles, 2 chapters, 1 book and 3 dissertations that have not appeared in past issues of this newsletter. If you know of others that

were published within the past several months, please let us know (tpacknews.editors@wm.edu).

Articles

Agyei, D., & Keengwe, J. (2014). Using technology pedagogical content knowledge development to enhance learning outcomes. *Education & Information Technologies*, *19*(1), 155-171. doi:10.1007/s10639-012-9204-1

Abstract:
"This paper describes an intervention in which pre-service teachers developed their TPACK through multiple data sources. Teachers' self-reports of their TPACK knowledge were triangulated with performance-based assessment of their instructional practices and artifacts to give a better understanding and nature of pre-service teachers' TPACK development. Although self reported measures did not correlate with pre-service teachers' actual increased knowledge of technology integration, this study enhances better understanding of the pre-service teachers' TPACK development through the multiple assessment measures. The learning outcome measures provide specific information and concrete representation of what pre-service teachers can actually do with technology in their TPACK development. The findings suggested multiple concerns about self-reported measures that are discussed in the framework of the TPACK instrument."

Avidov-Ungar, O., & Eshet-Alkalai, Y. (2014). TPACK revisited: A systemic perspective on measures for predicting effective integration of innovative technologies in school systems. *Journal of Cognitive Education and Psychology, 13*(1), 19-31. doi: 10.1891/1945-8959.13.1.19

Abstract:
"TPACK (Technology Pedagogy Content Knowledge) is currently considered one of the most useful frameworks for describing the types of knowledge that teachers should master in integrating technologies effectively in their teaching. According to the TPACK framework, these types of knowledge consist of technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK). This article suggests improving the authenticity and the holistic nature of the TPACK framework by (a) adding a new aspect (the affective aspect, which involves teachers' attitudes toward change) and (b) elaborating on the systemic-organizational aspect (associated with the teachers' perception of school as a learning organization) and the cognitive aspect (related to the cognitive skills required for effective use of educational technologies), which are not discussed in enough detail in TPACK."

Bilici, S. C., Yamak, H., Kavak, N., & Guzey, S. S. (2013). Technological Pedagogical Content Knowledge Self-Efficacy Scale (TPACK-SeS) for pre-service science teachers: Construction, validation, and reliability. *Eurasian Journal of Educational Research (EJER), 52,* 37-60.

Abstract:
“Problem Statement: Based on developments in the 21st century technology has become a large part of the classroom experience. Teachers need to have an understanding of how technology can be coordinated with pedagogy and content knowledge in order to integrate technology effectively into classroom instruction. Self-efficacy beliefs toward technology also play a key role in technology integration. It has been shown that the beliefs of a teacher are closely linked to the technologies that they use and the way in which they use them. More specifically, the beliefs of a teacher with regards to their technological pedagogical content knowledge (TPACK) are pivotal in terms of using technology in the classroom because belief about their capability to use technology is a powerful predictor of their potential technology use. Hence, it is critical to measure pre-service teachers' self-efficacy beliefs toward TPACK in order to identify the factors that contribute to a teacher's use of technology in classroom instruction. Purpose of This Study: The purpose of this study is to develop a comprehensive instrument to determine pre-service science teacher's self-efficacy beliefs towards TPACK Methods: The participants in the study consisted of 808 senior pre-service science teachers in 17 colleges for teacher education. In this study, the data was split into two random subsamples to perform factor analysis. Exploratory Factor Analysis (EFA) was conducted using one subsample (n = 420) to determine the factorial structure of the scale, and Confirmatory Factor Analysis (CFA) was conducted on the second subsample (n = 388) in order to confirm the structure model obtained from the EFA analysis in cross-validation the Technological Pedagogical Content Knowledge Self- Efficacy Scale (TPACK-SeS) for a different sample. Item total correlations and Cronbach's alpha internal reliability coefficient were utilized in determining the reliability of the whole scale and its subscales for both samples. Findings and Results: Based on the EFA results, the final version of the scale consists of an eight-factor structure with 52 items. Following EFA, CFA supported this eight-factor structure and showed a good fit with high indices. Cronbach's alpha coefficient, demonstrating the internal consistency reliability of the subscales and whole scale, were found to be high, and item total correlation coefficients were valid for the different samples. Conclusions and Recommendations: The results show that TPACK-SeS can serve as a valuable tool for teachers, educators, and researchers in evaluating pre-service science teacher's self-efficacy beliefs towards TPACK.”

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

Abstract:
“Whereas teachers’ Stages of Concern (SoC) and their Technological, Pedagogical, and Content Knowledge (TPACK) appear to be related constructs, studies are scant regarding the connection between these two research areas. This study intensively examined the association between Taiwanese senior high school teachers’ SoC and TPACK through a national survey (*N* = 605) and canonical correlational analysis. To ensure rigor of study, we revised a TPACK instrument for Taiwanese senior high school teachers, statistically tested SoC’s developmental phases, and reworked the Stages of Concern Questionnaire. Three canonical correlations became evident, portraying a significant connection between SoC and TPACK and further supporting our

hypothesis that a higher level of technology integration would correlate higher with more synthesized types of teacher knowledge. Recommendations were put forward regarding support strategies of change facilitators, as well as directions for future research."

Drijvers, P., Tacoma, S., Besamusca, A., Doorman, M., & Boon, P. (2013). Digital resources inviting changes in mid-adopting teachers' practices and orchestrations. *ZDM, 45*(7), 987-1001. doi: 10.1007/s11858-013-0535-1

Abstract:
"Digital resources offer opportunities to improve mathematics teaching and learning, but meanwhile may question teachers' practices. This process of changing teaching practices is challenging for teachers who are not familiar with digital resources. The issue, therefore, is what teaching practices such so-called 'mid-adopting' mathematics teachers develop in their teaching with digital resources, and what skills and knowledge they need for this. To address this question, a theoretical framework including notions of instrumental orchestration and the TPACK model for teachers' technological pedagogical content knowledge underpins the setting-up of a project with twelve mathematics teachers, novice in the field of integrating technology in teaching. Technology-rich teaching resources are provided, as well as support through face-to-face group meetings and virtual communication. Data include lesson observations and questionnaires. The results include a taxonomy of orchestrations, an inventory of skills and knowledge needed, and an overview of the relationships between them. During the project, teachers do change their orchestrations and acquire skills. On a theoretical level, the articulation of the instrumental orchestration model and the TPACK model seems promising."

Efilti, E., & Coklar, A. N. (2013). The study of the relationship between teachers' teaching styles and TPACK education competencies. *World Journal on Educational Technology*, *5*(3), 348-357. Retrieved from http://www.world-education-center.org/index.php/wjet/article/view/2540/pdf_217

Abstract:
"The aim of this study was determining teacher candidates' TPACK education competencies and qualifications and the status of different teaching styles so the relationship between TPACK education competencies and teaching styles could be shown. For this purpose, two different measuring tools of quantitative methods were applied to teacher candidates. To determine teacher candidates' teaching styles "Teaching Style Inventory" developed by Grasha, and adapted by Uredi to Turkish was applied. Moreover, "TPACK Deep-Technological Pedagogical Content Knowledge Scale" developed by Kabakçı-Yurdakul, Odabaşı, Kılıçer, Çoklar, Birinci and Kurt was used. The participants of the study consisted of 342 senior students who were teacher candidates studying at the University of Necmettin Erbakan during the academic year of 2012-2013. As a result of the research it was seen that teacher candidates' teaching style scores were respectively listed as, facilitator, delegator, personal model, expert and authority. In terms of TPACK education competencies, teachers found themselves at a highly advanced level. On the other hand, the type of teaching style, as well as TPACK competencies didn't show any

statistically significant gender differences. Finally, between all the teaching styles and TPACK competencies, there was an intermediate and a positive correlation."

Finger, G., Albion, P., Jamieson-Proctor, R., Cavanagh, R., Grimbeek, P., Lloyd, M.,…Romeo, G. (2013). *Teaching Teachers for the Future (TTF) Project TPACK survey: Summary of the key findings. Australian Educational Computing, 27*(3), 13-25. Retrieved from http://eprints.usq.edu.au/24522/

Abstract:
"This paper presents a summary of the key findings of the TTF TPACK Survey developed and administered for the Teaching the Teachers for the Future (TTF) Project implemented in 2011. The TTF Project, funded by an Australian Government ICT Innovation Fund grant, involved all 39 Australian Higher Education Institutions which provide initial teacher education. TTF data collections were undertaken at the end of Semester 1 (T1) and at the end of Semester 2 (T2) in 2011. A total of 12881 participants completed the first survey (T1) and 5809 participants completed the second survey (T2). Groups of like-named items from the T1 survey were subject to a battery of complementary data analysis techniques. The psychometric properties of the four scales: Confidence - teacher items; Usefulness - teacher items; Confidence - student items; Usefulness- student items, were confirmed both at T1 and T2. Among the key findings summarised, at the national level, the scale: Confidence to use ICT as a teacher showed measurable growth across the whole scale from T1 to T2, and the scale: Confidence to facilitate student use of ICT also showed measurable growth across the whole scale from T1 to T2. Additional key TTF TPACK Survey findings are summarised."

Getenet, S. T., Beswick, K., & Callingham, R. (2014). Professionalizing in-service teachers' focus on technological pedagogical and content knowledge. *Education and Information Technologies.* Advance online publication. doi: 10.1007/s10639-013-9306-4

Abstract:
"In Ethiopia, primary school teachers of science and mathematics are encouraged to integrate Information and Communication Technology (ICT) into their teaching as a means to improve the quality of education. However, there has not been the same emphasis placed on providing professional learning opportunities for teachers on how to use ICT in their teaching. The present study investigated how a group of practising primary school science and mathematics teachers developed the skills needed to integrate ICT into their teaching. The study employed a combination of qualitative and quantitative research methods within an action research approach. The teachers took part in activities from a Technological Pedagogical and Content Knowledge (TPACK) based professional learning workshop, including designing lessons, classroom instruction, and reflection activities in teams. A lesson evaluation sheet, questionnaire, observation checklist, and logbook were used to gather data. The results showed that the teachers acquired an improved competency to integrate available ICT into their teaching through the intervention activities."

Hechter, R., & Vermette, L. A. (2014). Tech-savvy science education? Understanding teacher pedagogical practices for integrating technology in K-12 classrooms. *Journal of Computers in Mathematics & Science Teaching, 33*(1), 27-47.

Abstract:
"This paper examines the technology integration practices of Manitoban K-12 inservice science educators based on the Technological, Pedagogical, and Content Knowledge (TPACK) framework. Science teachers (n= 433) completed a 10-item online survey regarding pedagogical beliefs about technology integration, types of technology used, and how often each of these technologies was utilized in pedagogical practices. Results indicate that technology is integrated to promote student engagement, teach 21st century skills, as best teaching practice, to stay current, and for hands-on interactive learning. Through quantitative descriptive statistics, results identified that interactive whiteboards and digital communication programs are frequently integrated; while podcasting, digital hand-held data collection sources, online discussion boards, and simulation software are almost never integrated in Manitoban science classrooms. In addition, data indicates that teachers over-report how often classroom technology is actually placed in student hands. Implications of this study inform school division technology purchases, pre-service teacher education, and professional development opportunities."

Jamieson-Proctor, R., Albion, P., Finger, G., Cavanagh, R., Fitzgerald, R., Bond, T., & Grimbeek, P. (2013). Development of the TTF TPACK survey instrument. *Australian Educational Computing, 27*(3), 26-35. Retrieved from http://eprints.usq.edu.au/id/eprint/24524

Abstract:
"One of the major outcomes from the national Teaching Teachers for the Future (TTF) Project in 2011 was the development and statistical validation of a survey instrument to measure the Technological Pedagogical Content Knowledge (TPACK) of pre-service teachers as a result of the TTF intervention implemented across all Australian Education Institutions (HEI) delivering pre-service teacher education programs. The TTF project was positioned within the context of the emerging implementation of National Professional Standards for Teachers (AITSL, 2011) and focused specifically on the national curriculum areas of Mathematics, Science, English and History. The TTF TPACK Survey instrument developed for the TTF Project was informed by earlier work on the measurement of TPACK and ICT integration in classrooms (Albion, Jamieson-Proctor & Finger, 2010; Jamieson-Proctor & Finger, 2009; Jamieson-Proctor, Watson, Finger, Grimbeek & Burnett, 2007). The development of the instrument was guided by the TTF Research and Evaluation Working Group and incorporated additional items to extend the earlier developed TPACK Confidence Survey (TCS), in order to meet the particular needs of the TTF project. The data collected were subject to a battery of complementary analysis procedures using both the pre (N=12881) and post (N=5809) data. Four scales were investigated and confirmed as reliable: (1) Confidence - teacher items; (2) Usefulness - teacher items; (3) Confidence - student items; and (4) Usefulness - student items. This paper describes the theoretical framework and psychometric properties of the TTF TPACK Survey developed and administered in 2011."

Jordan, K. (2013). The influence of gender on beginning teachers' measurement of TPACK knowledge. *Australian Educational Computing, 28*(2). Retrieved from http://journal.acce.edu.au/index.php/AEC/article/view/21.

Abstract:
"TPACK is emerging as an influential framework for conceptualising teacher knowledge in regards to integrating ICT and is generating considerable international research interest. To date, the question of whether gender plays a role in how teachers self-assess their TPACK knowledge has not figured greatly in this research. This paper seeks to explore this possible role by using an adapted form of the Schmidt et al (2009b) instrument to survey two cohorts of beginning teachers (64 in the first cohort and 142 in the second) from Victoria, Australia. It suggest that while both genders rate their knowledge highly, especially Content Knowledge, there are significant differences in how male and female beginning teachers rated their knowledge, with males rating their knowledge higher in both years of this study."

Kabakci Yurdakul, I., & Coklar, A. N. (2014). Modeling preservice teachers' TPACK competencies based on ICT usage. *Journal of Computer Assisted Learning.* Advance online publication. doi: 10.1111/jcal.12049

Abstract:
"The purpose of this study was to build a model that predicts the relationships between the Technological Pedagogical Content Knowledge (TPACK) competencies and information and communication technology (ICT) usages. Research data were collected from 3105 Turkish preservice teachers. The TPACK-Deep Scale, ICT usage phase survey and the ICT usage level survey were used to collect the research data. The structural regression model was conducted to test the model regarding the fact that ICT usage phases and ICT usage levels were predictors of TPACK competencies. The ICT usage phase was a statistically significant predictor of TPACK competency for all such sub-factors of the TPACK-Deep Scale as design ($\beta = 0.12$; $p < 0.01$), exertion ($\beta = 0.20$; $p < 0.01$), ethics ($\beta = 0.93$; $p < 0.01$) and proficiency ($\beta = 0.41$; $p < 0.01$). Similarly, the ICT usage level was a statistically significant predictor of TPACK competency for all such sub-dimensions of the scale as design ($\beta = 0.23$; $p < 0.01$), exertion ($\beta = 0.12$; $p < 0.01$), ethics ($\beta = 0.78$; $p < 0.01$) and proficiency ($\beta = 0.21$; $p < 0.01$). The research findings demonstrated that ICT use based on ICT usage phase and level and technology use knowledge and skills also influence overall TPACK competencies. When ICT usage phases and/or ICT usage levels are increased with the help of ICT training, it could be stated that TPACK competencies might be influenced; however, certain sub-dimensions might be influenced more, and some dimensions might be influenced less."

Kazu, I. Y., & Erten, P. (2013). Teachers' technological pedagogical content knowledge self-efficacies. *Journal of Education and Training Studies, 2*(2), 126-144. Retrieved from http://redfame.com/journal/index.php/jets/article/view/261

Abstract:

"The aim of this study was to determine teachers' views on technological pedagogical content knowledge (TPACK), their self-efficacy, and whether these views changed according to sex, age, period of service, faculty graduated from, branch, access to the internet, the use of technology level, and access to in-service training which is oriented to the use of technology. Teachers' self-efficacies which are oriented to TPACK and its sub-dimensions known as technological knowledge (TK), content knowledge (CK), pedagogical knowledge (PK), pedagogical content knowledge (PCK), technological content knowledge (TCK) and technological pedagogical knowledge (TPK) were determined to be at a high level. According to this study, teachers' self-efficacy perceptions on TK, CK, PCK, TCK and TPACK did not change according to sex while the self-efficacy perceptions on PK and TPK changed according to sex. It was concluded that the self-efficacy perceptions of female teachers in these dimensions were higher when compared to those of male teachers. According to the present study, teachers' self-efficacy at TK and PCK changed according to age and the period of service, while self-efficacy at CK, PK, TCK, TPK and TPACK did not change according to these variables. In addition, a significant difference was determined between teachers' self-efficacy perceptions on TK and TPK according to the faculty graduated from. It was detected that the self-efficacy levels of classroom teachers on CK, TPACK, PCK and TCK were higher when compared with those of branch teachers. It was also concluded from this study that teachers' self-efficacy perception of TPACK did not change according to the situation of access to internet in the school in which they held office and that their efficacy was adequate. Teachers who thought that their self-efficacy in the use of internet was sufficient had higher levels of self-efficacies in TK, TCK, TKP and TPACK compared with other teachers. According to the present study, the in-service training that teachers receive on how to use the internet has more positive effects on CK and PCK compared with their self-efficacy in other dimensions."

Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)? *Journal of Education, 193*(3), 13-20. Retrieved from http://punya.educ.msu.edu/wp-content/uploads/2014/01/BUJoE.V193.3.KoehlerMishraCain.pdf

Abstract:
"This paper describes a teacher knowledge framework for technology integration called technological pedagogical content knowledge (originally TPCK, now known as TPACK, or technology, pedagogy, and content knowledge). This framework builds on Lee Shulman's (1986, 1987) construct of pedagogical content knowledge (PCK) to include technology knowledge. The development of TPACK by teachers is critical to effective teaching with technology. The paper begins with a brief introduction to the complex, ill- structured nature of teaching. The nature of technologies (both analog and digital) is considered, as well as how the inclusion of technology in pedagogy further complicates teaching. The TPACK framework for teacher knowledge is described in detail as a complex interaction among three bodies of knowledge: content, pedagogy, and technology. The interaction of these bodies of knowledge, both theoretically and in practice, produces the types of flexible knowledge needed to successfully integrate technology use into teaching."

Editors' note: Readers may also be interested to read Punya's blog post explaining the etiology of this article. The post can be found at http://punya.educ.msu.edu/2014/01/22/what-is-tpack-updated-article/

Koh, J. H. L. (2013). A rubric for assessing teachers' lesson activities with respect to TPACK for meaningful learning with ICT. *Australasian Journal of Educational Technology, 29*(6), 887-900.

Abstract:
"Teachers' technological pedagogical content knowledge (TPACK) for meaningful learning with ICT describes their knowledge for designing ICT lesson activities with respect to five dimensions: active, constructive, authentic, intentional, and cooperative. The ICT lesson activities designed by teachers can be assessed to determine the strengths and weaknesses of their TPACK for meaningful learning with ICT in practice. This study describes the conception, validation, and implementation of a rubric for assessing ICT lesson activities with respect to the dimensions of meaningful learning with ICT. It was conducted with 55 Singaporean pre-service teachers trained to teach Chinese as a second language. The 217 lesson activities they designed during a compulsory ICT module were rated using the rubric. High ratings were obtained for the active dimension because the activities involved students using and manipulating ICT tools. However, the ratings for the other dimensions were lower because opportunities for students' personal meaning-making, exploration of real-world phenomena, collaboration through divergent knowledge construction, as well as self-diagnosis and management of learning gaps were not as well supported in these activities. The uses of this rubric for enhancing TPACK assessment, ICT course design and the development of TPACK activity types will be discussed in the paper."

Koh, J. & Chai, C. (2014). Teacher clusters and their perceptions of technological pedagogical content knowledge (TPACK) development through ICT lesson design. *Computers & Education, 70,* 222-232.

Abstract:
"While the TPACK framework has been employed in many studies associated with use of technology in the classrooms, reports on the teachers' development of TPACK are inadequate to provide comprehensive description. This study employs cluster analysis to categorize teachers into groups based on their self-reported TPACK before they were engaged in lesson design activities as part of their professional development. Based on the pre-course survey, the cluster analyses revealed two categories of pre-service and in-service teachers respectively. Pre-service teachers deepened the connections among Technological Pedagogical Knowledge, Technological Content Knowledge and TPACK after ICT lesson design but the effects were more pronounced for those who were more confident in their pre-course TPACK. In-service teachers who were more confident in their pre-course TPACK deepened the connections between Content Knowledge and TPACK after ICT lesson design whereas those who were less confident perceived deeper connections between Pedagogical Content Knowledge and TPACK. The initial TPACK differences observed in teachers thus produced differentiated effects on their

perceptions of TPACK development at the end of ICT lesson design. Further support required to facilitate teachers' TPACK development when designing ICT-based lessons are discussed."

Lloyd, M. (2013). Something's coming, something good: Identifying TPACK competence in pre-service teachers' analyses of learning objects. *Australian Educational Computing, 28*(1). Retrieved from http://journal.acce.edu.au/index.php/AEC/article/view/12

Abstract:
"There is a song at the beginning of the musical, West Side Story, where the character Tony sings that "something's coming, something good." The song is an anthem of optimism, brimming with promise. This paper is about the long-held promise of information and communication technology (ICT) to transform teaching and learning, to modernise the learning environment of the classroom, and to create a new digital pedagogy. But much of our experience to date in the schooling sector tells more of resistance and reaction than revolution, of more of the same but with a computer in the corner and of ICT activities as unwelcome time-fillers/time-wasters. Recently, a group of pre-service teachers in a postgraduate primary education degree in an Australian university were introduced to learning objects in an ICT immersion program. Their analyses and related responses, as recorded in online journals, have here been interpreted in terms of TPACK (Technological Pedagogical and Content Knowledge). Against contemporary observation, these students generally displayed high levels of competence and highly positive dispositions of students to the integration of ICT in their future classrooms. In short, they displayed the same optimism and confidence as the fictional "Tony" in believing that something good was coming."

Lu, L. (2014). Cultivating reflective practitioners in technology preparation: Constructing TPACK through reflection. *Education Sciences, 4,* 13-35. doi:10.3390/educsci4010013

Abstract:
"Teaching is a complex profession, which is further complicated by the integration of technology into classrooms. Reflection can help teachers unpack the complexity in their practice. Reflection can be an effective instructional strategy in helping preservice teachers develop technological pedagogical content knowledge (TPACK), the complex and dynamic knowledge necessary for effective technology integration into instruction. In this study, reflective activities were integrated into a Learning By Design (LBD) environment, which was created to help preservice teachers develop TPACK. This paper investigated the participants' TPACK development and examined how reflection helped them construct TPACK. Through content analysis of the participants' reflective journals, the researcher found that the preservice teachers developed initial TPACK awareness. However, their reflection in technology knowledge and the content aspects of TPACK were limited and superficial. Interviews with the participants showed reflection helped the preservice teachers remember what they learned by describing and elaborating on their in-class experiences, pushed them to think about how to apply what they learned in their future classrooms, and helped them become more reflective and open-minded about using technology in classrooms. Finally, the researcher discussed this study's implications for teacher educators and researchers."

Niyomsap, S., Thongthew, S., & Rodpothong, S. (2013). A curriculum development utilizing TPACK as content framework to enhance digital courseware production competency for teachers. *Silpakorn University Journal of Social Sciences, Humanities, and Arts*, *13*(1), 157-178. Retrieved from http://antispam.kmutt.ac.th/index.php/sujsha/article/view/8730

Abstract:
"Regarding the lack of digital courseware, especially in the Social Studies subject which could well represent the Thai traditional society, social studies teachers must possess competency to create digital courseware based on local and learner's needs, situational adaptable, as well as uniquely different from other commercial or imported courseware. Therefore, it is very important to develop a curriculum to enhance digital courseware production competency for social studies teachers by applying the principle of TPACK as its content framework. This paper exhibits the experiment of applying a curriculum utilizing TPACK as the content framework to 11 social studies teachers in Punpin district in Southern Thailand. It is found that knowledge in applying social studies pedagogy to digital courseware production (adapted from PCK), knowledge in using technology to collect resources of social studies content (adapted from TCK) and knowledge in using computer program for digital courseware production (adapted from TPK) should be appropriately adapted based on existed knowledge and experience of teachers. In addition, the learning of the three knowledge areas should be integrated for better digital courseware production competency. It is recommended that knowledge in using technology to collect resources of social studies content and knowledge in using computer program for digital courseware production should be added in the learning management of knowledge in applying social studies pedagogy to digital courseware production in order for the teachers to see the overall picture of digital courseware and to guide and plan for the better self-production of digital courseware. It is also noted that follow-up coaching and encouragement is necessary to keep teachers participating in the curriculum accomplishing their productions."

Olatoye, M., Nleya, P., & Batane, T. (2013). Effective classroom management and the use of TPACK: Implications for pedagogical practices. *Journal of Education and Practice*, *4*(15), 119-124. Retrieved from http://www.iiste.org/Journals/index.php/JEP/article/view/6829

Abstract:
"This study was essentially exploratory, investigated the acquaintance and strategies of instructional materials usage by the teachers. It examines classroom management, preparation and handling of instructional materials. Classroom management in this context is the skill in organization and presentation of lessons in such a way that all learners are actively involved in learning. In the study two instruments were administered to science teachers; the first instrument was to ascertain the acquaintance of instructional materials by the teachers. The second instrument was classroom observation. The results revealed that acquaintance on the use of instructional materials by the teachers was very high but they hardly use them. Moreover, correlation coefficient of .721 which is positive and significant @ .05 showed that

instructional materials contributed to effective classroom management. The study has implication for practicing teachers and the stakeholders."

Parr, G., Bellis, N., & Bulfin, S. (2013). Teaching English teachers for the future: Speaking back to TPACK. *English in Australia (0155-2147)*, *48*(1), 9-22.

Abstract:
"This essay presents a critical, reflexive account of a twelve-month collaboration, when a practising secondary English teacher was seconded to work with a team of English teacher educators in a faculty of education in Melbourne. The collaboration was made possible by funding from DEEWR as part of the Teaching Teachers for the Future project (TTF). TTF aimed to produce 'systematic change in the Information and Communication Technology in Education (ICTE) proficiency of graduate teachers across Australia' with a particular focus on 'enabling pre-service teachers to achieve and demonstrate ... competence in the effective and innovative use of ICT' in order to 'improve student learning' (ALTC & ACDE, 2011, p. 4). Adopting collaborative, inquiry-based approaches to teaching and learning and research within the TTF project, the authors explored what it might mean to think about and 'do' English teaching and new technologies more critically than the project guidelines recommended. In this essay we report on the practices and relationships negotiated in the TTF project as it was enacted in our particular context. We consider them critically within a broader investigation of standards discourses and practices that are currently impacting on the professional practices of English educators in schools and in universities."

Phillips, M. (2013). Investigating in-service teachers' workplace TPACK development. *Australian Educational Computing, 28*(2). Retrieved from http://journal.acce.edu.au/index.php/AEC/article/view/23

Abstract:
"Technological, pedagogical and content knowledge (TPACK) provides a theoretical lens which attempts to identify 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 we acquire this knowledge, especially in relation to in-service secondary teachers. This paper investigates workplace learning literature in an attempt to provide a theoretical grounding that will enable future investigations to examine the complex context in which professional educators develop individual knowledge within a socially mediated, participatory workplace culture."

Rogers, A. M., Lynn, H. H., & Staal, L. A. (2014). Using culturally responsive teaching and technological pedagogical content knowledge (TPACK) with eighth grade Lumbee students. *Reading Matters, 14*, 25-30. Retrieved from http://scira.org/content/wp-content/uploads/2014/01/RM2014-Using-Culturally-Responsive-Teaching.pdf

Abstract:

"This article is an update on a project reported on in last year's edition of *Reading Matters* in the article "Using Kindle Fires to Fuel the Flames of Reading Motivation: Eighth Grade Students Read the Hunger Games" (Rogers, Higgins, & Staal, 2013). As the three researchers from the University of North Carolina at Pembroke began their second year of a successful literacy partnership with a local K-8 school, it was important for them to assess exactly what had worked well in the previous year and what they needed to do to further their goals, as they worked with eighth graders to improve their reading motivation. The K-8 school, close in proximity to the university, is situated in a predominantly Lumbee Indian community, a state-recognized Native American tribe located in rural eastern North Carolina. It is a Title I, K-8 school with 968 students in 2012-13. The demographics of the school include 89% Native American, 4% White, 5% African American, and 2% Hispanic students (http://www.ncpublicschools.org/fbs/resources/data/esas/). According to the school report card, prior to the start of this project, 60.5% of 8th graders passed their end-of-year reading assessment (http://www.ncreportcards.org/src/)."

Stover, S., & Veres, M. (2013). TPACK in higher education: Using the TPACK framework for professional development. *Global Education Journal, 2013*(1), 93-110.

Abstract:
"The TPACK framework is the complex interplay between the three forms of knowledge: Content (CK), Pedagogy (PK), and Technology (TK) that faculty need to have to be able to interpret content and transform it for teaching that makes it accessible to their students. The majority of colleges and universities have bifurcated professional development programs that address these types of knowledge separately which results in unrelated separate professional development programs that do not emphasize the importance of the relationship between technology, pedagogy and content. This action-research study examines the self-reported learning of graduate students in an online program designed using the TPACK framework in their Content Knowledge (CK), Pedagogical Knowledge (PK) , Technology Knowledge (TK) and Technology Pedagogical Content Knowledge (TPACK). Results indicate that the participants in the graduate class reported significant gains these areas."

Tokmak, H. S., Yelken, T. Y., & Konokman, G. Y. (2013). Pre-service teachers' perceptions on development of their IMD competencies through TPACK-based activities. *Educational Technology & Society, 16*(2), 243–256. Retrieved from http://ifets.info/journals/16_2/20.pdf

Abstract:
"The current study investigated perceived development of pre-service teachers in their Instructional Material Design (IMD) competencies through the course Instructional Technology and Material Design, which is based on a technological, pedagogical, and content knowledge (TPACK) framework. A total of 22 Elementary Education pre-service teachers participated in the study. Five activities based on TPACK were designed by the instructors to provide students with specific teaching experience. Action research methodology was followed during the study, and each activity was part of the cycle of design. Data were collected through a questionnaire on

pre-service teachers' IMD competencies, their journals, assignments, open-ended questionnaires, teaching practice forms, observations, and software evaluation forms. The study revealed that pre-service teachers gained essential competencies in instructional material design. Moreover, the results showed that they experienced incorporating TPACK into their future teaching practices."

Xiaobin, L., Lijun, J., Huiwen, Z., & Wei, Z. (2014). Chinese EFL teachers' application of e-educology of foreign languages: An investigation based on TPACK framework. *Teaching English with Technology, 1,* 49-75.

Abstract:
"For the past few years, TPACK has become a hot issue in the research fields of teacher education, integration of Information Technology (IT) and curricula as well as teacher knowledge. Besides, more and more concerns have been on TPACK of teachers in different subjects. Based on the TPACK Theory, the author uses questionnaires and interviews to investigate practical application status of Educology of Foreign Languages among English teachers involved in National English Teachers Training Project. The author also offers strategies and suggestions for trainings on Educology of Foreign Languages. The results show that the practical application of English teachers stays pessimistic in that teachers are far from the criterion required in terms of TPACK."

Yurdakul, I. K. (2014). Modeling preservice teachers' TPACK competencies based on ICT usage. *Journal of Computer Assisted Learning.* Advance online publication. doi: 10.1111/jcal.12049

Abstract:
"The purpose of this study was to build a model that predicts the relationships between the Technological Pedagogical Content Knowledge (TPACK) competencies and information and communication technology (ICT) usages. Research data were collected from 3105 Turkish preservice teachers. The TPACK-Deep Scale, ICT usage phase survey and the ICT usage level survey were used to collect the research data. The structural regression model was conducted to test the model regarding the fact that ICT usage phases and ICT usage levels were predictors of TPACK competencies. The ICT usage phase was a statistically significant predictor of TPACK competency for all such sub-factors of the TPACK-Deep Scale as design ($\beta = 0.12$; $p < 0.01$), exertion ($\beta = 0.20$; $p < 0.01$), ethics ($\beta = 0.93$; $p < 0.01$) and proficiency ($\beta = 0.41$; $p < 0.01$). Similarly, the ICT usage level was a statistically significant predictor of TPACK competency for all such sub-dimensions of the scale as design ($\beta = 0.23$; $p < 0.01$), exertion ($\beta = 0.12$; $p < 0.01$), ethics ($\beta = 0.78$; $p < 0.01$) and proficiency ($\beta = 0.21$; $p < 0.01$). The research findings demonstrated that ICT use based on ICT usage phase and level and technology use knowledge and skills also influence overall TPACK competencies. When ICT usage phases and/or ICT usage levels are increased with the help of ICT training, it could be stated that TPACK competencies might be influenced; however, certain sub-dimensions might be influenced more, and some dimensions might be influenced less."

Chapters

Chai, C. S., & Tsai, C. C. (2013). Looking back at the future school journey. In L. Y. Tay & C. P. Lim (Eds.), *Creating holistic technology-enhanced learning experiences: Tales from a future school in Singapore* (pp. 195-199). Dordrecht, Netherlands: SensePublishers. doi: 10.1007/978-94-6209-086-6

Abstract:
"The proliferation of computers has transformed all aspects of life in the contemporary world. Schools, which are traditionally positioned to preserve and transmit the cultural achievements of the past for continuous future development, have been challenged to change its roles. Hence the notion of future schools is born and selected schools are tasked to be the path finders to create the new knowledge and practice of schooling and educating children. This book documented the important lessons learnt in one of the future primary schools in Singapore. As the broad schemes of the book and the first chapter have aptly revealed, ICT offer many opportunities for elementary school children to be enculturated into the technology-mediated world. However, the opportunities have to be actualized in the classrooms through teachers' design efforts (Chai, Koh, Tsai, & Tan, 2011) to bear positive outcomes."

McComas, W. F. (2014). Technological pedagogical content knowledge. In W. F. McComas (Ed.), *The language of science education:* An expanded glossary of key terms and concepts in science teaching and learning (p. 106). Dordrecht, Netherlands: SensePublishers. doi:10.1007/978-94-6209-497-0

Abstract:
"TPACK is expanded from Shulman's (1986) work in defined types of teacher knowledge and was first introduced by Mishra and Kohler in 2006. TPACK is the space formed where two of Shulman's "teacher knowledge" circles overlap."

Books

Serow, P., Callingham, R., & Muir, T. (2014). *Primary mathematics: Capitalising on ICT for today and tomorrow*. New York: Cambridge University Press.

Abstract:
"Primary Mathematics provides a comprehensive introduction to teaching and learning mathematics in today's classrooms. Drawing links to the Australian Curriculum, this book covers the core learning areas of measurement, space and geometry, early number concepts, data and statistics, chance and probability, and patterns and algebra. At the centre of this book is the belief that ICT can be a powerful tool for enhancing student learning. Although many classrooms have been resourced with computers, interactive whiteboards and mobile technology, teachers need to be able to transform these technological tools into meaningful teaching and learning experiences. This book explores the ways in which technology can be integrated into the mathematics classroom. The book also explores issues around student

diversity, assessment 'for', 'of' and 'as' learning, and teaching in rural and remote areas. Primary Mathematics is an indispensable resource for pre- and in-service teachers alike."

Editors' note: Although not mentioned in the abstract, there are multiple references to TPACK throughout this book.

3. Recent TPACK-Related Dissertations & Theses

Alpert, A. P. L. (2013). *Factors supporting college mathematics success: Orientation, voice, and technological pedagogical content knowledge* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (AAT 3607220)

Abstract:
"The purpose of this study was to examine factors supporting college mathematics success. First, effect of a brief high school orientation to mathematical technologies used for college placement testing was examined. Secondly, the voice of participants in this orientation was heard. Finally, bootstrapped orientation data were presented to teachers and instructors of introductory statistics courses as a scaffold to their technological pedagogical content knowledge (TPCK) as these teachers and instructors strive to actively engage students to achieve college mathematics success.

Many entering college students are placed into developmental mathematics classes based on scores from college placement assessments that allow extremely limited use of calculating technology and have various time constraints. Students in a rural central Texas 3A high school that were enrolled in Algebra II course were given pre- and post-tests in Arithmetic and Algebra. Each 20-minute test contained 15 mathematical content questions and one qualitative question. The post-test was given approximately a week after the pre-test. During the week, students were provided time to explore review material using only pencil and paper for the arithmetic review, and a four-function calculator on the algebra review questions. Effects of the orientation were analyzed using mean scores, confidence intervals, effect size, and GLM for whole-group and sub-groups. A paired samples t-test was calculated. These effects were discussed.

A case study involving participants of the orientation was conducted. Twelve participants were interviewed after each had entered college. Five themes emerged from these interviews: (1) Knowledge of College Mathematics, (2) Technology and Mathematics, (3) Mathematics Tests/Assessments, (4) Teaching and Learning Mathematics, and (5) Mathematical Experiences, Hopes and Dreams. Each theme is discussed.

Using Microsoft Excel, bootstrapping is presented to instructors of first year introductory statistics courses in support of student success as instructors' technological pedagogical content knowledge is developed. A course project demonstrating and developing application of computational technology by bootstrapping confidence intervals at the 95 % level using Microsoft Excel is presented. Data from the orientation were further analyzed in the bootstrapping project. Confidence intervals were empirically calculated from bootstrapped resamples of the mean. The number of resamples used was 250 at each of three levels: Over-sampling, at-sampling, and under-sampling. Graphs of bootstrapped confidence intervals, using

the Rule of Eye 4, showed statistically significant differences between pre-test and post-test scores for all pairs of data sets."

Jackson, B. C. (2013). *Teachers' preparation needs for integrating technology in the classroom* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (AAT 3601562)

Abstract:
"School districts across the country are charged with preparing the next generation for competing in a global economy and have spent billions of dollars on technology acquisition and Internet use. However, teachers do not feel prepared to integrate technology in the classroom. To prepare teachers for technology integration, the most common approach to professional development is the one-stop-shop. Teachers typically spend one hour to one day in professional development given the content area. One-stop-shop professional development focuses on training teachers to operate computers and software packages instead of how to integrate technology in the classroom (Knapp, 1996; McCannon & Crews, 2000). This type of training is not found appropriate for meeting teachers' pedagogical needs and is too far removed from their day-to-day classroom practice. This type of training has yielded uninterested teachers and lack of teachers integrating technology in the classroom. To address this issue, data were collected from 209 teachers about their expertise for integrating in the classroom using the TPACK survey instrument. Demographic data were also collected to further identify teacher's unique preparation needs and to avoid a one-size-fits-all approach. Multiple Regression was used to identify teacher preparation needs for classroom technology integration. With the results, yielded as a group, teachers' preparation needs are TK, SC, PK, PCK, TPK, and TCK. When data were filtered by demographic categories, teacher preparation needs for classroom technology integration were different. Conducting a Training Needs Analysis (TNA) should be the first step for preparing teachers in this regard."

Robertshaw, M. B. (2013). *Mixing the emic and etic perspectives: A study exploring development of fixed-answer questions to measure in-service teachers' technological pedagogical content knowledge* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (AAT 3598845)

Abstract:
"Using a sequential mixed-method methodology, this dissertation study set out to understand the emic and etic perspectives of the knowledge encompassed in the technological pedagogical content knowledge (TPACK) framework and to develop fixed-answer questions based on that knowledge. While there have been many studies examining ways to measure TPACK in in-service and pre-service teachers, very few have addressed measuring TPACK using fixed-answer questions. Through the use of the mixed-methods, a snapshot of the emic (inside) and etic (outside) perspectives on the TPACK framework was obtained. This study used a focus group with in-service teachers (emic perspective) and interviews with teacher educators (etic perspective) to understand the kind of knowledge attributed to the TPACK framework. Six themes were derived from the focus group and interviews, from which 11 fixed-answer

questions were developed. Those six themes included such issues as access to technology, the use of technology for solid teaching and learning purposes, and passive versus active learning when using technology. Following best practices, the eleven questions included a scenario that gave context to the questions asked and the answers provided. In-service teachers reviewed the items to assure that the language and context were appropriate to classroom practice. Four experts on the TPACK framework reviewed the items for face validity. Across the experts six of the eleven items were rated as valid. Although only the experts saw a small number of items as valid, this study indicates that this kind of measurement for the TPACK framework may be possible."

4. Recent & Upcoming TPACK Presentations

Editors' note: TPACK-related presentations at the international **2014 Society for Information Technology and Teacher Education (SITE) Conference**, March 17 - 21, 2014 in Jacksonville, Florida, USA are listed online at: http://bit.ly/SITE2014TPACK. Presentation titles, presenters' names, and presentation abstracts are available. Membership in SITE is required to access the papers associated with these presentations.

Editors' note: : TPACK-related presentations at the **2014 Annual Meeting of the American Educational Research Association (AERA)**, April 3 - 7, 2014 in Philadelphia, Pennsylvania, USA are listed online at: http://bit.ly/AERA2014TPACK and http://bit.ly/AERA2014TPACK2. Presentation titles, presenters' names, presentation abstracts, and session locations, dates, and times are available. Membership in AERA is required to access any papers associated with these presentations that have been added to the online paper repository.

Boschman, F., McKenney, S. & Voogt, J. (2013, November). *Teachers conversations during design of technology rich curriculum activities for early literacy.* Paper presented at the European Association for Practitioner Research on Improving Learning (EAPRIL) Annual Conference, Biel/Bienne, Switzerland. Retrieved from http://dspace.ou.nl/bitstream/1820/5308/1/EAPRIL2013-BoschmanMcKenneyVoogt-Dspace.doc.pdf

Abstract:
"Technology is steadily gaining more foothold in kindergarten practice and classrooms. As such, kindergarten teachers are challenged with how to integrate computers in such a way that they aid kindergartners in developing skills in various areas of development. Especially, technology may be used in a rich learning environment targeting the attainment of early literacy skills by kindergartners (Lankshear and Knobel, 2005; Van Scoter, 2008) TPACK has been conceptualized as the knowledge and skills related to technology integration in the classroom, which teachers develop when they collaborate on the design of learning material and instruction with technology (TPACK, Mishra and Koehler, 2005, 2008; Niess, 2011). Several studies found that teachers increased and gained TPACK by designing and implementing learning material (Mishra, Koehler and Yahya, 2007). TPACK represents a useful way of conceptualizing explicated reasoning during design of such beforementioned material, because it highlights how during

such a task a teacher integrates knowledge and beliefs from pedagogy (p), early literacy (c) and technology (t) to shape knowledge and beliefs in any of the four compound domains (tp, tc, pc and tpck). Especially higher order inquiry processes such as analysis and planning are considered to aid a team in developing new knowledge and understanding, and thus might foster the development of TPACK in design teams."

Doukakis, S. (2013, October). *A case study of e-tutors' training program.* Paper presented at the International Conference on Information Technology Based Higher Education and Training, Antalya, Turkey. doi: 10.1109/ITHET.2013.6671052

Abstract:
"In the present study the training program of four in-service secondary educators to undertake the role of e-tutor is presented. The training program was based on the Technological Pedagogical Content Knowledge (TPACK) framework and realized via a blended learning environment. After the completion of the training program the educators acted as e-tutors in a pilot e-tutoring program. Once the pilot e-tutoring was finished the educators gave semi-structured interviews and participated in a focus group, where issues raised during the implementation of the pilot program were discussed. The analysis of the interviews highlighted how important the educators considered the understanding of the different context in which e-tutoring is taking place in contrast with that of a conventional classroom. They also pointed out the technological and pedagogical knowledge that e-tutors need to have so that they can work on the e-tutoring environment."

Holmberg, J., Brenner, M., & Hallen, M. (2013, June). *Planning and implementing in-service ICT-training to support development of higher education teachers' technological pedagogical content knowledge.* Poster presented at the annual conference of The European Distance and E-Learning Network (EDEN), Oslo, Norway. Retrieved from http://urn.kb.se/resolve?urn=urn:nbn:se:hig:diva-15287

Abstract:
"The rapid technological development and the growth of online learning, present new challenges for higher education teachers and institutions. Web 2.0 tools create new opportunities for teachers and students to communicate, collaborate and contribute by different modalities. The need for teachers to harness this potential in order to be able to respond to the changing needs and expectations of their students make in-service training of higher education online teachers a priority. What is often overlooked in in-service initiatives however, is that teachers have varying degrees of technological competence and pedagogical competence. They also teach different kinds of content to students with different pre-existing knowledge, etc.

This poster presents the implementation and outcomes of two simultaneous in-service training initiatives at the University of Gävle, Sweden. The initiatives were aimed at developing online teachers' ability to successfully integrate ICT in their teaching. When planning this initiative we deliberately wanted to avoid techno centrism and a narrow focus on standards or competencies. Instead we were inspired by Mishra & Koehler's theoretical framework TPACK

(Technological Pedagogical Content Knowledge) which recognises that developing the ability to successfully integrate ICT as a tool for learning means understanding the reciprocal relationship between technological knowledge, pedagogical knowledge and content knowledge (Mishra & Koehler 1986; 1987). Mishra & Koehler has built on Shulman's (1986) pedagogical content knowledge (PCK) to create a conceptual framework that also includes technological knowledge and the ability to successfully integrate this with their pedagogical knowledge and content knowledge. In other words, a teacher that possesses TPACK knows how to successfully integrate ICT in their practice to create an added pedagogical value."

Lye, L. T. (2013, October). Opportunities and challenges faced by private higher education institutions using the TPACK model in Malaysia. In M. N. B. A. Bakar, (Ed.), *PSU-USM International Conference on Humanities and Social Sciences* (Vol. 91), 294-305. Miamisburg, OH: Reed Elsevier (ScienceDirect). doi:10.1016/j.sbspro.2013.08.426

Abstract:
"In this research study will examines the opportunities and challenges faced by one of the private higher education institution group in Malaysia that implementing the Technological, Pedagogical, and Content Knowledge (TPACK) model in their teaching and learning processes. This private higher education institution group (case study) has branches of college across Malaysia such as Penang, Seremban, Pahang, Kuala Lumpur, Sabah and Sarawak states. In this institution group supported their staff with hardware, software and as well as the online teaching and learning or pedagogical skills training program. The online teaching and learning training modules mainly concentrated in two areas which are pedagogical area and integrate Information and Communication Technology (ICT) in educational (technology) area. The online teaching and learning training modules that categorized in the pedagogical area consist of knowledge regarding the teaching and learning theories such as active learning approach, problem solving approach, collaboration approach and etc. Meanwhile, the technological area will include how to make use of modern technology such as social network feature, Internet, software in teaching and learning environment. The technology used as a tool to help the academic staff to deliver more effective inside and outside the classroom settings. The institution group management has the vision to use the combination of technology knowledge, pedagogical knowledge and content knowledge to enhance students' learning capability in private higher education level. The ultimate goal of this research study is to make use of TPACK model or framework will beneficial the academic staff in the educational development process. The questionnaire survey designs based on the TPACK model specifications, used to identify the aspects of technology knowledge, pedagogical knowledge and the content knowledge of the respondents of the research. Based on the TPACK model, this study sees the sights of these interrelated questions: to what extent that the modern technologies have been utilized by the education group based on the TPACK model? What are the potential challenges faced by the academic staff in teaching and learning in ICT based? What are the opportunities that academic staff beneficial from the TPACK model? Is there any significant difference between the engineering (technology) and non engineering (non-technology) subjects' academic staff applying ICT in their teaching and learning processes?"

Nordina, H., Davis, N., & Tengku Ariffin, T. F. (2013, November). A case study of secondary pre-service teachers' Technological Pedagogical and Content Knowledge mastery level. In Isman, A., Siraj, S., & Kiyici, M. (Eds.), *13th International Educational Technology Conference* (Vol. 103), 1-9. doi: 10.1016/j.sbspro.2013.10.300

Abstract:
"In recent years, researchers reported that effective ICT integration requires teachers to acquire knowledge of technology, content, pedagogy and the intersection of these, known as TPACK (Mishra & Koehler, 2006; Archambault, & Crippen, 2009). This study specifically sought to answer: 1) What are pre-service teachers' perceptions of their TPACK mastery level before and after field experience; and, 2) Is there a significant difference of TPACK after field experience in schools? The TPACK survey instrument was adapted from Schmidt et al. (2009) and Archambault and Crippen (2009) and administered before and after their field experience to 107 pre-service teachers in a research intensive university programme in New Zealand. In addition, three student teachers were interviewed before and after field experience. These pre-service teachers scored highest in Content Knowledge (CK) and lowest in Technology Knowledge (TK) domains within TPACK at both before and after field experience. Paired-sample t-tests showed significant increases in most TPACK domains, namely, TK, PK, PCK, TCK and TPACK. Interviews and observations of three students clarified complex changes in knowledge of TPACK that linked to their experience in schools. The study continues to support the need for field experience while also adding caution to the interpretation of TPACK survey evidence given the strength of the student teachers' perceived knowledge before field experience. Further research is underway with a comparative survey in a programme that prepares teachers for secondary schools in Malaysia."

Oster, A., & Peled, Y. (2013, September). Technological pedagogical content knowledge in pre-service teacher education: Research in progress. In L. Uden, Y-H. Tao, H-C. Yang, & I-H. Ting (Eds.), *The 2nd International Workshop on Learning Technology for Education in Cloud*. Paper presented at 2nd International Workshop on Learning Technology for Education in Cloud, Kaohsiung, Taiwan (41-47). Netherlands: Springer.

Abstract:
"The Israeli Ministry of Education launched the IT National Initiative Program (ITNIP) in 2011, with the objective of transforming teacher education in order to meet the demands of the twenty-first century [1, 2]. The ITNIP program emphasizes the need to develop required skills among students, including ICT literacy, critical thinking, inquiry and problem solving, communicating and teamwork, self-oriented learning and ethics and cyber awareness. The initiative focuses on teachers as agents of change, on the need to teach them how to integrate ICT wisely into teaching and how to develop innovative pedagogy that will enhance learning and teaching processes. Implementation of the ITNIP began in the 2011–2012 school year.

The present study focuses on two colleges of education that participate in the ITNIP: a large college located in the center of Israel and a small college from the northern part of Israel. The study examines the ability of pre-service teachers to integrate technological knowledge with pedagogical content knowledge (TPACK) in their teaching. The participants are 280 pre-

service teachers from the large college and 200 pre-service teachers from the small college. Jewish as well as Arab pre-service teachers study at both colleges. The study compares the integration of TPACK in the large college to its integration in the small college. The study will try to determine whether demographic variables (gender, ethnicity, age) influence the integration of TPACK by the pre-service teachers."

Saengbanchong, V., Wiratchai, N., & Bowarnkitiwong, S. (2014, February). Validating the Technological Pedagogical Content Knowledge appropriate for instructing students (TPACK-S) of pre-service teachers. In J. G. Laborda, F. Ozdamli, & Y. Maasoglu (Eds.), *5th World Conference on Educational Sciences* (Vol. 116), 524-530. doi:10.1016/j.sbspro.2014.01.252

Abstract:
"Based on Mishra & Koehler's idea of Technological Pedagogical Content Knowledge (TPACK), a student component had been added to form the Technological Pedagogical Content Knowledge (TPACK) appropriate to instruct student model (TPACK-S) as a useful frame to grasp complete teacher knowledge. The primary purpose of the present study was to validate the newly developed TPACK-S measurement model consisting of 15 components. Data for this pilot study were collected using the five- level Like scale questionnaires from a sample of 135 student teachers, analyzed using confirmatory factor analysis, and estimated psychometric properties. The research results indicated that the TPACK-S measurement model fit the empirical data. Internal consistency between the individual factors was also strong. The implied policy implication is that the teacher equipped with TPACK-S would enhance students' achievement."

5. Recent TPACK-related Blog Entry

Silvana, M. (2013, December 9.) Is technology shoving pedagogy to the center stage? TPACK reviewed. [Web log post]. Retrieved from http://silvanameneghini.com/2013/12/09/is-technology-shoving-pedagogy-to-the-center-stage-tpack-reviewed/

Excerpt:
"Pedagogical ideas like student centered learning, collaboration, and critical thinking have been around for a long time and are slowly making the way into the classroom. When technology came into play in schools, there was a big focus on technology tools and acquiring tech skills. Nowadays, there is a perception that technology has to be seamless and the main focus is on pedagogy. I couldn't agree more. But is that happening because technology is actually shoving pedagogy to the center stage? If yes, what are the implications for teacher professional development in the age of fast technological changes?"

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., & Theisinger, D. (Eds.). (2014, March 18). TPACK newsletter issue #19: March 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

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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:
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- Judi & Diana

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